

Kayo Matsushita *Editor*

# Deep Active Learning

Toward Greater Depth in University  
Education

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# Preface

Since the first decade of the twenty-first century, active learning has been a focus of attention in Japan as a key to transforming university education from teacher-centered to learner-centered. In August 2012, the Central Council for Education of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) published a report titled *Towards a Qualitative Transformation of University Education for Building a New Future*, which has made active learning one of the key phrases for reforming university instruction. In Japan, active learning has hitherto been viewed as a general term for teaching and learning methods that incorporate students' active participation in learning. In actual practice, active learning is often confined to the level of instructional formats that integrate group work, discussions, and presentations.

What is required now is not just active learning but, rather, *deep active learning*. Whereas active learning focuses on the formats for learning, deep learning focuses on the quality and content of learning.

Deep active learning refers to learning that engages students with the world as an object of learning while interacting with others, and helps the students connect what they are learning with their previous knowledge and experiences as well as their future lives.

So, how does deep active learning occur? What kinds of curricula, instructional methods, assessments, and learning environments facilitate the occurrence of deep active learning? We believe that this book links theory and practice to provide some of the answers.

Kyoto, Japan  
August 2014

Kayo Matsushita

## Preface to the English Edition

This book is the first to bring together the concepts of active learning and deep learning. It contains discussions of the theory and practice of each of these concepts by researchers who are engaged in higher education across a range of academic fields (education, psychology, learning sciences, teacher training, dentistry, and business) in three countries: Japan, the United States, and Sweden.

The Japanese edition, first published in Japan in January 2015, has undergone nine printings as of May 2017 and it continues to enjoy a wide readership.

In Japan, the concepts and methods of active learning were initially adopted in university-level education. Now, however, active learning has become a key phrase for educational reform on all levels, from elementary school through university, and is generating high levels of interest and excitement among educators. Active learning was just beginning to catch on at the time that this book was first published, and we predicted that only its superficial aspects would find widespread acceptance. The warnings in this book influenced Japanese educational policy and, currently, active learning is gaining popularity in educational settings in a form that could be described as “independent, dialogical, and deep learning”.

Today, the term *deep learning* is known to the general public as the name of the concepts that underlie the most recent research in artificial intelligence; however, it dates back to a term that Prof. Ference Marton, a contributor to this book (Chap. 4), and his colleagues used to describe one of the student approaches to learning in the 1970s. In this book, its meaning has expanded to include *deep understanding* and *deep engagement*.

Prof. Shinichi Mizokami, one of my colleagues and the author of Chap. 5, and I have long focused on the concept of deep learning and we have organized the following international symposia on this topic under the auspices of the organization with which we are affiliated, the Center for the Promotion of Excellence in Higher Education, Kyoto University: “Towards Higher Education Based on Deep Learning” with Ference Marton and others in December 2011; “Deepening Active Learning with Peer Instruction” with Eric Mazur and others in October 2012; and “Learning Assessment and Technology to Enhance Deep Active Learning: Focusing on Learning Catalytics” with Eric Mazur and others in October 2013.

Prof. Elizabeth F. Barkley, author of Chap. 3, spoke at an international symposium called “Advancement of Higher Education in the Network Age: Sustaining the Mutual Evolution of Learning and Teaching” held in January 2013. The other authors also participated in these symposia and agreed to explore the intersection of the axes of active learning and *depth*. Prof. Marton included his own previously published article most relevant to the general topic of this book and made minor revisions on the occasion of the article being republished in English. Likewise, Prof. Mazur contributed his article on peer instruction to our Japanese edition, although it is not included in this English edition because of copyright restrictions. Prof. Barkley wrote a new article for our book. Thus, this book truly came into being as a result of international partnerships.

This English edition is not just a translation of the original Japanese edition. I have added an introduction, and the article on the flipped classroom by Tomoko Mori, which used to be a short column attached to Mizokami’s chapter, has been enlarged to a new chapter (Chap. 6). In association with these changes, the structure of the book has been reorganized. Besides, the contributors have added some explanation for foreign readers to each chapter.

Coincidentally, in 2012, the United States National Research Council issued a report titled *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*, which highlighted the importance of *deeper learning* in order to foster 21st century competencies. In 2015, that report was published in book form under the title *Deeper Learning: Beyond 21st Century Skills* (J.A. Bellanca, ed.). Clearly, concerned educators have constructed an international educational network focused on deep learning and deeper learning.

This book is a message from Japan about the results of collaboration among researchers in a variety of academic fields from three countries. Besides the English edition, we are preparing to publish one in Chinese. I am pleased to have the opportunity to bring this book to a wider audience through these translated editions.

Kyoto, Japan  
May 2017

Kayo Matsushita

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## About the Editor

**Dr. Kayo Matsushita** has been a professor of the Center for the Promotion of Excellence in Higher Education and the Graduate School of Education at Kyoto University since 2004. She received her Ph.D. in education from Kyoto University. After having completed the doctoral program in Education at Kyoto University, she served as an assistant professor at the Faculty of Education, Kyoto University and an associate professor at the Faculty of Education, Gunma University. She has been conducting research on development of teaching and learning in higher education as well as school education. Her present research focus is learning assessment, especially in the form of performance assessment. She is an author of *Performance Assessment* (in Japanese, Nipponhyojun, 2007), an editor of *Does New Concept of Ability Change Education: Gakuryoku, Literacy, and Competency?* (in Japanese, Minerva Shobo, 2010), and a co-editor of *Building Networks in Higher Education: Towards the Future of Faculty Development* (Maruzen Planet, 2011), *Transition from High School & University to Work* (in Japanese, Nakanishiya, 2014), and *Assessment of Active Learning* (in Japanese, Toshindo, 2016). She is the Chief Editor and a council member of the Japan Association for College and University Education, a council member of the Japanese Educational Research Association, the Japanese Society for Curriculum Studies and the National Association for the Study of Educational Methods, and a member of the Science Council of Japan.

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# Chapter 1

## Introduction

Kayo Matsushita

### Active Learning Boom in Japanese Education

The attention to active learning ideas and methods in Japan's higher education began with the onset of the universal phase (Trow 1974) at the beginning of the 2000s. However, this interest in active learning was initially limited to a narrow circle of specialists.

The impetus for its dissemination among faculty members nationwide was a report titled *Towards a Qualitative Transformation of University Education for Building a New Future* released in August 2012 by the Central Council for Education, the advisory body of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), which deliberates Japan's educational policies.

The report defined *active learning* as “the general term for a teaching and learning method that incorporates the learners' active participation in learning, unlike education based on one-sided lectures by the instructor.” The active learning method was characterized by topics such as “heuristic learning, problem-based learning, experiential learning, and investigative learning” as well as “group discussion, debate, and group work.”

Starting in late 2014, the term *active learning* was adopted into the elementary and secondary education policies, and since then it has become one of the keywords of Japanese education reform, spurring a big boom.

Searching “active learning” in Japan's university library book database CiNii Books produces 244 hits starting in 2010. However, out of this number, 228 were published after 2015 (as of March 2017).

As stated in the Preface, our book does not merely focus on the formats for learning, as is typical for the boom surrounding active learning, but also explores the quality and content of learning through the concept of *deep learning*, and

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proposes a new concept of *deep active learning* by combining the two above-mentioned concepts.

The theory and practice of deep active learning is discussed in detail in Part I and Part II, whereas this Introduction describes the state of higher education in Japan as the background for understanding our book.

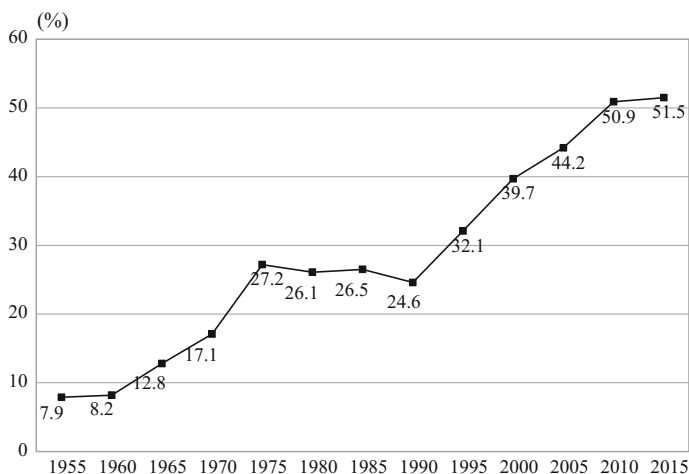
## The State of Higher Education in Japan

### *Changing University Entry Rate*

Figure 1.1 depicts the change in Japan's university entry rate in 5-year intervals.

For a short period after World War II the university entry rate stayed below 10%, but with the high economic growth in the 1960s it rose quickly to go above 25% by the mid-1970s. Subsequently, with the establishment of specialized training colleges offering an alternative path upon graduation from high school, the university entry rate stagnated for about 15 years. Nevertheless, after the early 1990s it again began to rise until it reached more than 50% in the latter half of the 2000s. This is how Japan's higher education entered the universal phase.

In recent years, many countries have experienced an increase in the level of academic qualification, resulting in rising university entry rates (OECD 2014, p. 340). Hence Japan might be regarded as just another such case. Yet it is important to note that the increase in university entry rate is accompanied by a population decline in 18-year-olds (the denominator). Another significant factor is the long-lasting economic recession that has negatively impacted the employment opportunities of high school graduates, spurring them to seek university education.



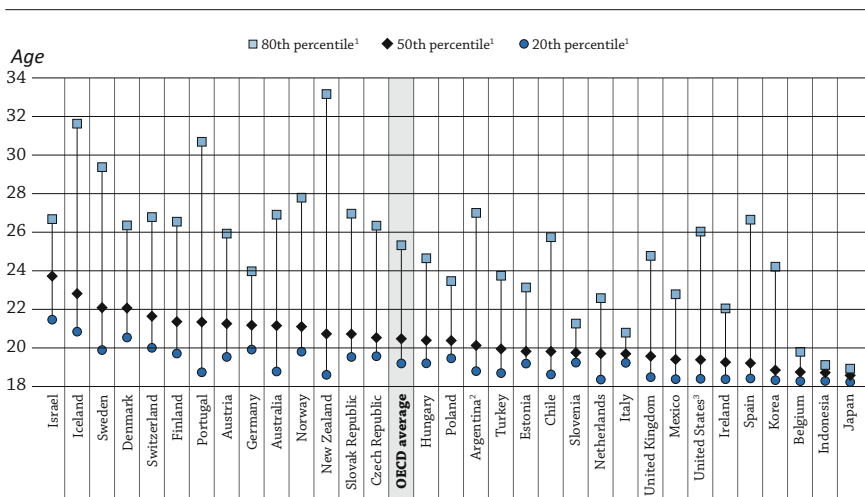
**Fig. 1.1** Trends in university entry rates. *Data source* MEXT School Basic Survey

## Narrow Age Distribution of New Entrants

Another characteristic of Japanese universities is the low ratio of adult students accompanied by a strikingly narrow age distribution of new entrants. Figure 1.2 shows the age distribution of new entrants using 20th, 50th, and 80th percentiles (OECD 2011). In the case of Japan, almost all entrants are between 18 and 19 years of age, entering either right after high school graduation or 1 year later. Whereas the OECD average for entrants above 25 years is 18%, in Japan they represent a mere 2% (cf. OECD 2014, p. 339). In other words, we can say that Japanese university students are a homogenous group with regard to their age and their lack of life experience. Although Japan’s university entry rate has been rising in recent years, it is still below the OECD average (59%, as of 2009). One cause is the small window of university entry.

Originally, Trow (2000)’s universal model meant a *universal access* model (i.e., a system that can grant anyone at any point in their life who wishes to do so the opportunity to receive higher education).

On the other hand, Japan’s universalization functions as a *universal attendance* model (i.e., a system where everyone is virtually forced to enroll in some institute of higher education). In other words, universities do not fulfill the role of providing



1. 20%, 50% and 80% of new entrants, respectively, are below this age.  
 2. Year of reference 2008.  
 3. The entry rates for tertiary-type A programmes include the entry rates for tertiary-type B programmes.  
 Countries are ranked in descending order of entry rates for tertiary-type A education in 2009 (50th percentile).  
 Source: OECD, Argentina, Indonesia: UNESCO Institute for Statistics (World Education Indicators Programme). Table C2.1. See Annex 3 for notes ([www.oecd.org/edu/eag2011](http://www.oecd.org/edu/eag2011)).

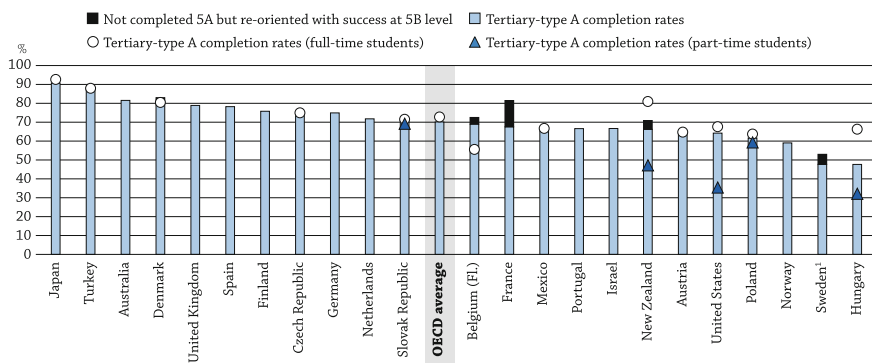
**Fig. 1.2** Age distribution of new entrants into tertiary-type A programs (2009). Source OECD (2011, p. 311, Chart C2.2). Note Since the symbols for the 80th and 20th percentiles were converse in the original figure, the author repositioned them based on the data source

opportunities for lifelong learning, but rather they represent nothing more than an extension of institutionalized school education. Therein lies the distinguishing feature of Japanese universalization.

### High Completion Rate

Japan’s university education is distinctive not only at the point of entry, as described above, but also at the point of exit. Figure 1.3 shows the proportion of students who enter tertiary education and receive a degree, that is, the completion rate (OECD 2013). Whereas the OECD average is 68.4%, Japan scores 89.6%, the highest among economically advanced countries.

However, such a high completion rate does not necessarily imply a high-quality level of Japanese university education. Conversely, low completion rates can reflect a multitude of factors, such as that the standards set by university have not been met; that part-time students found it difficult to continue their studies; that students transferred to another university; that they found a lucrative job opportunity before graduation; that part of the working students were interested only in some specific subjects, not a degree. Japan’s high completion rate can also have its downsides. Namely, universities set their standards vaguely or not high enough; it is relatively easy to earn college credits; the majority of students are full-time students; it is difficult to change schools; it is difficult for drop-outs to find job opportunities; the ratio of working students is extremely low. These are characteristic features of Japanese universities.



**Note:** Some of the students who have not graduated may be still enrolled, or may have finished their education at a different institution than the one they originally attended, as occurs frequently in the United States. Please refer to Table A4.1 for details concerning methods used to calculate the completion rates.

1. Includes students entering single courses who may never intend to study all courses needed for a degree.

Countries are ranked in descending order of the proportion of students who graduate from tertiary-type A education with at least a first degree.

Source: OECD, Tables A4.1 and A4.2. See Annex 3 for notes ([www.oecd.org/edu/eag.htm](http://www.oecd.org/edu/eag.htm)).

StatLink <http://dx.doi.org/10.1787/888932846443>

**Fig. 1.3** Proportion of students who enter tertiary-type A education and graduate with at least a first degree at this level, by status of enrollment (2011). *Source* OECD (2013, p. 66, Chart A4.2)

## ***Expectations from University Graduates***

Why hasn't there been more concern over the fact that Japanese universities lack clear standards and are so easy to graduate from? The reason is that employers have been interested only in the name of the university and the department that their employees have come from, and have had a disregard for what they actually had learned and what skills they possessed. Such a tendency was especially pronounced toward humanities and social sciences students.

Hamaguchi (2013), Japan's leading expert on labor policy, described Western countries as "job-oriented societies," whereas Japan was a "membership-oriented society." In a job-oriented society people are sought based on the job they are to perform; in a membership-oriented society people are sought based on their potential for contributing to a specific community (e.g., company or government office), flexibly allocating various tasks once employed. In fact, the Japanese terms for "finding employment" and "entering a company" are used nearly interchangeably.

In this membership-oriented society, new graduates going through the regular recruitment process did not need to show off their job-specific skills, but what was valued was their potential ability for carrying out future tasks. Also, since on-the-job training (OJT) and job rotation formed a basic part of company training, university education or job training before entering the company was not usually given much thought.

Nevertheless, Hamaguchi (2013) points out that such a membership-oriented society is quite unique in the global context, and even in Japan this arrangement worked smoothly for only about 40 years starting in the 1960s. The question of how to transition from a membership-oriented society, which is becoming less and less effective, to a job-oriented society is increasingly attracting attention in Japan.

## **The Context of Active Learning Dissemination**

### ***What Kind of Abilities Should Be Fostered at Universities?***

The context for dissemination of active learning in Japan was, as mentioned above, the onset of the universal phase, which was accompanied by a lower level and a wider variation of academic abilities and learning motivation on the part of new entrants. Consequently, it was becoming more difficult to teach academic subjects in the traditional lecture format of 90-min-long classes. At the same time, the direct cause of the rapid dissemination of active learning, on a par with what could be considered a boom, was the aforementioned strong promotion by government education policy.

So how did active learning end up being promoted as a policy? The reason is that active learning became seen as an effective method for achieving competences or learning outcomes. Within Japanese education policy, outcome-based education



was first clearly put forward in 2008 by the Central Council for Education’s report titled *Towards Building an Undergraduate Education*. This report proposed the concept of “graduate capabilities” (*gakushiryoku*) as “learning outcomes that our country’s undergraduate education strives to achieve across all universities.” The substance of graduate capabilities is highly similar to the essential learning outcomes (AAC&U 2007) by the Association of American Colleges & Universities (AAC&U), which are most likely the source of inspiration. See Table 1.1.

Moreover, in this 2008 report, in order to ensure the acquisition of learning outcomes, all universities were expected to develop a systematic undergraduate program by formulating their policies regarding admissions, curricula, and diplomas. Starting from fiscal 2017, the law stipulates that all universities formulate and announce these three policies. In this way, the introduction of outcome-based education was a kind of reply to the challenge of transition from a membership-oriented society to a job-oriented society by giving more emphasis to what students learn at universities and what they can do.

At the same time, MEXT required that the subject-specific committees within the Science Council of Japan, which is the representative organization of Japanese

**Table 1.1** AAC&U’s essential learning outcomes and the MEXT’s *gakushiryoku*

Essential learning outcomes	Graduate capabilities ( <i>gakushiryoku</i> )
<i>Knowledge of human cultures and the physical and natural world</i>	<i>Knowledge and understanding</i>
<ul style="list-style-type: none"> <li>• Through study in the sciences and mathematics, social sciences, humanities, histories, languages, and the arts</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge and understanding of diverse cultures</li> <li>• Knowledge and understanding of human cultures and societies, and of nature</li> </ul>
<i>Intellectual and practical skills</i>	<i>Generic skills</i>
<ul style="list-style-type: none"> <li>• Inquiry and analysis</li> <li>• Critical and creative thinking</li> <li>• Written and oral communication</li> <li>• Quantitative literacy</li> <li>• Information literacy</li> <li>• Teamwork and problem solving</li> </ul>	<ul style="list-style-type: none"> <li>• Communication skills</li> <li>• Quantitative skills</li> <li>• Information literacy</li> <li>• Logical thinking</li> <li>• Problem solving</li> </ul>
<i>Personal and social responsibility</i>	<i>Attitudes and dispositions</i>
<ul style="list-style-type: none"> <li>• Civic knowledge and engagement—local and global</li> <li>• Intercultural knowledge and competence</li> <li>• Ethical reasoning and action</li> <li>• Foundations and skills for lifelong learning</li> </ul>	<ul style="list-style-type: none"> <li>• Self-control</li> <li>• Teamwork</li> <li>• Leadership</li> <li>• Sense of ethics</li> <li>• Social responsibilities as a citizen</li> <li>• Lifelong learning</li> </ul>
<i>Integrative learning</i>	<i>Integrative learning experience and creative thinking</i>
<ul style="list-style-type: none"> <li>• Synthesis and advanced accomplishment across general and specialized studies</li> </ul>	<ul style="list-style-type: none"> <li>• Capabilities to utilize acquired knowledge, skills, and attitudes in an integrative manner, to apply them to newly formulated issues and to solve them</li> </ul>

Sources AAC&U (2007, p. 12) and CCE (2008, pp. 12–13)

scientist community, create their benchmark statements for building each subject's degree program. As of March 2017, 25 subjects had announced their benchmark statements.

### ***In What Way Should Students Learn?***

Building on the 2008 report, the 2012 report by the Central Council for Education titled *Towards a Qualitative Transformation of University Education for Building a New Future* proposed active learning as one of the key concepts for a qualitative reform, as discussed above. Active learning became endorsed policy-wise as a method for acquiring the various skills and attitudes depicted in Table 1.1. Active learning formats—"heuristic learning, problem-based learning, experiential learning, and investigative learning" as well as "group discussion, debate, and group work"—offer an easy-to-grasp layout for fostering *generic skills*, such as communication skills and problem-solving, and *attitudes and dispositions*, such as teamwork and leadership.

However, when generic skills, attitudes and dispositions are detached from knowledge and understanding, and only the formats for learning are emphasized, then there is an increasing risk that the learning quality and its content get overlooked.

### **Our Book's Conception and Its Influence in Japan**

We drew up a plan for the Japanese edition of our book in March 2013. Even though the 2012 report already had been released, the term *active learning* was still known only to university education experts, and its boom involving elementary to higher education was yet to come.

*Deep active learning* is a phrase I coined. As active learning began being adopted as a key term of governmental policies and its practice started to spread, I felt a sense of caution that, if things progressed in the way they were going, active learning might end up as just another variation of class formats that include activities such as group work, discussions, and presentations. Before coming to the current institute, primary and secondary education was my field of study. The active learning class format was already widely used in elementary schools, where "many activities and little learning" was becoming a problem.

It was therefore easy to imagine a similar outcome in a university environment. Although active learning is valuable in terms of providing a chance to reexamine the existing lecture-dominant class format, if it stayed as just that, temporary liveliness might be the only benefit it provided for classes. Besides, the term for high-quality learning should not be limited to active learning in the first place. The depth of the content and quality of learning should be equally important.

In light of this idea, I focused on the concept of *deep learning* in order to relativize active learning. Deep learning may be mostly recognized as the idea behind the artificial intelligence such as the AlphaGo program, which defeated top human Go players in recent matches. However, the concept of deep learning has been present in the field of learning theory since the 1970s. The main issue was how to cross active learning, which focuses on the formats for learning, with deep learning, which focuses mainly on the quality and content of learning. Our book provides both theoretical and practical proposals in a total of 11 chapters.

After being first published in January 2015, our book went through nine reprints (as of May 2017), with 516 copies being archived in university libraries across Japan (according to CiNii Books).

The revision of the National Course of Study (aiming to regulate the goals and content of elementary and secondary education) by MEXT has lasted for the past 2 years. In that process, this book has been used as one of reference materials, and consequently, active learning is explained as “independent, dialogical, and deep learning.”

## Introduction to the Chapters

This book is broadly divided into two parts. Part I, “The Theoretical Foundation of Deep Active Learning,” is a collection of chapters that theoretically discuss establishment of the foundation for deep active learning. In Chap. 2, “An Invitation to Deep Active Learning,” I pose the following questions: Why should learning be deep as well as active?; What does “deep” mean here?; If we add “deep,” how is that different from mere active learning? I first point out that active learning tends to generate problems, such as discrepancies between knowledge (content) and activities. To grasp and tackle them, I introduce the theories of the *activity system* and the *learning cycle* (Engeström 1994), which help delineate the structure and the processes of learning activities. Based on these theoretical frameworks, higher-order thinking and externalization of cognitive processes are considered basic characteristics of active learning, while the essential prerequisites for that are acquisition and understanding of knowledge (internalization). Furthermore, I classify and examine the lineages of learning theories focusing on depth into *deep learning*, *deep understanding*, and *deep engagement*. The following two chapters are related to deep engagement and deep learning respectively.

In Chap. 3, “Terms of Engagement: Understanding and Promoting Student Engagement in Today’s College Classroom,” Elizabeth F. Barkley carries out mainly theoretical investigations into student engagement in classes, based on knowledge from fields such as neuroscience and cognitive psychology. She states three conditions for promoting deep engagement on the part of the students: (1) design tasks that are appropriately challenging, (2) help each student feel like a valued member of a learning community, and (3) teach for holistic learning by integrating multiple domains (cognitive, affective, and kinetic/psychomotor).

Here, I would like to add that these ideas have been validated through her extensive practice of interacting with students of diverse ethnicities and backgrounds at Foothill College, a 2-year college in Silicon Valley known for its high educational standards.

Ference Marton, the contributor of Chap. 4, titled “Towards a Pedagogical Theory of Learning,” is a psychologist who ventured into current deep learning theory as early as the 1970s. While deep versus surface approaches to learning described and analyzed variations among learners, the variation theory set forth in Chap. 4 asserts the importance of having the students experience variation and invariance in the object of learning. The discussion might appear to be reverting to the starting point of concept formation, but it can be read as a warning that an over-emphasis on the indirect object of learning (capability) in contemporary university education is weakening interest in the direct object of learning; namely, the content.

Chapter 5, “Deep Active Learning from the Perspective of Active Learning Theory,” by Shinichi Mizokami, summarizes current trends in the theoretical and practical aspects of active learning, and lists six perspectives to enhance the quality of the instruction based on active learning: (1) assessing learning hours outside the class, (2) backward design, (3) curriculum development, (4) multiple classes per week, (5) building an environment for active learning, and (6) the flipped classroom. From these perspectives, he argues that learning should necessarily become both deep and active, rather than just deep. He moves from active learning, which goes beyond conventional teaching paradigms (Positioning A), to describe a shift to active learning that proactively seeks to encourage students’ learning and development (Positioning B), thus providing a framework for understanding the current state of active learning.

Part II, “Attempts in Various Fields,” is a collection of practical experiences in various academic fields that have the characteristics of deep active learning. Those fields include natural science (hydrology, information science), language skills, philosophy, teacher training, dentistry, and business (leadership theory), whereas the foci of the practical applications also vary. One of the trends in active learning that has spread most rapidly in the last several years in Japan is the flipped classroom. Chapter 6, “The Flipped Classroom: An Instructional Framework for Promotion of Active Learning,” by Tomoko Mori, divides current practice in the flipped classroom into two categories, the investigative model and the knowledge acquisition model, and illustrates how these models are put into practice in hydrology and information science classes. Building on those classifications, Mori points out that the flipped classroom is becoming a proposition for a universal learning model that refocuses on the importance of knowledge in active learning and reconstructs a tentative understanding of the individual student into a real understanding through interaction with other people. The assertions about active learning coordinated with understanding of knowledge overlap perfectly with deep active learning as described in this book.

As I mentioned above, Barkley, in Chap. 3, states three conditions for promoting deep engagement: task design, learning community, and holistic learning. Of these

conditions, Satoru Yasunaga, in Chap. 7, “Class Design Based on High Student Engagement Through Cooperation: Toward Classes that Bring About Profound Development,” focuses on the second condition. He presents cooperative learning methods that go beyond group learning techniques and lead to the building of a learning community while also describing an example of a logical language skills course. (The author is the chief translator of Barkley’s *Collaborative Learning Techniques: A Handbook for College Faculty*.)

Chapter 8, “Deep Learning Using Concept Maps: Experiment in an Introductory Philosophy Course,” by Mana Taguchi and me, describes an experimental application of so-called active learning to an introductory philosophy course, which has been thought to be difficult to make compatible with this technique. Furthermore, the concept maps used during the final class session showed that these could be not only a learning tool but also an assessment tool for deep active learning. Rubrics were used to assess student learning demonstrated in the concept maps drawn by the students, and the chapter also explains the procedures for creating rubrics based on the students’ work.

Chapter 9, “Course Design Fostering Significant Learning: Inducing Students to Engage in Coursework as Meaningful Practice for Becoming a Capable Teacher,” by Kazuhiko Sekita and Masakazu Mitsumura, is divided into two parts: a report on practical implementation by Sekita and a verification section by Mitsumura. The end result is a combination of a report about practical application and qualitative research about practical application. In this chapter, the authors propose the concept of significant learning as one form of deep active learning. This is the kind of learning in which (1) what students are learning at the moment is related (meaningful) to themselves, (2) they want to apply and try what they have learned, and (3) what they have learned is contributing to their own growth (they are becoming capable by learning). The authors present several means of stimulating significant learning.

While Chaps. 8 and 9 deal with only one course each, Chap. 10, “PBL Tutorial Linking Classroom to Practice: Focusing on Assessment as Learning,” by Kazuhiro Ono and me, looks at the entire undergraduate curriculum for a faculty of dentistry and reports on implementation of problem-based learning (PBL) courses as the core of the curriculum. Issues with PBL have been (1) how to give proper weight to both knowledge acquisition and problem solving, and (2) how to conduct assessments. We adopted the approach of having the students acquire the knowledge necessary for problem solving through individual learning outside of class or through lectures that ran in parallel to the PBL course, while that knowledge was deepened through group problem-solving exercises in class. For assessment, they developed and implemented the Modified Triple Jump method and analyzed its effectiveness. This can be viewed as a good example of constructive alignment (Biggs and Tang 2011) linking goals, curriculum, instruction, and assessment.

The final chapter is Chap. 11, “New Leadership Education and Deep Active Learning,” by Mikinari Higano. It describes a theory of leadership training supported by the results of the Business Leadership Program (BLP) in the College of Business at Rikkyo University, which is highly evaluated by Kawaijuku Educational Institution’s (2014) survey. The author defines leadership as “an act of

sharing a vision or a goal by getting others involved” regardless of power or rank. According to this understanding, active learning can be redefined as “learning through students’ leadership.” Furthermore, his indicator for deep learning is that students can organize learning outside the classroom or university, and after graduation, without any “training wheels” (support) from their instructors. The curriculum of the College of Business of Rikkyo University is like the two wheels of a bicycle, with studies of leadership through the BLP and specialized knowledge acquired through electives working together as the “training wheels” are gradually removed, a structure in which the students can claim leadership for themselves. Even though dentistry and business are fields far removed from each other, PBL and BLP—schemes that allow both acquisition of knowledge and problem solving—can be seen as similar. They are curriculum practices for deep active learning.

If I were to define deep active learning on the basis of the content of the chapters described above, my definition would be that it is “learning that engages students with the world as an object of learning while interacting with others, and helps the students connect what they are learning with their previous knowledge and experiences as well as their future lives.” The chapters in this book take a variety of approaches to active learning. Yet, with active learning rapidly spreading throughout academia, one approach that is common to all of these chapters is to add the characteristic of depth to active learning, whether overtly or tacitly.

I hope that you, the reader, will be able to acquire some understanding of deep active learning through the many and varied theoretical and practical endeavors described in this book.

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## Author Biography

**Dr. Kayo Matsushita** has been a professor of the Center for the Promotion of Excellence in Higher Education and the Graduate School of Education at Kyoto University since 2004. She received her Ph.D. in education from Kyoto University. After having completed the doctoral program in Education at Kyoto University, she served as an assistant professor at the Faculty of Education, Kyoto University and an associate professor at the Faculty of Education, Gunma University. She has been conducting research and development of teaching and learning in higher education as well as school education. Her present research focus is learning assessment, especially in the form of performance assessment. She is an author of *Performance Assessment* (in Japanese, Nipponhyojun, 2007), an editor of *Does New Concept of Ability Change Education: Gakuryoku, Literacy, and Competency?* (in Japanese, Minerva Shobo, 2010), and a co-editor of *Building Networks in Higher Education: Towards the Future of Faculty Development* (Maruzen Planet, 2011), *Transition from High School & University to Work* (in Japanese, Nakanishiya, 2014), and *Assessment of Active Learning* (in Japanese, Toshindo, 2016). She is the chief editor and a council member of the Japan Association for College and University Education, a council member of the Japanese Educational Research Association, the Japanese Society for Curriculum Studies and the National Association for the Study of Educational Methods, and a member of the Science Council of Japan.

**Part I**  
**The Theoretical Foundation of**  
**Deep Active Learning**



# Chapter 2

## An Invitation to Deep Active Learning

Kayo Matsushita

The central message that we want to convey in this book is that learning in universities ought to be not only active but also deep. Why should learning be deep as well as active? What does “deep” mean here? If we add “deep,” how is that different from mere active learning? In this introductory chapter, I will answer these questions as I open the door to deep active learning.

### What Is Active Learning?

First, what does active learning mean? Bonwell and Eison’s *Active Learning: Creating Excitement in the Classroom* (1991) is a pioneering work that lays out the principles of active learning and one of the most frequently cited works, even today. In this article, the authors list the following as general characteristics of active learning:

- (a) Students are involved in more than listening.
- (b) Less emphasis is placed on transmitting information and more on developing students’ skills.
- (c) Students are involved in higher-order thinking (analysis, synthesis, evaluation).
- (d) Students are engaged in activities (e.g., reading, discussing, writing).
- (e) Greater emphasis is placed on students’ exploration of their own attitudes and values.

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In addition, active learning is defined as “involv[ing] students in doing things and thinking about the things they are doing.” (Bonwell and Eison 1991, p. 2). In other words, active learning is a matter of acting and then learning by reflecting on those actions. Eric Mazur of Harvard University has said, “Just as you can’t become a marathon runner by watching marathons on TV, likewise for science, you have to go through the thought processes of doing science and not just watch your instructor do it.”<sup>1</sup> Here, too, it is asserted that, in order to learn the thought processes for “doing science,” it is important to become aware of those processes on one’s own, after having actually tried them (action and reflection).

Active learning in Japanese higher education became an “official educational method” owing to a report by the Central Council for Education, published in August 2012 under the title *Towards a Qualitative Transformation of University Education for Building a New Future: Universities Fostering Lifelong Learning and the Ability to Think Independently and Proactively* (the so-called Qualitative Transformation Report) and the Acceleration Program for University Education Rebuilding (AP) begun as a result of the report, thereby spurring its widespread adoption. In the Qualitative Transformation Report, active learning is defined as “the general term for a teaching and learning method that incorporates the learners’ active participation in learning, unlike education based on one-sided lectures by the instructor.” On that basis, “it seeks to foster generic capabilities, including cognitive, ethical, and social capabilities, cultural refinement, knowledge, and experience.” Comparing this description against the five characteristics laid out by Bonwell and Eison, we can see that it emphasizes (a), (b), and (d), and it is clear that the description especially stresses a contrast with “education based on one-sided lectures by the instructor.”

In Chap. 5 of this book, Mizokami defines active learning as “all kinds of learning beyond the mere one-way transmission of knowledge in lecture-style classes (=passive learning). It requires engagement in activities (writing, discussion, and presentation) and externalizing cognitive processes in the activities” (p. 79). In this definition, Mizokami looks at “externalizing cognitive processes in the activities” in addition to the features described above.

In this chapter, I have adopted Bonwell and Eison’s comprehensive definition of active learning, adding a sixth characteristic to their general characteristics (a) through (e):

(f) It requires externalizing cognitive processes in the activities.

In addition, I would like to discuss the question of why learning at university level should be not only active but also deep.

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<sup>1</sup>“At M.I.T., Large Lectures Are Going the Way of the Blackboard,” *New York Times*, January 12, 2009. Retrieved from <http://www.nytimes.com/2009/01/13/us/13physics.html>.

## Problems with Active Learning

### *From Surveys and Case Studies*

Given the demands for universalization of university education and various new abilities such as “graduates capabilities” (*gakushiryoku*) (Ministry of Education, Culture, Sports, Science and Technology: MEXT) and “adults’ basic skills” (Ministry of Economy, Trade and Industry: METI), active learning has appeared on the scene and become widespread as a driving force for putting an end to the “input only, one-sided, passive lecture” format that formerly prevailed at Japanese universities, and for transformation to student-centered paradigms.

Yet, active learning is not a “silver bullet” for reform of university teaching. In fact, active learning has not necessarily produced the hoped-for effects. Far from it: there are several pieces of evidence that may even suggest that it produces results contrary to expectations.

1. In 2013, Benesse, a major Japanese educational services company, surveyed 5000 university students from all parts of Japan, for its Second Survey of the Scholastic and Daily Life of University Students. According to this survey, despite the fact that availability of active learning-type classes which incorporate group work, discussion, and presentations has been increasing, the number of students who thought “I like classes in which it is easy to earn credits, even if I am not very interested” as opposed to “I like classes that I am interested in, even if they are more difficult” increased from 48.9 (2008) to 54.8% (2012). In addition, in questions about everyday life, university students who thought that “University instructors should provide advice and support” as against “Things should be left to the student’s own initiative” increased sharply, from 15.3 to 30.0%. These results suggest, ironically, that the more active learning style classes spread, the stronger students’ passive attitudes regarding learning and lifestyles become.
2. The Massachusetts Institute of Technology (MIT) is known for its learning environment using Technology-Enabled Active Learning (TEAL), which has significantly influenced learning environment design at institutions in Japan, including the Komaba Active Learning Studio (KALS) at the University of Tokyo’s Komaba Campus (cf. Chap. 5 of this book). A TEAL classroom contains 13 round tables, each seating nine students, and the students use networked computers, clickers, multifaceted screens, whiteboards, and other tools as they engage in interactive, cooperative, active learning. But, TEAL is not accepted by all students.<sup>2</sup> When TEAL was described in the New York Times, intense arguments for and against it arose. This is the opinion

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<sup>2</sup>In March 2013, I visited MIT and Harvard University, where I had opportunities to observe classes based on TEAL, lecture courses at Harvard, and project-based learning (PBL) classes taught by Professor Eric Mazur. The attitudes toward learning of students in the TEAL classes

that received the most support: “Probably, a school should offer both options (active learning and lectures). Some people do learn best quietly, thoughtfully, by themselves, and by following a skilled ... faculty member through the development of an idea, rather than in an active buzzing setting, which can be distracting. But for anyone, the chance to self pace ... certainly is a better use of time, as is the opportunity for learning by doing.”<sup>3</sup>

In fact, MIT does not offer only courses based on active learning with TEAL. It also offers courses that combine TEAL with lectures and recitations (sessions in which the class is divided into several groups for discussions) as well as courses that teach theoretically sophisticated content.<sup>4</sup>

3. Based on experiences of participation in a variety of active learning classes, Mori (Chap. 6 of this book) states that even active learning has not resolved the issue, seen in lecture-style classes, of disparities in quality of student learning. Mori also points out the emergence of “free riders,” the deactivation of group work, and a gap between thought and action as being among the new problems that have arisen in active learning. These remarks are consistent in many respects with my own experiences of teaching and observing in university classes.

### *The Twin Sins*

Why do these situations occur? Curriculum researchers Wiggins and McTighe (2005) refer to “coverage-focused teaching” and “activity-focused teaching” as the “twin sins” of instruction (p. 3). Coverage-focused teaching is an attempt to teach all of the contents of the textbook and lecture notes without any omissions, while activity-focused teaching is aimed at getting students to learn by having them participate in various activities other than listening.

As we have already seen, active learning appeared on the scene as the antithesis of lecture-based instruction or, in other words, coverage-focused teaching. Yet, is it not now the case that the pendulum has swung to the other side, toward activity-focused teaching? As the phrase “twin sins” indicates, neither coverage-focused teaching nor activity-focused teaching gives rise to effective learning, and they are two sides of the same coin.

Some problems that remain unsolved and some of the new problems that arose after the introduction of active learning are described below.

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(Footnote 2 continued)

were not particularly active, at least not in the classes that I observed. For details, see Matsushita et al. (2014).

<sup>3</sup>From the highlighted reader’s comment on the article in Note [1].

<sup>4</sup>See the website for MIT’s physics course for first-year students. Retrieved from <http://web.mit.edu/firstyear/advisors/academics/physics.html>.

## **Discrepancies Between Knowledge (Content) and Activities**

When active learning is introduced into classes, time is designated for activities, thereby reducing the time available for transmitting knowledge (content). Moreover, in order to have the students engage in higher-order thinking, they must acquire knowledge (content) appropriate for such thinking. How is it possible to connect the two and ensure that both transmission of knowledge and engagement in activities occur? And, how can we achieve a balance between the two?

## **Passivity Induced by Classes that Aim at Active Learning**

In active learning, the activities are structured and, to the extent that students come under strong pressure to participate in these activities, they are no longer asked to decide whether or not they wish to participate of their own volition. In addition, active learning frequently occurs in the form of group activities, so the responsibility of each individual becomes difficult to define. What, then, is necessary to bring about the kind of active participation that active learning was originally intended to encourage?

## **Diversity of Learning Styles**

Given the value judgment that active learning classes are better than lecture-style classes, students who do not like active learning are likely to be regarded either as being unable to change their traditional views on learning or as being unwilling to expend their own time and energy on learning (cf. Cain 2012). Has active learning given full consideration to diversity of learning styles?

Deep active learning focuses particularly on the problem of discrepancies between knowledge (content) and activities, and it is aimed at reconstruction of active learning. I will begin by questioning the theories and concepts that are believed to underlie active learning.

## **The Connection Between Knowledge and Activities<sup>5</sup>**

### *The Structure of Learning Activities*

In various theories of learning, learning has been described as the relationship among three structural elements: the learner (self), the object, and others. For example,

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<sup>5</sup>This section is a major expansion and revision of Matsushita and Taguchi (2012) “1.2. How Should We View Learning?”.

Manabu Sato, Japan’s leading scholar on curriculum and learning, defines learning as “restructuring three relationships: a relationship between the learner and the object world, a relationship between the learner and others, and a relationship between the learner and himself/herself.” He called it “the trinity theory of learning” (Sato 1995).

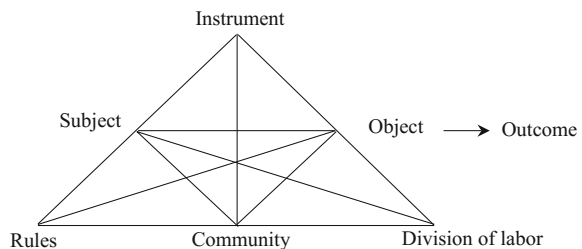
Yrjö Engeström of the University of Helsinki, who has expounded a theory of learning based on activity theory, posits a model of an *activity system* that refers to the three elements described above as the *subject*, the *object*, and the *community*, and to the mediating elements that tie them together as *instruments*, *division of labor*, and *rules* (Engeström 1994, 2015). Instruments include not only physical and external instruments but also symbolic and internal instruments, such as language, signs, and knowledge. Division of labor refers to the division of work and roles and the power relationships among the members of the community. Rules are the clearly stated or tacit regulations, norms, and customs regarding actions and interactions. The subject works on the object using instruments and transforms it into *outcome*, and the subject shares work and roles with the other members of the community. Having rules in common, the subject also participates in the community. Engeström understands learning as this kind of activity (Fig. 2.1).

If we explain the differences between lectures and active learning in terms of this, the results are as follows.

In a lecture, the entity positioned as the subject of the activity is the instructor, and the object is the student. The instructor transmits knowledge to the student using such instruments as textbooks and blackboards, and the outcomes are evaluated by means of tests and reports. The instructor and the students meet, at most, once a week during a semester in most Japanese universities (cf. Chap. 5 of this book), and no community exists except in a formal sense. The division of labor between the instructor and the students is such that the instructor speaks and writes on the board, while the students listen and take notes. Rules, such as those that stipulate how many sessions the students need to attend and the extent to which lateness and private conversations are allowed, are either directly conveyed by the instructor or indicated tacitly.

In contrast, active learning puts the student in the position of subject. The class is described in terms of what the students do and what they become able to do. For example, in problem-based learning (PBL), the object is the problem, and a problem related to the values and realities with which the students are dealing is chosen (cf. Chap. 10 of this book). The instruments that the students need in order to solve the problem are either those that they learn about on their own by seeking

**Fig. 2.1** A model of an activity system. *Source* Adapted from Engeström (2015, p. 63)



knowledge outside of class or those that are provided to them through lectures during class time. Moreover, PBL has clear rules about division of labor, with a stage in which the students learn in groups with the instructor as a facilitator, and a stage in which the students learn on their own outside of class, in line with the class processes. Thus, if the students can solve the problem with the support of their instructor, they achieve an outcome. When students and instructors spend a semester repeating the PBL process in this way, they are more likely to form an actual community than would be the case with classes based on the lecture format.

Note, however, that these are cases in which active learning is deemed successful. Whilst group activities can facilitate learning by students, they may also inhibit it. For example, there are cases in which there is a tacit understanding within the group to make half-hearted efforts in order to achieve mediocre outcomes (a tacit rule). Moreover, the division of labor within the group may be unacceptably unequal, allowing some members of the group to be free riders. Furthermore, if the students approach the subject without enough of the knowledge that is supposed to be the instrument for solving it, they will spend excessive time on the task without being able to arrive at anything but a superficial outcome.

Thus, using the model makes it easy to understand the features and potential pitfalls of active learning.

### *The Processes of Learning Activities*

What we have seen above is the structure of learning activities, but how can the processes of learning activities be stated in theoretical terms? Here, too, we can use the ideas of Yrjö Engeström as a reference. That is because his theory incorporates *deep learning* (Marton and Säljö 1976, described below) and has a high level of affinity with deep active learning.

Engeström (1994) describes the processes of learning activities in a six-step *learning cycle*, as shown in Fig. 2.2.

The starting point of the learning cycle is the conflict that arises between problems that the students encounter and their existing knowledge and experiences (motivation). In other words, it is the learners being confronted with the situation of being unable to deal with an immediate problem using their previously acquired knowledge and experiences. These students start engaging in learning activities with the aim of resolving the conflict (orientation). Then, they acquire the knowledge that they require for that task (internalization). Subsequently, they actually apply the knowledge in an attempt to resolve the conflict (externalization) but, often, instead of stopping at mere application of the knowledge, they discover

(1) motivation – (2) orientation – (3) internalization – (4) externalization – (5) critique – (6) control
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**Fig. 2.2** Six-step learning cycle. *Source* Engeström (1994)

the limits of that knowledge as they apply it and are forced to reconstruct it (critique). Finally, they look back over the sequence of processes thus far and make revisions, as needed, before moving on to the next learning process (control).

### **Internalization and Externalization**

This learning activities process also brings the features and potential pitfalls of active learning into sharp relief. One example is internalization and externalization.

As previously stated, (f) “It requires externalizing cognitive processes in the activities” is a feature of active learning. In classes based on one-sided knowledge transmission lectures, most of the time is spent on internalization of knowledge and the only externalization element is having the students regurgitate memorized knowledge during tests. In contrast, active learning has properly placed externalization of cognitive processes within learning activities. This is a signal achievement for active learning.

Yet, just as internalization without externalization does not work well, the same is true of externalization without internalization. Externalization without internalization is blind. Internalization without externalization is empty.

In its eagerness to criticize lectures that involve internalization only, active learning has tended to devalue internalization. Viewed in terms of the learning cycle, the definition of active learning provided by Bonwell and Eison at the beginning of this chapter, “involv[ing] students in doing things and thinking about the things they are doing,” focuses on externalization and control.

In contrast, the issue in deep active learning is how to combine internalization and externalization. Actually, all of the examples of deep active learning discussed in this book try to combine internalization and externalization, such as knowledge acquisition outside of class, with problem-solving and discussion within the class shown in the flipped classroom in Chap. 6 and PBL in Chap. 10.

It is true that the relationship between internalization and externalization is not a one-way progression from the former to the latter. After students have internalized knowledge, they reconstruct it through externalization activities such as using it to solve problems, talking to people, or writing, thereby deepening their understanding. At the stage when knowledge is internalized, the activity system model positions it as an object (for example, in the case of “understanding perspective,” “perspective” is the object of “understanding.”). However, at the stage of externalization, it becomes an instrument (for example, in the case of “analyzing a work of art in terms of perspective,” “perspective” is the tool of analyzing.). So, using knowledge as an instrument further deepens students’ understanding.

### **The Span of the Learning Cycle**

The learning cycle can occur over a variety of time spans, be it one class session, a semester-long course, or a 4-year undergraduate degree program. For example,



a common design for a single class session involves first presenting the problem, then conveying knowledge about it and, finally, discussing and making presentations about the problem, using the knowledge. A course design typically seen in U. S. universities is three class sessions of 50 min each per week. Including lectures, discussions, and exercises in the course makes it easy to combine internalization and externalization.

Extending this to a 4-year undergraduate degree program, most Japanese universities and undergraduate divisions have made more time available in their curricula and set up various ways for students to deal with externalization during their final year. These include writing papers, making presentations, and taking oral exams in relation to their graduation theses and graduation research projects. In order to ensure high-quality externalization, it is essential for the students to have a deep understanding of the knowledge that they have internalized through classes and independent study.

In these ways, the learning cycle can be realized, whether by class, by course, or by program. But, I would like to point out that the learning cycle should be visible, not only to the instructor but also to the students. For example, some instructors in the fields of science and technology assert that they need to cram students' heads full of basic mathematics and physics at the early stage of undergraduate education in order to equip them to undertake high-quality graduation research projects. In such cases, the 4-year learning cycle is visible to the instructors but not necessarily to the students. Effective ways of making the learning cycle visible to students may include using a curriculum map or having the students interact with older students who have completed their graduation or master's level research projects, so as to give them a feeling for the importance of the basic courses. It may be even more effective to embed much shorter learning cycles within the 4-year span, allowing the students their own repeated experiences with learning cycles and having them acquire that mode of learning. As in Rikkyo University's College of Business, some universities have set up Leadership Programs and specialized elective courses along parallel lines so that the curriculum balances leadership and specialized knowledge like the two wheels of a bicycle (Kawaijuku Educational Institution 2014; cf. Higano, Chap. 11 of this book). The Faculty of Dentistry at Niigata University also builds its curriculum around PBL, with relevant lectures and seminars arranged around this core, so that the learning cycle is repeated several times (cf. Chap. 10 of this book).

## The Lineages of Learning Theories Focusing on Depth

Thus far, we have looked at the features and potential pitfalls of active learning whilst paving the way for discussion of deep active learning. So, what does "deep" mean in this context? In the following, I would like to lay out lineages of learning theories focusing on *depth*, which is the theoretical basis of deep active learning.

## Deep Learning

The contexts that underlie deep active learning are such concepts as *deep learning* and a *deep approach to learning* (Matsushita 2009). Put into theoretical form by Ference Marton of the University of Gothenburg, Noel Entwistle of the University of Edinburgh, and their colleagues, it has been widely put into practice in higher education in such countries as the United Kingdom, certain Scandinavian countries, and Australia.

### A Deep Approach to Learning

The starting point of this research was the following study by Marton and Säljö (1976). Students were given an essay to read, after being told that they would later be asked questions on it. The students’ approaches to this task were clearly divisible into two types. Some students focused on the meaning that the text was seeking to convey and tried to understand it thoroughly. Others focused on fragments of information that seemed likely to appear in the test and tried to memorize them verbatim. Marton and his colleagues referred to the former approach as the “deep approach” and the latter as the “surface approach” (see Table 2.1).

In later research, by incorporating Pask’s (1976) theory on learning strategies, Entwistle (2000) identified two strategies in the deep approach: the *holist* strategy,

**Table 2.1** Defining features on approaches to learning

<b>Deep approach</b>	<i>Seeking meaning</i>
<i>Intention</i> —to understand ideas for yourself	by
Relating ideas to previous knowledge and experience Looking for patterns and underlying principles Checking evidence and relating it to conclusions Examining logic and argument cautiously and critically Using rote learning where necessary	
	And as a result
Being aware of one’s own understanding as it develops Becoming more actively interested in the course content	
<b>Surface Approach</b>	<i>Reproducing</i>
<i>Intention</i> —to cope with course requirements	by
Treating the course as unrelated bits of knowledge Routinely memorizing facts or carrying out set procedures Studying without reflecting on either purpose or strategy	
	And as a result
Finding difficulty in making sense of new ideas Seeing little value or meaning in either the courses or the tasks set Feeling undue pressure and worry about work	

Source Adapted from Entwistle (2009, p. 36).

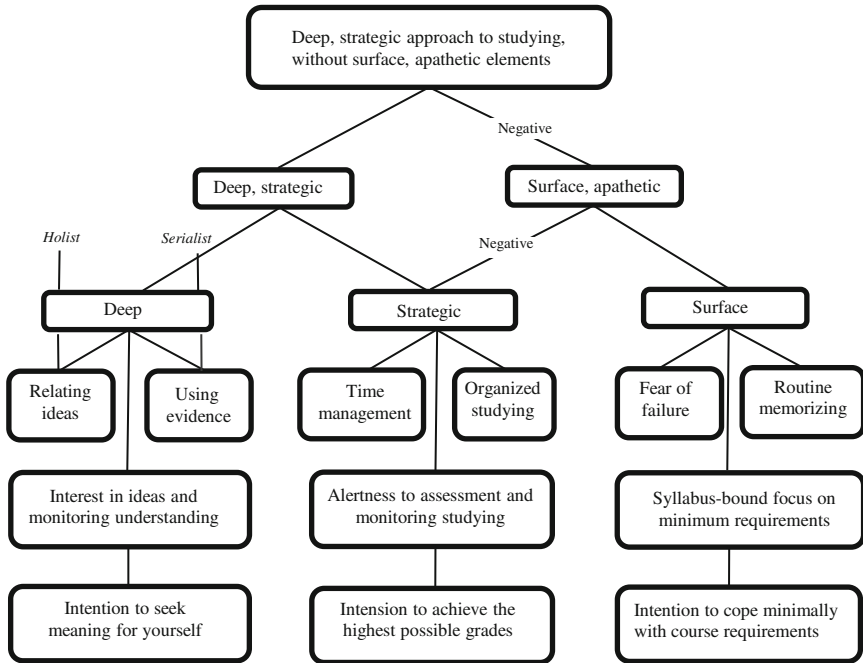


Fig. 2.3 Student approaches to learning and studying. Source Entwistle (2000, p. 4)

in which students try to create connections among the ideas and identify the overall patterns and principles, and the *serialist* strategy, in which students try to use evidence and examine the logic of the argument. Entwistle and his colleagues (Entwistle et al. 2000) also proposed the concept of *strategic approach* as opposed to the *apathetic approach*. While the deep approach is characterized by an interest in the content and significance of the subject matter, the strategic approach is characterized by self-regulation of learning and the alertness to assessment requirements. Entwistle (2000) presents the insights from his research in the form of Fig. 2.3.

Although it is difficult to see from this figure, the strategic approach can be connected not only to the deep approach but also to the surface approach. For example, students who do not fully understand the subject matter but are skilled at taking tests may use a surface, strategic approach.

### The Effects of Teaching and Assessment

Approaches to learning are different from learning styles. Learning styles are characteristic patterns of acquiring and processing information in learning situations. Some innate factors are involved and these are difficult to change

(Entwistle et al. 2000; Aoki 2005). In contrast, approaches to learning are the course of action that a student will be relatively likely to take when placed in a certain learning situation. Therefore, approaches to learning are the result of interaction between the student and the learning situation.

The deep, strategic approach generally tends to result in a higher level of learning outcomes but that is true only when the assessment method exactly evaluates the learner's understanding of the concept. Conversely, when the assessment method does not evaluate understanding of the concept, the surface, strategic approach yields better results but this does not lead to long-lasting, quality learning. So, we can see that, in order to encourage students to take a deep approach, there needs to be a suitable type of education, not only in terms of teaching (curriculum and instruction) but also in respect of assessment. John Biggs refers to linkage between the learning that the instructor wants the students to acquire, on the one hand, and teaching and assessment, on the other, as *constructive alignment* (Biggs and Tang 2011), and this concept is also suitable for learning approaches.

## Objects of Learning and Variation Theory

Marton, who, along with Entwistle, developed the theory of approaches to learning, has recently placed greater emphasis on the *object of learning* in promoting deep learning (cf. Chap. 4 of this book). Marton distinguishes three forms, the *intended object of learning*, the *enacted object of learning*, and the *lived object of learning*, and gears them to learning objective, the space of learning, and outcome of learning, respectively. Viewed in terms of education, they correspond to the field of goals (curriculum), instruction, and assessment.

Moreover, by positioning the learning content as the *indirect object of learning* and capability as the *indirect object of learning*, Marton seeks to integrate content and capability under the concept of object of learning. For example, in the case of such learning goals (intended object of learning) as “to be able to solve equations of the second degree,” “to understand photosynthesis,” “to be able to see similarities and differences between different forms of governments,” “to be able to see different religions in terms of what unites them and what sets them apart,” “equations of the second degree,” “photosynthesis,” “forms of governments,” and “religions” are the direct objects of learning. On the other hand, such capabilities as “to be able to solve ...,” “to understand ...,” and “to be able to see ... in terms of ...” are the indirect objects of learning (p. 62). Thus, the object of learning are understood in two dimensions, that of “intended,” “enacted,” and “lived,” and that of “direct” and “indirect.”

What Marton is trying to understand with the theory of approaches to learning is how variations in the lived object of learning arise through different approaches to learning with the same text. In contrast, the *variation theory* in this book focuses narrowly on direct object of learning and attempts to clarify how understanding of

the object of learning varies depending on variations in how it is presented. In other words, it is fair to say that looking at both the intended object of learning and the enacted object of learning takes us a step farther in constructing a theory of pedagogy.

In his *The University of Learning: Beyond Quality and Competence*, co-authored with John Bowden of Australia's Royal Melbourne Institute of Technology, Marton sounds a warning about competency-based higher education reform. Rather, Bowden and Marton (1998) argue that in the era of low predictability it is particularly important to possess the capability of discerning and focusing on critical aspects of situations, beyond the generic skills. Variation theory is a theoretical attempt linked to this assertion.

## *Deep Understanding*

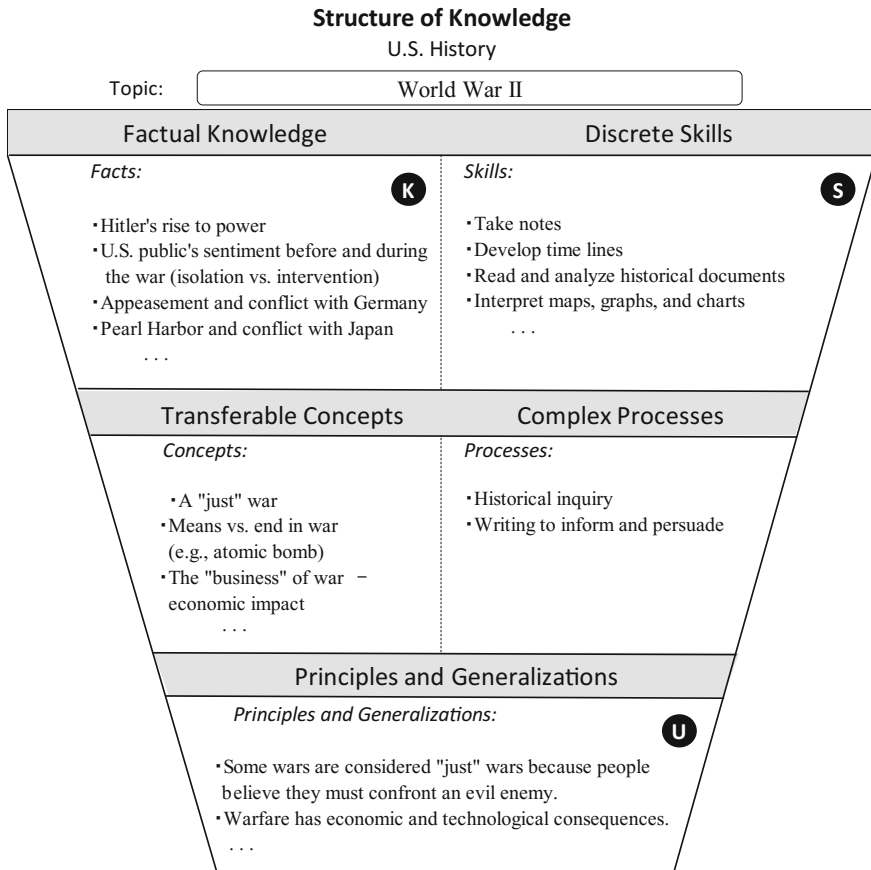
The second lineage of depth in reference to student learning that I would like to mention is *deep understanding*. Understanding is a characteristic of deep learning, and there are overlaps between deep learning theory and deep understanding theory. Even so, I take deep understanding as a different lineage because I want to shine some light on the axis of *depth* of understanding that goes beyond the dichotomy between “deep” and “surface.”

McTighe and Wiggins (2004), known for their book *Understanding by Design* (2005), show the *structure of knowledge* in graphic form in Fig. 2.4.

This structure of knowledge is characterized first by having an axis of depth of understanding, and second, by showing content knowledge and intellectual manipulation in a corresponding relationship.

At the most surface level are factual knowledge and discrete skills. Deeper down are transferable concepts and complex processes. And then, principles and generalizations are positioned at the deepest level. Transferable concepts, complex processes, and principles and generalizations comprise *enduring understandings*. What Wiggins and McTighe mean by enduring understandings is the understanding that answers the question, “What do we want students to understand and be able to use several years from now, after they have forgotten the details?” They are “central to a discipline and are transferable to new situations” (Wiggins and McTighe 2005, p. 342).

I would especially like to note the concept of *understanding* developed by Wiggins and McTighe. When they refer to understanding, they are referring to a complex concept with six facets: explanation, interpretation, application, perspective (critical and insightful points of view), empathy (the ability to get inside another person's feelings and worldview), and self-knowledge (the wisdom to know one's ignorance and how one's patterns of thought and action inform as well as prejudice understanding) (Wiggins and McTighe 2005, Chap. 4).



**Fig. 2.4** An example of structure of knowledge. *Source* Adapted from McTighe and Wiggins (2004, p. 66)

This view of understanding is different from that of active learning theories. Most active learning theories seem to follow Bloom's taxonomy<sup>6</sup> in taking the cognitive domain as a hierarchical structure consisting of knowledge, comprehension,

<sup>6</sup>Bloom's taxonomy refers to the taxonomy of educational objectives developed by Benjamin S. Bloom et al. It was first developed as a theoretical framework for creating test items in university education and it is made up of three domains: the cognitive domain (published in 1956), the affective domain (published in 1964), and the psychomotor domain (incomplete). Of these, the most influential domain and the one that has the direct connection to active learning is the taxonomy of the cognitive domain. Later, Bloom's colleagues (Anderson and Krathwohl 2001) revised Bloom's taxonomy (cognitive domain), incorporating results from fields such as cognitive psychology, to create the Revised Bloom's Taxonomy. A major feature of the revised version is that knowledge, which was classified as lower-order cognition in the original version, has been repositioned as a dimension independent of cognitive processes. Moreover, the cognitive process

application, analysis, synthesis, and evaluation. For example, the “higher-order thinking (analysis, synthesis, evaluation)” described by Bonwell and Eison is nothing more than the higher-order cognitive processes in Bloom’s taxonomy. On the other hand, “knowledge” and “comprehension” have been positioned as lower-order cognitive processes in Bloom’s taxonomy. I believe that this is a remote cause for knowledge and understanding not having been emphasized to any great degree in active learning theories. Yet, Bloom’s taxonomy itself is currently being revised (Anderson and Krathwohl 2001), and knowledge is being appropriately repositioned as the knowledge dimension, independent of cognitive processes.

The understanding described by Wiggins and McTighe is different from the comprehension described in Bloom’s taxonomy. It refers to overall workings of the intellect, including higher-order stages such as interpretation and application as well as procedural knowledge and meta-cognitive knowledge in addition to conceptual knowledge.

As stated previously, deep active learning takes the view that understanding deepens through repeated internalization and externalization. The concept of understanding espoused by Wiggins and McTighe can be the theoretical base for this kind of deep active learning.

## *Deep Engagement*

The third lineage of depth in student learning is depth of student engagement.

Student engagement (or involvement) first became an object of attention in higher education in the early 1990s with the publication of Pascarella and Terenzini’s *How College Affects Students* (1991). An impetus for the spread of this concept in North America was the National Survey of Student Engagement (NSSE), which was first conducted in 1999. This survey looked at the extent to which students put time and effort into university resources, learning opportunities inside and outside the classroom—including regular curricular classes, co-curricular programs such as study abroad or service learning, and clubs and other extra-curricular activities—and the degree to which these offerings led to their learning and development or, conversely, what impacts the resources and opportunities offered by the university had on student learning and development.<sup>7</sup>

For the purposes of the NSSE, *student engagement* means engagement not only in regular classes but also in co-curricular and extra-curricular opportunities for

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(Footnote 6 continued)

dimension has been revised from “knowledge, comprehension, application, analysis, synthesis, and evaluation” to “remember, understand, apply, analyze, evaluate, and create” (Ishii 2011).

<sup>7</sup>The subjects of the survey were first-year and fourth-year students. Data was gathered concerning the development of students in the undergraduate courses at each university and comparisons between one’s own university and other universities of similar type. The data can be used to evaluate universities. See the NSSE website (<http://nsse.iub.edu>).

learning within and outside of the classroom. However, in this book, we focus particularly on classes in the regular curriculum. Elizabeth F. Barkley defines *student engagement* in university classes as “a process and a product that is experienced on a continuum and results from the synergistic interaction between motivation and active learning” (Chap. 3 of this book, p. 40). She describes student engagement in a *double helix model* consisting of motivation and active learning.

The focal point here is that student engagement is understood as a continuum. In other words, there is an axis of depth of engagement ranging from non-engagement to surface engagement to deep engagement. Deep engagement is close to what the psychologist Csikszentmihalyi (1997), known for research on happiness and creativity, refers to as *flow*. It is a state in which one is fervent, immersed, and in a veritable trance. One is probably unlikely to encounter such engagement in a university class but most people have probably experienced a class that was so interesting that time seemed to pass quickly. This subjective sense of time is one of the indices for deep engagement.

Barkley sees student engagement as an interaction between motivation and active learning. She defines motivation as an interaction between expectancy (“I think I can do this assignment”) and value (“This assignment is worth doing”), and active learning as the mind being actively engaged. Note that motivation, a theme hidden within deep learning (a deep approach to learning) and deep understanding, becomes a major theme here, drawing attention to the affective factors of the depth axis. Another point worth noting is that Barkley understands active learning more as *minds-on* than as *hands-on*. Her status as the co-author of a handbook on collaborative learning techniques (Barkley et al. 2005) gives weight to her definition.

## The Meaning of Deep Active Learning

Given the different but interrelated lineages of learning theories focusing on depth (deep learning, deep understanding, and deep engagement), activeness in active learning can be viewed from an internal aspect and an external aspect and depicted in two-dimensional form as in Fig. 2.5 (Matsushita 2009).

Barkley’s definition of active learning, in which the mind is actively engaged, is in contrast to the current state of active learning (easily confused with physical activity) in that it emphasizes an internal aspect of activity (A or B). That is to say, deep engagement is a phrase that expresses the depth of internal aspect of activity.

**Fig. 2.5** Internal and external aspects of activity

		<i>Internal aspect</i>	
		<i>Low</i>	<i>High</i>
<i>External aspect</i>	<i>Low</i>	D	B
	<i>High</i>	C	A



On the other hand, activity-focused teaching, as Wiggins and McTighe point out, is teaching whose outcome is learning in which students are not active in the internal aspect, even if they are active in the external aspect (C). Coverage-focused teaching is teaching whose outcome is learning in which neither the external nor the internal aspect is active (D) as a result of focusing only on covering the content.

Deep active learning is learning that emphasizes activity not only in external aspect but also in internal aspect (A). The use of “deep” is an implied criticism of active learning classes where activity in the external aspect is emphasized and activity in the internal aspect tends to be devalued.

For all that, deep active learning is not some kind of newly proposed theory or practice. Rather, it is an attempt to identify and illuminate consideration for the dimension of depth in the theories and practices that have been proposed as active learning.

## Summary

- Active learning has been considered as acting and then learning through reflection about one’s actions. Pushed by the national educational policy, this new educational method is spreading rapidly to Japanese universities in response to the challenges of universalization and competency-based education.
- Active learning has appeared on the scene as the antithesis of one-sided, lecture-based knowledge transmission but, due to excessive criticism of coverage-focused teaching, we have ended up with problems caused by activity-focused teaching.
- It is easier to grasp the features and likely pitfalls of active learning, based on the theories of the activity system and the learning cycle, which respectively delineate the structure and the processes of learning activities. Higher-order thinking and externalization of cognitive processes on the part of students are basic characteristics that active learning should incorporate but the essential prerequisites for that are acquisition and understanding of knowledge (internalization). Lecture classes and active learning classes are not antithetical; rather, they complement each other. They are different in terms of degree of emphasis on internalization or externalization (or acquisition of knowledge or higher-order thinking that makes use of knowledge) within the overall learning cycle. The learning cycle can extend over a single class period, a semester of a course, or even a 4-year program. However, both instructors and students need to perceive and be aware of the learning cycle.
- Deep active learning emphasizes depth of learning but this context of “depth” can refer to deep learning, deep understanding, or deep engagement. If we understand activity in terms of internal as well as external aspects, then we, through deep active learning, emphasize activity not only in the external aspect but also in the internal aspect.

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## Author Biography

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# Chapter 3

## Terms of Engagement: Understanding and Promoting Student Engagement in Today's College Classroom

Elizabeth F. Barkley

When I began my college teaching career almost four decades ago, I had never heard the phrase “student engagement.” Indeed, I would have been quite surprised had someone told me “student engagement” was something I was expected to promote in my courses. Most of my colleagues and I believed a college teacher’s job was to lecture, and a college student’s job was to listen, study, and take tests. Then I took a decade off to be an administrator, and when I returned to the classroom in the mid-1990s, the teaching landscape had changed. The students sitting in front of me seemed mostly not to want to be there. Despite my enthusiastic efforts to engage them in a stimulating discussion, they stared at me with looks that ranged from utter apathy to outright hostility. The situation got worse. Three weeks into the term, the Dean who had been hired as my replacement called me into his office. Stunned, I listened as he read from a legal-size pad a seemingly endless list of complaints from a couple of particularly unhappy students. I had eagerly anticipated my return to teaching, but now felt confused and humiliated. Although I had been a successful and popular teacher just ten years earlier, it was clear the ‘old ways’ were no longer working. Because I was too young to retire, engaging students became my central concern.

My experience is not unusual. Teachers in colleges and universities in the United States as well as other countries tell me that teaching today can be tough. Most of us chose our field of scholarly endeavor because somewhere along the line we developed a passion for it. Part of the attraction of a career in academia is the opportunity to share our enthusiasm with others and possibly even recruit new disciples to the discipline. It is very disheartening, therefore, to look out into a classroom and see students who make little effort to hide their boredom and apathy. Equally distressing are students who are obsessively focused on their grade, but seem to care little about the learning the grades are supposed to represent.

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Why do some students bother to register for the course if they are not interested in learning what we are teaching? Why is it sometimes so hard to get students to think...to care...to engage? These, and similarly troubling questions, are part of today's international dialogue on student engagement.

The elements of the dialogue vary, largely because higher education today is astonishingly diverse. While attention at the moment seems to be focused on student engagement in large classes with hundreds of students, engagement can be a challenge in courses with an average class size of twelve. While some teachers are looking for ways to challenge their students' higher order thinking, others struggle to get students to show up to class, or to put their cellphones away or take the earbuds out of their ears so that they can focus sufficiently to develop basic academic success skills. While many teachers struggle to engage students in courses taught in the traditional onsite face-to-face environment, more and more are looking for ways to engage students in courses taught partially or wholly online.

The unifying thread is "engagement," but what is "student engagement?" The answer is: it means different things to different people. Bowen, in an article appropriately titled "Engaged Learning: Are We All on the Same Page?" observes that despite the emerging emphasis on engagement as evidenced by the number of vision statements, strategic plans, learning outcomes, and agendas of reform movements that strive to create engaged learning and engaged learners, "an explicit consensus about what we actually mean by engagement or why it is important is lacking" (2005, p. 3). My purpose in this chapter is to construct a conceptual framework for understanding student engagement by first exploring the background of the phrase and then proposing a teaching-based model for what it means within the context of a college classroom.

## **Defining the Term "Student Engagement"**

One of the earliest pairings of the term engagement with learning occurs in Pascarella and Terenzini's treatise on the impact of college on students: "Perhaps the strongest conclusion that can be made is the least surprising. Simply put, the greater the student's involvement or engagement in academic work or in the academic experience of college, the greater his or her level of knowledge acquisition and general cognitive development" (1991). A decade later, Russ Edgerton pointed to the need for students to "engage in the tasks" that discipline specialists perform in order to really understand the concepts of the discipline in his influential Higher Education White Paper (2001, p. 32). In this same paper, Edgerton coins the phrase pedagogies of engagement: "Learning 'about things' does not enable students to acquire the abilities and understanding they will need for the twenty-first century. We need new pedagogies of engagement that will turn out the kinds of resourceful, engaged workers and citizens that America now requires" (p. 38). Building on Edgerton's and others' work, Shulman places engagement at the foundation of his learning taxonomy: "Learning begins with student engagement..." (2002, p. 2).

In the United States, the National Survey on Student Engagement (NSSE) and associated efforts such as The Community College Survey on Student Engagement (CCSSE) aim to measure student engagement. They define engagement as the frequency with which students participate in activities that represent effective educational practices, and conceive of it as a pattern of involvement in a variety of activities and interactions both in and out of the classroom and throughout a student's college career. "Student engagement has two key components," explains NSSE's associate director, Jillian Kinzie, "the first is the amount of time and effort students put into their studies and other activities that lead to the experiences and outcomes that constitute student success. The second is the ways the institution allocates resources and organizes learning opportunities and services to induce students to participate in and benefit from such activities" (Kinzie 2008).

All of these usages of the term 'engagement' work well when looking at general trends at the national and institutional level, but they aren't very helpful to college teachers who are trying to engage students on a daily basis 'in the trenches' of academe, so let's take a closer look at what constitutes student engagement in a single college class.

### ***Towards a Classroom-Based Model for Understanding Student Engagement***

When college teachers describe student engagement, most tend to approach it in one of two ways. The first is to use phrases like "engaged students really care about what they're learning; they want to learn" or "when students are engaged, they exceed expectations and go beyond what is required" or "the words that describe student engagement to me are passion and excitement" (Barkley 2009). These phrases reflect a view of engagement rooted in motivation. The etymological roots of the word engagement offer clues to this perspective. "Engage" is an Old French word for pledging one's life and honor as well as for charming or fascinating someone sufficiently that they become an ally. Both meanings resonate with teachers' motivation-based view of student engagement: we want students to share our enthusiasm for our academic discipline and find our courses so compelling that they willingly, in fact enthusiastically, devote their hearts and minds to the learning process.

The second way many college teachers describe student engagement is with phrases like, "engaged students are trying to make meaning of what they are learning" or "engaged students are involved in the academic task at hand and are using higher order thinking skills such as analyzing information or solving problems" (Barkley 2009). These teachers are relating engagement to active learning. They recognize that learning is a dynamic process that consists of making sense and meaning out of new information by connecting it to what is already known. Bonwell and Eison neatly define active learning as "doing what we think and thinking about what we are doing" (1991). Edgerton observes that, "to really

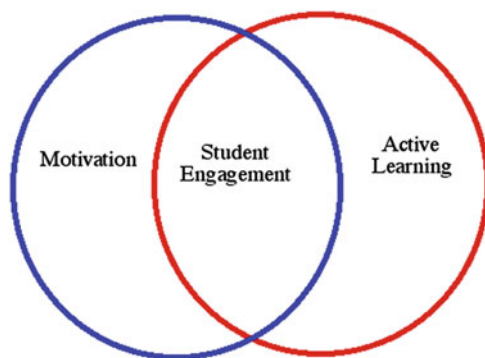
understand an idea...a student must be able to carry out a variety of performances involving the idea...Students know about chemistry by reading and listening to lectures, but to really understand chemistry, students need to engage in the tasks that chemists perform.” He adds that some teaching approaches (such as problem-based learning, collaborative learning, and undergraduate research) are “pedagogies of engagement” because they require students to be actively learning as they ‘do’ the tasks of the discipline (Edgerton 2001, p. 32). Bowen points out that NSSE, “which assesses the extent to which these pedagogies are used, has become one de facto operational definition of engagement” (2005, p. 4).

Whether teachers think primarily of the motivational or active learning elements of student engagement, they are quick to point out that both are required. A classroom filled with enthusiastic, motivated students is great, but educationally meaningless if it does not result in learning. Conversely, students who are actively learning but doing so reluctantly and resentfully are not engaged. Student engagement, therefore, is the product of motivation and active learning. It is a product rather than a sum because it will not occur if either element is missing. It does not result from one or the other alone, but rather is generated in the space that resides at the overlap of motivation and active learning (see Fig. 3.1).

While combined motivation and active learning promote basic student engagement, some teachers are pushing for more: they want students to be truly transformed by their educational experiences. Although any learning, by definition, results in some level of change, transformative learning is deep and thorough change. Cranton (2006) defines transformative learning as, “a process by which previously uncritically assimilated assumptions, beliefs, values, and perspectives are questioned and thereby become more open, permeable, and better justified” (p. vi). It requires learners “to examine problematic frames of reference to make them more inclusive, discriminating, open, reflective, and able to change” and can be “provoked by a single event ...or it can take place gradually and cumulatively over time” (p. 36).

Transformative learning occurs when students are challenged intensely, creating the kind of growth described by Perry’s upper levels of intellectual and ethical

**Fig. 3.1** Venn diagram model of student engagement



development. In Perry's observations, most freshmen enter college as dualists, believing that there are clear, objective, right/wrong answers. One of the goals of a college education is to help students move beyond dualistic thinking to more complex stages as they learn to deal with uncertainty and relativism. As experiences challenge their thinking, students begin to see that truth is contextual and relative, and since there is not a single correct answer, "everyone has a right to their own opinion." Eventually they recognize that there may be multiple answers to a question, but not all answers are equal, and specific criteria such as empirical evidence and logical consistency can help them evaluate the usefulness and validity of knowledge claims.

In Perry's fourth and final stage, students come to recognize that they must make individual choices that require both objective analysis and personal values (Perry 1998). As students' thinking matures to this level of sophistication, it is truly transformative. Interestingly, Bowen observes that students often resist teachers' attempts to promote transformative learning precisely because it "necessarily threatens the student's current identity and world view," and cites a study at an elite liberal arts college that revealed that the majority of students did not want to participate in a discussion until they felt well prepared to defend their already firmly held views (Bowen 2005). Some teachers consider transformative learning to be an element of engaged learning, but it may not be so much a required element as much as the result of sustained engagement or engagement that has achieved a higher level of personal intensity.

Motivation and active learning work together synergistically, and as they interact, they contribute incrementally to increase engagement. From this perspective, rather than a Venn diagram that describes engagement as the overlap of active learning and motivation—thereby limiting the influence of each—engagement may be better described as a double helix in which active learning and motivation are spirals working together synergistically, building in intensity, and creating a fluid and dynamic phenomenon that is greater than the sum of their individual effects (see Fig. 3.2).

**Fig. 3.2** Double helix model of student engagement





Thus engagement occurs on a continuum: it starts at the intersection of motivation and active learning, but these two works synergistically and build in intensity. At the far end of the continuum are the transformative, peak experiences that constitute the treasured milestones of an education. As attractive and appealing as these experiences are, they are not sustainable on a constant basis—they'd be too exhausting. As college teachers, we can strive to increase experiences of deep engagement, reduce the incidence of indifference and apathy that characterize lack of engagement, and attend to the many ways we can adapt our teaching methods to enhance engaged learning throughout the range in between.

Within the context of a college classroom, then, I propose this definition: Student engagement is a process and a product that is experienced on a continuum and results from the synergistic interaction between motivation and active learning. Understanding basic principles drawn from the research and theory on motivation and active learning can offer insights into how to promote student engagement. Let us therefore begin by exploring the first element in our double helix model: student motivation.

## Engagement and Motivation

Jere Brophy from the University of Michigan defines motivation in the classroom as “the level of enthusiasm and the degree to which students invest attention and effort in learning” (2004, p. 4). Let me share with you one of my early attempts to motivate students: the “Good Student Bonus.” I give students this bonus early in the term, and list the behaviors that they must do to retain the bonus:

You are a good student if you:

- take responsibility for your own learning. One of the main reasons you are in college should be because you want to become better educated. I cannot make you learn, you have to decide to do this yourself.
- look to see if your question is answered in the Syllabus before asking me a question.
- manage your time well and don't ask for a deadline extension.
- read assignment directions carefully and use the grading rubrics to guide you as you do an assignment, then do your best effort. Not only will you learn more this way, but you'll get a better grade.
- don't argue over your grade.

This bonus helps me reward the vast majority of students who are “good students” and who behave in these kinds of ways. When a student does not do one of those behaviors—for example, asks me questions about information that is clearly in the Syllabus, I can respond, “I can answer that question for you, but the answer is already in the Syllabus, and therefore you would lose your Good Student bonus. Do you still want me to answer your question?”

I even created penalties to discourage the behaviors I don't like. For example, after reading assignments that looked like they had been done at the last minute, I created a "Junk Effort Penalty," which includes the following statement: "If you have disregarded the basic directions, and/or put little or no college-level thought into the assignment, and/or submitted it with multiple grammar and spelling errors, it is a waste of my time and a waste of your time and you will have earned a -200 point penalty."

I see that my courses have become complex matrices of rewards and punishments, of bonus points and point penalties, all designed to motivate students to work hard and discourage students from being lazy. My strategy of bonuses and penalties has its roots in the behaviorist model of motivation. This behaviorist model suggests that teachers can develop motivated students by reinforcing the desired learning behavior that constitutes excellent work (attentiveness in class, careful and thorough work on assignments, thoughtful and frequent contributions to discussion), thereby encouraging students to continue these behaviors. If students are not able to engage in these behaviors immediately, they'll gradually improve if the correct behaviors are reinforced and incompatible behaviors are extinguished through nonreinforcement or, if necessary, suppressed through punishment.

Many teachers are like me, and find that the easiest and most direct way to spur students to invest time and effort in their coursework is through the use of reward strategies such as the bonus I just described, or high grades, praise, incentives (e.g., if you achieve x amount of points, you do not need to take the final exam), and achievement recognition ("the three best projects were done by students x, y, and z). The problem with this approach is that students can start to focus on getting the rewards and avoiding the punishments, and lose focus on learning. Kohn, in his influential *Punished by Rewards* (1999), is a leading critic of these approaches because such strategies are seen as bribing students and shifting students' focus away from valuing the task itself to valuing the consequences of task completion. He draws on research that provided evidence that if you reward people for doing what they are already doing for their own reasons, you may decrease their intrinsic motivation and the quality of their performance as they do whatever will garner them the most rewards with the least effort. This is evident, for example, in the behavior of students who enroll in "easy A" courses rather than more challenging courses in order to preserve their GPA. In short, although strategies that provide extrinsic rewards are 'quick fixes' for increasing motivation, they may be counter-productive to our efforts to help students develop the kind of intrinsic motivation to learn that we associate with truly engaged learning.

Cognitive models of motivation started replacing behaviorist models in the 1960s, emphasizing learners' subjective experiences. Reinforcement was still important, but its effects were mediated through learners' cognitions. Within the cognitive models, needs models developed first. These models, such as Maslow's Hierarchy of Needs, propose that behavior is a response to felt needs, implying that basic physiological needs (such as sleep) must be met before higher level needs (such as a sense of belonging) can be met. In terms of the classroom, this means that before students can focus on college-level learning, lower level needs must first be met. In other words, students who are hungry because they're rushing between

classes and didn't eat, or are tired because they worked late at their part-time jobs or studied all night for an exam, will be distracted by these fundamental needs and not be able to concentrate on the coursework at hand. Or as another example, basic safety will discourage students from participating in a discussion and saying what they truly think or feel if they are anxious about rejection from their peers or criticism by their professor.

Both behaviorist and needs theories depict motivation as reactive to pressures, either from extrinsic rewards or internal needs. Theorists gradually began to acknowledge that humans are not always just pushed or pulled but are sometimes more proactive in their behavior, leading to 'goals' models. Goal theories suggest students are motivated, for example, by performance goals (preserving self-perception or public reputation as capable individuals), learning goals (trying to learn whatever the instructor's task is designed to teach them), and even work-avoidant goals (refusing to accept the challenges inherent in the task and instead focusing on minimizing the time and effort required to complete the task). Studies by goal theorists and other motivational researchers contributed a great deal of information about the situational characteristics that predict students' tendencies to adopt different goals in achievement situations.

To apply goals theory to the college classroom, teachers would try to (a) establish supportive relationships and cooperative/collaborative learning arrangements that encourage students to adopt learning goals as opposed to performance goals and (b) minimize the sorts of pressures that dispose students toward performance goals or work-avoidant goals. When these conditions are created in a classroom, "students are able to focus their energies on learning without becoming distracted by fear of embarrassment or failure, or by resentment of tasks that they view as pointless or inappropriate" (Brophy 2004, p. 9). In the 1980s, intrinsic motivation theories combined elements of needs and goals models. Self-determination theory (Deci and Ryan 1985, 2002), for example, suggests that at times we engage in behavior simply because we want to. Settings that promote intrinsic motivation satisfy three innate needs: autonomy (self-determination in deciding what to do and how to do it), competence (developing and exercising skills for manipulating and controlling the environment), and relatedness (affiliation with others through social relationships). Students are likely to be intrinsically motivated in courses that promote these three characteristics.

Today's theories about motivation combine elements of needs and goals models and emphasize the importance of factors within the individual. Brophy (2004) and Cross (2001) observe that much of what researchers have found can be organized within an expectancy  $\times$  value model. This model holds that the effort that people are willing to expend on a task is the product of the degree to which they expect to be able to perform the task successfully (expectancy) and the degree to which they value the rewards as well as the opportunity to engage in the processes involved in performing the task itself (value). As with our model of engagement as a product rather than a sum, motivation is also viewed as the product rather than the sum: it is assumed that people will expend no effort if either elements (expectancy or value) are missing entirely. People will not willingly invest effort in tasks that they do not enjoy and that

do not lead to something they value even if they know that they can perform the tasks successfully, nor do they willingly invest effort in even highly valued tasks if they believe that they cannot succeed no matter how hard they try. In short, students' motivations are strongly influenced by what they think is important and what they believe they can accomplish. Let us first explore the construct of value.

## *Value*

I propose that in teaching, value involves two aspects: the product (what is it we want students to learn) and process (how are we designing the tasks or the ways in which students learn it). In ideal conditions for engaged learning, students value both the product and the process. Unfortunately, many of our students don't find value in either. For example, in surveys I've administered, most of my students say they are taking the course not because they are interested in what they are supposed to learn, but because the course is a requirement they must check off their graduation list.

Csikszentmihalyi's (1993, 1997) concept of 'flow' describes states of deep intrinsic motivation that occurs when we highly value the activity we are doing, and it sounds a lot like deep engagement. Csikszentmihalyi proposes that when we experience flow, action and awareness merge. We are so absorbed in the task at hand that irrelevant stimuli disappear from consciousness and worries and concerns are temporarily suspended. We lose track of time; in fact, it seems to pass faster. The activity becomes autotelic - worth doing for its own sake. Wlodkowski (2008) notes that helping students achieve a sense of flow is more possible than many instructors realize, and he identifies the following characteristics as contributors: (1) goals are clear and compatible, allowing learners to concentrate even when the task is difficult; (2) feedback is immediate, continuous, and relevant as the activity unfolds so that students are clear about how well they are doing; and (3) the challenge balances skills or knowledge with stretching existing capacities (Wlodkowski 2008, pp. 267–268). Brophy observes that while some people seem to possess a flow personality, seeking out challenges and taking great pleasure in stretching their limits, others rarely experience flow because they fear failure and avoid challenging situations (2004, p. 11). Therefore, one core strategy for increasing student motivation is helping students to see the value in what they're learning. So before continuing to read this chapter, consider pausing to reflect on the following prompt: "What do you or teachers you supervise do to help students see the value in what they are learning?"

## *Expectancy*

Contemporary theory regarding motivation proposes that in addition to value, you need high expectancy, which in its simplest terms refers to the belief that you will

succeed. Expectancy is complex, and is based on at least three factors: past experience, self-confidence, and perceived difficulty of the task. Martin Covington at Berkeley found four typical student patterns regarding student expectancy.

1. *Success-oriented* These students are serious learners who want to perform well, and they usually do. They are predisposed toward engagement and find personal satisfaction in challenging assignments because they are accustomed to success and are able to preserve their perceptions of self-worth even in the event of an occasional failure.
2. *Overstrivers* These students are also successful and will take on challenging tasks, but they are not entirely confident in their ability, usually because they have had a few unsuccessful experiences in the past. They consequently worry about their grades and performance, anxious that new learning tasks might expose lower levels of ability. They compensate by expending a great deal of effort to ensure that they *do* succeed and are also likely to be the ones that challenge us to change their grade to higher grades.
3. *Failure Avoiders* Like overstrivers, failure-avoiders also suffer anxiety, but because they have often struggled in school (perhaps they have learning disabilities, or they are kinesthetic learners trying to cope in a system that favors auditory-visual learners) they are afraid that if they fail at a specific learning activity, they will demonstrate that they lack the ability to succeed. In order to preserve their sense of self-worth, they avoid tasks that are too challenging and want and need very clear directions and expectations.
4. *Failure-Accepters* These students have become so accustomed and resigned to academic failure that they feel hopeless. They respond to learning tasks with indifference or even antagonism. These are often the students in our at-risk populations and are very difficult to motivate because they have, for so long, disengaged from the learning process.

Consider thinking about your own experience as a student—how would you describe yourself?

Expectancy is complex—for example, is it due to general, pervasive self-esteem or is it contextual? We all know students who are confident with their ability to learn one subject area, but are not confident in another area. If it is contextual, what are the influencing factors? Even a student who has low confidence in his or her ability to learn math, for example, might become more confident with a teacher whose approach to teaching math is supportive and more in line with his style of learning. In my own courses, long before I understood the theoretical implications, I had developed a strategy that I recognize now addresses expectancy issues. I always send out an e-mail prior to the academic term that includes the following: “Thank you for enrolling in my class. I’m delighted you are here. Over the years, thousands of students have taken this course and been successful, and I have every reason to believe you will be successful too.” Contrast that with the professors we know that love promoting the image that their class is so tough only a few will make it. That strategy may work effectively with students who fit Covington’s Success-Oriented type, but it will probably make an Over-Achiever fearful and fill the Failure

Avoider or Failure Accepting student with panic and despair. So before continuing to read this chapter, consider pausing to reflect on the following prompt: “What do you or teachers you supervise do to help students expect that with effort, they will succeed?”

### *The Interaction of Value and Expectancy*

Attending to either expectancy or value can help us increase student motivation, but it can be particularly useful to see how the two components interact. For example,

- *Low Value/Low Expectancy* If a student does not expect to succeed and does not value the task, they are likely to reject it. Lacking either a reason to care about succeeding or the confidence that they could do the task even if they tried, they simply become passive or feel alienated.
- *Low Value/High Expectancy* Evading is likely when success expectancies are high but task value perceptions are low, i.e., students feel confident they can do the task but don’t see any reason to do so and instead daydream, interact with classmates on topics unrelated to course content, think about their personal lives, and so forth.
- *High Value/Low Expectancy* Dissembling occurs when students recognize the value of the task but feel incapable of doing it because they aren’t certain of what to do, how to do it, or doubt that they can do it. They then make excuses, deny their difficulties, pretend to understand, or participate in any of the other behaviors designed to protect their ego rather than developing the task-related knowledge and skill.
- *High Value/High Expectancy* Engagement occurs when students both value the task and expect that with reasonable effort they can do it successfully. Basically, we can increase student motivation by taking steps to increase the value of the learning to students and helping students hold positive expectations about their own ability to succeed.

Motivation is the portal to engagement. Understanding the complexities that underlie motivation can guide us in our efforts to set up conditions that enhance students’ eagerness to learn. That said, it is important to realize that motivation is internal and individual—we can’t ‘motivate students,’ but we can create a context that a larger percentage of students will find motivating. My model of classroom engagement proposes that engagement occurs through the synergistic interaction between motivation and active learning, so let us turn our attention to this other component of the model: active learning.

## Engagement and Active Learning

Although the terms “teaching” and “learning” are typically paired, those of us who teach know that students don’t always learn. When I complained about this early on in my teaching career, a more seasoned and experienced colleague chided me, “Saying ‘I taught students something, they just didn’t learn it’ is like saying ‘I sold them the car, they just didn’t buy it.’” Since helping students learn is our primary goal as educators, how do we best accomplish that? The simplest answer may be to set up conditions that promote active learning. Active learning puts into practice over a half-century of research that demonstrates that to truly learn, we need to take an idea or a concept or a problem solution and make it our own by working it into our personal knowledge and experience.

Active learning has become an umbrella term for a variety of pedagogical approaches such as collaborative/cooperative learning, problem-based learning, service learning, and undergraduate research. It is easy to confuse active learning with physical activity, thinking, for example, that simply breaking a class into small groups so that more students have a chance to participate will result in greater learning. Recognizing that pedagogies such as collaborative learning are more likely to encourage engagement than others, it is not safe to conclude that if students are talking to each other they are learning. It is equally risky to conclude that students are learning when they are listening to other students talking. Active learning means that the mind is actively engaged. Hence active learning can occur when students are working independently, and even sitting in a lecture if they are thinking about, processing, and connecting new information to existing knowledge. Like motivation, the actual cognitive processing that underlies active learning is huge and would take more time than appropriate for this chapter. I am therefore going to address just a couple of aspects that I hope will be helpful.

Neuroscientists are making remarkable discoveries that help us understand what happens within our brains when we are learning. To better understand how active learning occurs, it is useful to have at least a fundamental understanding of its neurological basis. There are now several books that explain the brain’s functioning to educators and general audiences, and the following is a synthesis of information provided in several of these sources (Wlodkowski 2008; Sousa 2006; Ratey 2002; Diamond and Hopson 1998) as well as Barkley et al. (2005), and Cross (1999).

### *What We Know from Neuroscience*

The brain is comprised of cells called *neurons*. Neurons start out as round cell bodies, but then each cell body grows as many as 100,000 short branches called *dendrites* as well as a single long root known as an *axon*. Neurons act like tiny batteries, receiving information through the dendrites, sending it as a signal down the axon where chemicals called neurotransmitters are “fired” across a gap called

the synapse to be received by the dendrites of another neuron. As the neurotransmitter enters the dendrites of a neighboring neuron, it sparks a series of electro-chemical reactions that cause the receiving neuron also to “fire” through its axon. The process and reactions continue in a sequence until there is a pattern of neuronal connections firing together.

Bombarded with thousands of stimuli that create these events every moment of our lives, neurons stay in a state of readiness for hours or even days. If the pattern is not stimulated again, the neuronal network will decay and the perception will be lost. This is so that our brain does not get cluttered with useless information. If, on the other hand, the pattern is repeated during this standby period and the associated network of neurons fires together again, the web of connections becomes more permanent. Each neuron and its thousands of neighbors intertwine to form an extraordinarily complex, interconnected tangle consisting of about 100 trillion constantly changing connections. Through repetition, some connections are strengthened and we ‘learn,’ while connections that are seldom or never used are eliminated and we ‘forget.’

Thus dendrites are the main way by which neurons get information (learn), the axon is the main way the neuron sends the information (teach), and everything we know and understand has been preserved as a network of neurons in our brain. When adults learn, they build on or modify networks that have been created through previous learning and experience. If the new information fits easily with the old information, it is said to be assimilated. If the new information challenges the existing information sufficiently that the existing structure needs to be revised, it is said to be accommodated (Svinicki 2004b, p. 11). The more dendrites an individual has on which to hang or attach new information, the easier it is to learn and retain new information. The greater number of basic neuronal networks an individual has, the easier it is to form more complex networks. From a neuroscientific viewpoint, therefore, learning is long-lasting change in neurons and existing neuronal networks. When we promote active learning, we are helping students grow dendrites and activate and build on existing neuronal networks.

### ***What We Know from Cognitive Psychology***

Findings from neuroscience parallel models of the working mind envisioned by cognitive psychologists, who postulate a structure of the mind known as the *schema*, or in plural form, *schemata*. “A schema is a cognitive structure that consists of facts, ideas, and associations organized into a meaningful system of relationships. People have schemata for events, places, procedures, and people, for instance. A person’s schema for a place, such as a college, might include concepts such as location, reputation, the characteristics of the student population, the style of campus architecture, even the location of campus parking lots. Thus, the schema is an organized collection of bits of information that together build the concept of the college for each individual. When someone mentions the college, we ‘know’



what that means, but the image brought to mind may be somewhat different for each individual” (Cross 1999, p. 8). One can readily imagine the ‘rich’ schema that would be in the mind of someone who had taught at or attended the college (including, for example, memories of courses, classrooms, professors, and so forth) and contrast it with the relatively sparse schema of someone who had simply heard of the college. The potential for errors and misunderstanding is also readily apparent as one considers the kinds of erroneous connections that would result if the person confuses the college with another college with a closely-related name or a college that has the same name but is in a different state.

The value of a well-developed schema is revealed in research on the differences between the learning of novices and experts. For the expert in any subject, new information is quickly grasped in useable form because connections to existing knowledge are numerous. The learning of a novice, in contrast, is labored and slow, not because the novice is less intelligent than the expert, but because connections between new information and existing schemata are sparse—there are no hooks on which to hang the new information, no way to organize it (Cross 1999, p. 8; de Groot 1966). Each schema changes and grows throughout life as new events, filtered by perception into the schema, are organized and connected to the existing structure to create meaning. Thus new information results in meaningful learning only when it connects with what already exists in the mind of the learner, resulting in change in the networks that represent our understandings.

### *The Role of Transfer in Active Learning*

When activating prior learning to make sense of something new, the brain searches for any past learnings that are similar to, or associated with, the new learning. If the experiences exist, the corresponding neuronal networks or schema are activated, reinforcing the already-stored information as well as assisting in interpreting and assigning meaning to the new information. Svinicki (2004a, b, p. 99) notes that there are many types of transfer discussed in the literature, but two types are the most important for purposes of instruction. The first is positive versus negative transfer. If the connections are accurate, the search results in ‘positive’ transfer that can aid the learner in understanding and integrating new learnings. If, on the other hand, the connections are incorrect, the result is negative transfer, which creates confusion and errors. For example, when teaching Romance languages to English speakers, teachers frequently encounter positive transfer (e.g., “mucho” in Spanish sounds similar to “much” in English) and negative transfer (“librairie” in French sounds like “library,” but means “bookstore”) (Sousa, pp. 138–139).

The second type of transfer is near versus far transfer. This distinction refers to the type of task: near transfer tasks are those that look very much alike and follow the same rules for responding, while a far transfer task is where the same rules apply, but they are transferred to a different setting. “Far transfer” requires more thinking on the part of the learner. Svinicki offers driving a mid-level automatic

sedan as an example: if you've driven one, you can easily drive any other because the steering wheel, gear shift, windshield wipers, and turn signals all look alike and are in the same position. If, on the other hand, you get into a car that is very different (such as a convertible, stick-shift sports car), your normal driving responses are not instantly triggered and you have to stop and figure out where everything is. The rules are the same, but the car looks different. Moving between different mid-level automatic sedans is a near transfer task, moving from a mid-level automatic sedan to a stick-shift sports car is a far transfer task (Svinicki, pp. 100–101).

There are several factors that affect the quality of transfer: similarity/difference, association, and context and degree of original learning.

### **Similarity and Differences**

How similar a previously encountered situation is to a new situation affects transfer. Interestingly, it appears that the brain generally stores new information in networks that contain similar characteristics or associations, but retrieves information by identifying how it is different from the other items in that network. For example, the visual appearances of people we know seem to be stored in the network of what humans look like (e.g., torso, head, two arms, two legs) but if we are trying to find someone we know in a crowd, we will look for the characteristics that distinguish them from other people in the group (e.g., facial characteristics, height, voice, and so forth). Obviously when there is high similarity with few differences, distinguishing between the two becomes more difficult (Sousa, p. 143). Thus the potential for negative transfer is higher when concepts, principles, and data, or the labels for this information, are similar. For example in music, “whole tone” and “whole note” sound similar, but the terms represent very different concepts (whole tone is a specific distance between two pitches, while whole note is the rhythmic duration of a single pitch).

### **Association**

Learning two items together such that the two are bonded or associated also affects transfer, and when one of the items is recalled, the other is spontaneously recalled as well. When we hear or read “Romeo,” we unconsciously add “and Juliet,” or when we think of trademark symbols such as McDonald’s golden arches or Apple’s apple logo, we immediately think of the associated product (Sousa 2006, p. 145). Since everything we know and understand is preserved as a network of associations, the more associations we make, the greater the number of potential places we have to attach new information and the easier it is for us to learn and retain that information. In short, the more we learn and retain, the more we *can* learn and retain.

## **Context and Degree of Original Learning**

Emotional associations can have a particularly potent influence on transfer, as emotions usually have a higher priority than cognitive processing for commanding our attention. Words such as *abortion*, *torture*, and *terrorist* often evoke strong emotional responses. Math anxiety—the fear and tension that interferes with some students’ ability to manipulate numbers or solve mathematical problems—is an example of the association of a negative feeling with a content area. Students with math anxiety will try to avoid situations involving math in order to spare themselves the negative feelings associated with it. In contrast, people will devote hours on hobbies because of the feelings of pleasure and satisfaction they associate with these activities (Sousa, p. 145).

Not surprisingly, the quality of the original learning also strongly influences the quality of transfer to new learning. If the original learning was thorough, deep, and accurate, its influence will be much more constructive than learning that was originally superficial. At the college level, we work with the cumulative “prior learning” of K-12, over which we have little control. Because we have greater control over what students learn when they are with us in college (especially at the department/degree level) we should take extra care to help students connect positive feelings to new learnings and ensure that foundational material is taught well, as everything that is learned in these courses becomes the basis for future transfer.

## ***The Role of Memory in Active Learning***

Once students learn something, we want them to remember it. There are currently several different models describing memory, but a basic and generally accepted classification divides memory into two main types: short-term and long-term.

### **Short and Long Term Memory**

Short-term memory gives continuity from one moment to the next and allows us to carry out hundreds of tasks each day by holding the data we are dealing with at the moment, but then letting it go so that our brain can turn its attention to other things. Short-term memory is where the brain works with new information until it decides if and where to store it more permanently. While short-term memory is supported by transient neuronal networks and functions as temporary storage, long-term memory is retained for greater lengths of time—days, decades, even an entire lifetime. It is structurally different from short-term memory in that it is maintained by permanent cellular changes that have been created by neuronal connections distributed throughout the brain. We want students to remember important new learning long term, so how do short-term memories become long-term memories? Research suggests that there is a special window in time during which this transition

occurs: the time needed for neurons to synthesize the necessary proteins for “long-term potentiation” (LTP). An initial stimulation triggers communication across the synapse between two neurons; further stimulation causes the cells to produce key proteins that bind to the synapse, cementing the memory in place. If the memory is to last for more than a few hours, these proteins must bind to specific synapses and actually change the cellular structure.

### ***The Importance of Sense and Meaning to Long-Term Memory***

The criteria by which short term memory determines whether or not information should be stored for the long term is complex. Information tied to survival or information that has a strong emotional component has a high likelihood of being permanently stored. In classrooms, where these two elements are generally minimal or absent, other factors come into play. One important factor is whether or not the information “makes sense;” does it fit with what the learner already knows about the way the world works? When students say that they don’t understand, it means that they cannot make sense of what they are learning, and hence probably won’t remember it. The other important factor is whether or not the information “has meaning”—is it relevant, is there some reason the learner has for remembering it?

We remember some information just because it made sense even though it isn’t particularly meaningful to us (this is the kind of data people may recall when they are doing crossword puzzles or playing games such as Trivial Pursuit). We also remember information that didn’t make sense to us just because it had meaning (it was important for us to memorize it in order to pass a test). Of the two criteria, meaning is more significant. For example, telling a student that they need  $x$  number of units in their academic major for a degree at your institution, but  $y$  number of units at a different institution in another state ‘makes sense,’ but the student will have a higher likelihood of remembering the number of units at her own institution because it is more meaningful and relevant to her educational plans. Brain scans have shown that when new learning is readily comprehensible (it makes sense) and can be connected to past experiences (it has meaning), retention is dramatically improved (Sousa, pp. 49–51).

### **Retention**

The process by which long-term memory preserves learning in such a way that it can be located, identified, and retrieved accurately in the future is called ‘retention.’ Retention is influenced by many factors, but a critical factor is adequate time to process and reprocess information so that it can be transferred from short- to

long-term memory. The encoding process from short-term to long-term memory that allows for retention takes time, and usually occurs during deep sleep. Since research on retention shows that the greatest loss of newly acquired information or a skill occurs within the first 18–24 hours, if a student can remember the information after 24 hours, there is a higher likelihood that it is now in long-term storage. If a student cannot remember the information after that period, it is most likely not permanently stored and will not be retained.

Learning is a dynamic process in which the learner literally “builds” his or her own mind by constantly making and changing connections between what is new and what is already known. Deep, long-term learning occurs when changed connections result in reformatted neuronal networks. As much as we (and often students!) would like to think that we as teachers can simply transfer knowledge into learners’ brains, it is just not possible. Students need to do the work required to learn. Consider reflecting on the following prompt prior to finishing this chapter: “What do you, or teachers you supervise do, to help students be active participants in their own learning, thus ‘building’ their own minds at the level of involvement required for engaged learning?”.

### **Three Conditions that Promote Deep Engagement**

In my model of student engagement, motivation and active learning are twin helices that work together synergistically. How can we promote this synergy? I propose that there are classroom conditions that function somewhat like steps or rungs between the two sides of the double helix spiral. These conditions, because they integrate elements of both motivation and active learning, contribute to the synergy that promotes increased levels of engagement.

#### ***Condition One: The Task Has to Be Appropriately Challenging***

One of the fundamental principles of learning is that tasks must be sufficiently difficult to pose a challenge, but not so difficult as to destroy the willingness to try. Working at the optimal challenge level creates synergy because in terms of active learning, doing things we already know how to do is rehearsal and practice (which reinforces learning) but it is not new learning; just as trying to do things that are impossibly difficult leads to failure and frustration, not learning. In terms of motivation, when our students face challenging tasks but do not expect to succeed, they experience anxiety; when expectancy is high but the task is not valued or challenging, students become bored; when both challenge and skill level are low,

students become apathetic. All three qualities—*anxiousness, boredom, and apathy*—undermine motivation and characterize lack of engagement.

One strategy that I use to promote optimal challenge in my own classes is *differentiation*, a pedagogical strategy developed by Carol Ann Tomlinson at the University of Virginia (Tomlinson 1999, 2001; Tomlinson & Eidson 2003; Tomlinson & Strickland 2005). In a differentiated classroom, the teacher makes a special effort to understand, appreciate, and build upon student differences and designs the course specifically to encourage all students to work at a level that is appropriately challenging to them for maximum growth and individual success. For example in my own courses, I differentiate two core elements:

1. *Material*: I organize my content into modules and then challenge students who already know a portion of the material to move to new, more advanced modules.
2. *Delivery*: All the learning material and activities are delivered both onsite and online, and I encourage students to choose the method that best suits their personal learning style.

These are just a few of the many variables to consider when thinking about differentiating a course. Readers are encouraged to consult works written by Tomlinson and her colleagues that provide both conceptual and practical background for how to organize a course around differentiation principles.

### ***Condition Two: Sense of Community***

Creating conditions in which students interact with each other as members of a learning community also promotes student engagement and creates synergy between motivation and active learning. In terms of motivation, it fulfills the basic human need to be part of a social community. In terms of active learning, it encourages students to be active participants in their own learning as they collaboratively construct, reconstruct, and build their understanding. Furthermore, if we had only our own observations of students using cell phones as evidence, we would know community is important to today's students, but "Team Orientation" has also been identified as one of the core traits of today's college students.

One strategy that I have incorporated in my own courses is to try to move away from assuming such a strongly authoritarian role. This is because in a true learning community, teachers and students are partners in the learning process. Although I am not personally prepared to undergo a complete transformation in the way I interact in the classroom, I have made small changes that I hope communicate to students that I want to promote a sense of community. For example, I try to minimize harsh, directive language in my syllabus and assignment instructions, and I always treat my students with respect. Even these minor shifts in tone have made a significant difference in how students engage in my course.

### ***Condition Three: Teach so that Students Can Learn Holistically***

As college professors, administrators and staff, we flourish in the ‘thinking’ world. When we consider college-level learning, we readily understand abstract thought. Bloom’s Taxonomy of the Cognitive Domain, which classifies behaviors such as knowledge acquisition and synthesis into a series of hierarchical levels, has served as a guide to many of us as we design and develop our courses. But learning involves more than rational thinking and today’s neuroscientists challenge us to embrace a concept of learning that extends beyond logical thinking. Harvard clinical psychologist John Ratey observes that the brain and body systems are distributed over the whole person and that we cannot separate emotion, cognition, and the physical body. In fact, separating these functions, “is rapidly coming to be seen as ridiculous.” I know many math teachers tell me that in remedial classes, they have to spend a significant portion of their time dealing with students’ emotional anxiety about learning before they can help them to actually learn.

Teaching for ‘holistic’ learning—trying to at least integrate the cognitive and affective domains, but where possible and appropriate also considering the kinetic/psycho-motor domain and even the ethical domain, can contribute to synergy because it supports active learning (learners are thinking and caring about what they are doing and doing what they are thinking and caring about) and it also enhances motivation (many students find domain-spanning activities intrinsically more interesting and enjoyable, other students find domain-spanning activities necessary to be more successful learners).

For example in my own courses, I try to teach so that students use multiple processing modes. Most of us have heard for years that lecture is not as effective as active learning pedagogies. Research generally shows that the amount of retention corresponds with the degree to which a student is dynamically participating in the learning activity. In lecture, for example, where students are sitting passively, the student is concentrating primarily on processing verbal information just enough to convert what they are hearing into written notes. If the lecturer supplements the presentation with visual information (such as using PowerPoint slides) or demonstration (thus using physical movement), the student is processing both verbal and visual information, and retention increases. I therefore augment lectures with slides, videos, music, demonstration, and performance to promote as many processing modes as possible during class time. Students not only appreciate the variety, but based on Sousa’s (2006) summary of his and others’ research on the impact of various teaching methods on retention, their retention most likely increases.

Again, consider pausing and reflecting on the following prompt: “What do you, or teachers you supervise do, to help students (1) work at their optimal challenge level (neither too hard nor too easy), (2) feel like valued members of a learning community, and (3) learn holistically?”

## Conclusion

To summarize, I propose that college teachers can promote student engagement in their classrooms by creating conditions that create the synergistic interaction between motivation and active learning. Additionally, there are three conditions that promote this synergy: designing appropriately challenging tasks, building community, and teaching for holistic learning. Student engagement is complex, and my model of student engagement is simply one contribution to an ongoing discussion on both what student engagement means and what we as college teachers can do to promote it. Our understanding will continue to evolve and deepen as the dialogue continues both nationally and internationally.

## Summary

- Although “student engagement” has become a major concern throughout higher education, there is not consensus on what “student engagement” actually means. To help college teachers who are trying to engage students in today’s college classroom, I defined student engagement as “a process and a product that is experienced on a continuum and results from the synergistic interaction between motivation and active learning.” Accordingly, I proposed a classroom-based model for understanding student engagement in the form of a double helix in which motivation and active learning are spirals working together synergistically.
- There are many theories on motivation, but some scholars observe that much of what researchers have found can be organized within an expectancy x value model. Expectancy is what students believe they can accomplish; thus students are more likely to be motivated to learn if they believe that their efforts will be successful. Value involves both product and process, so we are more likely to set up conditions that students find motivating if we teach in ways that help students value both what it is they are learning (product) and the manner by which they are learning it (process).
- Although it can be easy to confuse active learning with physical activity, what active learning really means is that the mind is actively engaged. To understand the cognitive processes that underlie active learning, it is helpful to know basic findings from educational neuroscience and cognitive psychology. Learning is a dynamic process that begins with connecting new information to prior knowledge and results in reformatted neuronal networks (from the perspective of neuroscience) or schemata (from the perspective of cognitive psychology). It is also important to help students transfer learning to new contexts and to preserve new learning in long-term memory in ways that it can be located, identified, and retrieved accurately in the future.



- To promote synergy between motivation and active learning and thus increase student engagement, consider attending to the following three conditions that integrate elements of both: design tasks that are appropriately challenging (neither too difficult nor too easy); help each student feel like a valued member of a learning community; and teach for holistic learning by integrating multiple domains (cognitive, affective, and kinetic/psychomotor).

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## Author Biography

**Dr. Elizabeth F. Barkley** is an internationally known scholar, educator, and consultant who prides herself on her four decades of experience as an innovative and reflective college teacher. Her special interests include engaging students through active and collaborative learning; transforming onsite and online curriculum to meet the needs of diverse learners; the scholarship of teaching and learning; and connecting learning goals with outcomes and assessment. Always trying to connect theory to practice, her books *Learning Assessment Techniques*, *Collaborative Learning Techniques*, (both co-written with Claire H. Major) and *Student Engagement Techniques*, (Jossey-Bass, 2016, 2014 and 2010) were written to help college professors such as herself find practical but research-based solutions to the challenges they face in today's college classroom. She is also the author of three music history textbooks that are now offered as digital interactive learning environments through Kendall-Hunt/Great River Technology.

# Chapter 4

## Towards a Pedagogical Theory of Learning

Ference Marton

This chapter describes the early stages of developing a theory of learning, which offers an alternative perspective to those currently underpinning teaching and learning. It is not specific to higher education; indeed, it has been developed mainly from work at school level. However, the ideas are sufficiently general to apply to teaching and learning at university level, and there are already some examples of research in universities based on the theory. As it is still being developed, the status of ‘theory’ has yet to be attained: what is offered is better thought of as a ‘framework,’ a way of thinking about learning within educational contexts. Its importance lies in directing the teacher’s attention to the specific *object of learning*—the actual content of what the student is expected to learn. The theory also suggests in general terms what is needed to make learning possible, and so is a pedagogical theory which has generally been referred to as *variation theory*, for reasons which will become clear.

### The Importance of Variation in the Object of Learning

The work had its roots in the phenomenographic research which described the different ways in which students see and make sense of important concepts, principles or phenomena met in their studying (Marton and Booth 1997). Typically, these investigations identified five or more distinct conceptions existing among the groups of students interviewed. However, at that stage, the research was essentially

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descriptive and did not provide direct help for teachers about the implications of these importantly different conceptions for teaching. The new theory helps to explain how we learn to make sense of the world around us in terms of different phenomena, aspects and categories. It describes how we learn to see the world in different ways and is complementary to both phenomenography and other theories of learning. Above all, it involves teachers in thinking critically about how they present topics and what they have to do to ensure that learning is made easier for the students.

One of the problems with traditional ways of thinking about learning is that human memory has been viewed in too mechanistic a way, imagined as various 'boxes' which can be accessed as required to transfer previously coded material from long-term memory into working memory. Our approach is to think in terms of *awareness*, and to recognize that our perception of past events, and hence our memories, are continuously being modified, by reflecting on those events in the light of new experiences. Therefore, our theory begins by exploring the nature of the awareness involved in coming to see a phenomenon or topic in an importantly new way, and leads to questions about what we need to do in order to learn how to handle new situations in more powerful ways. If we are able to handle a situation in a more powerful way, we must first *see* it in a powerful way, that is discern its critical features and then take those aspects into account by integrating them together into our thinking simultaneously, thus seeing them holistically. In addition, to discern those critical features, we must have experienced a certain pattern of variation and invariance in the object of learning. A medical student, for example, has to listen to the hearts of many different patients before any sense can be made of the differences heard, while to say anything interesting about the taste of a certain wine, we must first have tasted many different wines.

The practical meaning of the theory changes with the specific object of learning. The most fundamental thing about learning is that we learn different things. A pedagogical theory, which is to be practically efficient, must be sensitive to *what* is learned and this is exactly what variation theory provides. It focuses on the significance of experiencing the *variations* in an object of learning without which understanding is logically impossible. To learn about the meaning of democracy, for instance, students have to experience a certain pattern of variation and invariance. They must familiarize themselves with forms of government other than democracy and also with different forms of democracy. To develop empathy, though, a quite different pattern of variation and invariance is necessary. They must have tried to see the same thing from different perspectives and different things from the same perspective, while to understand the idea of the mathematical proof they must have seen two different proofs, at the very least. The aim of our theory is to make theoretical tools available for analyzing the extent to which the necessary conditions for achieving specific aims for learning are present in certain situations. Then, these tools can also be used to create necessary conditions to achieve those aims.

Discussions on learning and teaching in educational institutions are often about what general conditions are favorable, or not, for learning, but variation theory is

different. When questions are raised about why students succeed or not, it is—as a rule—assumed that it is possible, in principle, for all students to learn what is being taught. However, this rarely happens in practice. Nobody can learn to solve new problems if they have never encountered any problem for themselves, without a teacher being there to explain how it is supposed to be solved. Nor can anybody adjust their way of expressing themselves in written language to different situations if they have previously written for only one situation. If the teacher gives a proof of the Pythagoras theorem on the board, and does only that, the students will find it impossible to understand the meaning of ‘to prove a mathematical proposition,’ as then the *idea* of a mathematical proof cannot be distinguished from a single proof for a specific proposition. At least two proofs are needed to do that, and at least two different proofs are required if the same proposition is to evoke the idea that there might be different proofs for the same proposition.

## Learning and Discernment

Learning to discern the critical features of concepts, of problems or situations, is a crucial form of learning in higher education. In addition, it is an ability many students find it difficult to acquire within academic disciplines. Learning to discern, distinguish, make new distinctions, in a metaphorical sense, amounts to learning to ‘see,’ and more importantly, to see in a different and more revealing way. Our capacity to discern and focus on different aspects of an idea or topic is quite limited. We discern and focus on only a few aspects at the same time, and people differ in the aspects they see as salient. A way of seeing can be defined in terms of the aspects which are discerned and focused on simultaneously, and so people may share the same perception, or may have quite different ones.

Variation theory is concerned with learning to see something in a new way, but there are, of course, other important forms of learning. We not only need to learn to tell colors apart, but we must also be able to name them in a consistent way. We not only need to understand the idea of democracy, but we also have to remember what specific forms exist in different countries. Understanding the idea of mathematical proof is not sufficient as we also have to be able to spell ‘Pythagoras.’ Education involves learning facts and details, but here we are concerned only with the type of learning that involves changing our way of seeing important aspects of the world around us.

## Variation and Simultaneity

To be able to discern differences, we must first experience variation. However, that variation must also be experienced in ways which enable us to compare the instances alongside each other, in other words, simultaneously. To experience green

as distinct from red, both colors must be present, together, in our awareness. If we were to focus on them one at a time, without being aware of, or remembering, the other, we could never experience any difference, any variation. If a woman seems tall to us, she does so against the background of all other women whom we have met before and who, so to speak, co-exist with her in our awareness. This kind of simultaneity in experience, a kind of simultaneity over time, is also needed if we are to experience a melody. The different tunes must co-exist in our awareness, otherwise we would hear each tune by itself and not any distinguishable melody.

However, there is another kind of simultaneity which is necessary for seeing something in a certain way. As there are generally several characteristic features that we must discern and focus on in order to see something in a certain way, *simultaneity* is necessary in the experience of those different aspects at the very same point in time, that is not *over* time but *in* time. If two people look at the same thing and discern the same critical features, but one of them is focusing on all these features simultaneously, while the other does so one at a time, the two people see the same thing in two very different ways.

## The Object of Learning and the Space of Learning

Learning is always the learning of something. This something, as we have seen, is the *object of learning*. This is often seen simply in terms of content: equations of the second degree, photosynthesis, forms of government, the most frequent religions and so on. These certainly can be objects of learning, but we need to draw attention to different senses in which an object of learning can exist in classroom contexts.

The content of learning can be seen as the *direct object of learning*, but often the teacher expects the student to learn how to use that object or work with it in some way. If the students' attention is to be focused on what they are expected to learn, the teacher has also to be concerned with the capability that the students are meant to develop. What are they expected to be able to do with the direct object? The nature of the intended capability is the *indirect object of learning*. The object of learning as a whole thus comprises the indirect and the direct object—the *how* and the *what* of learning, as described in phenomenography (Marton and Booth 1997). The object of learning brings together capabilities and content, for example, '*to be able to solve* equations of the second degree,' '*to understand* photosynthesis,' '*to be able to see* similarities and differences between different forms of governments,' '*to be able to see* different religions *in terms of* what unites them and what sets them apart.' The capabilities, 'to be able to solve ...,' 'to understand ...,' 'to be able to see ... in terms of...,' are the indirect objects.

At this stage, what we have is an object of learning seen from the teacher's perspective—the *intended object of learning*. However, the intended learning objective has to be realized in practice. The object of learning is not only about what *should* be learned but also what *can* be learned in the situation as it exists in the classroom. Although there is great emphasis these days on formulating precise

learning objectives or ‘intended learning outcomes,’ it is not the objectives, as words, that affect the students; it is how the object of learning is presented and brought to life within a lecture, tutorial or other teaching-learning activities—what the students encounter is what makes it *possible* for them to learn. We call this the *enacted object of learning*, which is constituted by the teacher and students together, within a teaching-learning event. The actions of the teacher and the students together create a ‘space’ within which learning can take place, as described more fully in *Classroom Discourse and the Space of Learning* (Marton and Tsui 2004).

In order to find effective ways of arranging for learning, researchers first need to address *what* it is that should be learned in each case, and find the different conditions that are conducive to different kinds of learning. It is only when we have a fair understanding of what learners are expected to learn, what they actually learn in those situations and *why* they learn something in one situation but not in another that pedagogy becomes a reasonably rational set of human activities. In other words, we need to become more analytical and systematic in ensuring that we are setting up situations in which it *really* is possible for students to learn. And for this, it is important that the enacted object of learning can be described in terms of a theory. And that such a theory should make clear for the students what is worth noticing and what is not.

The enacted object of learning should thus indicate what aspects of the object of learning are possible to learn under given conditions. Therefore, following our previous argument, for every object of learning it must be possible to identify a certain pattern of variation and invariance that the learners must experience in order to learn effectively. This does not imply that this is the *only* necessary condition, as there is a mutual responsibility in teaching and learning between the teacher and the students. It is also necessary that the students actively focus their attention on the object of learning. These two conditions are not independent of each other: students are able to focus their attention better on the object of learning if the conditions provided make it possible for them to make sense of it, to ‘appropriate’ it. However, here we are concentrating on just the pattern of variation which is a necessary, but not sufficient, condition for learning to happen.

The enacted object of learning has been described, so far, from the point of the view of an outside observer who is looking at the scenario from a theoretical perspective. However, we must also ask what the object of learning is like from the point of view of the students, in other words the *lived object of learning*. If we are to discover how certain ways of seeing develop, we must consider what aspects of the object of learning the students discern and focus on simultaneously. In other words, it is a description of how the researcher aided by these theoretical tools perceives the students’ ways of experiencing the object of learning (i.e. what aspects they discern and focus on simultaneously).

As we have seen, learners can discern a certain aspect of the object of learning if they experience variation in a dimension of that aspect. When students discern and focus on those critical aspects of the object of learning, which are possible to recognize in a particular situation, their lived object of learning becomes equivalent to the enacted object of learning. Such an identity is far from always the case,

however, as students do not always make use of all the possibilities that the situation affords.

We have now pointed to three different forms of the object of learning and their equivalents:

- intended object* – learning objective;
- enacted object* – the space of learning;
- lived object* – outcome of learning.

Of course, we might try to do without the term ‘the object of learning,’ but we want to emphasize that we have to deal with three distinct forms of this same thing. But what is this ‘same thing’? The object of learning comprises all the possible dimensions that in principle could be discerned, but, as we can never specify all the different ways in which something can be seen, ‘the object of learning’ remains a theoretical concept of which the different forms are just parts.

## What Is Critical for Students’ Learning?

Pedagogical discussions are often about how learning is organized. What is the best way of going about lectures, group work, individual studies and so on? How good is project work, problem-based learning? By now it should be obvious that, first, a certain way of organizing learning cannot be the best for all forms of learning, that is the best regardless of the purpose. Secondly, it should be obvious that it is important *how* the content is taught. In problem-based learning, even with the same learning objectives, the quality of the problems and thereby the student’s learning, may vary a great deal. That is true also of other forms of teaching, such as the lecture, where the same content may be dealt with in entirely different ways, with consequent differences in the students’ learning.

We have carried out a large number of studies in Hong Kong schools since 1998 (Chik and Lo 2004; Marton and Tsui 2004). In all of these, we have studied how the same object of learning is handled in different classrooms (two or more) and in most cases we have also investigated the learning results and made comparisons between classes, trying to understand the differences found. In every study, we managed to establish a close relationship between how the object of learning was handled and what the students learned from the lessons, that is between the enacted and the lived objects of learning. In some classes, the lessons proved to have a higher ‘learning value’ for a certain object of learning than in others, as the students could appropriate the object of learning much better. When we compared lessons with the same intended object of learning but which differed in terms of learning value, we found that the variation in results is a function of the *variation provided* in the pedagogical dimension of the content or subject. We can never say that a lesson is better than another lesson in any absolute sense, but we can say that one is a better resource for a specific learning aim than the other.

Although most of the work using variation theory has been carried out in schools, we can give two illustrations of studies in higher education which have



made use of at least some of the evolving principles. The first comes from research into medical education, while the second is drawn from a doctoral thesis that looked at differences among university teachers of accounting.

### ***Medical Education***

This study was not based on the variation theory itself, but the method used involved comparing and contrasting critical features of an object of learning. Hatala et al. (2003) compared two conditions for learning interpretation skills for ECGs. Following a sequential presentation of three typical ECG diagnoses (myocardial infarction, ventricular hypertrophy and bundle branch blocks), illustrated by two examples each, two groups of students engaged in the practice of those diagnoses under two different conditions. One of these was called ‘non-contrastive’: the students had to examine 4 new cases exemplifying each diagnosis, for one diagnostic category at a time (12 cases all together). In the other condition, called ‘contrastive,’ the same 12 cases were mixed and the students were encouraged to compare them. In the non-contrastive condition, the students were primarily focusing on what was common for each diagnostic category, while in the contrastive condition the students focus was necessarily on how the diagnostic categories differed. When using six novel cases to be diagnosed as a test, students from the contrastive group clearly outperformed those from the non-contrastive group.

[In the contrastive practice], students were encouraged to compare and contrast the difference in the features between the competing diagnoses ... [and this proved relatively] more effective in helping students notice the types of features that discriminate between competing diagnostic alternatives ... The contrastive approach should be applicable to other perceptual and/or diagnostic domains where noticing features is an important component of the task, and the list of competing alternatives for a given diagnosis is limited (Hatala et al. 2003, pp. 23–24).

### ***Accountancy Education***

In this second example, it is possible to interpret the study more directly in the light of variation theory. The focus was on how differences in the ways in which the topic was treated affected what students came to understand about the topic. Rovio-Johansson (1999) followed three lecturers teaching accounting at university level, video-recording three parallel 2-h lectures for each one of the three different topics. After each lecture, she interviewed five students about the topic dealt with. From analyses of the data, she could detect a pattern running through the three teachers’ ways of teaching. As Bowden and Marton (1998) explained in commenting on an earlier phase of the study, one of the lecturers addressed the topics at a concrete, technical level, aiming at the development of the students’ capability to

solve certain types of problem, defined in advance. The second tried, throughout the lecture, to situate each topic within a theoretical framework, aiming at a deep understanding of the concepts and principles used, while the third lecturer moved between general formulations and specific instances of the same problems, aiming at developing students' capabilities for making and grounding rational economic decisions.

These differences can be illustrated in relation to the first topic investigated—the limiting factor in production. This refers to the factor in the production process, which limits the total capacity (given that there are relatively greater resources available as far as the other factors are concerned). The three teachers planned the lecture together. After an introduction, a problem was presented and worked through by the teachers. Discussion, mainly carried through by the teacher, followed and the lecture was concluded. In the problem, the limiting factor, which in this case was the machine hours available, was identified. Then, a decision had to be made about how to decrease the demands on machine hours by buying something ready-made instead of producing it 'in-house.' The choice had to be based on optimal contribution to profit.

There were clear-cut differences found among the three teachers, even though the content of the lecture was well defined, and the staff had planned it together and worked through the very same problem. Furthermore, the content of the lecture could be considered fairly elementary and straightforward. Still, the differences were striking. The first teacher talked about the problem, while going through the solution on the board, concentrating on the problem in isolation. The teacher moved between the actual production process referred to in the problem and the method for dealing with the problem. The focus was thus on the problem-solving process, rather than on a specific solution within a defined context.

The second teacher opened up several dimensions of variation in the introduction and talked about different cost concepts, not only the ones immediately relevant to the actual problem, and about different ways of deciding what costs to allocate to different component parts in the production process. This teacher also pointed out the relativity of the system of accounting itself, explaining that different systems will give you different kinds of information, and therefore 'opening up' a dimension of a variation corresponding to how the system for calculating the outcome was set up, by showing that it could be done in different ways.

The third teacher gave a variety of different examples from several companies (this is certainly a dimension of variation) and opened up a dimension of variation corresponding to the way in which costs are determined. Like the second teacher, he also went through the different cost concepts and not only those which applied to costing in the actual case. Furthermore, he made the point that there are other ways for setting prices in addition to calculus, and that finding the appropriate way may vary from case to case.

Therefore, there were differences in what was taken for granted and what was opened up as a dimension of variation. These differences were reflected in the interviews with the students. While four out of the five students who had listened to the first teacher focused on the specific example given, when discussing the limiting

factor, they all talked about ‘machine hours.’ In contrast, the students who had listened to the other two teachers dealt with the question in more general terms. Also, there were distinct differences in how the students went about solving the problem about the limiting factor during the interview. Although, to solve the problem, it was essential to discern the effect of the limiting factor on the relationship between profitability and profit, students who had been listening to different lecturers approached the problem differently. Students of the first teacher saw the problem from a point of view of the effect of the limiting factor on the relationship between the process of production and the contribution to profit; students of the second teacher concentrated on the effect of the limiting factor on the relationship between costs or expenses (such as variable and incremental expenses) and on contribution to profit, while students of the third teacher were more concerned about the effect of the limiting factor on the relationship between costs and pricing and on contribution to profit (Rovio-Johansson 1999).

From this example, we can argue that it is not so much how the *teaching* is organized (in lectures, project work, problem-based learning, etc.), but how the *content* is organized that is of decisive importance for the students’ learning. The point is not, however, that a particular form of organization (pattern of variation and invariance) is better than another in general, nor that more variation is better than less variation. The point is that *what varies, and what is invariant*, are the most important aspects of how the content is organized; and how the content is organized decides on what conditions learning might or might not take place (For a detailed treatment of the actual theory of learning, see Bowden and Marton 1998; Marton and Tsui 2004).

## Differences Between Conditions and Between Individuals

In the detailed studies in school classrooms in which we had deliberately set up conditions to test variation theory, not all students in the experimental groups managed to learn effectively, while some students in the comparison groups, in which, according to variation theory, it ought to have been impossible to learn, still managed to learn. This is hardly surprising, of course, but it does seem problematic for the theory. And yet, we must remember that the expression ‘impossible to learn’ is used in the sense of ‘impossible to discern,’ and ‘impossible to discern’ means ‘impossible to discern from what the learner could experience and discern *in that particular situation*.’ Still, it is of course, entirely possible that some students have already been able to discern a certain aspect which is invariant in the specific situation. For example, someone who has seen different colors before would, of course, notice that everything has the same green color in a room without any contrasts at all. The contrast resides in previous experiences which are present in awareness together with all the green here and now.

It is also possible that a learner can discern something which has never been discerned before and which is not possible to discern in the actual situation. Take, for instance, the object of learning ‘to understand the idea of mathematical proof,’

at its most basic level. Obviously, it takes two instances at least to separate the idea of mathematical proof from the specific proof that the student has happened to encounter. Imagine, for instance, a lecture in which only one proof is presented and thus the separation of the idea of proof from the actual proof is not made possible. However, think of a student who has seen only one mathematical proof before and thus never been aware of the idea of mathematical proof. Now if that student encounters another example and if, at the same time, is aware of the proof seen before, all of a sudden it becomes possible to separate the proof from the idea of the proof. This oversimplified example points to an interesting principle, namely the complementarity between the variation experienced by the students previously and the variation they can experience in a certain situation. If, after a lecture, a student can discern a certain critical aspect of the object of learning, that could be because it had been done before, because it had been learned during the lecture or because a combination of experiences before and during the lecture had created the necessary conditions.

## **Making Learning Possible**

If we can tell whether or not learning is possible under certain given conditions, then we should also be able to create the conditions that make learning of a certain kind possible. Doing so also implies putting the theory to the test. Some such attempts have been made and with remarkable results. These studies (Holmqvist et al. 2005; Lo et al. 2005; Marton and Pang 2006) show, first, that when the learners have the opportunity to experience the pattern of variation necessary for learning something, they are successful to a much greater extent than when the necessary pattern of variation has not been provided. This may sound tautological, but it did show, first, that there is a certain necessary pattern of variation for every object of learning to which students are introduced, and secondly, that an appropriate pattern of variation has been found in each particular case.

The theory should be useful in all situations where the learning objective is of the kind we are discussing here. However, the problem is that the implications of the theory vary with the object of learning. Its meaning has to be interpreted for every particular case and for every specific object of learning. And the only way of doing so is by ensuring that the teachers themselves are engaged in the work of finding the necessary patterns of variation for the different objects of learning.

An approach similar to this can be seen in the Japanese 'lesson study' which Stiegler and Hiebert (1999) drew to international attention when they suggested it as a possible explanation for the uniquely high achievements of Japanese students in mathematics and science. 'Lesson study' is a traditional form of in-service training of teachers in Japan. A group of teachers, who teach the same subject and who work together, choose a specific object of learning (learning target) and try to find the best way to help the students to appropriate it. They design a lesson or a series of lessons for this purpose and produce collaborative lesson plans. A member

of the group then carries out the lesson in his/her own class, while the others observe the lesson, analyze and discuss what has happened, before developing a new design and lesson plan, which another member of the group carries out, again observed by the others. After yet another analysis and discussion, they document their experiences in such a way that other teachers can profit from them. Even if 'experts' from the outside have been invited to join the group, the work with lesson study is rooted in teachers' own experiences, rather than in any theory. In addition, as a rule, there is no external systematic evaluation.

The idea of 'design experiments,' introduced by Collins (1992), and Brown (1992), was based on the premise that you cannot use scientific experiments (varying one factor at the time, while keeping the other constant) to test conjectures about teaching, as factors in teaching cannot be disaggregated. There is a whole set of interacting factors within the design. We have then to look for the effects of such a design, through comparisons with other designs and through the accumulation of experience through a systematic series of adjustments to the teaching. A design experiment is theory—based and aimed at testing theoretical conjectures about the complex situations of pedagogical reality.

By combining the ideas of lesson study and design experiment, we have found a new way of developing pedagogical insights, namely *learning study* (Lo et al. 2005). It is carried out by a group of teachers, preferably together with a researcher, with the aim of achieving a certain pedagogical goal or object of learning. The group tries to find a powerful way to achieve this aim through several cycles of improvement along the lines of the lesson study model but, in this case, the work is based on a specific theory. Moreover, the lesson is preceded by a test of what the students already know, followed by a test of what they have actually learned. All this is like a design experiment approach, except that here the teachers 'own' the study themselves; they choose the object of learning and the way to handle it, but are guided by the theory and supported by a researcher.

The different lessons are, ofcourse, carried out in different ways. This variation in the enacted object of learning can then be related to the lived object of learning, that is to the students' results. In the end, a document is produced, which is useful both for teachers' practice and for continued research. Every study is a way of trying out the conjectures that originate from the theory on which the experiment was based.

'Learning study' is advantageous for all three groups involved: students achieve a better grasp of the object of learning, teachers understand how an object of learning can be handled and researchers find out how the theory works in concrete instances. Learning study is not defined in terms of a certain object of learning or a certain theory, but presumes *some* object and *some* theory. The advantage of the theory of variation is that it changes with the object of learning and if it can be formulated in a sufficiently clear and comprehensive way, it constitutes a powerful resource for the teachers (and for the researchers too) in handling the many varying objects of learning.

No research findings about learning study are yet available for higher education, but the idea of lesson study is currently being used as the main vehicle for the

improvement of the quality of learning and teaching at the University of Wisconsin (see <http://www.uwlax.edu/sotl/lsp>). There are, nevertheless, good reasons why lesson study—or even better, learning study—in higher education could have a marked impact on student learning. If the way in which the content is dealt with is the single most important factor that constrains the effectiveness of learning, then alerting university teachers to the idea of ‘different ways of dealing with the content’ must be beneficial. In addition, to recognize the importance of that idea they must be able to see the effects of variation in ways of dealing with the same content. When university teachers start looking at their colleagues’ ways of dealing with the same content that they themselves have taught, and when ways of dealing with content become a topic of conversation for them, then an important step towards the improvement of university teaching and learning will have been taken. Lesson studies and learning studies are just two of the ways of making this happen.

## The Variation Theory of Learning

As stated at the beginning of this chapter, variation theory aims at making theoretical tools available for the teachers themselves. The theory is not seen so much as a set of eternally true statements about reality, but as an instrument for handling that reality for specific purposes and in more powerful ways than it can be done without using these tools, other things being equal. The aim is to make a form of learning possible, learning, which means that new and more powerful ways of seeing certain phenomena, or certain classes of situations, are developed. This form of learning is considered fundamental to how the meaning of different things develops and changes in people. However, are our examples actually about this form of learning?

To see something in a certain way depends on discerning certain critical features and bringing them together in awareness simultaneously. That awareness is not of the totality of the world we experience, but what is necessary and critical for our specific purposes in relation to an object of learning. It is the discernment of critical features which distinguishes one way of seeing something from another and—as a rule—provides a more powerful way of seeing the same thing. Unlike phenomenology, the theory neither aims at capturing the experienced world in all its richness nor seeks to describe the structure and workings of the human intellect, as cognitive psychology does. The theory is driven by an interest in pedagogical knowledge, the question of why someone learns what someone else fails to learn. The reasons can lie, in part, in genetic predispositions, prior knowledge, motives and so on, but variation theory describes the conditions which are needed for appropriating specific objects of learning. We do not want to argue that these conditions are the most important factor, but we do say that they are necessary and that to create them is, has been, and is going to be, central for teachers, whether in schools or higher education (cf. Carlgren and Marton 2000).

Hence, in the end, variation theory is about differences in capabilities between, and within, human beings. And we argue that the differences in capabilities have to

do with people's opportunities for discerning aspects of the world around them through experiencing variation, that is differences in these aspects. This is what Pang (2002) calls the 'two faces of variation.' He alludes to the fact that what we call the theory of variation describes how people experience variation in different aspects of the world around them and therefore experience that world in different ways. And it has sprung from the research program of phenomenography, which also describes variation (i.e., differences) in people's ways of seeing and experiencing their world. The strictly descriptive research approach of phenomenography is thus being transformed into a theory, which explains the earlier descriptive results. This means, hopefully, that we have taken some steps towards the development of a *pedagogical* theory of learning, which should be valuable to both teachers and researchers, and which can be used to encourage collaboration between teaching colleagues in exploring the critical features of important concepts, and the variations in those features that need to be made explicit for students if the quality of their learning is to be improved.

## Summary

- If we are able to handle a situation in a more powerful way, we must first see it in a powerful way, that is discern its critical features and then focus on them simultaneously. To do it, we must have experienced a certain pattern of variation and invariance in the object of learning. To learn about the meaning of democracy, for instance, students have to familiarize themselves with forms of government other than democracy and also with different forms of democracy.
- The object of learning has three forms: the intended object of learning, the enacted object of learning, and the lived object of learning. These correspond to the learning objective, the space of learning, and the outcome of learning, respectively. At the same time, the object of learning comprises the indirect and the direct object—the how and the what of learning. For example, 'to understand photosynthesis,' 'photosynthesis' is the direct object, while 'to understand ...' is the indirect object. Thus the concept of the object of learning brings together content (what) and capabilities (how).
- The variation theory is the theory of variation and invariance in the object of learning. What variation and invariance students experience is the most important aspect of how the content is organized, and thus it is a necessary condition of learning. However, instructors cannot control all the variations students experience. They are dependent on the complementarity between the variations experienced by students before and during the class.
- We have created the method of learning study by combining the ideas of Japanese lesson study and design experiment. We are now on the way of developing the variation theory as a pedagogical theory of learning by cumulating the findings from diverse learning studies.

## Appendix: Reinterpreting Approaches to Learning

The main focus of this chapter has been steps towards a pedagogical theory of learning primarily from the perspective of teaching. But this research builds on earlier studies of qualitative differences in learning at university level. In this appendix an attempt will be made to briefly illustrate that the variation framework outlined so far is also applicable to such differences (cf. also Marton 2015).

### *Deep and Varied Approach to Learning*

Marton and Säljö (1976) made a distinction between two ways of going about learning, the deep approach and the surface approach. The former refers to the learner focusing on the text being read (“the sign”), the latter refers to the learner focusing on the meaning of the text (“the signified”). The distinction was based on the learners’ own accounts of how they went about learning, i.e., how they experienced their own attempts to learn. In one case they seemed to direct their efforts to be able to retell the text, in the other to tell what the text was about, in their own words. Those adopting a surface approach did not seem to search for the meaning of the text actively when reading, while those adopting a deep approach did so. The meaning dimension of variation was not opened up in the former case, but was so in the latter. When answering the question what the text was about, those adopting a surface approach tried to stick to the text as closely as possible, i.e., keeping it as invariant as they could, while those adopting a deep approach opened up the dimension of wording, but keeping the meaning found invariant. The distinction between the two approaches to learning can thus be depicted in terms of differences between two patterns of experienced variation and invariance. Silén (2000) investigated medical students’ ways of learning in the context of a problem-based learning program, from the point of view of the students’ responsibility for, and independence in, their own learning. She concludes:

Challenging one’s own perspective, looking for alternative explanations, comparing different ways of seeing the same thing, searching for novel angles and trying out understanding and doing things in different ways, are acts that the students take the initiative to themselves. This implies that this is an important and fundamental constituent part of learning. It is interesting that in the present context (the students own responsibility for their learning), seeking variation becomes to a great extent something that the students have to do (p. 265, translation mine).

This study was followed up a few years later, in the same context, with the same kind of students, by Fyrenius et al. (2007). In this case, 16 medical students were interviewed about their understanding of certain physiological phenomena and about their approach to the learning about those phenomena. In 10 of the 16 cases, the researchers found that the students strived for changes in perspectives and for deliberately creating situations or actions rich in variation (p. 156). This is often expressed metaphorically: talking about turning around, twisting, looking at the



object of knowledge from different perspectives (In the transcripts below, S11 indicates Student #11, S20–97 Student #20 of the 1997 class, and so on).

(S11) It [the tutorial] contributes to what you should use the knowledge for, it is like the clinical, ‘why is that treatment better than this one? Why doesn’t it work? The same kind but it ought to work’... then you have more, like, applied it, even more like twisted and turned it, and applied it more and dissected it even more, so to say ... (p. 157).

In the next quote, we can see the same “turning and twisting” metaphor in the context of “repetition with variation”:

(S12) If you work through one thought several times so that you sort of get familiar with it in a way, it sort of, that you can twist and turn it in various ways and then it sticks better (p. 157).

The need for coming up with different options (or opening up a dimension of variation) was expressed by another student in the following way:

(S7) [facts] are tested against other facts and there’s questioning work in progress all the time, how can this potentially be related to this? And then maybe you come up with some alternatives, some of which are more likely than others, some feel as they have potential (p. 157).

The above quote from S12 resembles a way of going about learning found among Chinese students. They combine learning for understanding and learning for remembering (variation and repetition). They are reading different accounts of the same thing and they read the same account several times, but different ways.

Comparing studies of high school students with their own study of university students, Marton et al. (2005) argue that while understanding and memorization are not differentiated in young high-school students’ accounts, they are frequently separated and even contrasted by older high-school students, to be brought together in a complementary relationship by many university students. Twenty students from various fields of study, at an elite Chinese university, were followed during the first one and half year. Many of them referred to the importance of variation in gaining understanding, and to an increasing extent to the central role of differences.

Some students pointed to the pattern of variation and invariance called *generalization*. The focused aspect of the object of learning is invariant, while other aspects vary:

Extracting what is general from different cases (S20–97).

You and the thing are in the same world. It has already been in your mind. I might not be able to speak it out, but if I encounter this word, a picture will appear in my mind and I know the general idea (S3–99).

... you know something about what you have learned, extend this knowing and draw inferences about other cases from one instance (S6–97).

... getting deeper and deeper, from the superficial to the essence (S7–99).

... you cannot stay on the surface of what you learn. You should mix in your own ideas while you learn it. So you can further digest what you learned ... to have your own idea after you learned it (S5-97).

Other students referred to the pattern of variation and invariance called *contrast*. The focused aspect of the object of learning varies, while other aspects are invariant:

... to change to another point of view, or another side, and try to think from that person's point of view (S6–99).

You will approach it from different angles, and then go deeper into it, and at last draw a conclusion (S14–99).

I will first grasp its intention and extension, then grasp its characterization, find the difference between it and other things.

The difference is of great importance ...

Through comparison, for example when I get a concept, I will first read through it to find its general idea and its key points, then compare the key points with the difference between this concept and others (S20–99).

For example, I need to understand three kinds of knowledge, A, B, C. A is the learned knowledge while B and C are the unknown knowledge. Then I will use A to analyze B. After understanding B and comparing A and B, I have got knowledge AB. Then I can use AB to analyze C and thus get the knowledge ABC. In this continuous process, there is neither a clear end, nor the clear starting point. Understanding and memorization are mixed and this enlarges our knowledge (S20–99).

Try to think from other people's perspectives (S8–97).

... knowledge becomes deeper. ... If I want to understand something, at first I should generate interest in it. Then I will seek for its features and why it has such features that makes it different from others (S18–99).

(If you want to understand something, what would you do?) I will first think, look up references, and then discuss with classmates, comparing mine with their opinions ... (S15–99).

(Marton et al. 2005, p. 310)

Experienced patterns of variation and invariance in learning illuminates what a deep approach to learning is like.

In order to develop a powerful way of seeing something, the learner must decompose the object of learning and bring it together again. Such decomposition happens in two ways: through delimiting parts and wholes, on the one hand, and through the discernment of critical aspects, on the other hand. Towards such an end, the learner has to create the necessary patterns of variation and invariance. This is deep approach to learning in terms of the Theory of Variation.

### ***Surface and Less Varied Approach to Learning***

What is then the alternative to deep approach, in such terms? Marton et al. (2005) found three students in the beginning of the study, one of them also at the end representing such an alternative. The most common answer to questions about his

way of studying was ‘I will read it over and over again’ (S12–99). When he was asked about if he had a particular method of preparing for argumentative (as opposed to short answer) questions, he said:

I will memorize the key points, such as those beginning with “First,” “Second,” and discussion and exposition.

(Do you think that you have some special methods to memorize things?)

No. I only read them many times.

(For example, if you read something three times, is it the same every time? Does the meaning change?)

The same. I just repeat it until I can memorize it.

(No difference?)

No. (S12–99) (Marton et al. 2005, p. 300).

The repetitive (invariant) way of handling the learning task can also be illustrated by some interview excerpts from Boulton-Lewis and his colleague’s (2004) study how a group of Australian students with comparatively weak academic background, tried to cope with the demands of the university;

I: So what actually does study mean to you?

S: Probably just actually learning the material. Actually sitting there and for an exam ... if I have to study for an exam I’ll be copying out the sheet and rereading it over and over, you know, start doing that a week before the exam or something so I can be familiar on that.

I: So after you rewrite what you are actually studying, what’s the process after that?

S: I find the easiest way for me to do it is probably writing it out again and reading it to myself and then reading it, reading it, reading it (S1–97).

I: Did you try and memorize them?

S: Yes. I wrote them over and over again on a piece of paper, the science word for it and the meaning for it. I used to write out a whole sheet before I’d get it in my head. I used to try that method before as well, just getting there and saying the bold words and the definition and read it over, I used to do both, like read the other ones and the ones I don’t get through I write over and over until I get it (S2–97).

I: How do you actually memorize it?

S: Read it over and over, then I come back and then I cover it up and I see if I remember it then I’ll have a look at it, if I’m right I’ll keep going but if I’m not I’ll read it again and again and again until I get it (S10–97) (Boulton-Lewis et al. 2004).

These quotes illustrate Brousseau’s (1997) thesis about the paradoxical nature of the “didactic contract,” from the learner’s perspective: by trying hard to fulfill the didactic contract, in the sense of becoming able to answer the teacher’s questions, the students make it impossible for themselves to fulfill the didactic contract, in the sense of making the ideas taught or read about, their own.

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## Author Biography

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# Chapter 5

## Deep Active Learning from the Perspective of Active Learning Theory

Shinichi Mizokami

*Active learning* (AL) forms the basis of deep active learning. In this chapter, I will first explain how active learning is defined and how it is related to the paradigm shift from teaching to learning. Second, I will propose six practical suggestions to enhance the quality of AL-based instruction: (1) assessing learning hours outside the class, (2) backward design, (3) curriculum development, (4) multiple classes per week, (5) building an environment for active learning, and (6) the flipped classroom. Finally, I will discuss in what ways deep active learning is indispensable from the perspective of active learning theory.

### What Is Active Learning?

#### *Definition*

Active learning is an umbrella term. It has been considered impossible to find an agreed-upon definition for everyone. With that in mind, here is my definition:

*Active learning* includes all kinds of learning beyond the mere one-way transmission of knowledge in lecture-style classes (= *passive learning*). It requires engagement in activities (writing, discussion, and presentation) and externalizing cognitive processes<sup>1</sup> in the activities.

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<sup>1</sup>*Cognitive processes* mean the processes of information-processing on mental representations using such cognition as perception, memory, language, and thinking (logical/critical/creative thinking, reasoning, judging, decision-making, problem-solving, etc.). We understand that information-processing is done in the process of activities such as writing, discussion, and presentation.

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Bonwell and Eison (1991) are well known early proponents of the concept. In their article *Active Learning* they argued how difficult it was to define the *active* in active learning. They presented the following two critical comments raised by educational traditionalists in order to shed more light on active learning.

(A) *To begin with, does passive learning even exist?*

(B) *Isn't attentive listening to a lecture also active learning?*

Comment (A) may have been derived from the following syllogism on action, on the basis of which any kind of learning would be *active*, not *passive*:

Learning is action.

Action is active.

Therefore, learning is active.

Another explanation is that when you take a position in a stationary object (T1) and next you see the object start to move (T2), you observe the gradual movement from T1 to T2. This movement is action and thus active. From this standpoint, learning (action) is always active, and passive learning cannot exist.

Although we may understand what action itself is, we cannot be sure about what kind of action is important to active learning. We are motivated to characterize it by some *standard* so we need to take the context into consideration regarding the *active* in active learning. However, what is the standard? The condition has already been laid out in the first part of the above definition: "...lecture style based on one-way transmission of knowledge in lecture-style classes (= *passive learning*)" (Biggs and Tang 2011; Meyers and Jones 1993; Prince 2004). If we accept the above explanation of action itself, listening would also be considered an action, and therefore it would be active. However, we consider listening to be passive based on our operational definition of active learning, which requires some form of active engagement.

Then, what are the grounds upon which we defined listening to a lecture as passive learning? The answer is the paradigm shift *from teaching to learning* (Barr and Tagg 1995; Tagg 2003). Active learning has been proposed based on the learning paradigm as opposed to the teaching paradigm that relies on the one-way transmission of knowledge through passive learning, such as listening to a teacher-centered lecture. However, we are still not sure about how to best characterize the active component in active learning. The latter part of the definition has been operationalized as "engagement in activities (writing, discussion, and presentation) and externalizing cognitive processes in the activities." Writing, discussion, and presentation are specific examples of active learning, denoting the paradigm shift from teaching to learning at the activity level.

In addition to activities, such writing, discussion and presentation, the component of "externalizing cognitive processes" is equally important to the definition of active learning. In fact, there are quite a few practitioners who do not see how cognitive processes are involved in students' activities. However, active learning reflects the ongoing societal changes by fostering cognitive, interpersonal,

and social skills, and competencies. That is why the definition of active learning places a special emphasis on the adequate interaction between activities and externalizing cognitive processes to the outside world.

According to the above discussion, it is clear that the learning in *Comment (B)* is *not* active learning. Listening, whether attentive or lax, represents passive learning in the teaching paradigm. If you try to understand active learning intuitively and without setting a standard, objections akin to *Comment (B)* are likely to arise. However, active learning is not a mere *active* learning but it is a technical term that is operationally defined. Bonwell and Eison (1991) criticized the intuitive approach to active learning.

### ***The Shift from Positioning A to Positioning B***

Attention to active learning grew in relation to massification of higher education and diversification of students in the 1980s in the United States. However, once active learning and the learning paradigm were accepted, both went beyond effective learning (method) to overcome difficulties in teaching diverse students who did not listen attentively. Active learning and the learning paradigm have continuously evolved, adding more developmental purposes, especially fostering cognitive, interpersonal, and social skills and competencies, and learning how to learn. This was the case in Bonwell and Eison's (1991) active learning. Fink's (2003) active learning was greatly advanced by incorporating it in his theory of significant learning experiences.

In Japan, active learning started to be gradually accepted since the mid-1990s. University teachers struggled to encourage their students to actively engage in classes by using minute papers or comment sheets, quizzes, student course evaluations, and so on, at the end of the class. It is clear today that such practice of active learning, merely to overcome students' passive learning habits, was rather inadequate. The teachers did not have a developmental perspective in their active learning techniques at that time. Recently, however, active learning has incorporated the developmental perspective, as typically seen in the 2012 Central Council for Education Report advocating qualitative transformation of university education. The report indicated that among the main goals of active learning are the development of students' generic skills and competencies, ethics, culture, knowledge, and experience.

To clarify the difference between earlier active learning and recent active learning let us employ the dynamic concept of positioning. *Positioning* is defined as taking a position relative to others (thing, person, etc.). We can see the same thing differently from different positions. Adopting this concept active learning has historically been looked at from at least two different kinds of positioning: Positioning A and Positioning B (see Fig. 5.1). In Positioning A, it is not until you take a position in passive learning in the teacher-centered lecture that active learning can commence. The *active learning* emerges as a new position relative to the traditional *passive learning*. In this positioning, teachers struggle to encourage their students to actively



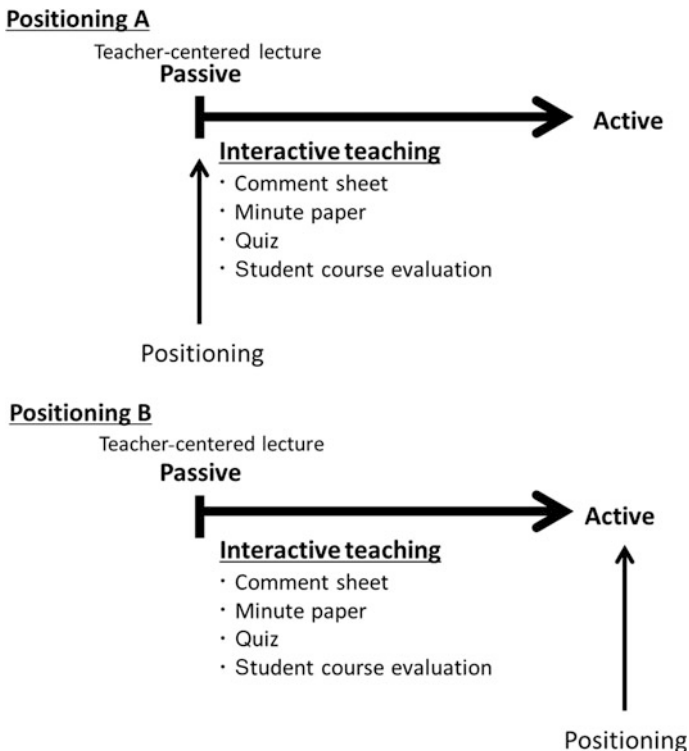


Fig. 5.1 Transition from Positioning A to Positioning B in active learning

engage in classes by using minute papers, comment sheets, quizzes, student course evaluations, etc. By contrast, active learning in Positioning B aims to actively develop students’generic skills, competencies, ethics, culture, knowledge, and experience, as reported in the 2012 Central Council for Education Report (Advocating qualitative transformation of university education). It is also more active than that in Positioning A because it does not simply respond to massification of higher education and diversification of students but actively incorporates students’ developmental perspective in learning. Thus, Positioning B is a new and evolving position both for *student learning* and *the development paradigm*.

Fink’s (2003) significant learning experiences aimed to develop students’ “foundational knowledge,” “application,” “integration,” “human dimension,” “caring,” and “learning how to learn”. His learning theory covered not only acquisition of knowledge and development of cognitive abilities but also a wider human development. He discussed student learning and development systematically and comprehensively. Recently, many other useful learning theories and strategies for promoting student development have been proposed (Ambrose et al. 2010; Bain 2004; Biggs 2003; Biggs and Tang 2011; Ramsden 1992, 2003), all of which are rooted in the student learning and development paradigm whether they are conscious

of it or not. Even when the term “active learning” is not explicitly used, many learning theories and strategies embrace the learning described by Positioning B. When it comes to Positioning B, active learning is essentially required regardless of learning theory or strategy. Thus, once the learning in Positioning B becomes common in the future, the term “active learning” will no longer be needed.

## **Practical Suggestions to Enhance the Quality of AL-Based Instruction**

In this section, I will suggest six practices for enhancing the quality of *AL-based instruction* (= lecturing + active learning): (1) assessing learning hours outside the class, (2) backward design, (3) curriculum development, (4) multiple classes per week, (5) building an environment for active learning, and (6) flipped classroom. *Deep active learning (DAL)*, the topic of this book, is also one such practice that connects active learning to deep learning. However, as DAL was already explained in Chap. 2, I am going to review the other six practices here.

### ***Assessing Learning Hours Outside the Class***

Many AL-based instructions are designed comprehensively to include not only in-class learning but also out-of-class learning such as preparation, review, homework, tasks, essays, etc. (Fink 2003). Mazur’s (1997) Peer Instruction (PI) is based on students’ reading assignments before the class. Other learning theories and strategies, such as Learning Through Discussion (LTD) (Yasunaga 2006, 2012) or Problem-based Learning (PBL) (e.g., Albanese and Mitchell 1993; Barrows and Tanblyn 1980), also attempt to structure both in-class and out-of-class learning. It is not always the case that the more time spent, the better. Conversely, too little time devoted to out-of-class preparation is also problematic. Hence, to enhance AL-based instruction teachers need to assess their students’ learning hours outside the class, in order to know how much time is needed to achieve desired learning outcomes.

Qualitative assessment is equally indispensable. Most AL-based instructions provide a variety of distinct tasks, such as writing worksheets, group discussions or presentations, which teachers need to assign to students in a fast pace. As a result, students often lack the classroom time to absorb the presented information and think deeply about the topics. Students should not devote their whole out-of-class time to a mindless preparation, review, and homework. Rather, they must reexamine their understanding try to connect it with their prior knowledge and experience, look up new words and terms that came up during the classes, thereby actively enhancing the quality of understanding of the learned content and creating

their own “individual learning time/space”. Likewise, the teachers need to assess the quality of out-of-class learning, so that they can increase the quality of active learning.

### ***Backward Design***

My second suggestion for enhancing the quality of AL-based instruction is using *backward design* by Wiggins and McTighe (2005), emphasizing results-focused and assessment-based instructional design.

The idea of backward design was proposed in their theory of *authentic assessment*, which assessed learning and activities not only in the school context but also assessed performance and activities directly associated with real social and life problems through the following three stages: (1) identify desired results, (2) determine acceptable evidence, and (3) plan learning experiences and instruction.

Backward design and traditional curriculum design greatly differ in their direction. Traditional courses or instructions have been designed on the basis of what to teach and how to teach. In contrast, backward design is focused on results. Specifically, teachers first identify desired results as learning outcomes, then determine acceptable evidence for assessment, and finally plan learning experiences and instruction for the following classes. Thus far, assessment and evaluation have been mostly conducted through tests or essays at the end of the course. Test questions or essay topics may be decided in the middle of the course (or near the end of the course). However, in backward design, teachers determine the evidence for assessment first, which creates a basis for planning learning experiences and instruction.

Backward design is not an idea for directly enhancing the quality of AL-based instruction. Nevertheless, higher education is shifting the paradigms from teaching to learning and development, which requires teachers not only to provide knowledge but to develop students’ cognitive, interpersonal, and social skills and competencies for adapting to changing society. Backward design enables teachers to design their course and instruction while focusing assessment on desired results.

### ***Curriculum Development***

The third suggestion is to adopt a curriculum development. Basically, active learning or AL-based instruction involves teaching and learning at class and course level, not at curriculum level. However, recently the government has required university teachers to set teaching and learning objectives for the desired learning

outcomes in their courses, based on three policies<sup>2</sup> in undergraduate educational reform. Backward design is also involved in this context. Thus, as soon as you start to think about teaching and learning, AL-based instruction, design, etc. in class and course, the discussion always comes to desired learning outcomes, and finally to curriculum development.

More attention should be paid in this context to developing students' cognitive, interpersonal, social skills and competencies through the course. Over the last decade, the government has proposed "graduate capabilities" (*gakushiryoku*) to help establishing undergraduate education. It consists of not only knowledge and understanding but also generic skills, attitudes and orientations, integration of learning experiences, and creative thinking. Accordingly, universities have to construct or reconstruct not only their curricula but also their teachers' methods for teaching and learning. AL-based instruction is involved here. The teachers have to switch teacher-centered style to AL-based instruction to develop students' cognitive, interpersonal, social skills and competencies from the curricular perspective, which can enhance the quality of AL-based instruction.

### ***Multiple Classes Per Week***

Many courses in the United States provide multiple classes a week. Some of the lecture-based courses, which are typically seen in the freshman classes, provide not only two or three lecture hours but also a seminar hour conducted mostly by teaching assistants. In contrast, in Japan, most lecture-based courses just provide a 90-minute lecture without seminar or discussion session. In addition, the difference between lecture courses and seminar courses is strictly defined in most universities in Japan.

From the perspective of active learning, the course format consisting of a lecture and a seminar each week as typically seen in the United States is attractive and offers a potential for enhancing the quality of AL-based learning. Multiple classes combining lectures and seminars each week exemplify a helpful system for students because the classes are close together and students can concentrate on their work. Teachers can ask more necessary questions, assign tasks, and sometimes can add or modify the learning contents according to the formative assessment of how students are learning. In contrast, in most Japanese courses, teachers have recently been required to create AL-based instruction by splitting a 90-minute class into a lecture hour and seminar (active learning) hour. It may be better to build a course format consisting of several classes comprised of lectures and seminars (active learning) each week, although this does not mean that only the course format will resolve various problems surrounding AL-based instruction.

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<sup>2</sup>The so-called *three policies* (admission, curriculum, and diploma policies) were first issued by the 2005 Central Council for Education (Future Higher Education of Japan) of the government.

## ***Building an Environment for Active Learning***

The fifth suggestion is to build a learning environment for supporting students' active learning. Hayashi (2011) indicated that universities need to build the following three kinds of learning environments: (a) active learning studios, (b) learning commons, and (c) communication spaces. I will explain the first two below.

Regarding (a) active learning studios, Hayashi introduced MIT's TEAL project (TEAL: Technology-Enabled Active Learning). The studio built for it provides an active-learning environment using round tables, laptops, projection screens, whiteboards, clickers, etc., which support student thinking, discussion, and presentation. Hayashi (2011) introduced the KALS (Komaba Active Learning Studio) at the University of Tokyo and the KALC (Kaetsu Active Learning Classroom) at Kaetsu University as well. These are not always necessary for effective active learning, but if they are available, a variety of learning styles and opportunities can be provided for students. To teachers, students, and other stakeholders, studios can send a message that universities and faculties are promoting active learning and AL-based instruction organizationally, which can enhance the quality of AL-based instruction. The (b) learning commons are built by integrating the functions of library, information technology, and other academic support. They provide students with a series of services on learning, guidance to the right places, functional and dynamic spaces for inquiry, cooperation, collaboration, discussion, consultation, etc. (McMullen 2008).

Somerville and Harlan (2008) stated that learning commons have been developed as a learning environment by connecting them to the paradigm shifts from teaching to learning in higher education. The idea arose from the comprehensive extension of functions of a library from the inside to the outside including learning commons to facilitate student collaboration and independent learning. In the near future, more collaboration between librarians and faculty members will be expected in order to develop the learning commons and to enhance the quality of active learning and AL-based instruction.

## ***Flipped Classroom***

The last suggestion is the flipped classroom, which has recently been popular in Japan. The *flipped classroom* (or inverted classroom) is defined as a style of teaching and learning that reverses traditional in-class teaching and out-of-class learning. That is, what has been taught in the class traditionally is moved out to out-of-class learning, and what has been learned outside the class traditionally is moved into the classroom to confirm the understanding of contents, deeper thinking, and problem solving by cooperative learning. This style of teaching and learning has become possible because computers and online learning at home have greatly advanced. More recently, a lot of video materials are provided online at sites

such as YouTube with the OpenCourseWare (OCW) and the MOOCs (Massive Open Online Courses), such as Coursera and edX in higher education (Shigeta 2014). Students can prepare for their class by watching online materials of what has been traditionally taught in the class.

I would like to add the flipped classroom to the other forms of AL-based instructions, for it enables teachers to design AL-based instruction with enough time during the class. The flipped classroom is AL-based instruction in *Positioning B* rather than *Positioning A*, because teachers can have enough time to prepare for student development during the class. Moreover, the flipped classroom is much more AL-based than ordinary AL-based instruction in *Positioning B* because it provides much more time for active learning during the class, since large portion of the course content is provided as online materials. The flipped classroom is difficult to design but it is highly-valued for its role in enhancing the quality of AL-based instruction.

## Why Is Deep Active Learning Indispensable?

*Deep active learning (DAL)* can enhance the quality of active learning by deeper learning and understanding. In this sense, it should have been taken up in the previous section. However, as this is the central theme of this book and it was already explained in the previous chapter, I will tackle it from different perspectives here.

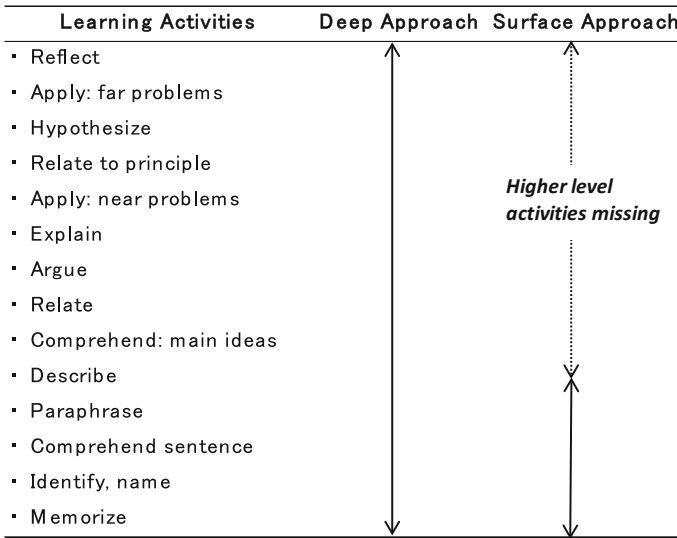
### *Deep Approach to Learning*

The concept of *deep approach to learning* is traced back to the Swedish scholars, Marton and Säljö's (1976). In their experiment, they asked participants to read the chapters of a textbook and a newspaper article. Then, five or six weeks later, they examined what the participants understood and how much they could remember what they had read. The results revealed two *types* of reading. In one type, the participants just read the textbook and articles without understanding the content properly. They wanted to find the answers to questions provided by the researchers by just reading some of the paragraphs that looked relevant. They did not score well on the tests of comprehension. In contrast, another type of participant read the whole text while paying attention to what the authors intended, what the gist was, what the conclusion was, etc. When tested, they did well, even after five or six weeks. Since then, the two different approaches to learning—the deep approach and surface approach—have become better understood (Entwistle et al. 2010). The *deep* approach to learning seeks meaning, whereas the *surface* approach to learning attempts to finish a given task without deep commitment by focusing on words and facts individually. These approaches are sometimes simply called *deep learning* and

**Table 5.1** Characteristics of deep and surface approaches to learning

<b>Deep approach</b>
• Relating ideas to previous knowledge and experience
• Looking for patterns and underlying principles
• Checking evidence and relating it to conclusions
• Examining logic and argument cautiously and critically
• Being aware of understanding developing while learning
• Becoming actively interested in the course content
<b>Surface approach</b>
• Treating the course as unrelated bits of knowledge
• Memorizing facts and carrying out procedures routinely
• Finding difficulty in making sense of new ideas presented
• Seeing little value or meaning in either courses or tasks set
• Studying without reflecting on either purpose or strategy
• Feeling undue pressure and worry about work

Source Adapted from Entwistle et al. (2010)



**Fig. 5.2** Approaches to learning characterized by the “verbs” of learning activities. Source Adapted from John Biggs and Catherine Tang, Teaching for Quality Learning © 2011. Reproduced with the kind permission of Open University Press. All rights reserved

*surface learning.* Table 5.1 illustrates distinctions between deep and surface approaches to learning.

Biggs and Tang (2011) characterized the deep and surface approaches to learning using verbs of learning activities (see Fig. 5.2). The figure shows that the deep approach to learning is characterized by higher cognitive verbs such as “reflect,” “apply: far problems,” “hypothesize,” “relate to principle,” etc., whereas

the surface approach to learning is characterized by the repetitive, non-reflective, procedural problem-solving verbs such as “memorize,” “identify, name,” “comprehend sentence,” “paraphrase,” “describe,” etc. The true value only lies in the deep approach, which makes use of all the verbs, including the repetitive, non-reflective, procedural problem-solving verbs. For the deep approach, students may use “memorize,” “comprehend sentence,” and “paraphrase” as well. In this sense, the problem of the surface approach is the lack of the higher cognitive verbs (Biggs and Tang 2011).

### ***Not Learning Style But Approach to Learning***

Biggs (2003) warns that deep and surface approaches to learning depend on teaching and learning situations and therefore one should construct them independent from students’ learning styles (Pask 1976). Teachers should create learning situations and settings for students to take the deep approach to learning despite their own learning styles. If teachers give such a traditional lecture that all students can do is just to adopt the surface approach, even students who usually embrace the deep approach cannot help taking on the surface approach. Conversely, if teachers provide strategic AL-based instruction with the deep approach, even students who normally adopt the surface approach will have to take on the deep approach.

Figure 5.2 also suggests that there are some verbs (learning activities) that students would not adopt very spontaneously in the class. For example, “explain” and “argue” are activities done with others, which are quite different from verbs that are processed internally, such as “relate” and “relate to principle.” If teachers do not design activities such as “explain” and “argue,” students will not engage in those activities spontaneously. The activities such as “apply: far problems” and “apply: near problems”—called *knowledge application*—suffer from the same neglect without a careful course design. Thus, some activities for the deep approach can arise even in traditional lectures, but others can arise only when more strategic AL-based instruction is provided. The DAL combining active and deep learning is more comprehensive and substantive theory and practice than deep learning (deep approach to learning).

### **Summary**

- Active learning was defined as all kinds of learning beyond the mere one-way transmission of knowledge in lecture-style classes (= passive learning). It requires engagement in activities (writing, discussion, and presentation) and externalizing cognitive processes in the activities.
- Attention to active learning grew along with the massification of higher education and diversification of students. However, once active learning and the



learning paradigm were accepted, both became effective learning methods for overcoming the difficulties in teaching diverse students who did not listen attentively. Both have also evolved, adding more developmental purposes. In this chapter, this shift was explained by using Positioning A (in contrast to the teaching paradigm) and Positioning B (aiming at the learning and development paradigm).

- Six practical trends were given for enhancing the quality of AL-based instruction: (1) assessing learning hours outside the class, (2) backward design, (3) curriculum development, (4) multiple classes per week, (5) building an environment for active learning, and (6) flipped classroom.
- According to Biggs and Tang (2011), who characterized deep and surface approaches to learning by using verbs of learning activities, the problem of the surface approach to learning is that it lacks higher cognitive verbs such as “reflect,” “apply: far problems,” “hypothesize,” and “relate to principle.” Some of the verbs can be applied only by strategic AL-based instruction, hence the necessity of deep active learning (DAL), not just deep learning.

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**Part II**  
**Attempts in Various Fields**

# Chapter 6

## The Flipped Classroom: An Instructional Framework for Promotion of Active Learning

Tomoko Mori

Thanks to the Japanese initiatives that transform the paradigm from teaching to learning, the flipped classroom implementing the active learning activities are rapidly introduced.

In this chapter, I provide several examples of the flipped classroom for designing active learning, differentiating two model types, i.e., investigative model and knowledge acquisition model.

You will find that through the preparatory video lectures, the flipped classroom could circumvent the gap between thought and action, one of general problems in the active learning, and that the flipped classroom is indeed expedient for successfully designing the learning strategy through the repeated internalization-externalization processes.

As such, the flipped classroom is one of most efficient form for effectively realizing and deepening the active learning activities.

### What Is the Flipped Classroom?

The flipped classroom, which originated as a grassroots movement in the United States in the second half of the 20th century, is a combination of e-learning and face-to-face classroom sessions. It is an instructional format in which students are encouraged to engage in preparatory self-learning in the former and, in the latter, are given opportunities to do exercises designed to promote deeper understanding and absorption of the materials being learned, or to engage in learning advanced content. In recent years, with the advent of MOOCs (Massive Open Online

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Courses), the notion of the Flipped classroom has become a keyword in educational reform movements.

The flipped classroom is said to have originated as the “classroom flip,” coined by Baker (2000). Subsequently, high school chemistry teachers Bergmann and Sams (2012) began using the term “flipped classroom” and devised the more typical form of the method. Aaron Sams explained the reason for the method when he visited Japan: He and Bergmann were seeking to replace teacher-centered classes focused on imparting knowledge with learning-centered classes in which students carry out activities in a dynamic manner.<sup>1</sup> That is to say, the flipped classroom is not merely a new instructional format in which classroom instruction and self-instruction at home are reversed; it would seem correct to position it as one of the initiatives to transform the paradigm from instruction to learning.

This method began to be implemented widely in Japanese higher education around 2012 and there are four conceivable major reasons why it has spread as a grassroots phenomenon, just as it did in the United States:

1. Learning environments in which it is easy to introduce flipped classrooms have been set up. Learning management systems (LMS), which form the basis of e-learning and blended learning, have already been instituted in tertiary education and, parallel with this trend, students have begun carrying smartphones that can be employed as user-friendly terminals.
2. It is appropriate as a specific preparation system that gives shape to the credit system, which has been promoted as an educational policy. Having the students view videos has made it possible to guarantee that they put in substantive preparation time.
3. It matches instructors’ needs. There have been several reports of students understanding the material at a markedly deeper level as an effect of the flipped classroom (Bergmann and Sams 2012; Khan 2012). The approach was particularly successful in classes where students’ basic academic abilities were declining.
4. Finally, it is a good fit for active learning in the context of higher education reform. In fact, in courses that use the flipped classroom to great effect, the students form complementary relationships during the face-to-face class sessions in which the learning activities are introduced, and that is the essence of active learning.

## What Is New About the Flipped Classroom?

In order to aid understanding of the characteristics of the flipped classroom from a variety of angles, we created Table 6.1, which shows a comparison between course designs for a flipped classroom class and those for a traditional lecture-style class, focusing on students’ learning processes during the course.

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<sup>1</sup>From the Second Public Seminar sponsored by the Department of Flipped Learning Technologies of the University of Tokyo Interfaculty Initiative in Information Studies, May 24, 2014.

**Table 6.1** Comparison of learning activities in traditional and flipped classrooms

Course sequence	Student activities	Traditional course design	Flipped classroom course design
Preparatory self-learning	Activity agency	Optional	<i>Student</i>
	Learning activities		<i>Viewing videos (perhaps repeatedly)</i>
	Active units		<i>Individual</i>
Class session	Main activity agency	<i>Instructor</i>	<b>Student</b>
	Learning activities	<i>Listening to lectures</i>	<b>Practice, participation in project-based learning</b>
	Active learning units	<i>Individual</i>	<i>Fellow students</i>
Review	Activity agency	<b>Student</b>	Optional
	Learning activities	<b>Practice</b>	
	Active units	<b>Individual</b>	

In a lecture class, preparatory learning is optional in most cases. As a result, learning begins in the classroom, the venue where everyone participates. The class is based on instructor-centered lectures and this is where the students first encounter the course content. A major characteristic of such classes is that there are few interactions among students and, ultimately, learning activities consist of nothing more than individuals listening to a lecture. It is difficult to ascertain simply by watching them how well all of the students understand the content of the lecture or how well they are constructing their knowledge. Then, there is a progression in which the students retain and make use of content that they heard in class by doing homework assigned afterward. Often, they first realize that they have questions or don't understand the content well enough when they start thinking about and doing the homework. Yet, at that point, they are remote from an instructor or classmates who can answer their questions. These ordinary learning activities, in which the instructor teaches and the students learn, constitute the standard pattern in Japanese secondary education and this pattern of learning is deeply ingrained in most students.

So, what happens in a flipped classroom? Actually, there are no major differences from traditional course design in that, after listening to an instructor-centered lecture, the students follow a progression in which they retain and use the knowledge. That is clear from Table 6.1. Yet, the actual learning activities begin not with the class session but rather with preparatory learning. In that sense, it may be more appropriate to refer to the process not as a "flip" but as a "slide." It is just that moving the learning process forward in this way is of great significance. What is important is what the classmates do when they assemble for class. The individual activity of listening to a lecture has already occurred during the preparatory learning period at home. Thus, the students retain and use the knowledge in independent

activities in a classroom where they come together and can communicate with the instructor. In such a situation, even if students do not understand some of the content, it is possible for them to solve that problem by teaching one another and learning from each other, and they can also ask the instructor to teach them something on the spot. This probably has a major connection with the active leaning effect that has been pointed out in the context of the reform of Japanese higher education. The flipped classroom is a type of active leaning course design that facilitates deeper understanding and training in multiple competencies through autonomous learning amidst interactions with others.

## **The Flipped Classroom as a Type of Active Leaning**

The flipped classroom has deep connections to active leaning in Japan but we need to think a bit about active leaning. It began to be recommended as an educational policy as a result of increasing awareness of the issue of how to guarantee learning quality in an era of mass entry into higher education, giving rise to wide-ranging differences in students' academic abilities and motivation to learn. Addressing that issue requires not only equipping the students with knowledge but also training them in a wide variety of competencies so that they can put their learned knowledge to use. For that reason, educational methods should not center on one-way lectures; they need to incorporate active leaning "which includes externalization of cognitive processes" (Mizokami 2015). Yet, as active leaning spread rapidly through academia, several issues emerged in the educational settings where it was implemented. In this chapter, we categorize these issues.

Issues with active leaning can be divided into (1) those concerned with externalization and (2) those concerned with internalization. The issues that we hear about from instructors in educational settings currently appear to be concerned mainly with externalization, especially with group work. For example, the presence of free riders, who simply coast on the achievements of other group members, leads to more stringent structuring of group work in order to avoid that phenomenon. That said, we can cite cases of students paying attention only to the portions of the work for which they are personally responsible. Active learning issues also include cases in which group work never "comes to life" (Mori 2017). Enlivening face-to-face classes is largely dependent on painstaking construction of course design in advance and facilitation by the instructor on the day of the class.

However, from my perspective as one who has actually participated in classes and researched students' learning activities, the fault does not lie solely with the students. In many active leaning classes, the problems to be worked on are assigned on the spot, and active externalization is expected without sufficient time for preparation. The current practice of expecting students to think and articulate extemporaneously highlights the most serious problem with active leaning; namely, insufficient internalization. In order for externalization to occur, it ought to be essential for students to have content that they want to externalize but, if the content

is lacking, a gap develops between thought and action. For that reason, active leaning that is centered on externalization tends to be understood mainly as project-based learning aimed at fostering competencies. Thus, it has been assumed that it would be difficult to introduce it in the basic subjects of the undergraduate curriculum, which are geared toward deeper understanding and retained knowledge.

These are the “twin sins” that Wiggins and McTighe (2005) have also highlighted (Matsushita 2015). A given class may have lively activities as far as an observer can tell but thinking is neglected and the focus is on the method. Another type of class is based on knowledge transmission using textbooks and lecture notes, with the focus on coverage and the emphasis on content. To put the conditions of the twin sins in another way, in a traditional course design based on learning occurring after teaching, there can be no guarantee of sufficient learning activities but, if we emphasize only learning in an active leaning class, then the understanding and cogitation parts will be missing. Under such conditions, Matsushita (2015) recommends deep active leaning, which is aimed at achieving both acquisition of knowledge and the fostering of skills, concurrently. As a result of efforts by instructors in classroom environments to deal with both of these issues, the flipped classroom, quite simply, is a course design that embodies deep active learning in a complete package which incorporates preparation and review, with teaching and learning in harmonious balance.

## Design and Implementation of a Flipped Classroom

Active leaning is usually classified according to the formats of its activities but here we would like to emphasize the objectives of the class. We have broadly classified them into two types: (1) the investigative model and (2) the knowledge acquisition model. It is actually valid to distinguish between these two types when designing a flipped classroom.

The investigative model is a method that emphasizes what we might call the essence of active leaning; namely, fostering competencies. The aim is to provide an environment that is almost a “society” and to foster a variety of competencies by having the students make use of existing knowledge and work in harmony with others to solve problems and carry out projects. This includes project-based learning, learning through problem-solving, and service learning. In such cases, it is not merely the knowledge acquired that needs to be evaluated, as in conventional courses, but also the performance of competencies based on that knowledge, so new evaluation methods need to be developed. As of 2012, 93.5% of Japanese universities had instituted first-year education programs. Up to 73.8% of those classes are aimed at fostering competencies and skills through presentations, group discussions, and other forms of externalization.<sup>2</sup> Even though acquisition of academic

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<sup>2</sup>From “An Investigation on the Status of Reforms of Educational Content and Other Matters in Higher Education,” Ministry of Education, Culture, Sports, Science and Technology, 2012.



skills is an objective, adaptation to learning and life on a university campus have been mentioned as effects of the first year education programs, so it is necessary to construct communities that can serve as foundations for learning or to promote development of fellowship through group activities.

On the other hand, the knowledge acquisition model attempts to use active leaning to promote understanding and retention of knowledge. But, in fact, there have been few cases of institution of active leaning in the core subjects that have those goals and form the nucleus of undergraduate education. One reason is that important content is usually offered as (1) a set of classes comprising lectures and exercises or practical training, or (2) in the form of a continuous sequence of numbered courses. Moreover, precisely because these courses constitute the foundation for undergraduate education, they are based on teaching, with the students required to retain accurate knowledge. To date, however, as many academic fields connected with research on learning have proved, deeper understanding and retention can be obtained only through autonomous learning. In this respect, there may be gaps between educational goals and methods.

In the following, we present examples of experimental implementation of these models.

### ***Knowledge Acquisition Model***

The knowledge acquisition model is a method aimed at getting all students to achieve the prescribed level of learning with regard to the course content. In this model, the students are first given preparatory assignments, the content of which is then reviewed and revisited through active learning activities in face-to-face classroom sessions to verify that the students have learned what they are supposed to learn and then to advance that learning. In this model, there is less room for the instructor's personal expertise to determine the success or failure of instructional intervention as long as certain conditions are met; therefore, it is relatively easy for any instructor to apply the model to any given class. The conditions to be met include (1) creating a situation whereby the students come to have a sense of "understanding" by means of "teaching" through preparatory video lectures, (2) questioning and disrupting this self-assumed understanding through group work in face-to-face classroom sessions, and (3) reconstructing a renewed and sound understanding on the part of the students through a process of hesitancy and bewilderment. This instructional model has achieved major success in the academic domain of natural sciences, where systematic accumulation of basic knowledge is essential. Let us look at an actual case of this model having been put into practice.

#### **Case 1: Basic Hydrology Class in a Faculty of Natural Sciences**

Professor B at University A incorporated the flipped classroom into a specialized course called Basic Hydrology, which deals with the fundamental principles of dynamics with respect to the flow of water. The major obstacle for the time-pressed

instructors in implementing the flipped classroom was preparation of video materials for preparatory learning. For that task, they employed software that allowed them to add hand-written notes and explanatory audio to PowerPoint presentations which they had already made for their regular classes, creating PPT slide presentations of about 15 min' duration. Grades were based on the aggregate scores for three in-class quizzes given during the semester, rather than on a one-shot final exam, in order to place primary importance on the learning process.

Table 6.2 shows the overall course design for that class. An in-class survey revealed that the average time spent on preparatory learning for each class module was a little over 2 h. During the 90-min face-to-face class session, immediately following a brief introduction given by the instructor, the students embarked on cooperative group learning wherein they taught and learned from one another to ensure that everyone in the group understood the assignments that had been given previously. We observed that, even in groups that started out rather awkwardly, the students who had not completely understood the preparatory assignments were eager to make use of other students in order to advance their own understanding.

The following conversation, observed in a class conducted on January 30, 2014, is one good example of such in-group interactions.

Student A: Huh? Why did you use that calculation, there?

Student B: Uh, well, here's a sample problem.

(The two students work on the problem together.)

Student A: But the pressure is the same, so isn't this the right answer?

Student B: Oh, yes, you're right. That's it.

During the group work, the instructor and one teaching assistant walked around the classroom, advising the students on their progress in making notes and checking their levels of comprehension. The sight of them answering questions from each group, sometimes eliciting laughter, reminded me more of casual office-hours interaction between a teacher and students than of a formal classroom session. Using the last 10 min of the class session, the instructor explained the answers to the problems in lecture format. Since this lecture-type explanation came after the students had done their own thinking, they listened to the instructor very attentively and with keen interest. Comparing the students' final grades in this flipped

**Table 6.2** Example of a course design based on the knowledge acquisition model

Educational activities	Learning activities
Preparatory self-learning 1	• Viewing a video lecture
Preparatory self-learning 2	• Taking notes on relevant information
Preparatory self-learning 3	• Answering exercise questions
Face-to-face in-class sessions (cooperative activities in small groups of four students each)	• Continuing the exercises
	• Individual checking by the instructor
	• Lecture-type explanation of the answers to the exercise problems

classroom against those of a regular lecture-type class in the preceding academic year, we found an improvement in average scores. This may suggest that provision of preparatory learning opportunities and introduction of cooperative in-class activities during the face-to-face sessions had contributed to raising the performance levels of the students who were not good at dynamics at the beginning of the semester.

### ***Investigative Model***

Whereas in the first type, i.e. the knowledge acquisition model, the goal is total assimilation of the knowledge that the students are supposed to have learned during preparatory self-learning by means of repeated reviewing and rethinking of the problems in the face-to-face classroom sessions, the main objective of this instructional model is to have the students make use of the knowledge learned during preparatory learning and to develop it further during face-to-face classroom sessions. This model is most suitable for academic fields that involve practical exercises and research but it can also be introduced into a number of versions of active learning classes, such as project-based learning (PBL), in other fields. One advantage of this model is that provision of basic knowledge and construction of shared awareness can be incorporated into video materials and made part of preparatory learning, allowing the bulk of class time to be devoted to active learning in face-to-face, in-class sessions. Although this model is extremely effective for active learning that presupposes a certain level of prior knowledge on the part of students, the learning outcome is largely dependent on the ability of the instructor in charge of the face-to-face classroom sessions. The poorer the instructor's ability, the more likely it is that active learning classes under the investigative model will encounter the same issues as those described in the previous section. The following is a brief description of an actual case of this particular model having been put into practice.

#### **Case 2: Class in Information Science: Human–Computer Interaction**

Professor D at University C introduced the flipped classroom approach into one of the specialized classes in information science, Human–Computer Interaction, which had as its objective having the students learn the basic information, ranging from theoretical to practical matters, for constructing user-friendly computer systems. The class consisted of 15 class modules, which were divided into lecture and PBL segments, with a degree of variation in course design. For the lecture portion, the instructor created videos (each about 20 min long) by adding explanatory audio to the PowerPoint presentations already prepared for the class and advised the students to view them prior to attending the face-to-face class sessions. Depending on the content of each module, relevant YouTube videos were also included in the

**Table 6.3** Example of a course design based on the investigative model

Educational activities	Learning activities
Preparatory self-learning 1	• Viewing a video lecture
Preparatory self-learning 2	• Taking a comprehension check quiz
Face-to-face in-class sessions (cooperative activities in small groups of four students each)	• Project activities
	• Individual checking by the instructor
	• Group presentations
	• Peer evaluation

preparatory assignments. A simple comprehension check quiz was also prepared for each module so that the students could confirm that they understood the module content. The check quizzes had no direct bearing on the students' final grades. Instead, they were given to promote students' understanding and could be repeated as many times as necessary. For the PBL segment of the in-class sessions, two group projects were set up with the topics "Planning a Weather App for Smartphones" and "Identifying Inconvenient User Interfaces." For the "Weather App" project, each group was instructed to (1) identify and sort out users' needs, (2) organize possible operation sequences into a storyboard, (3) sketch out the proposed solutions (user interfaces), and (4) review the proposed solutions from the users' perspectives and make necessary amendments and/or improvements. Finally, each group presented its solution to the class (i.e. visualization of the thinking process and product), followed by peer evaluation of one another's work (Table 6.3).

There was something that we noticed in the course of observing each class session and recording the statuses of students' learning with field notes. That was the emergence of free riders on the groups' results, although learning activities in the investigative model became active, as in the knowledge acquisition model. When there are closed-ended solutions, as in the knowledge acquisition model, it is easy to understand the results of activities conducted by one's own group as good or bad and the results can be made visible to others. However, in open-ended models such as the investigative model, the results of activities can be difficult to understand and, at the same time, it is difficult to elicit individual results; accordingly, the presence of free riders may emerge. In such cases, the instructor needs to make moves to get the students to commit themselves more to group work and the very act of learning. In the knowledge acquisition model, the students' activities are naturally clustered around one solution, so the instructor's activities are more along the lines of supporting the students' understanding, but, in the investigative model, instructors will need a teaching skill that has not previously been required of them: supporting students' motivation to work toward open-ended solutions that demand diverse solutions.

## **Avoiding the Gap Between Thought and Action (The Pathway Between Internalization and Externalization)**

Here, we focus our attention on internalization and externalization of course design in terms of internalization, which is one of the issues with active leaning. Observations of several active leaning classes, not only those based on the flipped classroom, revealed the common characteristics of implementations with remaining issues, namely, insufficient internalization. As previously mentioned, if the internalization is of poor quality before active leaning is instituted, then active leaning activities tend not to be very lively.

Concepts related to the cognitive processes of internalization and externalization are based on transformation of inter-mental functions to intra-mental functions, as described by Vygotsky (1978). Taking mathematics education as an example, Sfard (1998) compared the acquisition metaphor of making knowledge and concepts one's own and the participation metaphor of making use of knowledge while participating in a community. In doing so, he provides a suggestion about how to mediate between these two apparently inconsistent metaphors. Similarly, Engeström (1994) has a concept of "the cycle of exploratory learning" whose starting point is the actual problems and conflicts that arise in the midst of learners' practice activities, so that the learning cycle consists of six steps in acts of learning: (1) motivation, (2) orientation, (3) internalization, (4) externalization, (5) criticism, and (6) control. In Engeström's learning cycle, internalization and externalization exhibit a tendency to be ordered, although this is not a one-way connection but a two-way path, as Matsushita (2015) shows. "A two-way path" means that the learner takes the externalized object and actively works on it internally, in order to correct and extend existing knowledge, which is none other than a new phase of internalization. Thus, internalization and externalization can be understood in terms of various learning theories but, in this chapter, we simplify matters so that internalization refers to understanding and acquiring knowledge while externalization refers to making use of knowledge (the performance that occurs in this process).

We can try applying this to the case study of the knowledge acquisition model described above. The knowledge acquisition model has been instituted in a number of basic subjects but, in fact, the class presented in this chapter showed a far greater degree of effectiveness than other implementations with respect to its objectives of knowledge retention and enlivened group work. How, then, did it differ from other implementations? It may be repetitious to say that the knowledge acquisition model in the flipped classroom is a course design that is aimed at developing understanding and retention of knowledge that actually already exists, and that the question presented as an in-class issue can be aggregated into a single answer, which is a closed-end type.

First, the basic knowledge is presented in the form of lecture videos. In these classes, in addition to the action of watching and listening to the video, preparation includes taking lecture notes, which help the students organize what they understand. The knowledge that the instructor transmits by means of the videos is

insufficient but it is an activity designed to externalize what the students understand at the time. If the students are anxious about not understanding something, they can return to the videos any number of times and confirm their understanding of the content. Moreover, a standard routine for the face-to-face class sessions is to have the instructor check the students' notes, so they naturally write their notes under the assumption that they will be read. Even though this is a somewhat extrinsic motivation, there is a degree of externalization in that each individual can construct a tentative understanding before class, in addition to the passive actions of viewing and listening to the videos that are aimed at internalization.

After that comes the face-to-face class. The responses to the closed-ended assignments aggregate into one answer but the students arrive at this answer by diverse processes of understanding. The individual's tentative understanding becomes a variation in the midst of diversity. Through a process of scrutinizing these variations one by one, confirming them, and criticizing them, the classroom becomes an environment in which the individual reconstructs his or her tentative understanding into real understanding. The class under discussion, the one in the case study, considers 45 min to be sufficient time for this process. A further feature of this class is that, in the last segment of the class, the instructor explains the so-called correct solution to the assignment. In other words, the instructor teaches, even in an active leaning class. Actually, Schwartz and Bransford (1998) concluded that it is important to convey methods of developing existing knowledge at appropriate times. That appropriate time may be described as "teaching after learning." In fact, that is where the students' needs lie. In the post-investigation phase of pre- and post-investigations of several flipped classrooms, we analyzed students' open-ended responses (with 217 students responding, in all). The results showed that students who attended a class based on the knowledge acquisition model said that they wanted to be told the correct answer or that they still didn't understand the content very well. When working on closed-ended assignments, merely using active leaning allows the students to reconstruct their tentative understanding into real understanding but a certain number of students are uneasy about attaining real understanding solely through interactions with fellow students. In the classes in the case studies, a major difference in effectiveness from other implementations arose when the instructor decided to teach at the end, based on his or her past experience.

This tells us that, in classes which have internalization of knowledge as their objective, it is effective to follow this learning process:

1. Viewing the videos (internalization)
2. Taking notes (externalization)
3. Returning to the videos if something is still not understood (internalization)
4. Looking at and discussing the assignment (externalization)
5. Teaching and learning from one another (externalization)
6. Lectures (internalization).

**Table 6.4** Course design based on the knowledge acquisition model with concepts of internalization and externalization

Educational activities	Educational design	Internalization and externalization
Preparatory self-learning 1	• Viewing a video lecture (about 15 min)	Internalization
Preparatory self-learning 2	• Taking notes on relevant information	Internalization and externalization
Preparatory self-learning 3	• Working on the exercise questions	Externalization
Face-to-face inclass sessions (cooperative activities in small groups of four students each)	• Continuing the exercises	
		• Individual checking by the instructor
	• Lecture-type explanation of the answers to the exercise problems	Internalization

In this little cycle of moving back and forth between internalization and externalization, one can check one's own understanding on each occasion of externalization. This approach is also very effective in fostering meta-cognitive abilities. Moreover, it is precisely the flipped classroom that allows Activities 1–4 to be part of preparation, a tactic that leads to less pressure on the face-to-face classes (Table 6.4).

The flipped classroom, which initiates the two-way path between internalization and externalization with internalization by means of a video, can be made more effective by concluding with internalization in the form of teaching at the end of the class. Furthermore, investigation of LMS logs makes it clear that after class, the students voluntarily watch the videos of the content that they have just covered. An environment has been created wherein the students do not give up on the cycle of externalization and internalization, even after class has ended, and it may be said that, just as students can take a book off the shelf at any time, the fact that they can return to the lectures at any time promotes autonomous learning. The special skill required for designing a flipped classroom involves combining internalization and externalization, and enabling the students to move back and forth between the world of the course content and themselves. However, this is not limited to flipped classrooms. It is true of all course designs that include active learning or lectures.

## Reconsidering Active Learning

In today's knowledge-based society, the nature of the knowledge and abilities required of each of us has been undergoing major change. Rather than taking on board the fixed knowledge presented by teachers and reproducing it as quickly and

accurately as possible, students will be expected to respond to changing times with the ability to take their own existing knowledge, connect it to new information, and reconstruct that knowledge. However thorough their learning may be, they will not be able to put their acquired knowledge to active use if it remains fixed. The process of reconstructing a self-assumed shallow understanding into something much deeper and more meaningful through interaction with other people, involving at times considerable emotional disruption and bewilderment in the process, is indeed a universal model applicable to the notion of lifelong learning. While it is a great advantage for students to “learn how to learn” in the flipped classroom within the larger framework of university education, the importance of this kind of deep knowledge acquired and reconstructed through the process of active learning will only increase in years to come. Furthermore, this new type of learning is not confined to the traditional classroom situation; it can also be extended to a variety of educational venues and opportunities outside of classroom hours or after graduation, such as in-service training, hands-on workshops, corporate employee training, or lifelong learning via MOOCs. The flipped classroom will indeed “flip” the traditional learning process and will provide a new design framework for knowledge-based active learning.

## Summary

- The flipped classroom is recognized as one of the initiatives that transform the paradigm from teaching to learning, not merely an instructional format reversing the traditional order of classroom lectures and self-instruction at home. By following governmental higher education reform, the flipped classroom in Japan often implements active learning activities through reciprocal interactions among the students. The flipped classroom is recognized as the course design of active learning that facilitates deeper understanding and training in multiple competencies through autonomous learning and interactions with other people.
- The flipped classroom for designing active learning can be broadly classified into two types, depending on the objectives of the class: investigative model and knowledge acquisition model. The former model is a method that emphasizes fostering competencies, making use of existing knowledge and working in harmony with others to solve problems and complete projects. The latter model utilizes active learning to promote understanding and knowledge retention, aiming at acquiring a certain level of knowledge in the course by all enrolled students.
- Designing the flipped classroom that allows each student to construct a tentative understanding by preparatory self-learning is effective for circumventing the gap between thought and action, one of the leading problems in active learning. By repeating internalization and externalization, one can reconstruct a tentative



understanding into a real understanding. The process of reconstructing tentative understanding of individual student into the real understanding through interactions with other people, especially by going through an emotional disruption and bewilderment, is indeed a universal learning model, applicable also to lifelong learning.

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# Chapter 7

## Class Design Based on High Student Engagement Through Cooperation: Toward Classes that Bring About Profound Development

Satoru Yasunaga

In recent years, Japanese universities have begun focusing on active learning, impelled by the momentum for improvement and reform of the nation's university education system. *Active learning* is a new concept for the Japanese educational community. There are no fixed definitions for it and no indications of the specific techniques involved. There is widespread understanding of class formats that intentionally incorporate activities involving active student engagement (Mizokami 2007, 2013). In order to promote visible and specific activities to encourage students to write, speak, express themselves, debate, be physically active, and manipulate things, instructors have begun designing a variety of classes centered on group activities, such as *peer instruction*, *role playing*, *problem-based learning*, *research-based learning*, and *experiential learning*.

However, this type of approach to designing classes has not necessarily been successful. Too much attention has been paid to classes that incorporate group activities and one can also find the extreme notion that, if the students are required to participate in some sort of group activity, then that constitutes active learning. On occasions, one sees classes that produce poor results in terms of learning, even though the format is one of active learning.

In this chapter, therefore, instructional methods for improving the quality of classes centered on group learning will be examined through the viewpoint of *cooperative learning*. First, I will provide a summary of the theory and techniques of cooperative learning and then I will move on to look at the effects that one can expect from cooperative learning and how to evaluate them. Next, I will present some thoughts on how to design classes based on *learning through discussion* (LTD), which is one of the strategies of cooperative learning, and will add some

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points that should be borne in mind with regard to improving the quality of classes. Finally, I will demonstrate that the type of study that is expected from *deep active learning* can be achieved through class design based on cooperative learning.

## Theory of Cooperative Learning

Cooperative learning is a theory of teaching and learning that is aimed at enabling the individual student to experience the enjoyment and satisfaction of learning in company with his or her classmates, and at developing solid academic skills together with individual change and growth. It is not merely a technique for group learning.

### *Diffusion of Cooperative Learning*

There is already a wealth of research findings and examples of practices with regard to designing classes that elicit active student engagement using small groups. Cooperative learning<sup>1</sup> (Johnson and Johnson 2005), based on *social interdependence theory*, inter alia, is known as a highly reliable and effective theory.

It was in the latter half of the 1950s that empirical research into cooperative learning substantively began in both Japan and other countries (Johnson et al. 1991; Shiota and Abe 1962; Sueyoshi 1959). Since then, cooperative learning has played a central role in the designing of classes that increase active student engagement. The effectiveness of cooperative learning has been proved in theoretical and practical research over many years and in many countries, and it is known that classes based on cooperative learning can yield gains from both cognitive and attitudinal aspects (Cohen et al. 2004; Johnson et al. 2002; Shibata 2006; Sugie 1999; Yasunaga 2013).

Until quite recently, most practical implementations of designing classes based on cooperative learning took place at elementary or junior high school levels. However, since moving into the 21st century, introductions of the method into university contexts have become commonplace (Johnson et al. 1998). Momentum for this approach is steadily increasing and the study of how to use the theory and techniques of cooperative learning to promote active learning are being carried out worldwide. For example, active learning and experiential learning, based on cooperative learning, have been introduced particularly in countries with high educational levels, such as Western countries and East Asian nations, irrespective of the type of school (Hmelo-Silver et al. 2013; Millis 2010). Student-centered classes are also being

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<sup>1</sup>Collaborative Learning is a similar concept. The distinction between collaborative learning and cooperative learning is explained in detail in Sekita and Yasunaga (2005) and in Barkley et al. (2005).

created in Japanese universities and vocational schools (IDE Daigaku Kyokai 2011; Japanese Association of First Year Experience at Universities and Colleges 2013; Yasunaga 2009). And, interest in cooperative learning has increased among elementary and junior and senior high schools, alongside nationwide implementation of new curriculum guidelines, and many new examples of cooperative learning being put into practice have been reported (Chichibu 2013; Sugie 2004).

### *Class Design Based on Spirit of Cooperation*

I refer to class design with the aim of raising the degree of active student engagement based on the theory and techniques of cooperative learning as *class design based on high student engagement through cooperation*. These are classes in which all students work toward attaining shared learning goals in accordance with spirit of cooperation, make profound contributions to their own learning processes and those of their classmates, and spontaneously and actively teach and learn from one another. In such classes, each student can feel that he or she has acquired solid academic skills, changed, and grown.

The spirit of cooperation is especially important in these classes. What I mean by *spirit of cooperation* is that the students join their minds and strengths with those of their classmates and study diligently for both themselves and their classmates in order to attain learning goals. The self-centered attitude of “anything is alright as long as I am OK” is thus negated. In order to attain the learning goals that they share with classmates, the students are asked to take active roles in making whatever contributions they can and to take specific actions. Of course, not all students properly acknowledge the meaning and value of the spirit of cooperation at first. Rather, the spirit of cooperation is cultivated little by little as students realize how significant it is to teach one another and learn from each other through interactions with their fellow students.

While aiming to deepen the understanding of class content together with one’s peers, the focus inevitably falls on the learning process. The fellow students are aware of each other’s degree of understanding, which they try to accelerate by coming up with and sharing appropriate advice. The goal is a class environment in which independent and active learning takes place as a result of students being aware of their learning processes, while experiencing the ongoing development facilitated by learning from one another.

The spirit of cooperation plays a major role not only in group activity situations but also in classroom situations where groups are not used. If students possess the spirit of cooperation that propels them to join their classmates in attaining learning goals, the actual learning format basically does not matter. Even if no group activities are included, we can call this kind of learning cooperative learning (Jacobs et al. 2002). On this point, Sugie (2011) states: “Cooperative learning is not a theory about techniques for conducting classes. It is a theory about the basic principles that underlie support for children’s learning in all school situations.”

Shikanai (2013) proclaims that cooperative learning is the philosophy that underlies the creation of classes.

Thus, the accurate recognition of cooperative learning, not merely as technique but also as a theory underlying class creation is the basis for designing classes based on cooperation. When instructors can understand and accept cooperative learning as a theory, their understanding of its techniques deepens and, unconstrained by superficial learning formats, they become able to devise flexible classes that are replete with imaginative and ingenious features that are relevant to students' actual conditions.

### ***Basic Elements of Cooperative Learning***

In the interests of distinguishing cooperative learning that is imbued with the spirit of cooperation from regular group learning, Johnson et al. (2002) highlighted the following five basic elements<sup>2</sup>:

1. ***Positive interdependence***: Cooperative learning requires all students to exhibit their own strengths to the full and to display interdependence with their classmates based on basic relationships of mutual trust, in order to achieve the group's learning goals. Such interdependence is positive when it moves learners closer to attaining their goals but it becomes negative interdependence when it obstructs goal attainment (such as in cases of *social loafing*).
2. ***Promotive interaction***: Even if there are positive relationships of interdependence, no learning effect will occur if the students do not take a proactive approach. Cooperative learning assumes that the students face one another while proactively exchanging ideas, teaching and learning from each other.
3. ***Individual accountability***: Each student has two responsibilities. One is to take responsibility for his or her own learning; the other is to take responsibility for his or her classmates' learning. If a student's classmates do not understand the material, the student needs to reflect on whether or not he or she has offered sufficient support and to take a proactive approach to supporting other learners.
4. ***Interpersonal and small group skills***: Two kinds of skills are needed in a group to enable learning from one another: learning skills and interpersonal skills. If the students have not acquired these skills, it is necessary to coach them and to encourage the use of those skills.
5. ***Group processing***: In order to improve the quality of learning activities using the group format, cooperative learning requires constructive evaluation of such activities. The instructor has the students look back at their own and their classmates' words and actions during the learning activities and asks them to decide for themselves what they should continue and what they should discard. The objective is not to draw distinctions among classmates or criticize them.

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<sup>2</sup>The names of the basic elements have been partly revised but the content remains the same.

Group learning that fulfills these basic elements is generally called cooperative learning in order to distinguish it from regular group learning. Of course, it is never the case that it contains all of the elements in the beginning. In particular, even if the students understand positive interdependence and individual accountability on an intellectual level, turning these concepts into actions is difficult. The students need to be conscious of the ideas and to practice them in their daily classes. Thus, any kind of group learning in which students are conscious of and strive to fulfill the above five requirements—irrespective of the degree—can be called cooperative learning.

Kagan (1994) refers to any kind of group learning that contains the following four basic elements—positive interdependence, individual accountability, *equal participation*, and *simultaneous interaction*—as cooperative learning. Of these requirements, positive interdependence and individual accountability are the same as in Johnson et al. (2002). Given that two different theoreticians recognize these as basic elements of cooperative learning, they are considered to be especially important. On the other hand, equal participation and simultaneous interaction can be used as easily understandable criteria for deciding whether or not group activities introduced into a class constitute cooperative learning.

Equal participation indicates conditions whereby all classmates are participating in mutual learning activities to the same extent. Here “equal” means that, if one person speaks once, his or her classmates each earn an opportunity to speak. If one person talks on and on, that is not equality. The basic techniques for cooperative learning are devised with a view to guaranteeing such equality of participation.

Simultaneous interaction means that most students participating in a class are carrying out specific, visible, interactive activities at the same time. For example, suppose that the students are required to talk to one another. If they are working in pairs, 50% of the students should be carrying out the interactive process of talking at the same time. If they are working in groups of four, then 25% of the students should be doing so. Devising group activities that increase simultaneous activity is the foundation for eliciting effective cooperative learning.

In aiming for simultaneous interaction, it is necessary to bear in mind the need for balance in respect of the amount of information that a group can obtain from interactive activities. If we focus on simultaneity, then pair work, with the highest degree of simultaneity, is the most desirable format. However, groups of three or more make it possible to obtain more information. On the other hand, as the number of group members increases, the level of simultaneity in the activities declines, and the students become less active. There is an inverse relation between amount of information and simultaneity, so it is essential to determine the number of persons to be involved in an activity with consideration given to balancing the two factors according to the objectives of the group activity.

Repeatedly experiencing group activities that contain all of the basic elements of cooperative learning fosters a basic sense of trust, and a supportive environment is formed in which students can speak frankly about any doubts they may harbor and

the things that they do not understand. In doing so, they gain a sense of how satisfying it is to attain learning goals while sharing their minds and strengths. Their awareness of the meaning and value of cooperation deepens, and their spirit of cooperation is cultivated.

## Techniques of Cooperative Learning

It is necessary to understand the theory of cooperative learning and its techniques, refined in practical situations, and to properly put the techniques into practice in order to increase active student engagement in actual classes.

### *Types of Techniques*

The techniques of cooperative learning are a compiled set of learning procedures constructed in accordance with the theory of cooperative learning. Barkley et al. (2005) divide the techniques of cooperative learning (collaborative learning) into five categories—techniques for discussion, techniques for reciprocal teaching, techniques for problem solving, techniques using graphic information organizers, and techniques focusing on writing—and they present 30 techniques. *Round robins*<sup>3</sup> and *think-pair-share*,<sup>4</sup> both of which are basic techniques for cooperative learning, belong in the category of techniques for discussion. Other well-known techniques are *one stray*, *three stay*<sup>5</sup> and *jigsaw learning*.<sup>6</sup> There are also more

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<sup>3</sup>Round robin is composed of the sequence of clarification of the task, thinking alone, and thinking together. After the instructor talks to the whole class about the content that he or she wants to convey, he or she gives the students appropriate questions or tasks to help them understand the content (clarification of the task). The individual students think by themselves and prepare their own answers to the questions (thinking alone). Next, the students form groups and each student in turn is given almost the same amount of time to describe his or her answer. Then, the students discuss the questions as a group, seeking to develop better answers (thinking together). If necessary, the entire class looks into the questions together, so that groups can share their answers.

<sup>4</sup>The basic procedures for think-pair-share are the same as for round robin. The difference between the two is the number of participants. The latter is for group activities involving three or more students while the former is for pair activities.

<sup>5</sup>The procedure for one stray, three stay is as follows: Using round robin, for example, the group's first distill the responses into a shared group understanding. Then, they designate one member as a reporter and send him or her to the other groups to hear their answers. The remaining members receive the other groups' reporters. The reporters collect information about the groups to which they were sent and then return to their own groups to share with other members what they learned from the other groups.

<sup>6</sup>In jigsaw learning, the basic technique is to equally divide the content to be learned by the number of members of each group (jigsaw groups). Each member takes the responsibility for learning his or her own part of the content and explaining that portion to the rest of the group. The specific



complicated learning techniques based on cooperative learning, such as learning through discussion (Rabow et al. 1994; Yasunaga 2006; Yasunaga and Sudo 2014), *group investigation* (Sharan and Sharan 1992), *project-based learning* (Newell 2003), and *problem-based learning tutorial* (Yoshida and Onishi 2004).

The techniques for cooperative learning have several points in common. Each of them has a basic structure that takes the sequence “*clarification of the task* → *thinking alone* → *thinking together*” into consideration (Yasunaga 2012). Before the students learn from one another in groups (thinking together), they must pursue learning on their own (thinking alone). Each individual in the learning group acquires his or her opinion through thinking alone in order to facilitate more profound mutual learning in the group. Moreover, prior to thinking alone or thinking together, defining “what, how, and to what extent”, namely the purpose and procedures of thinking (clarification of the task), encourages independent and active learning activities. If there is no task clarification, students are unable to perceive the sequence of class activities and they are always kept waiting for the teacher’s instructions. This does not foster independence.

### ***Key Points for Implementing the Techniques***

It is recommended that instructors who are attempting to implement cooperative learning for the first time should start from simple techniques attuned to class goals. If students understand the techniques’ steps and their key points, and follow the procedures faithfully, their level of activity will increase and the students will be able to achieve the kind of results that are expected from cooperative learning. Repeated use of the same techniques will gradually deepen the understanding of both instructors and students about the techniques of cooperative learning and the concepts behind it, and the value of these techniques and concepts will increase with experience. Instructors who then challenge themselves to try more complex techniques will be able to gain a deeper understanding of the world of cooperative learning.

Next, I will explain the points that instructors should bear in mind at each stage in implementing the techniques of cooperative learning in classes (Barkley et al. 2005; Yasunaga 2006, 2012; Yasunaga and Sudo 2014).

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(Footnote 6 continued)

procedure is as follows: (1) everyone studies his or her portion of the content individually, (2) they then join the members of other groups that have been assigned the same part of the content in order to deepen their understanding and consider ways of explaining their own part of the content, so that they become the expert group for that information. Finally, (3) the individuals return to their original jigsaw groups and teach one another what they learned in their respective expert groups until everyone understands all of the content.

1. **Preparation:** In preparation for a class, the instructor should determine the methods for forming groups and the number of students in each group, look over the teaching materials, formulate tasks, examine methods for presenting the tasks, propose procedures for activities, and estimate the time to be allotted for the activities, bearing in mind the goals for the class.
2. **Beginning:** When initiating group activities during the class, the instructor should clearly indicate the tasks not only verbally but also visually, in print or with slides. This presentation should include the objectives and procedures for the activities, clear definition of the tasks, an emphasis on cooperation, and methods of grading both groups and individuals. Only then should the instructor direct the students to start work. If the students do not start immediately in response to that directive, the instructor can assume that he or she did not do a good job of presenting the instructions. In such case, the instructor should have all groups stop what they are doing and then present the tasks again.
3. **Intervention:** The instructor should circulate among students' desks during group activities in order to monitor what each group is doing. Note, however, that the instructor should avoid unnecessary intervention as much as possible. Even if there are long silences or if the students' discussions are misdirected or off-track, it is preferable that the instructor does not intervene. The basic principle is to let the group solve problems that arise during group activities. If the instructor keeps the group's independence in mind when giving advice, the group will acquire skills in promoting its own activities and its productivity will rise.  
If the instructor determines that intervention is necessary, he or she should not single out a specific group. Instead, the instructor should tell all groups to stop whatever they are doing and then advise the whole class.
4. **Assessment:** At the end of the group activity, the instructor should provide opportunities for each group to summarize its activity. For example, if the groups have completed a one-time activity, have them report to the whole class and leave time for questions and answers. If the group activity is being carried out across multiple class sessions, one possible option is to arrange opportunities for groups to report on the results of their activity to those who are particularly interested in the content of the activity.
5. **Closing:** Finally, it is time for the 'review' stage. This is where the students themselves analyze and evaluate the learning activity and the content of what they learned, and express their own ideas for improving the group's activities in terms of cooperative learning.

Merely putting the students in groups and giving them a task to work on is not cooperative learning. As noted above, proper implementation of the techniques of cooperative learning requires meticulous preparation and teaching skills on the part of the instructor.

## ***Teaching Skills Required of Instructors***

Even when multiple instructors use the same technique, the effectiveness of that technique differs depending on each instructor's teaching skills. At the very least, the skills required of instructors can be classified into *perceptive skills*, *modification skills*, and *practical application skills* (Yasunaga 2012).

Perceptive skills are those that enable an instructor to be aware of the entire class session and to discover and recognize hidden problems. The question of what can be perceived as problems depends on the instructor's awareness of cooperative learning and the goals of the class session. Modification skills refer to those specific skills needed to resolve problems and issues discovered during the class session. In the case of cooperative learning, they include the ability to make use of the techniques of cooperative learning. Practical application skills are those that equip the instructor to guide the class toward attainment of the goals, using his or her perceptive skills and modification skills appropriately in a class environment that changes from day to day. It is difficult to obtain the expected results if instructors merely follow the protocol when introducing cooperative learning techniques as modification skills into the class. First, it is necessary to gain an appropriate grasp of the relevant students' conditions, choose appropriate techniques for the individual class compatible with its goals, arrange the techniques as necessary, and introduce them. Next, the instructor needs to be quite perceptive of the flow of the class session and have the leadership qualities for resolving matters on the spot, as the situation demands.

Acquiring the three teaching skills presented here forms the foundation for the instructor's ability to improve his or her skills in practical classroom implementation. These skills are not something that can be acquired in a single day. They are acquired through repeated intentional use in the classroom, on a daily basis, and through constant introspection. An effective way of acquiring these skills is to develop them in cooperation with one's colleagues.

## **Effects and Evaluation of Cooperative Learning**

If an instructor understands the theory of cooperative learning and constantly makes use of its techniques in the classroom, the students can obtain significant results. Next, I will discuss the effects that one can expect from cooperative learning and the ways of evaluating them.

### ***Expected Effects of Cooperative Learning***

If an instructor develops highly active classes based on cooperation, it is possible to achieve both cognitive gain and attitudinal development in a course (*simultaneous acquisition of cognition and attitudes*).

Cognitive gain refers to comprehending the content of the course and other overall cognitive aspects, as well as practical/manipulating skills. It is known that cooperative learning increases one main measure of cognition, namely students' grades, whether the students are of high or low academic ability (Barkley et al. 2005). In addition, improvement in study skills, reading skills, communication skills, interpersonal skills, and other skills can be expected (Mandel 2003; Yasunaga and Fujikawa 1998; Yasunaga et al. 1998).

Attitudes include awareness of cooperation, motivation to learn, and views about learning, classmates, and school. Repeatedly engaging in cooperative learning improves awareness of cooperation, heightens motivation to learn, and improves awareness about academic work and interpersonal relationships (Nagahama et al. 2009; Yamada 2011).

Teachers greatly benefit from the fact that devising classes with cooperative learning leads to simultaneous acquisition of cognition and attitudes. There used to be a strong believe that instructions for learning a subject took place in the classroom and that other kinds of practice and training for student guidance took place outside the classroom. However, in cooperative learning, it is possible to provide both academic and student advising in class simultaneously, regardless of the subject matters or content. This has a particular relevance for contemporary higher education, where university attendance has become universal and institutions are admitting a wider variety of students.

### ***Evaluation in Cooperative Learning***

Grading is an unavoidable issue in the classroom, and grading criteria have a significant effect on learning behavior. That is why it is necessary to explain the evaluation criteria to the students at the beginning of the class. At that point, the instructor needs to convey which aspects of learning results will be measured by what method and how the measurement results will be reflected in grades, in light of the academic goals of the class.

Typically, understanding and knowledge of the course content are assessed by means of conventional written examinations. In such cases, the instructor should not only check the basic foundations of understanding the content directly taught in class, but should also evaluate each student's ability to make use of that knowledge. It has been demonstrated that cooperative learning leads to a greater ability to put knowledge to use and makes deep learning a reality, in addition to providing the basic foundations of the subject (Sudo and Yasunaga 2011).

Various scales have been developed for evaluating attitudes and skills, depending on what is being measured, so that instructors can use the evaluation scales that are best suited to particular class goals. The author and other researchers have developed *the awareness of cooperative work scale*, which evaluates the basis of cooperative learning, namely, awareness of cooperation (Nagahama et al. 2009); *the discussion image scale*, which evaluates students' image of discussion

(Yasunaga and Fujikawa 1998); and *the discussion skills scale*, which evaluates the skills necessary for discussion (Yasunaga et al. 1998). Recently, grading by means of rubrics and portfolios has become popular, and this approach can be used for grading in classes that employ cooperative learning.

In classes that employ cooperative learning, instructors are faced with the question of whether or not group grades should be added to the students' individual grades and, if so, how much weight should be given to them. This should be determined based on the goals of the class. For example, if the class places priority on the individual student's level of understanding, then the group grade should not be added to the individual grade. However, in a class aimed at fostering cooperation with others and the ability to communicate, the instructor may add the group grade to the individual grade. In such cases, the question of how much weight to give the individual and group grades is left to the instructor's judgment. If the instructor wants to motivate the students for group activities, the best approach is to add the group grade to the individual grades (Slavin 1995).

Moreover, when adding the group grade to the individual grade, instructors agonize over whether or not to change the added grade in response to the individual's contribution, for example. There is no clear answer on this point, but the basic principle is to give all group members the same grade. In cooperative learning, it is assumed that all members will make as large a contribution as they are capable of in order to promote understanding among all members of the group. Since the group grade is determined on the basis of how actively and diligently all group members devote their energies to the group's work, we have determined that it is appropriate to give all group members the same grade.

## **Class Design Using the Learning Through Discussion Method**

Many and various types of class formats incorporate cooperative learning. There is no single set standard format. Creativity on the part of instructors, who have comprehensive knowledge of the theory and techniques of cooperative learning, can lead to major format changes. Here, we would like to present a method that has created a stir in higher education circles in recent years; namely, class design with active student engagement through cooperation based on the learning through discussion (LTD) method.

### ***LTD Method***

The LTD method (Rabow et al. 1994; Yasunaga 2006) is a complex technique for cooperative learning. The objective of the LTD is to take an assigned reading

**Table 7.1** LTD group process plan (for class meetings) and corresponding stages in the OECD reading process

Stage	Steps		Time <sup>a</sup> (min)	OECD reading process
Preparation	Step 1	Checking in	3	Retrieve texts and access them/interpret and integrate texts
Understanding	Step 2	Vocabulary	3	
	Step 3	General statement of author's message	6	
	Step 4	Identification and discussion of major themes or subtopics <sup>b</sup>	12	
Connections	Step 5	Application of material to other works	15	Reflect and evaluate texts
	Step 6	Application of material to self	12	
Evaluation	Step 7	Evaluation of author's presentation	3	
	Step 8	Evaluation of group and individual performance	6	

<sup>a</sup>Standard LTD meetings run for 60 min

<sup>b</sup>The themes or the subtopics express the reasoning that supports the author's message

selection that serves as the learning material and to read and deeply analyze it in cooperation with one's classmates. In order to do this, the students first study the assigned reading individually (thinking alone) and then, in the subsequent class meeting, they learn from one another (thinking together). In such cases, both preparation and class meetings should follow *the eight-step LTD group process plan* shown in Table 7.1. Except for step 1 and step 8, the basic structure is the same.

In preparing the text, an individual reads it following the steps and creates a preparation notebook. First, he or she reads and re-reads the text (step 1). Second, the student extracts any words in the text that he or she does not understand, looks them up, and summarizes them in his or her preparation notebook (step 2). Next, the student closely reads the text again and writes a concise summary of the author's main message in his or her own words (step 3). Then, the individual reads the text in order to identify the themes or subtopics (reasons and arguments) that support the message and summarizes those themes or subtopics in his or her own words (step 4). Now, the student takes the content that he or she read in steps 1 through 4, connects it to his or her existing knowledge (step 5) and to himself or herself (step 6), and summarizes it all in the preparation notebook. Up through step 6, the student merely accepts the author's message and may not offer any criticism or evaluation. Step 7 is the first point at which the student is allowed to provide constructive evaluation that might improve the assigned text. In this step, the student writes down those points in the preparation notebook. In step 8, the student visualizes the upcoming class

meeting situation, using the notebook as a guide, and rehearses what he or she is going to say.

In the class meeting, the students read the assigned text together in groups of four or five, according to the LTD group process plan, using their own preparation notebooks as guides. In that situation, there are time limits on each step, so they carry out the activities for the steps within the designated time frames. During the class meeting, step 1 is devoted to setting the tone at the beginning, and step 8 is reflection about the meeting.

The process plan described above, which underlies LTD learning activities, can be divided into two halves: Steps 1 through 4, in which the students read the content of the assigned text, and steps 5 through 8, in which they deepen their understanding of what they have read. If we compare this process to the reading process used as an evaluation framework in the Programme for International Student Assessment (PISA) survey (2000) sponsored by the OECD, the first half corresponds to “retrieving texts and accessing them” and “interpreting and integrating texts”, whereas the second half corresponds to “reflecting and evaluating texts.”

This LTD method can be expected to result in a greater ability to read and understand texts, to engage in dialogue with one’s classmates and learn from one another, as well as in improved interpersonal relations. Most of the classes that have introduced and implemented LTD are on the university level, and the method’s effectiveness has been demonstrated (Furushô 2013; Mineshima 2014; Yasunaga 2005; Yasunaga and Nakayama 2002). Sudo and Yasunaga (2014) have reported on practical examples of classes using the LTD method in designing a course called “Logical Thinking”, a first-year course for nursing students. This example of a highly active class based on cooperation is summarized below.

### ***Problems and Objectives***

The intellectual goal of the course “Logical Thinking” was acquisition of logic-based language skills (cognitive goal). A specific objective within that category was to equip each student with the ability to write a logical essay that could convey ideas to others. We adopted the theory and techniques of cooperative learning as the teaching method. We also expected growth in the area of attitudes, such as relationships of trust among classmates, approval of classmates, and contributions to group activities acquired through cooperative learning (attitudinal goal). In order to achieve those class goals, the entire class was composed of three interrelated stages: Reading, Argumentation, and Composition (Table 7.2).

The three features of this practical implementation are reliance on cooperative learning, adoption of segmented LTD (Sudo and Yasunaga 2011), and conducting classes based on LTD.

First, this practical implementation is based on designing classes with reliance on cooperative learning. That is, we aimed to foster the basic concepts of cooperative learning and the conversational and interpersonal skills needed for group

**Table 7.2** The three stages of conducting a class and the main learning content

Stage	Session	Main learning content
Reading	1	Getting acquainted, goals of the class, listening, and mirroring
	2	Basic elements of cooperative learning; basic principles of argumentation
	3	LTD group process plan, objectives and methods for LTD preparation steps 1–4
	4	LTD preparation steps 2–3, Jigsaw learning
	5	LTD preparation step 3, Jigsaw learning
	6	LTD preparation step 4
	7	LTD meeting methods, LTD meeting steps 2–4
	8	Objectives and methods for LTD preparation steps 5–8, LTD preparation steps 5–6
	9	LTD preparation steps 5–8
	10	LTD meeting steps 5–8
Argumentation	11	Summary of LTD; about debating, Circular debate
	12	Standard debate format; preparation for a practice debate
	13	Practice debate: “Instant foods”
	14	Deciding on questions for the debates, preparation for debating questions 1 and 2
	15	Question 1 debate: “Homework during summer vacation”
	16	Question 2 debate: “What is necessary for marriage”
Composition	17	Review of the previous classes and self-evaluation; plans for writing an essay
	18	Writing an essay: Title, central theme, themes
	19	Writing an essay: Sentence composition, connecting the themes
	20	Writing an essay: Rough draft, revision
	21	Writing an essay: Revision, clean copy
	22	Final presentation of an essay, summary

activities, by arranging the techniques of cooperative learning in a systematic manner and have the students experience them repeatedly (Table 7.2).

Next, this application was the first introduction of *segmented LTD* in higher education. Segmented LTD is based on the assumption that explanation of LTD, preparation and meetings will all take place during class and, within each step in the LTD group process plan, it repeats the sequence of Explanation-Preparation-Meeting. This segmented variety of LTD was intended for elementary school classes, where introducing LTD using the traditional implementation method is difficult. Sudo and Yasunaga (2011), who instituted segmented LTD in Japanese language classes for children in their fifth year of elementary school, confirmed that this method improved academic grades and interpersonal relationships.

The last feature is conducting classes based on application of the LTD group process plan. In earlier research into practical implementations (for example,



Furushô 2013; Yasunaga 1995, 1999), the focus was on introduction of LTD into university classes. However, in our practical implementation, introduction of LTD was already assumed, so the focus was instead on examining how to achieve the class goals effectively and efficiently using the LTD group process plan that the students had mastered.

In our practical implementation using the three features listed above, we looked into the question of whether the logical language skills acquired through fostering of reading skills with LTD were also effective in advising students on logical formulations and compositions.

### *Outline of the Class and Its Composition*

The class comprised 51 first grade students (39 female, 12 male) who were attending night classes at a nursing school sponsored by the local medical association. Their ages ranged from 20 through 39 (39 students in their twenties, 12 students in their thirties), and the average age was 26.2 years. Almost all of the students had daytime jobs as Licensed Practical Nurses in hospitals. Even though their desire to learn and their academic abilities were above a standard level, we realized that the individual differences among them were not insignificant.

Classes met once a week for 100 min. We formed 10 groups of five or six students each, of mixed age and sex. Twice during the term of the course, in the 8th and 17th sessions, we reshuffled the groups.

We tried conducting all of the classes with a focus on dialogue based on cooperation (Yasunaga 2012). The basic format was introduction, preview, review of the previous session, development, review of the current session, and we followed these procedures:

1. **Introduction:** After we greet the entire class, each group exchanges greetings, telling one another about their respective states of physical and mental health and recent events in their lives. This is a stratagem for promoting mutual learning through group activities.
2. **Preview:** Following the introduction, we use a slide presentation to describe the content and goals of the class session and the composition of the class. Sharing a preview of the class allows the students to participate independently and actively, and to learn.
3. **Review of the previous session:** After each student has read the class communiqué (Yasunaga 2012) issued for each session (thinking alone), the group exchanges opinions (thinking together) and, finally, the whole class confirms the necessary items (all-class dialogue). Since the class meets once a week, this activity helps the students to recall the content of the previous class and acts as a bridge to the content of the current class.

4. **Development:** We take up the content presented in Development of the Class below and put it into action in the class. This is when we repeatedly employ cooperative learning techniques such as think-pair-share, round robin, and jigsaw learning. This stage of the class may at times include practice in making connections included in the LTD group process plan (steps 5 and 6).
5. **Review of the current session:** At the end of the class, we conduct a review using the class record form (Yasunaga 2012), a sheet of A4 paper. On the front, students write self-evaluations vis-à-vis the class (16 items on five-point scale), and on the back they write their own opinions, feelings, and questions about the class, expressing themselves freely. We compile and edit the content of the free descriptions and issue a “class communiqué.”

In order to use self-evaluations in the class record form as a guide for evaluating the development and effects of the class, we classified, based on the content of self-evaluation items, 12 of the 16 items into five categories: understanding, participation and contribution, trust, affection, and acknowledgment.<sup>7</sup>

During the 17th and 21st sessions, we reviewed the free descriptions. We returned the class record forms from previous sessions and we had the students evaluate themselves, using the content of the free descriptions in the record forms, for number of lines written, presence or absence of theses, and presence or absence of supportive reasoning for the theses. In addition, following the self-evaluations, we asked the students to look back on the previous class sessions and write freely about their feelings.

## *Development of the Class*

As shown in Table 7.2, the class was divided into a reading stage, an argumentation stage, and a composition stage. The details are as follows.

### **Reading Stage**

In this stage, the LTD group process plan was used as a guideline to help the students understand the features of logical language skills. That is, the structure of

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<sup>7</sup>There are two questions under “understanding”: “How well were you able to understand the content of the class?” and “To what extent did the discussions of the class content deepen your understanding?” The questions under “participation and contribution” include “How much did you participate in the discussion?” “How much were you able to contribute to the discussion?” and three others. There are two items under “trust”: “How much closer have you become with the members of your group?” and “How much do you trust the members of your group?” The two items under “affection” are “Do you like the activity in this group?” and “Do you want to discuss things with this group again?” There is one item under “acknowledgment”: “Do you feel acknowledged by the members of your group?”

LTD is such that students first gain an understanding of author's message (step 3), then gain an understanding of the themes or subtopics that support the author's message (step 4) and, finally, further develop the content of the author's message in steps 5 and 6. Implementing this process plan gave the students an experiential understanding of logical language skills.

In order to train the students to carry out the LTD group process plan, we used the first two sessions to train them in the basic attitudes and skills needed for cooperative learning. In addition, we introduced segmented LTD using jigsaw learning. On this occasion, we used "Supportive communication" (Kimura 1992) as the assigned text. We made use of jigsaw learning in step 3, "understanding the theses." We divided the assigned text into five segments, gave them to the group members, and incorporated an activity in which the students learned to understand their section of the text and explained it to the other group members.

In this practical example, we divided the eight-step LTD group process plan into a first half and a second half, each comprising four steps.

### Argumentation Stage

We prepared for and held debates making use of LTD. Since the students had no experience of debating, we explained what a debate is, the four processes in a debate (determining the proposition, collecting and analyzing documents and data, constructing logical arguments, and conducting the actual debate), and the effects of a debate. Then, we used a *circular debate*<sup>8</sup> to provide practice in making opposing arguments.

Next, in order to conduct real debates, we followed the sequence of having the students write down the merits and demerits of the proposition, write down the reasoning (themes or subtopics, step 4) for the theses of the positive and negative sides (step 3), and add effective connections (steps 5 and 6) in order to give the reasoning (themes or subtopics) persuasive power. We held three debates on a group basis and we changed the role assignments for the groups (affirmative side debater, negative side debater, moderator, judge, audience) each time.

### Composition Stage

We used LTD to assign each student the task of writing an essay of approximately 1200 Japanese characters (about 450 English words). The specific order of

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<sup>8</sup>Give the groups a proposition for debate and have each individual think of arguments in favor of it and opposed to it. First, member A states an opinion in favor of "X." Then, member B states an opposing opinion: "A said X but I think that's wrong because the truth is Y." In this way, each group member takes a turn stating an opinion denying what the immediately preceding member said. After every group member has spoken, the order is reversed, and each member states an opinion opposite to the one that he or she first put forth.

procedures was (a) determining the title, a message (step 3), and themes or sub-topics (step 4); (b) composing sentences and linking themes or subtopics (steps 5 and 6); (c) writing a rough draft and revising it (step 7); (d) writing a clean copy; and (e) presenting the completed essay to one's classmates. At each stage, we gave the students tips on writing easily understandable sentences, use of Japanese-style composition paper, and revision methods.

### ***Results of the Class***

The 48 students who were the subjects of our analysis had an average attendance rate of 98.1% for the 22 class sessions. For 11 sessions, including sessions 1–8, attendance rate was 100%.

We looked at the shifts in average points for each of the previously mentioned five categories (understanding, participation and contribution, trust, favorability, and acknowledgment) in self-evaluations on the class record forms. The results showed that, in all categories, the scores dropped temporarily when the groups were shuffled but, basically, scores rose as we moved toward the last session. In analyzing the process of change in detail, we found that the students first came to enjoy talking within their groups and that, as a result, their increasing closeness fostered feelings of trust. We believe that feelings of “acknowledgment” increased, in that students felt acknowledged for the first time in these intimate exchanges, supported by the feelings of trust.

In the two reviews, conducted during sessions 17 and 21, we found that the volume of free writing on the class record forms showed a noticeable increase in the review of session 21 compared with the review of session 17. We also found that, when they discussed a message, the students became able to mention the supportive reasoning behind it. We also obtained the following feedback from the students about the class. During session 17, comments included: “I thought it was fun to come up with connections on my own. This class made me newly aware that thinking really requires power of concentration” and “Talking together as a group and listening to the opinions of the other groups was very stimulating for me.” Our overall impression was that the students were happy that their own thinking had become broader and deeper. Comments from the 21st session included: “I think that we had some extremely meaningful conversations in order to make one another's essays better,” “Learning together gradually made for deeper ties among the group members,” and “The words that made the greatest impression on me in the class (after session 17) were ‘competition and cooperation,’ and I thought that it would be ideal if we could go on this way, refining ourselves and one another.” That is, they mentioned the ties with their classmates.

All 48 students were able to complete an essay. These essays were evaluated on a 10-point scale. Students received 6 points passing score if they wrote a message, themes, and connections, with points added or subtracted for sentence structure, degree of interest, and number of characters. As a result, all of the students received

passing scores, with eight students scoring 6 points, nine students scoring 7 points, 18 students scoring 8 points, and 13 students scoring 9 points. The average score was 7.75 points. The 13 essays that received 9 points (27.1% of the total) required almost no correction compared to the other essays, and showed a high degree of completeness. Twelve of the essays (one student declined to participate) were entered into the Eighth Nursing Student Thesis Contest: Essay Division, a national contest sponsored by the journal *Kango Kyôiku (Nursing Education)* published by Igakushoin. Two of the essays, which were highly placed in the contest, were selected and then published in the August 2010 issue of *Kango Kyôiku*. The journal states that there were 64 entries in the Essay Division, of which eight were selected. This confirmed for us the high level of logical language skills cultivated during our class and it allowed us to determine that we had achieved our class's ultimate cognitive goal of enabling the students to acquire these kinds of skills.

### ***Discussion of Practical Implementation***

This practical implementation was aimed at devising a class with active student engagement based on the LTD method. We centered our class design and practical implementation on three points: reliance on cooperative learning, the adoption of segmented LTD, and conducting classes based on LTD. In the following, we look at each of the three factors.

#### **Reliance on Cooperative Learning**

When introducing LTD into a class, it is extremely important to require the students to understand the theory and techniques of cooperative learning ahead of time and to provide guidance so that it can be executed. As shown in Table 7.1, LTD is composed according to process plan, which is complex in itself. Moreover, the students need to spend a long time talking among themselves. That is why the instructor needs to make sure that the students acquire the desired concepts and specific skills for group activities in advance, based on the premise of the spirit of cooperation. This is not limited to LTD but applies to all group learning. It is especially relevant to project-based learning, problem-based learning, and other student-centered, long-term learning methods in which it is difficult for the instructor to provide direct supervision or guidance.

The once acquired theory and techniques of cooperative learning are not retained indefinitely. For each group activity, the instructor needs to have the students review it in terms of cooperation, get them to appreciate the merits of cooperation, and repeatedly require them to think about the ideals of group activities in order to maintain their effects. In this practical implementation, we conducted a variety of group activities from the first session through to the last but, each time, we reviewed

the learning activities and continually made necessary improvements. These improvement activities guaranteed that we would have classes with active student engagement based on cooperation for all 22 sessions.

### **Adoption of Segmented LTD**

For our practical implementation of LTD we adopted segmented LTD (Sudo and Yasunaga 2011), which was developed for elementary school pupils, despite the fact that we were working with nursing students at that time. This decision was based on the idea that, in order to have the students understand each step in the LTD group process plan systematically, the simplest approach would be to repeat the explanation → preparation → meeting sequence for each step within class time. The decision was also based on the fact that most of the students worked during the day, so it would have been difficult for them to prepare for LTD outside of class time.

In this practical implementation, we did not segment each step. Instead, we divided the process plan into a two halves, but our experience confirmed the effectiveness of segmented LTD for nursing students, as well. Prior to this implementation, the complexity of the steps was identified as a problem in instituting LTD. In fact, many felt that it was difficult for beginners to distinguish between the connections in step 5 and step 6. However, in segmented LTD, specific texts were assigned in order to explain LTD, and preparation was done during the class, so that students could obtain support from the instructor and group members when they didn't understand something, even during the first preparation. As a result, they were able to prepare fully and had high-quality meetings.

### **Conducting Classes Based on LTD**

In our practical implementation, we had the students learn about LTD in stage 1 (Reading) and, in stage 2 (Argumentation) we had them learn about debates and in stage 3 (Composition) we advised them on writing essays, while constantly adhering to the LTD group process plan. At each stage, we kept reminding them of the structure “message (step 3) → themes or subtopics (reasoning, step 4)”, and we had them repeatedly practice making connections (steps 5 and 6), which deepened their understanding of the LTD group process plan. In particular, ways of speaking and writing that showed awareness of the order “message → themes or subtopics (reasoning) → connection” were actions directly tied to everyday nursing duties, so they increased the nursing students' motivation to learn.

In terms of the order of the three stages adopted in the practical implementation, we determined that requiring the students to write an essay in the last stage was effective in the following two ways.

First, writing an essay is largely an individual task but, in this practical implementation, students cooperated through dialogues with classmates in setting

themes, developing concepts, correcting content, and proofreading. Moreover, essays by their nature require individuals to expose their inner worlds. That is why trusting relationships among classmates who learn from one another are so important. If the relationships of positive interdependence (Johnson and Johnson 2005) required in cooperative learning cannot be guaranteed, individuals cannot bring out their inner worlds in a learning situation. In that sense, they learn LTD based on cooperative learning in stage 1 (reading), and in stage 2 (argumentation) the relationships of positive interdependence emerge as they experience debates that require them to observe and analyze things from the other party's position. We believe that this led to the students writing essays with deep content.

Furthermore, the essays require the students to write about their own experiences in an easily understandable manner and clarify the meaning that the content held for them in a contemporary context. This activity corresponds exactly to connections in step 6 of LTD. Taking a flexible approach to making connections requires training and the students repeatedly experienced this training in stage 1 (reading) and stage 2 (argumentation). As a result, when they wrote their essays in stage 3 (composition), they were already accustomed to making connections, so we believe that the technique was effective. By making this kind of essay the final class assignment, we gave the students opportunities to look at themselves and their classmates with new eyes, and we determined that this was effective in heightening group consciousness. In addition, we believe that setting an achievable goal of submitting the essays to a national contest gave the students a clear objective for the class and increased their motivation.

We believe that this practical implementation demonstrates a systematic and multi-layered model for a class design aimed at fostering logical language skills, based on LTD. Going forward, we aim to continually improve and refine the model.

## **Aiming for Classes that Realize Deep and Tangible Change and Growth**

In this chapter, we have discussed creation of active classes using the theory and techniques of cooperative learning. In our practical example, we have demonstrated the design and implementation of a class based on LTD, together with its learning outcomes. Throughout this chapter, we have confirmed that the theory and techniques of cooperative learning are effective for designing classes with active student engagement and that the outcomes that are expected from deep active learning can be realized.

As can be inferred from the discussions in this chapter, conducting classes is complicated due to many contributing factors. We have mentioned only a few of them in this chapter. In order to bring about the classes that we want to deliver, we need to consider even more factors. Thus, the particular words that I would like

instructors to keep in mind when designing classes based on cooperative learning are “value” and “cooperation,” which I will touch upon and summarize here.

Value in designing classes refers to the educational usefulness of content and format. In designing classes based on cooperative learning, the instructor needs to get the students to understand the value of centering the class on independent student group activities, in addition to the value of the course content. Thus, the instructor should talk about the value of the course while relating it to the students’ life experiences, not being content with mere conceptual understanding but also seeking to have the students feel it as part of their everyday lives. If the students do not understand and accept the value of the course as their own, their motivation to learn will not increase. No matter what creative techniques the instructor uses, he or she will not bring about a class with active student engagement based on cooperation.

If they can share the value of the class and if the objectives and methods of the class are clear to them, students can begin learning independently and actively. In order to have them experience the benefits of learning together with their classmates, that is, the benefits of cooperation, the instructor is required to set up cooperation with classmates in every classroom situation. Repeated experiences of the joy of cooperating with classmates to achieve what they cannot achieve alone refine the students’ spirit of cooperation and improve their awareness of cooperation. As a result, the students’ adaptation to the university improves in the academic areas, as well as interpersonal relationships (Yamada 2011).

Finally, I would like to highlight the importance of cooperation with one’s colleagues in designing classes. There is a fixed notion that classes should be designed, taught, and evaluated by the designated instructor alone. I believe that this is influenced by the fact that only the instructor has the right to grant credits. However, students do not grow through the courses of just one instructor. Rather, they grow by taking multiple courses offered by various instructors at the university. That being the case, it stands to reason that growth of the individual student is the shared responsibility of the entire university. Individual instructors should not teach according to their own arbitrary views on teaching and learning, or their own methodologies. Instead, they should discuss the interconnections among classes.

If colleagues become a team and cooperate in designing classes, with a shared objective of helping students to change and grow, the organizational atmosphere will be utterly transformed (Sasaki 2013). Designing classes in cooperation with colleagues will bring the effects expected of cooperative learning to those colleagues, who will then share the merits of cooperation among themselves. Instructors who have experienced the merits of cooperation will join with their colleagues to design and implement classes with active student engagement based on the spirit of cooperation. Both the instructors and the students can experience the joy of learning and get a taste of how satisfying it is to cooperate with one’s colleagues and classmates. Repetition of such experiences will bring about a joyful learning community. I would be delighted if the discussions in this chapter contribute to the formation of such a learning community.



## Summary

- Cooperative learning is a theory concerning support for learning in every learning situation but it is not a simple group learning technique. The spirit of cooperation underpins cooperative learning. Students can acquire the spirit of cooperation by repeatedly doing group activities designed with awareness of the basic elements of cooperative learning.
- Understanding the techniques based on the theory of cooperative learning adapted to actual classroom environments and making appropriate use of them in a class situation can bring about reliable academic skills expected from deep and active learning and lead to change and growth in the individual.
- Conducting systematic and multi-layered classes based on the learning through discussion (LTD) method can be expected to foster the development of logical language skills. Designing classes with active student engagement based on cooperation cannot be fully accomplished in a single class period. Instructors will be required to design and implement classes that adopt a variety of learning techniques according to the content of the course and commensurate with the growth and development of the students.
- Unless the instructor who is leading the class has a deep understanding of the value of cooperation, it will be difficult for him or her to implement cooperative learning. If instructors gain the emotional support and cooperation of their colleagues and strive to design classes with active student engagement based on cooperation, they can construct a learning community in which not only the students but also the instructors can be expected to change and grow.

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## Author Biography

**Dr. Satoru Yasunaga** received his Ph.D. in educational psychology from Kyushu University. He has been a professor at the Faculty of Literature at Kurume University since 1996. He specializes in educational psychology and his particular interest is in the pedagogy of cooperation in education. He is now the President of Japanese Association of First-Year Experience at University and Colleges, and also a board member for Japan Association for the Study of Cooperation in Education. He conducts his research and practices based on the theme of designing classes with active student engagement based on Cooperative Learning. He is an author of *Instructional Design to Enhance Classroom Activity: Introduction to Cooperative Learning* (in Japanese, Igakushoin, 2012), and a co-author of *The Current State and Future of First Year Education* (in Japanese, Sekaishissha, 2013). He also co-authored *Learning Through Discussion* (in Japanese, Nakanishiya, 2014).

# Chapter 8

## Deep Learning Using Concept Maps: Experiment in an Introductory Philosophy Course

Mana Taguchi and Kayo Matsushita

The “mass lecture” instructional approach may be one of the most efficient and effective class formats, provided that certain preconditions, such as the presence of motivated students and superior teaching skills of the instructor, are met. However, even in the case of well conducted mass lecture, students should engage in activities beyond mere input, that is, listening. Output activities may sometimes spontaneously occur outside of class time but, if the instructor does not have student output data, it is impossible to determine what and how thoroughly the students have learned. Students’ facial expressions and behavior in the classroom are one kind of output and it is possible to infer from those indicators, to some extent, how much the students understand. However, if the instructor is aiming to improve the class, more detailed output data are needed. Not only does the output provide feedback to the instructor, but it also can play an important role in student learning.

Of the numerous techniques for eliciting output of various types from students, we focused on a tool called a “concept map.” We chose this technique because it is relatively easy to incorporate into a class, even a mass lecture class, and because it is effective as a learning tool for students in that it helps them to digest and understand a wide range of concepts in their own way.

In this chapter, we will present a case study on introduction of concept maps into so-called “traditional” lecture classes, using the maps as a tool with potential for promoting deep active learning and developing a rubric for concept map assessment.

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This article is a reworking of Matsushita et al. (2013a) with significant additional content.

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## Background to This Case Study

We are not experts in philosophy but, since 2008 we have been deeply involved in introductory philosophy courses offered by the Faculty of Letters at Kyoto University. The impetus for our collaboration was a “Pre-FD Project,” known as Preparing Future Faculty (PFF). FD stands for “faculty development,” and “pre-FD” is the made-in-Japan English term for activities that prepare university instructors before joining the faculty. In the Graduate School of Letters PFF Project, which was introduced as part of career support for post-doctoral instructors (“postdocs”), we looked at two questions: how to support postdocs, and how to improve the quality of the classes that they were in charge of Taguchi et al. (2013).

The classes that the postdocs taught were introductory seminars for first- and second-year students established in each of the six specialized courses in the Faculty of Letters, and they were set up so that several lecturers took turns delivering the content. The lecturers took up their own research topics as class themes and the content was very interesting but the class format was remarkably one-way mass lecture style. It is understandable since the instructors themselves had only ever experienced classes of that type. Furthermore, as this style of lectures had worked well for the instructors to progress to the Doctoral Program, they most likely had no doubts about this teaching style.

Typically, mass lectures at Japanese universities face disturbances from students in the form of their private chatting. However, this kind of behavior is not common in the Faculty of Letters at Kyoto University, even in mass lecture type classes. There were no private conversations among students during the classes and even students who were not interested in the lecture laid their heads on their desks and fell asleep, played with their cell phones, or read books to “remove themselves” from the class environment. So there was nothing that would have impeded the progress of such classes. Furthermore, even students who “removed themselves” found it easy to fill in the “class reflection sheet” giving the impression that they could follow and be interested in the class to a reasonable degree. Therefore when the lecturers read the reflection sheets, most would have assumed that their students had largely understood the lesson content.

Determining how much students have learned requires continuous feedback, but assessment of student learning in those classes was based on end-of-term reports, so the results were known only after all classes had ended. Furthermore, report assignments were set according to each instructor’s lecture theme and, because the students were supposed to choose only one, assessment was limited to ascertaining only the depth to which the students understood a single theme.

Given the nature of our project for supporting improvement of class design, we needed a tool to make students’ learning visible. Without determining whether or not the students were learning enough, and in which respects they were not learning sufficiently, we could not move forward on improving the classes. The class reflection sheet (one side of a sheet of A4 paper on which the student writes freely about the content and teaching methods of the class) that we introduced at the

beginning of the project proved to be an effective tool but there was a limit to what we could learn from it, and we felt that it was not an adequate tool for making student learning visible. As noted above, conventional report assignments also had their limitations. Thus, one of the solutions which we proposed that lecturers introduce was the concept map because we believed that not only did creating a concept map cause the students to learn more deeply but assessing the completed concept map also helped instructors to gauge the degree to which the students had understood the material.

However, it should be noted that there existed few research results regarding use of concept maps in fields other than the natural sciences, partly because this tool was originally used in science education and partly because, even now, they are only widely used in the fields with a clear concept structure. In fact, research into the use of concept maps in the humanities has only recently been initiated (Kandiko et al. 2013). Assessment methods for concept maps still have not been firmly established. Thus, when we introduced concept maps, we also had to concurrently develop assessment methods.

## Deep Learning and Concept Maps

Concept maps are diagrams in which the connections among concepts are drawn using nodes, links, and linking words. Usually, a focus question is placed in the center of the diagram. In other words, a concept map is a graphic representation in the form of a hierarchical network structure of the links among the concepts surrounding the central theme (focus question). J.D. Novak et al. of Cornell University were the leading developers of concept maps in the 1970s. Concept maps became known in Japan following publication of the Japanese translation of *Learning How to Learn* (Novak and Gowin 1984) in the early 1990s. Whereas, initially, they were mainly used in science education at the elementary and junior high school levels, they have recently begun to also be used at the university level.

In particular, D.B. Hay et al. of King's College London are actively pursuing research that makes use of concept maps for university-level education. Hay believes that concept maps can be used in multiple ways, such as for lesson planning, measurement of changes, organization of group work, and sharing of knowledge and understanding (Hay et al. 2008b, p. 302) and he classified the educational uses of concept maps into the following eight categories (Table 8.1).

In addition, Hay et al. have proposed using concept maps in assessment of deep learning and they have developed several methods (Hay 2007, 2008; Hay and Kinchin 2008). Figure 8.1 is a pattern diagram for identifying quality of learning from concept maps. If the knowledge structure remains unchanged, that is counted as “non-learning.” If there are no new links, or if the added concepts are not linked to the former knowledge structure, even though there are changes such as deletion

**Table 8.1** Use of the concept mapping method

Use	Explanation
Assessing change In the course of learning	Concept maps are made by students to describe the same topic over and over again in the course of learning The concepts and links are compared to assess the changes that have occurred
Identifying student misconceptions	Persistent misconceptions can be shown by analysis of the propositions used to describe individuals' understandings
Teaching practice	The quality of the dialogue between teachers and students can be enhanced through the use of concept mapping since the method facilitates an exchange of individual knowledge and understanding
Lesson planning	Teachers can use concept maps to plan their lessons: where they map their own understanding first and use their maps to organise the knowledge and information that they will present, second
Assessment	Concept maps can be used to test knowledge and understanding for the purposes of both formative and summative assessment
Cognitive typology	Concept maps have been used to show the cognitive structures that different people use to structure and organise their thinking
Identification of expertise	Concept maps can be used to show measurable differences between experts and novices
Team working	Different knowledge, understanding and team roles can be managed and integrated through the use of concept mapping

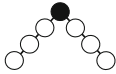
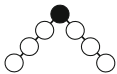



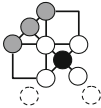
Source Adapted from David Hay, Ian M. Kinchin and Simon Lygo-Baker, Making learning visible: the role of concept mapping in higher education, published 2008 (p. 303), Taylor & Francis Ltd. Journal's website: [www.tandfonline.com](http://www.tandfonline.com)

and addition of concepts, that is counted as "surface learning." If new concepts are added to the original knowledge structure or new links are added, that is counted as "deep learning." Through analyzing the concept maps that students actually drew before and after class, Hay et al. (2008a) found that students' existing knowledge structure is difficult to change.

Concept maps are a method with its psychological foundation in D. Ausubel's *meaningful learning* theory (Ausubel et al. 1978). Meaningful learning is a mode of learning that contrasts with rote learning, and the distinction between those two modes overlaps the contrast between deep learning and Surface Learning (Engeström 1994; Hay and Kinchin 2008). Therefore, using concept maps developed for meaningful learning as a tool for assessing deep learning is a natural outcome.

Furthermore, concept map is a tool that makes it easy to organize concepts when the interrelationships are multi-layered or complex. They can be not only an assessment tool for instructors, as described above, but also a learning tool that enables students to derive deeper understanding. As in the practical implementation by Hay et al. (2008a), creating concept maps twice, both before and after class, makes it possible for the students themselves to check their depth of understanding. In addition, unlike short-answer tests, it is not a uniform method, which means that each student can express his or her own degree of understanding, and having the



	BEFORE INTERVENTION	AFTER INTERVENTION	
NON-LEARNING			knowledge structure remains unchanged
SURFACE LEARNING			some prior-concepts are rejected and new ones are added, but no new links are made and the newly added concepts are not linked to the prior knowledge structure
DEEP LEARNING			new concepts are linked to the retained knowledge structure and new links are made between those parts of the prior knowledge structure that are retained
top (organising) concepts ●    rejected concepts ○ (dashed)    retained concepts ○ (white)    added concepts ● (grey)			

**Fig. 8.1** A framework for the measurement of change in the course of learning. *Source* Hay et al. (2008a, p. 225)

students show one another their concept maps brings about a form of mutual assessment: it helps them to both appreciate the different nature of other people’s understanding and to reassess their own understanding.

Finally, we would like to add that concept maps have the advantage of being easy to incorporate into a class. Hay et al. claim that the method for creating a concept map can be taught in ten to twenty minutes and that most students can create an adequate concept map in twenty to thirty minutes (Hay et al. 2008b, p. 302). The fact that no special classroom or equipment and no extra personnel beyond the lecturer are needed is a major reason for our decision to introduce this tool on this occasion.

## Designing a Class that Uses Concept Maps

### *Outline of the Course*

Before the beginning of the term, we told the coordinating instructor for PFF Project in the Graduate School of Letters about the merits of the concept maps

described above, and the postdocs who were in charge of the classes were given opportunities to create concept maps. Then, we first introduced concept maps into the introductory philosophy course that began in AY2012. This course was taught with five lecturers taking turns.

If a class with multiple instructors is well designed, it has the advantage of being able to deal with a wide range of content that one lecturer, alone, could not cover. However, it sometimes happens that there is insufficient awareness of the connections among the topics, so that the course becomes a random assortment of narrow topics. In order to prevent that, it is essential to design the entire course at once, rather than each class session separately. In the first class meeting of the introductory philosophy course, the coordinating instructor explained the objectives of the classes to be conducted during the semester, with each of the five lecturers presenting a summary of his or her class sessions. During the classes, there were more than a few situations in which one lecturer mentioned the content of another's lectures, so we believe that they had relatively high awareness of making connections among the class sessions.

Even so, since the objective of the course was to introduce various specialties, the lecturers involved often made their respective research topics the themes of their own classes, as mentioned previously (cf. Table 8.2), and the course was a series of classes with rather specialized content that had no strong connections among them. Therefore, simply leaving it to the students to independently make connections among the themes was inadequate, so it became desirable to set up a class session in which the material was summarized. Moreover, when the students wrote their

**Table 8.2** Summary of the introductory philosophy course (second semester, 2012)

Session	Lecturer	Class theme	Key concepts presented in the final session
1–3	A	What are ethics? The controversy that Peter Singer stirred up	Peter Singer, utilitarianism, poverty, animals, euthanasia
4–6	B	Thinking about religion	Contemporary philosophy of religion, nihilism, the void, inter-religious dialogue, inter-religious experience
7–9	C	Thinking about understanding other people	Skepticism about other people's emotions, uncertainty of translation, principles of tolerance, interpretive functions
10–12	D	Images of women in early modern Japan	–
13–14	E	Introduction to the philosophy of mythology	Philosophy of mythology, demythologization, symbolic forms, the sacred ( <i>mana</i> ), emotions and thrown-ness (moods)
15	E	Review using concept maps	

*Note* Lecturer D was unable to attend the final class session, so no key concepts were displayed

reports—in which their performance for the semester was rated—at the end of the semester, they were asked to choose and discuss one of a total five report assignments which were assigned by the instructors. As previously mentioned, with this kind of report assignment, even if it is possible to assess the final report to determine if the student thoroughly understood one of the five themes, it is difficult to assess whether the students have made the connections among all of the parts of the material and understood the course content in a manner suitable for the introductory course. Given these circumstances, we expected that concept maps would offer the students opportunities to develop deep understanding of the course as a whole and that they would compensate for the disadvantages of assessing reports with deep but narrow topics.

### *Class Plan*

Concept maps were used in the middle (week 4, 5, and 6) and at the end (week 15) of the second semester of the AY2012 course. In weeks 4, 5, and 6, Lecturer B tried to use them with the objective of determining if the students thoroughly understood the content of his lectures and also put them to practical use in order to reflect upon his lectures.

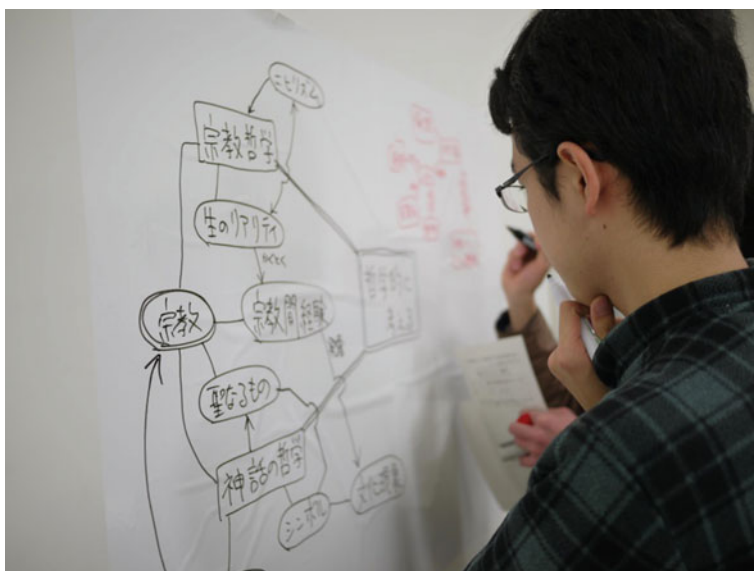
In the final class session, concept maps were used with the aim of encouraging the students themselves to identify the connections among the contents under different themes presented by the five lecturers. The students reviewed the classes by interconnecting each concept with the central theme of this course (focus question). The central theme (focus question), chosen in consultation with the lecturers as being appropriate for an introductory course, was “Thinking Philosophically.” In addition, the students were asked to draw concept maps after each instructor had presented them with four or five concepts as key words (total 19, shown in Table 8.2) from their own classes as they explained and summarized the course. The students were told that they could use as many concepts as they wished and also add their own concepts.

The final class session was conducted according to the sequence shown in Table 8.3. There were twenty-three students in the class, mostly first- and second-year students, of whom fourteen were given credits. Fifteen students participated in the final class session.

First, <1> we provided a simple explanation of the sequence of the class session and of concept maps, after which <2> four lecturers (the fifth one was absent) summarized the classes he or she was in charge of while writing four or five key concepts on the board. Next, <3> the fifteen students participating on that day were divided into seven groups of two or three students each and <4> told to draw a concept map. For this task, we distributed to each group two sheets (60 cm × 80 cm) that could be written on and erased like a whiteboard. We instructed them to draw a concept map on the side-by-side sheets while discussing the task within their group (Photo 8.1). <5> We chose four of the groups and gave each of them about

**Table 8.3** Sequence of the final class session

Segment	Time (min)	Content
<1>	5	Explanation of the sequence of today’s class and of concept maps
<2>	15	Summary of the preceding classes and laying out the key concepts by four lecturers
<3>	5	Division into groups
<4>	30	Creation of a concept map by each group
<5>	25	Presentation of student groups’ concept maps and comments from the lecturers
<6>	5	Presentation of the concept map created by the coordinator (professor) of the course
<7>	5	Filling in class reflection sheets



**Photo 8.1** Creation of a concept map by each group

five minutes to present the concept map that they had drawn, and the lecturers added comments (Photo 8.2). <6> The coordinator of the course (a professor of philosophy) then showed the students his own concept map and gave an explanation that connected the five themes. Finally, <7> as in every other class session, the students filled out a class reflection sheet freely offering their opinions about (1) the content (points that made an impression, unanswered questions, etc.) and (2) the methodology (opinions about the components and methods used in that day’s class, what they wanted from the class, etc.). They also freely offered their opinions and feelings about concept maps. The lecturers were also asked to express their thoughts on concept maps in writing.



**Photo 8.2** Presentation of student groups' concept maps and comments from the lecturers

Thus, the final class session combined group work, presentations, discussions, and creation of concept maps, and it was designed with the intention of attaining the characteristics of deep active learning.

## Significance of Concept Maps as a Learning Tool

Partly because Lecturer B had already introduced the idea, the actual creation of concept maps proceeded smoothly and all of the groups were able to complete their concept maps within the allotted time.

From the post-class survey, we were able to infer that both students and lecturers felt that concept maps had significant value as a type of learning tool. First, here are some of the opinions and impressions that the students revealed in their remarks:

[a] I felt as if I was reliving those fifteen lectures. It was meaningful as a summary.

[b-1] Creating a concept map as part of a pair took longer than making one by myself but it was instructive because I acquired ideas that I couldn't have acquired on my own.

[b-2] Hearing and seeing the thoughts of other groups, I understood concepts and links that I never would have thought of by myself.

[c-1] It was a pleasure to have five classes that I thought were kind of scattershot summarized into one.

[c-2] While we were creating the concept map, I was able to notice a lot of different things.

We found that the students also developed awareness of the three functions of concept maps: [a] reflection, [b] knowledge sharing, [c] knowledge creation.

Similarly, the lecturers mentioned the significance of concept maps for unified understanding of the concepts and as a tool for learning philosophy.

Initially, I was doubtful as to whether this course with multiple instructors could have any consistency but I'm glad I found out that there is consistency when we have this kind of revision class.

All of the key concepts that the lecturers mentioned were specialized, deep-level concepts. I thought it was wonderful that the students could add higher-level concepts, reflect, and summarize.

The experience of pursuing ideas and linking them to another topics was a good exercise in philosophy.

Neither lecturers nor students had any negative opinions about concept maps. They regarded concept maps highly as a tool for promoting deep learning in the field of philosophy.

Out of the seven concept maps created by the student groups two examples are shown in Figs. 8.2 and 8.3. The concept map created by Group 1 (Fig. 8.2) received the highest rating in the assessment described below, while the concept map created by Group 4 (Fig. 8.3) received the lowest rating. Although belonging to the group that created the lowest-rated concept map, the students could still grasp the significance of concept maps as a learning tool. As one student expressed: “After creating the concept map, I noticed that one of the underlying theme was ‘understanding others.’ I thought it was interesting that even when people are given the same keywords, they use different words to link them.”

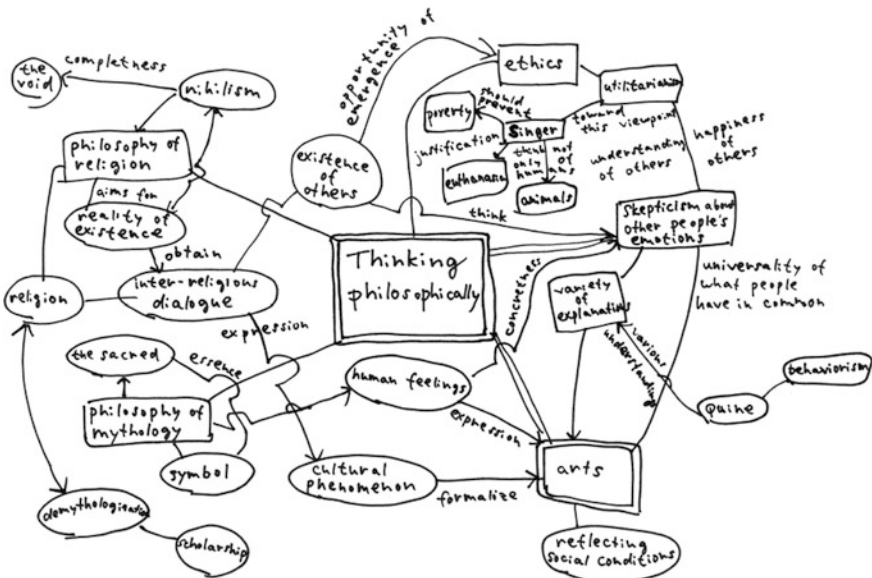


Fig. 8.2 The concept map created by Group 1

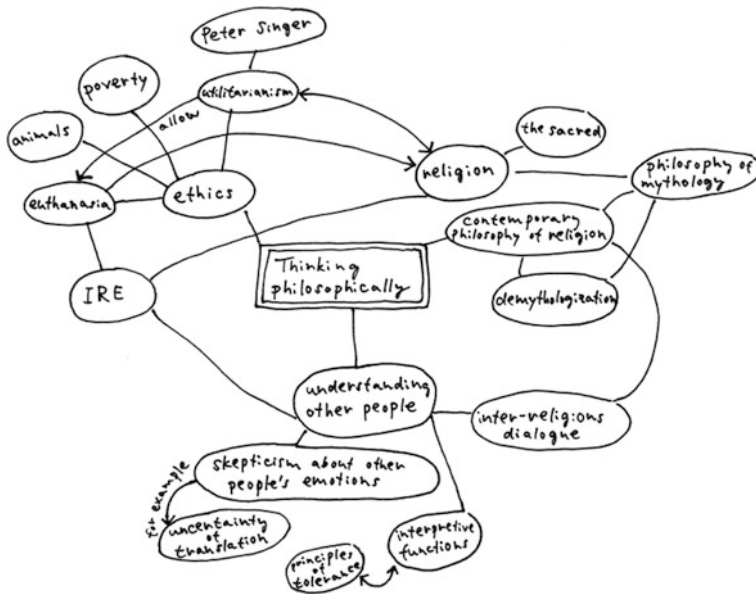


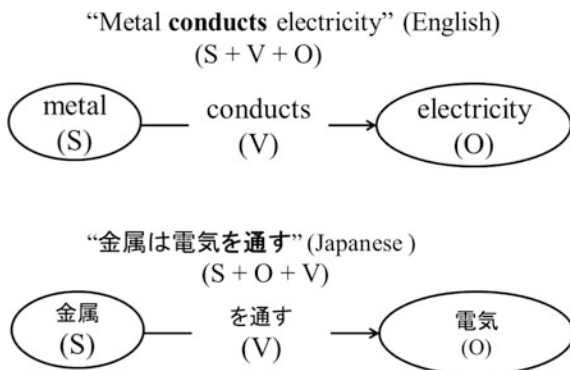
Fig. 8.3 The concept map created by Group 4

## Concept Maps as an Assessment Tool

As described above, students connected several different themes and key concepts of those themes covered in a semester-long course with multiple instructors, in order to answer an essential question in the field of philosophy: namely, “What does it mean to think philosophically?” Through such tasks, the students deepened their understanding of the concepts and reconstructed the conceptual structures, while reflecting on the class sessions experienced during the semester. In other words, these assignments were not simply exercises for the purpose of assessment: they also possessed the characteristics of *assessment as learning* (Earl 2003) that promote student learning. Then, how effective are concept maps as an assessment tool?

The effectiveness of concept maps as an assessment tool has been asserted from the outset (Novak and Gowin 1984) and proposals for their use have included a method of directly using the structural features of concept maps for grading purposes (Novak and Gowin 1984), a method of understanding differences in quality of learning by looking at changes in concept maps prepared before and after a class (Hay 2007), and methods that involve comparison with a master map drawn by an expert (McClure et al. 1999; Plummer 2008). However, there were problems with these approaches, such as complexity or difficulty of execution, or inability to effectively rate the quality of learning. Hence, we looked into methods of using rubrics to determine the quality of concept maps (Matsushita et al. 2013a). Rubrics are a tool for assessing a student’s performance (works produced and class

**Fig. 8.4** The relationship between language and concept maps: Contrast between English and Japanese



performance) and they usually take the form of an assessment criteria table, consisting of multiple criteria and levels, with descriptors that explain them (Matsushita 2012).

In assessing concept maps, the treatment of linking words is problematic, so we would like to add some remarks about the points of contention concerning the relationship between language and concept maps. This is because most of the previous research on concept maps has been conducted in English-speaking countries and things that are not problematic in English become problematic in Japanese. In English, the ordering of linguistic propositions and the concept map are one and the same. In contrast, they do not match up in Japanese and, when drawing a concept map, one must change the word order (cf. Fig. 8.4). In Hay’s (2007) assessment method, links without linking words are not subject to assessment because they lack meaning. However, this standard is too strict when we consider the differences between English and Japanese. In fact, even if no linking word is given, there are more than a few cases in which the connections among concepts are understandable. For that reason, we regarded links without linking words as suitable for assessment on these occasions. But, this does not mean disregarding the importance of linking words. There is no doubt that linking words serve as important indicators of comprehension of the links among concepts, and that idea is expressed in the rubric discussed below.

## Developing a Rubric for Assessing Concept Maps

We developed a rubric for assessing the concept maps that we introduced, using common standards. In order to do so, we needed to have experts who were well-versed in the contents of the classes make the standards for assessment clear to us. Thus, we first held a “Concept Map Review Session.” We took the conversation data obtained in that session and developed a rubric, and, in order to verify their



suitability, we had new assessors use the rubric to conduct assessments. The procedure is described below.

### *Concept Map Review Session*

The Concept Map Review Session was held three weeks after the final class session. The objective was to have several experts assess the seven concept maps that the students had created and to obtain information for creating a rubric. The assessors included lecturers for the course, persons scheduled to become lecturers, and teaching assistants: eight persons in all. All of them had completed their Doctoral Programs and were experts in the contents of the classes for this course.

The Concept Map Review Session was held in two stages: pre-session assessments and moderation on the day of the session. First, before the session, we had each of the seven concept maps assessed in three stages and had the assessors write down the bases for their assessments.

Table 8.4 shows the structural features of the concept maps and the distribution of scoring by the eight assessors. For Groups 1, 4, and 7, all eight assessors gave consistent scores but there were major disparities in the scores for Groups 2, 3, 5, and 6.

On the day of the Review Session, we first had each assessor explain his or her scores for the concept maps and the basis for that scoring. Then, we proceeded with the moderation task while showing the participants the distribution of the scores and the differences in views on assessment (criteria), which we had compiled in advance. As a result of the moderation, we not only made firm decisions about the

**Table 8.4** Structural features of concept maps and distribution of ratings from eight assessors

Student group	1	2	3	4	5	6	7
Structural features of concept maps: number of concepts	26	19	22	18	47	19	17
(Number of those concepts shown)	(14)	(11)	(11)	(15)	(15)	(11)	(9)
Number of links	40	12	29	25	51	22	28
Number of linking words	18	6	13	2	12	15	8
<i>Distribution of ratings</i>							
3 points	7	2	3	0	4	2	1
2 points	1	5	4	3	3	3	7
1 point	0	1	1	5	1	3	0
Average	2.88	2.13	2.25	1.38	2.38	1.88	2.13
Standard deviation	0.33	0.60	0.66	0.48	0.70	0.78	0.33
Final rating	3	2	2	1	2	2	2

Note “(Number of those concepts shown)” refers to the number of concepts used on the concept maps out of the nineteen key concepts presented in the final class session

scores but also agreed to set up five criteria and four levels regarding the rubric. The five criteria were: understanding of concepts (Do the students understand the concepts related to the class?); creation of concepts (Have the students created new concepts to make connections among the classes?); link structures (Have the students linked the connections among the concepts appropriately?); suitability of linking words (Have the students expressed the connections among the concepts with suitable words?); and connections with the central theme (Have the students connected the content of the classes to the central theme of the course?). Moreover, even though all of the concept maps prepared by the students in the class achieved the required level, we assumed that there might be other students who did not reach that level, so we designated failure to achieve Level 1 as Level 0. Thus, we ended up establishing four levels: Level 3 (excellent), Level 2 (good), Level 1 (satisfactory), and Level 0 (unsatisfactory). The Review Session lasted about two hours and thirty minutes.

### *Creating the Rubric*

Based on the conversation data that we had collected from the discussions on the bases for the assessments in section “[Concept Map Review Session](#)”, we created a rubric in a three-person group comprising two instructors and one graduate student, all specializing in education. Since we had already decided to establish five criteria and four levels, our task on this occasion was to write descriptors in each cell of the table.

First, we read the record of the conversation data acquired during the moderation task, extracted the places that served as the bases for the assessments, and wrote descriptors into the respective cells for most likely corresponding criterion and level. Next, we completed the rubric by removing duplicate content and organizing the sentences so that the differences among the levels by criterion were clear. According to Matsushita et al. (2013b), methods for establishing rubric levels include the conditional type (in which conditions are gradually increased), the quantifier type (using words and phrases that express quantities and gradually increasing the quantities), the verbal type (using verbs to gradually increase the degree of desirability), and the adjectival and adverbial type (using adjectives and adverbs to gradually increase the degree of desirability). The levels for these particular rubrics were set mainly with a combination of quantifier type and adjectival and adverbial type.

Table 8.5 is the final version of the rubric that we created.

In section “[Deep Learning and Concept Maps](#)”, we described several methods of assessing concept maps: however, the rubric that we created refer to the methods laid out in a method for direct scoring based on the structural features of concept maps (Novak and Gowin 1984). For example, the method of Novak et al. focuses on features such as “understanding of concepts,” “link structures,” and “appropriateness of linking words,” and we have also incorporated them into our criteria for

**Table 8.5** Rubric for concept map assessment

Criteria	Explanation of criteria	3 Excellent	2 Good	1 Satisfactory	0 Unsatisfactory
Understanding of concepts	Do the students understand the concepts related to the class?	Incorporation of a large number of concepts from each class, used appropriately	Mostly appropriate use of the concepts presented, but little use of concepts from other classes	Few concepts or inclusion of a number of inappropriate concepts	Failure to meet the criteria for Level 1
Creation of concepts	Have the students created new concepts to make connections among the classes?	Creation and effective use of independent concepts to make connections among the classes	Creation of independent concepts to make connections among the classes, but little effective use	Hardly any independent concepts created to make connections among the classes	Failure to meet the criteria for Level 1
Link structures	Have the students linked the connections among the concepts appropriately?	A number of appropriate links drawn. Their hierarchy is clear with multiple branching structures and several appropriate cross links <sup>a</sup>	Appropriate links have been drawn, but they are few in number. Not enough hierarchies or branching structures and only limited cross links <sup>a</sup>	Links have been drawn, but they are inappropriate, with little evidence of hierarchies or branching structures. No cross links <sup>a</sup>	Failure to meet the criteria for Level 1
Appropriateness of linking words	Have the students expressed the connections among the concepts using appropriate words?	A number of appropriate linking words that make the meanings of the links clear	Many linking words, but meanings of the links are not clear in several cases	Few linking words, or a number of linking words that are used inappropriately	Failure to meet the criteria for Level 1

(continued)

**Table 8.5** (continued)

Criteria	Explanation of criteria	3 Excellent	2 Good	1 Satisfactory	0 Unsatisfactory
Connections with the central theme	Have the students connected the contents of the classes with the central theme of the course?	Links created among the contents of the classes in response to the central theme, and their connections are shown on the entire concept map in a consistent way	Links created between the contents of the classes and the central theme, but only for part of the concept map	Attempts to connect the contents of the classes, but inconsistent with the central theme	Failure to meet the criteria for Level 1

<sup>a</sup>Cross links are links that connect the themes of one class with the themes of another class

the rubric that we created. On the other hand, there is no particular focus on “creation of concepts” or “connections with the central theme.” However, as in our practical application, we believe that these are appropriate and effective criteria in the case where we have each student not only understand the content of the classes but also create his or her own overview of all of the classes conducted during the semester. In other words, this rubric is believed to be appropriate in cases where we use concept maps with the expectation of reflection and knowledge creation.

### ***Assessment Using the Rubric***

After completing the rubric, we asked two experts who had not participated in the Concept Map Review Session to use the rubric to assess the seven concept maps. Both experts were lecturers who had taught the same introductory philosophy course in the previous semester. They had experience with classes that used concept maps but they had not participated in or observed the final class session in the second semester. In other words, they were asked to evaluate only the concept maps, without having any information about words used or actions that took place during the classes. We had also conducted semi-structured interviews of the two assessors in which we asked questions concerning such matters as their feelings about using the rubric for assessment and the advantages and disadvantages of concept maps as an assessment method. Each interview lasted about two hours.

As a result of comparing the levels of reliability between two assessors, with and without the use of rubric, we found that use of rubric increased the level of reliability between the assessors in concept map assessment, guaranteeing a certain level (Matsushita et al. 2013a). This indicated that use of rubric could guarantee reliability between assessors when assessing student learning with concept maps.

## **Effectiveness of Concept Maps as a Tool for Deep Active Learning**

Thus far, we have been discussing an actual class that incorporated concept maps. Our final section will summarize the effectiveness of concept maps as a tool when the objective is deep active learning.

First, as we stated at the outset, overall, these classes have been conducted as “mass lecture classes.” The learning acquired in them was not shallow but it was not Active Learning. One instructor from the Graduate School of Letters who participated in the final session of our class expressed his excitement: “Seeing students wandering around in the classroom during class sessions—this is the first time since the establishment of the Faculty of Letters.” This may be a slight

exaggeration but it is true that neither the instructors nor the students had much experience of Active Learning, whether in this class or in any other.

Yet, introduction of concept maps easily broke down the existing class format of a lecturer standing up front for the whole time and the students sitting and listening for the whole 90 min. Having groups of two or three create concept maps prompted discussions and incorporated presentations of their concept maps by the various groups. Moreover, since all of the lecturers involved in the course participated, there were elements of team teaching and the final class session unfolded in a dynamic manner.

During the class, the lecturers made comments as they showed the students new links on the concept maps that they presented and explained the links among concepts in a more structural way. In the closing portion of the class, the coordinator, a professor in the Graduate School of Letters, revealed his own concept map, showing the students the breadth and depth of the field and going beyond the lecturers' comments.

The postdocs who were the objects of the PFF Project were in charge of the final class session but, even without any special preparation or practice, they were remarkably able to bring about Active Learning by making use of the features of concept maps, which enable students to express and share what they understand.

Are concept maps effective as an assessment tool for deep learning? As described in section "[Deep Learning and Concept Maps](#)", the research of Hay et al. is well known but, what features distinguish the assessment method using the rubric that we developed from that of Hay et al.?

Hay et al. (2007), Hay and Kinchin (2008) sought to understand differences between deep learning, Surface Learning, and Non-Learning from changes that occurred in concept maps between the time before a class and the time after the class. In contrast, our experiment saw deep learning as a question of being able to integrate a group of concepts with five different themes in a way that goes beyond the themes, and we used the rubric as assessment standards for the achievement level. Even though the contents of these classes were at the introductory level, they were quite specialized and deep, and the students, mainly first- and second-year students, had low levels of prior knowledge on each theme, so the method of comparing concept maps before and after class would not have functioned well.

Moreover, Hay et al. did not clearly specify who should conduct the assessments, and it appears that they did not consider the issue of feasibility of execution. In our experiments, in contrast, experts in the field, including lecturers involved with the class, conducted the assessments. That is, "the connoisseurship of the expert" (Matsushita 2010) is reflected in the assessments and we have also considered feasibility of execution, so that instructors can use the rubric for assessment on a daily basis. In fact, in the interviews that we conducted in assessments using the rubric, both of the assessors said that they thought that concept maps could be used for assessment in the same form, even in classes with 100 students, and that they wanted to try using them.

Up to this point, concept maps had not been established as an effective method for assessment. As mentioned above, in methods for directly converting the

structural features of concept maps into scores (Novak and Gowin 1984), it is not always possible to rate quality of learning. In addition, Hay and Kinchin (2008) propose dividing concept maps into network types, spoke types (extending in a radial shape like the spokes of a bicycle wheel), and chain types, depending on their shapes, but it is impossible to identify quality of learning from the shapes. Ultimately, we need to have experts, who can evaluate the appropriateness of the nodes representing the concepts and the links representing the relationships between the concepts, conduct the assessments. On the other hand, we should not leave the assessments up to experts who conduct assessments based on their intuition. Clearly writing out the important viewpoints and ranges for assessments in the form of criteria and levels allows coherent assessments that are easy to explain to other people.

Thus, we can say with confidence that concept maps, in combination with rubrics, can be adequately put to use as a tool for assessing deep active learning in university-level education.

## Summary

1. In this chapter, we described an example of implementing concept maps into an introductory course of philosophy. While this was a lecture course with multiple instructors taking turns, in the final session we incorporated an active learning format that involved groups creating and presenting concept maps. This course reviewed the content of the semester's class sessions, made connections to the central theme of "Thinking Philosophically" while providing a structure for the concepts that the students had learned during the class sessions, and thereby promoted deep learning. In other words, concept maps were shown to be an effective learning tool for deep active learning.
2. On the other hand, concept maps can also be an effective tool for assessing deep active learning. They are not intended to replace the essay tests or reports that are still frequently used in university education but they are an effective method for ascertaining and assessing the depth of structural understanding that students have of a wide range of content.
3. Hay et al. have researched methods for assessing deep learning using concept maps but we have developed a method for assessing the concept maps drawn by students using a rubric. The rubric consists of five criteria—understanding of concepts, creation of concepts, link structures, appropriateness of linking words, and connections with the central theme—and four levels. They are clearly laid out so that "the connoisseurship of the expert" can be easily communicated to other people.
4. Combined with the rubric, concept maps can be actively used as an assessment tool for deep active learning in university-level education.

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# Chapter 9

## Course Design Fostering Significant Learning: Inducing Students to Engage in Coursework as Meaningful Practice for Becoming a Capable Teacher

Kazuhiko Sekita and Masakazu Mitsumura

While convincing ourselves of the significance of learning, learning is also a meaningful part of our lives. If we blindly memorize something without considering its meaning, it would not remain in our heads. At the same time, a teacher cannot completely manage what kind of meaning the students attach to certain facts and information. There are also times when the teacher him/herself is not certain as to whether the conveyed knowledge and information is really meaningful to the students. Even then, fortunately, it is relatively easy to encourage students to learn facts and information, giving meaning to the utilization of teacher training courses. Even for difficult contents, the teacher can utilize techniques such as having students explain the contents to the members of their group to clarify understanding. Even if the student does not understand the significance of the contents he or she is learning or the meaning of learning as such, they will immediately grasp the meaning of the act of teaching their friends. In this scenario, students will work on assignments with the aim of learning so that they can teach others.

This chapter has two sections: an introduction to classroom practice performed by Sekita, who is the primary author, and a study of its impact by Mitsumura, the secondary author. Through inducing students to engage in coursework as meaningful practice for cultivating the general classroom teacher's capacity, Sekita aimed to bring about learning that is meaningful to students. To evaluate this process of meaning making for students, Sekita utilizes the five basic features of good courses

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as identified by Dee Fink, the former chairman of POD,<sup>1</sup> useful as a benchmark for this research. Fink (2003) stated that “*good courses are courses that...*

- Challenge students to significant kinds of learning.
- Use active forms of learning.
- Have teachers who *care*—about the subject, and their students, and about teaching and learning.
- Have teachers who *interact well* with students.
- Have a good system of feedback, assessment, and grading” (p. 28).

## **Practice: Initiatives to Methodologies of Teaching**

### ***Methodologies of Teaching, A Course in a Teacher Training Program***

The majority of students in my Methodologies of Teaching course are juniors who are aiming to become junior high- or high-school teachers. In the past several years, two courses were offered in the first semester (April–July) and a total of approximately 100 students have taken the course. The majority of the students will participate in student teaching once they become seniors, and, most of the juniors who are taking my course have not yet developed an image of actual classroom teaching. Therefore, most of the students have difficulties grasping what kind of significance the activities in the class will have when they become teachers. On the other hand, the students who have experienced student teaching before or during the semester recognize the significance of what they are learning in this course and show increased motivation.

The course contains a mixture of students aiming to obtain teaching licenses in the subjects of mathematics, science, Japanese, English and social studies. They have already taken or are currently taking several subject-specific courses to master the contents of the subject and instructional methods. Therefore, in this course I am trying to incorporate contents that are conceptual to a certain extent and at the same time highly diverse. Specifically, the aim is to help the students grasp the basics of instructional design by actually designing classes. The purpose of the course is for students to learn the concept of class design and components of a class, and how to combine these components with few learning activities and assessment methods. Through this, by the end of the semester, the students are expected to become able to plan and design a class that takes into account the instructional goals of the subject based on their own educational philosophy (they will be able to write a lesson plan for a class they are going to teach).

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<sup>1</sup>The official name of POD is Professional and Organizational Development Network in Higher Education and is the largest organization in the U.S. of professionals involved in faculty development.

### ***My Intentions (or Wishes)***

The Methodologies of Teaching course, the focus of this study, is not centered on the transfer of knowledge through textbook explanation. I attempt to provide opportunities for students, who have already taken several teacher training courses, to imagine themselves as a teacher in front of a classroom. In addition, I would like students to improve their practical teaching skills. For this reason, I have designed and offered this course with the following expectations.

- i. First of all, I would like the students to hone their self-management skills so that they can take full advantage of student teaching experience and “survive” after being recruited as a teacher. The teaching profession is hectic (as a current OECD survey indicates that Japanese teachers’ averaged working hour is the largest among OECD countries), and it may not be possible to prepare for the following day’s class after school every day. Therefore, it is extremely difficult for a newly hired teacher, who does not have much insight of the progression of the academic year, to efficiently handle the expectations of the job. From the university student’s perspective, they are busy not only with studying but also with extracurricular activities and part-time jobs. For this reason, if they develop the time-management skills to work on the assignments of this course and sustain their lifestyle, they should be more likely to be able to survive when they actually work as a teacher.
- ii. In addition, I would like to provide opportunities for students to practice basic teaching skills. For example, I would like them to cultivate the skill to scan through students’ papers or homework and give feedback quickly and accurately. I would also like them to learn how to observe the appearance of students, ask about their condition if necessary, caring for their mental and physical health. Even as a beginning teacher, it is imperative to notice various signs such as the pupils’ appearance and the tone of their voice, and respond appropriately. I would like students to develop the ability to narrow down points of explanation and hone their skills to deliver well-modulated narratives. If they repeatedly practice these skills during the course, they should be able to make improvements.
- iii. Finally, I would like my students to understand through experience the positive educational effects of cooperation. I attach great importance to the power of education inherent in a group. In particular, the dynamism generated from learners’ cooperating and working on learning assignments collaboratively is something a teacher ought to understand. The teaching profession as a human service calls for high personal relations skills. I have repeatedly stressed in this course, the importance of caring for each other’s learning through interaction with group members.

## *Initiatives to Achieve the Goals*

In this course, students are required to submit two or three assignments in almost every class. The points given for each assignment (two to five points) are small, but whether or not the students can submit them as requested consequently becomes important. Moreover, students may easily make a mistake in certain assignments unless they carefully read the syllabus (in the course schedule table; for example, the range of preparation differs from the textbook order) and this will prompt them to carry out their own work appropriately (Appendix 9.1). Generally, one and a half to two hours of weekly learning outside of the class is required [see Sekita (2013a) for the concept of the assignment volume].

**Setting expectations at the beginning of the semester** I clearly state that I require students to submit all assignments on time in hopes of improving their self-management skills, but at the same time, I stress that judging whether or not to submit all assignments is an important skill for students to develop. If students are not well physically or mentally, it may be difficult to complete their assignments. In particular, I tell students that sometimes it may be necessary to prioritize their assignments for other courses over this course. Many students are surprised when I tell them, “If you do a half-baked rush job, that would cause trouble for your group members and it would also be difficult to achieve results in other courses if your power is dispersed. If you were going to spend two hours to gain five points in this course, you ought to positively think of using the time for something more valuable. You will become stuck in school if you deliver course contents with low-quality and yet justify your actions as merely trying hard.” This is the sort message I convey to students at the beginning of the semester.

**Several tools for stimulating students’ engagement** In this course, I aim to raise students’ awareness of the educational impact of cooperation with the structure of the course based on group learning and assignments. The following four assignments are primary:

### **i. Dialogue Journal (and practice of commenting)**

“Dialogue journal” is one of the instructional strategies of cooperative learning for colleges, introduced by Barkley et al. (2005). Students review what they learned in the class and consider the significance and relationships to their previous knowledge. They bring their journal to the class in the following week and have another student read it and comment on it. Commenting on each other’s work takes practice and the students are expected to write honestly and properly (see Appendix 9.2). They start by writing comments in five minutes and repeatedly practice so that they can write within three minutes by the end of the semester.

Students are instructed to provide comments that the writer of the journal entry will notice and accept, followed by providing encouragement regarding the matters mentioned in the journal. Furthermore, students whose journals entries were assessed read the comments made by their counterparts and give feedback verbally. They are encouraged to clearly tell their counterparts if the comment is not to the

point. I encourage them to polish their comments because it would be a problem later when they become teachers and write comments for their pupils.

### **ii. Preparation Mindmap**

Almost every week, students are required to draw a preparation mindmap based on the designated chapter of the textbook (Appendix 9.3). The students bring their mindmaps to the class drawn using colors on an A3 size paper and explain what they learned to their counterparts using the mindmaps. This provides a multilayered process to understand the contents of the text as they read, create a mindmap to represent the text, and explain (commenting on) it, and also listen to the counterpart's explanation (see Sekita et al. 2016 for details). It is primarily done in pairs with one person spending four and a half minutes (nine minutes for two persons) explaining the content of a dozen pages of the text (if a group has three members, each person spends three minutes for explanation).

### **iii. Collab-Test (and practice making questions)**

“Collab-Test” is a web-based assignment where each member creates several multiple choice questions regarding the designated portion of the text, solves each other's questions within the group, and checks the accuracy and appropriateness of the questions. Subsequently, they submit (enter in an online system) two or more questions which the group judged as good questions. It cannot be completed unless all group members prepare questions and evaluate each other in the system that reflects the level of the students' own efforts on the group scores (Takagi et al. 2010). The teacher carefully selects from the questions gathered from each group and uses them to conduct an actual test in the class (Sekita 2013b). Also, once the questions are collected, they are disclosed in advance and motivated students can practice solving the questions in advance using these probable test questions.

### **iv. Peer Assessment using Portfolio: Roleplay for parent-teacher-student conference**

The course also utilizes roleplay sessions for parent-teacher-student conferences using the portfolio introduced by Yoshida (2006) which has been modified for the students in the teacher training program. In this course, students prepare a learning portfolio using an A4 size pocket file to accumulate learning deliverables every week. At the beginning of the semester, students set their own goals in a form called “Manabi-hajime Sheet” as a reminder (Appendix 9.4). And at the end of the semester, they prepare a reflection sheet called “My learning journey” (Appendix 9.5). Learning deliverables are filed in this portfolio. In the parent-teacher-student conference, which is a roleplay of students acting as teachers, students and guardians, the student playing the role of pupil explains his or her own learning using the portfolio to the student playing the role of guardian. The student playing the role of teacher acts as an emcee and assists the student.

Before implementation this roleplay, most students had a negative image of parent-teacher-student conferences (confirmed visually by a show of hands),

but more than half of them demonstrated a somewhat more positive response after implementing the roleplay. Most of the students reflected positively on the use of portfolios.

### *My Active Learning*

As a required course for teacher training, this course is intended to facilitate the growth of students towards a career in teaching. And the aim of the course is to boost the students' awareness of becoming a teacher. The point of interest of my teaching is whether or not this course, as a teacher training education, offered a meaningful experience for learners and how I can make it a meaningful experience for students.

I often use activities in pairs and groups, called cooperative learning so that the time students spend talking to each other more than I speak to them [refer to Sekita (2004, 2005) for my stance regarding cooperative learning]. Therefore, the information I can offer and explain directly in the class is limited.

The essential information for the course is contained in the textbook and it is sufficient for students to read the text before class. However, in the class, I attempt to handle topics from a different perspective than the textbook. The flow of the class is as follows: I spend about 30 min for the students' preparations for the class based on cooperative learning including the confirmation of their preparation, and about 60 min for the combination of teaching the entire class and group learning alternately where they ask questions, think, exchange and confirm. I employ active learning in this manner, which definitely and effectively incorporates opportunities for students to voluntarily carry out learning activities.

In addition, I have been trying to improve the quality of active learning by making the learners aware of how this course is linked to their career development. For this reason, I have been attempting to intentionally narrate the significance of each of the assignments and activities in the following manner.

When students greet each other at the beginning of a class, I ask them, "Can you care for the learning of the pupils in your class without caring for the learning of your friends in this class?" In the journal exchange I prompt them, "Were you able to write comments by visualizing your pupils becoming cheerful after reading it?" In mutual explanation of mindmaps, I tell them, "Whether you can narrate the key points in a short period of time in an easy-to-understand way is a skill necessary for a teacher. Use the keywords in the mindmap as clues to steadily hone your skills to explain things clearly and concisely."

In this manner, students raise their awareness of "learning in the class" by demonstrating and practicing "how to teach" (how to explain, how to ask questions, how to praise, and so on).

## ***Summary of the Section***

Thus far, I have primarily discussed some teaching techniques and strategies used in my course. I would like the readers to consider my section not as just an explanation of such techniques but as a description of course design of how to arrange assignments and how to have students work on them.

**Was it effective?** According to the course evaluation survey of students carried out at the end of the semester, the learning time outside of the class for this course was more than two hours per week on average and the students' satisfaction of the course was around 4.5 out of 5 (on a likert scale of 1–5), and this result has been consistent for the past few years. Comparatively speaking, this evaluation ranks near the top for lecture-based subjects among the similar class size courses in my institution. The classes of our university are open to anyone who wants to visit, as a rule, and visitors, although it is rare to receive one, have rated the course highly, acknowledging that active learning is in fact being carried out. However, it is not possible to know from observing a single class to what extent students are familiar with the textbook contents and to what level the learning experience has been transferred. For this reason, the impact of the class under consideration is analyzed through qualitative analysis in section "[Verification: Reviewing the Course](#)".

## **Verification: Reviewing the Course**

### ***Method***

In section "[Practice: Initiatives to Methodologies of Teaching](#)" of this Chap., Sekita, who is the primary author, explained his own instructional activities in teaching the Methodologies of Teaching course from the perspective of the instructor of the course. The objective of section "[Verification: Reviewing the Course](#)" is for Mitsumura, who is the secondary author, to analyze Sekita's instructional activities from the *emic* perspective of learners (students who have taken the Sekita's Methodologies of Teaching course). Mitsumura reviewed the portfolios of 50 students who took the course mainly in the first semester of 2011 academic year in an effort first of all to grasp the contents of the course. The portfolios organize and integrate the goals the learner set at the beginning of the semester (Manabi-hajime Sheet), record the learning activities employed in the course (mindmaps, dialogue journals and parent-teacher-student conference roleplays) and the term-end review (My Learning Journey). These portfolios provide the necessary resources to examine the learning and growth of the learners through the semester comprehensively in a chronological order. Subsequently, Mitsumura focused on the portfolios that had all the learning deliverables together and scrutinized them in an attempt to interpret what kind of learning occurred as a result of the course. The dialogue journals describe the learner's learning and



realizations (it is not a summary of the contents of each class) and it provides a good opportunity to introspectively revisit the changes in learning (how they learned), improvements in the quality of learning, and the process of growth of a learner upon reviewing the learning that occurred during the semester. While attempting to extract the essence of the learning process in each learner by analyzing the description of portfolios, Mitsumura aimed to grasp the features of Sekita's instructional design. After completing the portfolio analysis, Mitsumura attended another course, Educational Research and Statistics, by Sekita (offered in the fall semester of 2013 academic year) throughout the semester with the aim of observing the class. This class observation was beneficial in understanding the research participants' testimonies in an interview survey held later on.

Furthermore, Mitsumura interviewed a group of learners who took the Methodologies of Teaching course. The aim of the interview was to gain the learners' perspectives to research questions that came up in the class observation and portfolio analysis, and also to enable a multilayer analysis of Sekita's instructional design and educational effects derived from the design. A semi-structured interview format of approximately 1 h was used for seven interviewees who had taken the course within the past five years to narrate their experiences regarding: (i) the kind of learning that happened in the course; (ii) the teaching approaches utilized by Sekita and the impact on their learning; and (iii) the effect, if any, that the course continues to have on them even today. Five of the seven interviewees were students (four undergraduate students and one graduate student) aiming to become elementary and secondary school teachers and two were assistant teachers engaged in teaching English at an undergraduate level. The voice data was recorded using an IC recorder, converted into character data using automatic voice recognition software, and analyzed in a qualitative manner.

## *Discussion*

Mitsumura performed a close investigation of the educational experiences of the learners who took the Methodologies of Teaching course and verified the potential continuous effects the learning experiences had on the learners. More specifically, he attempted to explore what kinds of learning occurred in the course, what kind of meanings were discovered, and the impact of the learning thereafter. Qualitative analysis of the former students who cooperated in the interview (hereinafter referred to as "former students") resulted in the creation of the following three conceptual categories: (i) "responsibility for learning," (ii) "motivation for learning," and (iii) "reflection on learning." Some of the comments from the interviewees are also provided based on these categories.

## Responsibility for Learning

First of all, one meaningful learning experience the former students listed was the sharing of “responsibility for learning” among the learners. In other words, each learner acquired the sense of responsibility regarding his or her own learning and that of their counterpart, demonstrating the educational effectiveness of the learning through lived experiences. As Sekita mentioned in section “[Practice: Initiatives to Methodologies of Teaching](#)”, the class would not move forward unless individual learners shared the responsibility of forming the class consciousness. One of the former students described the structure of a class as, “80% for learners and about 20% for the person teaching the class” (Interviewee 1, personal communication, November 14, 2013). Other interviewees also had similar observations.

The comments above support the belief that Sekita’s Methodologies of Teaching class would work only when learners recognize their responsibility as a member of the learning community. For example, the learners were required to conceptualize the content to be featured in the next class by drawing a mindmap (Sekita et al. 2016) in preparation for the class. In addition, they recorded in a dialogue journal what they learned and become aware of, and brought those experiences to the next class. At the beginning of each class, student’s mindmaps and dialogue journal were disclosed to their counterparts. Each learner was required to give an overview of their thoughts developed in the conceptual mindmap diagram. Regarding the dialogue journal, each learner had to read the counterpart’s journal in 3–5 min, followed by writing a response to the content. In these learning activities, learning itself would not have been practical unless each learner completed their assignments before class. This, at first sight, might appear to be a forced relationship of mutual dependency in the readers’ eyes, but it was confirmed from the former students’ testimonies that they eventually established a reciprocal relationship of mutual dependency on their own even though it was triggered compulsorily. In the pair work activities using the preparation mindmap, the learners at first sought to listen to the explanation of each other’s deliverables and subsequently, they exchanged feedback. Many former students said that they learned a lot from this mutual exchange, which created an energetic desire to improve their own preparation of mindmaps to improve their deliverables. Moreover, with the dialogue journals, some former students described it as, “Each of those words from the counterpart boosted my confidence” (Interviewee 2, personal communication, November 12, 2013) and it is thought that the learners’ affirmation grew as his or her own learning and awareness was accepted by the counterpart and this prompted mutual goodwill and support, helping the learner feel that, “I want to return comments that are as useful as possible” (Interviewee 3, personal communication, November 7, 2013). In these activities, cooperative and mutually beneficial learning activities were designed to boost the sense of responsibility for each learner and encourage them to get involved in each other’s learning in a constructive way and possibly contribute to the fostering of the independent learning.

Sekita, by employing this context of cooperation, helped students develop an awareness of becoming *creators of learning*. In his educational paradigm, learning

does not indicate the circumstance in which a learner simply receives knowledge that is given one-sidedly from the person who teaches the class in a teacher–learner relationship, but it is proactively brought into existence by the learners or in mutual exchange of the learners. The interviewees’ responses revealed that Sekita succeeded in providing the communal experience of mutual benefit for carrying out that responsibility. That is, the learners were relieved from the dependence on a teacher as a result of delegating the authority as much as possible to students in the community of learning, and the learners mutually supported each other and acquired the attitude to become independent. Comments from students emphasize these points.

I feel that in the forum, the relationship between people who are taking the course is given high importance. Probably messages like, ‘You are the ones who are playing the main role,’ were disseminated in various forms (Interviewee 3, personal communication, November 7, 2013).

The fact that the class does not work unless students take actions gave me a totally different impression from other courses (Interviewee 4, personal communication, November 15, 2013).

I feel that the main part of the class contents was entirely done by the students (Interviewee 5, personal communication, November 15, 2013).

Examining the mechanisms of learning activities introduced in Sekita’s Methodologies of Teaching class, by placing the philosophy of cooperation at its base, this induced the value of cooperation among the students. This process proves that cooperative education in essence aims to nurture independent learners. While cooperative education is an attempt to correct the power balance between the person teaching the class and learners by challenging the conventional education format in which authority is centralized on the person who teaches the class, it at the same time focuses on empowering individual learners. Through the act of cooperation, namely in connection and mutual support with others, cooperative education aspires to make each individual strengthen him or herself. In short, the learners who took the course recognized the responsibility for their own learning and others’ learning and gained experience of growing together by constructively participating in their own learning and that of others. Through this experience, they fostered independent thinking skills for the proactive act of learning and challenged the tendency to learn passively, simply relying on the person who is teaching.

### **Motivation for Learning**

Secondly, the former students also found meaning in the learning experience in that their own motivation for learning was brought out by the teacher’s action. The learners described that they were enlightened by Sekita’s attitude as a teacher which increased their engagement with the learning content. In addition, the experience seems to have provided a clue for the question of how to bring out children’s motivation for learning in their own educational activities in the future.

In this section, the focus is on the nature of the teacher–student interaction in the course. The former students testified that Sekita’s unique manner of talking has a positive educational effect. The features of his utterances can be summarized into three approaches: (1) empathetic utterances, (2) utterances that encourage introspection, and (3) utterances of caring. As described in the previous section, one of the features of Sekita’s Methodologies of Teaching course is the overwhelmingly high level of student-to-student interaction. However, the teacher’s positive and proactive interactions with learners cannot be overlooked. According to the testimonies of the former students, Sekita at first tries to recognize whatever comments the learners provide and never denies them. He always praises what the learners said as something beneficial for the progress of ongoing classroom discussions. Such an empathetic attitude fosters an environment in which learners feel safe and comfortable enough to make comments.

Whatever we say, he would never deny us and he would support us without denying and he would say something like, ‘Right, there is an opinion like that’ (Interviewee 1, personal communication, November 14, 2013).

He gives a strong impression that he somehow tries to empathize with us. Things like that of course work positively (Interviewee 6, personal communication, November 15, 2013).

The next point to emphasize related to teacher–student interaction is “utterances that encourages introspection.” This process starts with a question that prompts awareness of a learner such is, “What did you come here to learn today,” at the beginning of every class. This suggests that Sekita is prompting learners to consider the meaning of how each of the learning activities would be utilized in the future educational activities. This approach comports with the learners’ re-recognition or reconstruction of educational meanings that occurs within the learning experience of recognizing the significance of learning on their own by becoming aware of how each learning activity is linked to future educational activities. More specifically, it can be inferred that Sekita prompts learners’ voluntary motivation towards the learning in front of them by making them imagine the viability and applicability of current learning such that it can be utilized in the future.

Prof. Sekita brings out smoothly the important intention which we originally have in ourselves that we want to become a teacher in the future and work as an educator and with his generous utterance, he makes sure to attach a meaning to each matter, saying that things like this are also important when you become a teacher (Interviewee 2, personal communication, November 12, 2013).

It is very striking that we were always asked at the beginning, ‘What did you come to learn today? What have you come here for? What are you going to study?’ Other professors would never say anything like that (Interviewee 3, personal communication, November 7, 2013).

I learned a lot from his talks on things like the technique of how to extract, or extract nicely, what students have within themselves (Interviewee 4, personal communication, November 15, 2013).

Furthermore, several students’ testimonies suggested that “utterances of caring,” which are not necessarily related to learning content, stands out in their memories. For example, the casual, warm remarks he made when a student entered the classroom late, or a memory of his kind mention of a student being absent from the

previous class were reported. A teacher's good grasp of the condition of learners and responses to small changes in them (looking or not looking well and their attitude) leads to a feeling of security in students that the teacher himself is assuredly recognizing their existence and the sense of trust that he is watching out for them. It is an exchange between a teacher and students, which is usually not given very much importance in higher education. But the former students explained that they wanted to respond to his utterances because he cared for the learners and his actions stimulated higher motivation for learning and further participation in learning.

Motivating learners was also a focus of Sekita's interactions with students. Motivational theories can be divided roughly into extrinsic and intrinsic approaches. In the context of current higher education, we can observe a switch in perspective from extrinsic prompts (syllabus, numbering, GPA system, etc.), to intrinsic motivation which focuses on how we can nurture independent learners who can spontaneously motivate themselves to learn and plan and evaluate their learning. The former students said that the impact of Sekita's narratives and actions remain even after several years. For example, one of the students who subsequently did student teaching practice said, "What came to my mind (in front of children) was Prof. Sekita. I actually imagined and imitated a little of his style, the way he says things and how he addresses us" (Interviewee 3, personal communication, November 7, 2013). It seems fair to say that Sekita played the role of modeling for the learners.

Because he watches out for us with so much care that we feel sorry if we, the learners, did not respond to him. Prof. Sekita has that much of hope for us (Interviewee 2, personal communication, November 12, 2013).

I feel that he probably uses such ways of speaking because we are aiming to become a teacher from the perspective of reducing the distance with the likes of junior high school students, elementary school students and high school students when we actually come to teach (Interviewee 4, personal communication, November 15, 2013).

## **Reflection for Learning**

The third point to emphasize is that the reflective activities to review their own learning gave an opportunity for students to reconsider individual learning experiences and educational values in them. In Sekita's instructional design, opportunities for learners to reflect on their learning, such as goal setting at the beginning of the term, weekly dialogue journals, mid-term review, and term-end portfolios, are incorporated on a regular basis throughout the semester. The learners are required to employ these cyclical opportunities for reflection not only for connecting the trajectory of the past learning and current learning (at times to fill the gap) but also to foster the will to transform themselves positively for the future by making efforts to connect the current self and future self (what they aspire to be). The existence of fellow learners is indispensable to foster this will. In his Methodologies of Teaching course, all reflective works are done by employing the context of cooperation. That is, a positive space in which the learners try to grow with each other is created by disclosing their own reflective accounts to other learners and reading their

counterparts accounts, which also assists in deepening their individual reflective works. As evidenced in the previous paragraphs (“i. Responsibility for learning”), a mechanism of growth-oriented mutual dependence or growth-oriented mutual evaluation can be confirmed in the cooperative activities conducted by Sekita.

I learned that we can do assessment between students through such a method, not between a teacher and myself (Interviewee 1, personal communication, November 14, 2013).

I think it was beneficial for me as well as for everyone that we shared comments, or did it in a pair, in a group, and with everyone every week (Interviewee 2, personal communication, November 12, 2013).

In addition, from the remarks of the former students, it appears that the practice of reflecting on learning served to connect respective classes in his Methodologies of Teaching course. More specifically, the learners felt that Sekita’s class ensured the continuity of classes (as opposed to that of other teachers’ classes, where each class felt like a standalone experience). One of the former students commented that each class was organically connected because the course was deployed in a way that reviews learning in the previous classes and goes deeper from there. This process of reflection also works closely with the work of meta-cognition of knowledge, skills and attitudes which serve as a catalyst that bridges the temporary learning to sustainable learning. In particular, the weekly dialogue journal is not primarily aimed at sorting out the gist of the class in a descriptive manner but is rather thought to be elevated to an internal dialogue in search of the act of learning, as a primordial human activity. And its significance on the students’ personal lives by strongly encouraging the grasping of the trajectory of learning from both cognitive and emotional domains is evident.

It is probably good that it (journals) is not a simple summary of a class... You can write miscellaneous thoughts like, ‘This happened today,’ and what I thought about things from the content of a class, so I feel that it remains more in your mind and leads to the next step better than leaving something half-done (Interviewee 7, personal communication, November 15, 2013).

### *Summary of the Section*

In section “**Verification: Reviewing the Course**”, the narrations of the former students who took Sekita’s Methodologies of Teaching were organized and analyzed from the perspective of what experiences the learners find meaningful. Also, Sekita’s educational philosophy and course design and its impact on the learners were considered. This study confirmed that learners share the recognition of meaningful learning experiences when they recognize that it is: (a) a learning experience in which they voluntarily got involved; and (b) the learning experience provided lasting impact on the learners. At the same time, the three factors of “responsibility for learning,” “motivation for learning,” and “reflection for learning” were shown to be significant factors for inducing meaningful learning experience.

Sekita’s involvement with learners promotes the multilateral understanding of the role of the teacher as a person who designs a course. For example, the aspect of

*a teacher as learning environment* can be pointed out, without limiting this idea to arrangement and analysis of course content and design of learning activities. The knowledge derived from educational technology recommends a paradigm shift in course design from what the person who teaches the course would teach to what the learners would learn. However, as conventional educational technology focuses on construction of so-called instructional system (that effectively and efficiently works even if the replacement of the person who teaches the course is expected), it does not question the humanity of the person who teaches a course. Still, Inagaki and Suzuki (2011) stress that concern for and consideration of teachers' behavior such as voice, gaze, facial expressions, and attitude, is necessary to make classes attractive for learners. Reflecting on Sekita's Methodologies of Teaching class, his personality as reflected in his verbal and physical cues played a major role and ultimately the learners accepted his educational philosophy based on cooperation. As a result, the students positively and proactively got involved in the activities. Thus, it seems evident that the personality of a teacher and the educational philosophy and course design of cooperation are complementary.

[In his Methodologies of Teaching] I was able to accept that we had to do it based on that system because of the personality and character of Prof. Sekita (Interviewee 2, personal communication, November 12, 2013).

This study is a discussion regarding the issues related to active learning, of what kind of learning experiences learners find meaning in, and what kind of correlation the discovery of the meaning has with proactive involvement with learning. At the same time, this study is a discussion that attempts to analyze the factors regarding active learning and mentions what kind of approach (course design as well as the teacher talk and actions) by a teacher would encourage fostering a learner's will to set in motion active learning. I hope that even more multifaceted analysis (for example, analysis of medium- to long-term impact of active learning, the impact of active learning on individuals and groups, and so on) will be made in future studies on active learning, and further reflection between research and practice will be realized.

## Conclusion

People expand the possibilities of their students' lives by utilizing what they learned. Shallow learning is less likely to give the ability to expand one's life. I (Sekita) hope that my course provides opportunities for students to open up their lives. I, therefore, endeavor to provide classes in which students feel that: (i) what they are learning at the moment is related (meaningful) to themselves; (ii) they will want to apply and try what they have learned as teachers in the future; and (iii) what they have learned is contributing to their own growth (as capable learners). I argue that the learning that occurs through this class satisfies these three points: it is "significant learning" and I believe that this, as a result, is likely to set in motion "deep active learning", which is the focus of this book.

Fink (2003) describes the nature of good classes in detail with the phrase “significant learning experiences”. According to him, significant learning experiences are divided in the following six categories (pp. 31–32). He considers courses that incorporate these learning experiences as good courses (course design).

- “Foundational knowledge” that offers the basic understanding necessary for other kinds of learning.
- “Application” that is useful for other kinds of learning.
- “Integration” that provides learners with a specific form of intellectual power so that they are able to interpret the connections between different things.
- “Human dimension” that encourages learners to be aware of something important about themselves and others so that they interact with each other more effectively.
- “Caring” that deepens the degree to which learners care about something so that they are able to be more energetic for learning.
- “Learning how to learn” to become a self-directing learner.

Obviously, these learning experiences cannot be experienced in one class. Rather, we should expect that deep active learning” and significant learning experiences are achieved in accumulation of learning experiences throughout a semester and a lifelong journey of learning. My course enables review of every class and semester-based review using portfolios. Which is to say, I design the course by incorporating learning experiences worthy of being included in the portfolio in every class so that the students (by themselves) would feel that their learning was meaningful when they reflect on the experience. The success of deep active learning relies on creativity in course design, formulated based on a clear outlook of the entire semester.

## Summary

- Even when it is difficult for a student to find meaning in the learning content itself, it is still possible to give meaning to learning activities. In a teacher training course, raising awareness of how students will function as an effective teacher is one primary goal. And the key is what kind of metaphor can be delivered when students tackle such activities.
- There are various tools and methods to make it easier for students to review their learning that enables them to actualize their growth. However, the appropriate use of these tools and methods is important. For example, if you use portfolios, the accumulation of reviews of each class enables students to reflect on the entire semester. In other words, incorporating learning experiences that are worthy of being included in portfolio in every class and designing the course so that students (by themselves) can feel that their learning was meaningful when they reflect brings out the advantage of portfolio.



- It is my belief that deep active learning or significant learning experiences are nurtured in accumulation of learning experiences throughout a semester which emerges in a form that a student can recognize. The success of deep active learning depends on the creativity of course design based on the prospect of the entire semester.

## Appendix 9.1: Course Syllabus

First Semester, 2012  
Lecturer: Kazuhiko Sekit  
Contact: sekita@ ...

### Methodologies of teaching Syllabus

#### Aim of the course

When we say teaching profession, what you want to teach and the type of school at which you want to teach vary. In this course, instead of responding to such individual needs, I would like you to acquire basic things that are common for any field and school type. In particular, we are going to learn about instructional design and approaches to instructional development as well as evaluation methods.

#### Schedule:

Date	Main activities/topics	Flow of Collab Test	Remarks (deliverables)
Apr. 9	Orientation (explanation of syllabus and self-assessment rubric)		
16	Mindmap drawing practice, Collab Test instruction	Group adjustment survey	Textbook summary
23	Instructional design 1: Basics of instructional design	Group formation	Journal 1, Mindmap 1
30	Instructional design 2: Tips for instructional design		Journal 2, Mindmap 2
May 7	Instructional design 3: Assessment strategies	Question submission deadline	Journal 3, Mindmap 3
14	Instructional methods 1: Whole-class instruction	Collab Test 1	Journal 4, Mindmap 4
21	Instructional methods 2: Individual difference		Journal 5, Mindmap 5
28	Instructional methods 3: Project-based learning		Journal 6, Mindmap 6
Jun. 4	Instructional methods 4: Cooperative learning		Journal 7, Mindmap 7
11	Instructional methods 5: Experience learning		Journal 8, Mindmap 8
18	Learning evaluation 1: Assessments and grading		Journal 9, Mindmap 9

(continued)

(continued)

Date	Main activities/topics	Flow of Collab Test	Remarks (deliverables)
25	Learning evaluation 2: Paper test construction	Question submission deadline	Journal 10, Mindmap 10
Jul. 2	Learning evaluation 3: Authentic assessment	Collab Test 2	Journal 11, Reflection
9	Learning evaluation 4: portfolio conference roleplay		Submit Portfolio
16	Closing, Students' course evaluation		Return Portfolio

**Assignments and evaluation:**

- Dialogue journal            22 points (2 points × 11 times)
- Preparation mindmap    30 points (3 points × 10 times)
- Collab Test                28 points (14 points × 2 times)
- Learning portfolio        9 points
- Reflection                 6 points
- Summary paper            5 points

**Textbook**

Inagaki, T., & Suzuki, K. (2011). *Jugyo sekkei manyuaru* [Instructional design manual]. Kyoto, Japan: Kitaohji Shobo.

**Details of assignments:**

**Dialogue journal** Write down what you have learned in every class (not the class content itself but what you have learned and thought or what you realized) on a prescribed sheet of paper like writing a journal. In the following class, group members give comments on each other's journal. A journal which did not get comments within a prescribed time receives one point.

**Summary paper** Read Chaps. 1 and 15 of the textbook and summarize the content of each chapter in one A4-sized sheet separately. Five points are given for two chapter summaries. If you have done it for only one of the chapters, at most you could gain two points.

**Preparation Mindmap** Summarize each designated chapter of the textbook in a mindmap. Explain the content of the summarized map each other with other students in the class at the beginning of each lesson. If you sufficiently finish explaining it within the prescribed time to your counterpart, you are given three points, otherwise one point down.

Note 1: If you submit, what you originally need to submit in the class, such as a preparation mindmap and dialogue journal, later on, only those submitted by the following class are scored by reducing 50% of the points but the assignments submitted after that are not given points.

**Collab-Test** By using a computer system called Collab-Test, prepare questions regarding the content of the test scope in a group, and submit good questions out of them. Some good questions from the group of submitted may be chosen for implementing real quizzes in the class.

Portions for which questions are prepared in Collab-Test 1: the textbook pp. 1–50; Portions for which questions are prepared in Collab-Test 2: the textbook pp. 51–97 and 111–143

**Learning portfolio** Learning deliverables (journal, mindmap, etc.) that have been filed throughout the semester are put in one pocket file and this is called learning portfolio. You can purchase a pocket file at 100 yen shops and you need to get one on your own.

Seven points are given to a learning portfolio that files “Manabi-hajime Sheet” as well as all the handouts distributed in classes with required items being entered. One to two points are reduced depending on the rate of unfiled, lost or incomplete items. Items that missed deadline are given zero points. It is used at the time of parent-teacher-student conference. If it is utilized properly, two points are added. (Total of nine points).

**Reflection** It is a general review of the course that lasts for about three months and it is a self-evaluation of what kind of abilities you have gained in the course. A separate handout regarding the detailed procedure will be distributed; it is an assignment to look back at your own learning by using project-related materials and deliverables you have accumulated in the portfolio as clues. Full points (six) will be given if it is properly described in accordance with the procedure. Points are reduced for rough or incomplete ones. Zero points will be given if it is not included in the portfolio at the time of submission.

Note 2: The deliverables from the classes due to the student’s absence that falls under authorized absence are scored without automatic reduction of points as far as they are submitted by the following class. However, the student is required to explain the situation to the teacher before leaving for student teaching and receive approval.

Note 3: If a student plans to participate in student teaching practice during the semester, he or she may replace the learning assignments to be given in the classes in which the student is absent with individual assignments that are set forth separately. If a student wishes to work on a substitute assignment, he or she must consult with the teacher two weeks ahead of the student teaching practice. Such an assignment done without advance consultation will not be rated for evaluation.

**Substitute assignment** You may ask this instructor to make up by submitting a substitute assignment in case of your authorized absence.

Here is a **sample of a substitute assignment**: Select one from the works written by Mr. Yoichi Mukoyama in 1980s (excl. those edited) and write a report in 800 to 1000 words on what you expected when you started reading it, what you have learned and what you thought regarding your own learning (Equivalent to six points).

### Appendix 9.2: Dialogue Journal

<b>Dialogue Journal</b>	No. _____
Name: _____ Student ID number: _____ Date of preparation: _____ Name of person who entered comment: _____	
<p>What students should write in the journal depends on the teacher’s intention. I usually instruct them to i) remember what he or she heard, saw, wrote, did and thought in the class and record what he or she thought regarding them at that time, instead of making it a fair copy of the notes, and ii) to add what he or she thought and realized after once again reviewing the notes and so on.</p> <p>If there are many students who cannot write very much (it does not reach the required volume), I may see how it would go by making them answer several times the questions I set.</p> <p>Question examples:</p> <p>i. What did you think was the most important thing in the class this time? Why do you think so?</p> <p>ii. What did you feel would benefit your life (you would like to make use) among things you learned in this class? Why do you think so?</p>	

### Appendix 9.3: Example of Preparation Mindmap



## Appendix 9.4: Manabi-Hajime Sheet

Manabi-hajime Sheet		Date: _____
<p>Briefly state the goals you would like to achieve by taking this course (things you would like to understand, skills you would like to acquire, and so on).</p>		<p>Rate your current motivation out of 100 points</p> <p style="text-align: right;">points</p>
<p>Explain the significance of working towards achieving the above goals (what kind of good things would occur if you achieve the goals, for what you are going to work hard, and so on).</p>		
<p>Write about things you would like to challenge and/or cautiously keep in your mind toward achieving the goals stated above.</p>		
<p>Describe resources (previous experience, personal support, and so on) you can use (would like to use) for achieving the goals.</p>		
<p>Signature of confirmation</p> <p>I am taking this course upon reading through the syllabus and understanding and accepting the course policy and assignments.</p> <p style="text-align: right;">Signature _____</p>		

\*Fill up this sheet within one week from the first class you attended and place this sheet in the portfolio.

## Appendix 9.5: Direction for Preparing a Reflection Paper

### **My Learning Journey:** Let's write a reflection paper

It is nearing the end of the semester and the content of your portfolio (also called a learning file) must have become quite thick. There are various ways to use the portfolio, and here we are writing a reflection paper as a work to extract the essence of your learning (growth) from this file.

### **My Learning Journey**

A great number of memories filed in the portfolio (reports and preparation mind-maps on which you worked hard, journals filled with warm comments from your friends, and so on). They are what you have created one by one through this course. These accumulated learning deliverables are important evidence of your learning. That said, as you closely look at the one and only, valuable foot marks, daily learning in which these foot marks were made would come back to your mind.

At the beginning of the semester, what was in your mind to take this course? When you gathered for the first class, when you worked on the first assignment, and when you bought the textbook, what did you feel and what were you seeking? What kind of knowledge and skills were you seeking to gain through this course?

As the course progressed, what kind of efforts did you make to obtain what you were seeking? There must have been various adventures and challenges as well as various meetings and tests. After completing a significant assignment, how do you feel at the moment? The journey is nearing the end, so you are going to confirm the knowledge and skills you have gained once again. To do so, list the following items in details (based on the facts that have been filed). Use a word processor and put it together in one to two pages of A4-sized paper.

1. The goals you have set at the beginning of the semester (knowledge and skills you wanted to acquire through the course) and the revised goals you set in the mid-term review
2. Things which you kept in mind and you have made efforts for to achieve the goals
3. Your own growth that has been visualized by once again closely looking at the accumulated learning deliverables (what you came to be able to do now, what you came to be able to understand now, what you came to think about, and your goals for the future).

### **Structures of “Preface” and “Epilogue”**

First of all, write what you felt after experiencing the work of reflecting on your learning using the portfolio. This serves as the “Epilogue or Closing words” of your story. Then, give a nice title to your portfolio. When doing so, write a foreword including where the title came from and your thoughts that have been reflected in it. This becomes your “Preface.” It does not matter how short it is. Still, please attach great importance to your learning. I would like you to be honest to your own

learning. I want it to be worthy of the culmination of your precious learning that is one and only in this world.

\*Print out the “**Preface**” and “**Epilogue**” on separate sheets of paper and put them in the beginning and the end of the portfolio.

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## Author Biographies

**Dr. Kazuhiko Sekita** received his Ph.D. from University of Illinois. He has been a professor at the Faculty of Education since 2005 and is now an assistant Dean of School for Excellence of Educational Development and also the Director of Student Performance Acceleration Center at Soka University. He specializes in educational psychology and his particular interest is in the pedagogy of cooperation in education. He is the ex-president of Japan Association for the Study of Society of Cooperation in Education and also a board member for Japan Association for First Year

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**Dr. Masakazu Mitsumura** received his M.Ed. in Instructional Systems Technology from Indiana University, Bloomington, and Ph.D. in Curriculum and Instruction from Arizona State University. He specializes in multicultural education, educational use of theatre, and bullying prevention. He conducts his research and practices based on the theme of fostering teachers' perceptions and awareness toward minority issues through participatory theatre. He is a co-editor of *Transforming Japanese Elementary School Language Arts Through Active Learning Strategies* (in Japanese, Meijitoshu, 2017) and his article include "Participatory Theatre as Transformative Education: A Case Study of Multicultural Teacher Education in U.S. Higher Education" (in Japanese, *Soka University Peace Research*, 28, 73–94, 2014), "The Current State and Challenges of School Bullying in Japan: Examining the Invisible Phenomenon in Bullying" (in Japanese, *Bulletin of Soka Educational Studies*, 67, 93–115, 2016).



# Chapter 10

## PBL Tutorial Linking Classroom to Practice: Focusing on Assessment as Learning

Kazuhiro Ono and Kayo Matsushita

The demand for a qualitative transformation of university education has drawn attention to *problem-based learning* (PBL) as a form of active learning focused on solving problems. PBL has been incorporated into a range of academic disciplines, and some universities have even introduced it across the curriculum as common education. On the other hand, some medical universities that were early adopters have now abandoned PBL, which would suggest that there are some key issues to be addressed not only in terms of this particular learning mode but also PBL functionality.

In this paper we discuss the implementation of PBL at the Niigata University Faculty of Dentistry and the development of the *modified triple jump* as a means of directly assessing problem-solving ability. We observe that, in order for PBL to have an educational effect, learning outcomes need to be properly assessed, and the assessment process needs to comprise more than just *assessment of learning*. It should also be a learning experience for the student—in other words, *assessment as learning* (Earl 2003).

### Two PBLs

In recent years, universities have been required to effect a qualitative transformation. A December 2008 report from the Central Council for Education entitled *Towards Building Undergraduate Education* identified a number of expected learning outcomes from undergraduate education, regardless of students' particular

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departments or majors. These comprised not only knowledge and understanding, but also generic skills such as the capacity for logical thinking, problem-solving ability and communication skills; attitudes and dispositions such as teamwork, leadership and social responsibilities as a citizen; and integrative learning experience and creative thinking. In other words, universities were called upon to develop students acquiring not only knowledge but also the ability to use it. A further CCE report released in August 2012 was called “Towards a Qualitative Transformation of University Education for Building a New Future: Universities Fostering Lifelong Learning and the Ability to Think Independently and Proactively,” representing a more specific drive for a qualitative transformation in university education in which active learning became a key term.

One form of active learning that has come under the spotlight as part of this drive is PBL, which focuses on problem-solving. PBL is the abbreviation for two education methods: problem-based learning, developed in the 1960s primarily in the context of medical education; and project-based learning, developed in the 1990s primarily in the context of engineering education. In both cases, learning is designed on the basis of constructivist theory—the concept that knowledge is actively constructed by the learner—and both PBLs share a framework of activity whereby small groups engage with authentic problems, with students managing their own learning and teachers supporting this process as facilitators. In problem-based learning, however, the learning process is clearly defined and reflected in the design of activities, whereas in project-based learning, the learning process is entrusted to each specific practice (Yuasa et al. 2011).

This chapter focuses on problem-based learning, using the example of PBL implementation at the Niigata University Faculty of Dentistry to examine what is required to guide students toward deep active learning, particularly from the perspective of assessment as learning.

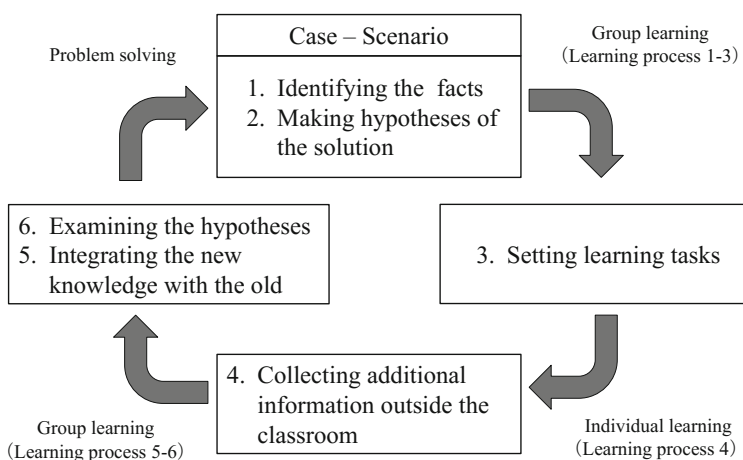
## **PBL in Practice**

### ***PBL and the Curriculum***

The Niigata University Faculty of Dentistry was established in 1965 as a Japanese national university dentistry faculty, and originally comprised only an undergraduate course training dentists. In 2004, however, the Department of Oral Health and Welfare was set up to train professionals with the skills of both a dental hygienist and a social worker. The aim was to provide comprehensive services based on partnership among oral health, dentistry and welfare in order to meet the needs of a super-aged society. Today, the school comprises the Department of Dentistry and the Department of Oral Health and Welfare. The Department of Dentistry is a 6-year course, and the Department of Oral Health and Welfare four years, with 40 students in each year of the former and 20 in the latter. The basic philosophy of

both departments is that undergraduate education comprises the first stage in life-long learning as an oral health care provider, with the focus accordingly placed on developing problem-solving abilities, training professionals who are able to develop their own expertise in their subsequent learning at graduate school and out in society. To that end, we added “generic skills” to “knowledge and understanding”, “professional expertise”, and “attitudes and dispositions” as the learning outcomes we expect students to acquire by the time they graduate, and as of 2004—in other words, as of the time that we established the Department of Oral Health and Welfare within the Faculty of Dentistry—we introduced PBL into the curriculum to develop students’ problem-solving abilities within the context of dental education (Ono et al. 2006, 2011).

PBL at the Niigata University Faculty of Dentistry follows the formula developed by the Malmö University Faculty of Odontology in Sweden (Rohlin et al. 1998), where classes take the format of students working through problems in groups of seven or eight facilitated by a tutor. First, facts are identified from cases—*scenarios*—and students discuss questions and thoughts arising from those facts. Students then determine what knowledge they lack to resolve their questions and to test their hypotheses, and set learning tasks. Outside class, students then individually undertake their learning tasks. They reconvene a week later to consider as a group the results of their research, discuss whether their hypotheses were valid, and solve the problem. In PBL, therefore, learning is pursued as a three-step process of group learning in class, individual learning outside class, and then again group learning in class (Fig. 10.1). Because students learn through a process of solving problems derived from scenarios in collaboration with a group, PBL results in the acquisition of a body of deep knowledge and understanding integrated from a wide



**Fig. 10.1** PBL cycle

range of disciplines, and development of (a) the ability to analyze and solve problems, (b) interpersonal skills, and (c) a desire to continually learn (Barrows 1998).

PBL is used in the fifth year in the Department of Dentistry, and from the second to the fourth year in the Department of Oral Health and Welfare. Here we examine the PBL curriculum in the Department of Oral Health and Welfare.

The academic year comprises two semesters of 15–16 weeks each. The semester is taken as one large basic unit for learning, with key learning content for each semester determined and each semester including between five and 16 related courses. The learning for each semester is chosen based on current social conditions, and is structured from the simple to the complex, or from oral science to subjects related to individuals' health and the wider social context (Table 10.1). Within each semester too, with the exception of the first year, classes are not necessarily conducted in the Japanese university's traditional format of one class per week throughout the semester; rather, the order in which each subject is taught is determined by the learning content—a modular curriculum, in other words.

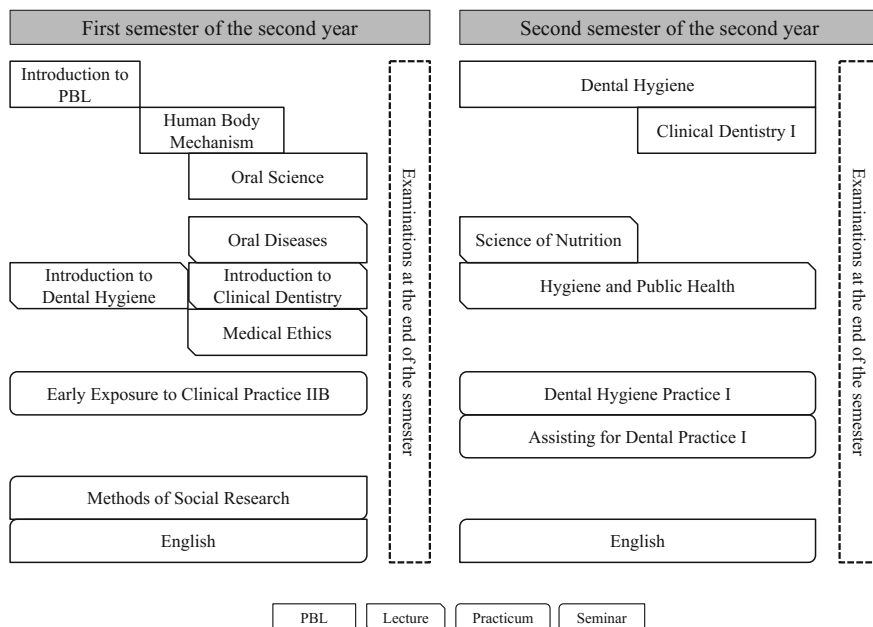
Classes are taught through a suitable combination of PBL, lectures, practicums and seminars. In the first semester in the first year, the students acquire learning skills and the ability to think logically in a 'Study Skills' seminar. Then, from the second year until graduation, PBL is used to help students acquire integrated knowledge and boost their problem-solving abilities and interpersonal skills. From early on after university entrance, students are also continually provided with the opportunity to interact with actual patients, fostering their professional identity as oral health care providers along with the appropriate attitudes. PBL, lectures, practicums and seminars are organically linked, ensuring that the learning content of each is related. As much as possible, classes with related content are held over the same period, regardless of their form, so that students can put the model that they have learned in class immediately into practice or observe what they have learned in a clinical or welfare context.

The year's curriculum for second-year students is shown here as a specific example (Fig. 10.2).

The first semester of the second year serves as students' first real introduction to professional education. The emphasis is on students understanding and implementing PBL, grasping the actual roles and duties of dental hygienists and social workers, understanding the structure and functions of the mouth, understanding the pathogenesis and pathology of oral diseases, and learning infection control measures. In 'Introduction to PBL,' the first course in the first semester, students study the PBL learning method, and then apply the PBL method to their learning in 'Human Body Mechanism' and 'Oral Science.' In 'Early Exposure to Clinical Practice IIB,' students go off-campus to general hospitals, public health centers, social welfare offices, and special nursing homes for the elderly, etc., for the experience of interacting with patients/users and staff at these facilities. In the second semester, students use the knowledge and skills acquired in the first semester to tackle PBL subjects such as 'Dental Hygiene' and 'Dental Hygiene Practice I,' learning how to diagnose, treat and prevent mild oral diseases. The

**Table 10.1** Core learning in each semester

	First semester	Second semester
First year	<b>Higher education study skills and personal growth</b>	
	Acquisition of study skills and autonomous learning attitude	
	Liberal arts cultivation	
	Interaction with a variety of people, including patients/users	
Second year	<b>Oral health promotion and self-awareness as an oral health care provider</b>	<b>Diagnosis, treatment and prevention of mild oral diseases</b>
	Understanding the structure and functions of the mouth	Theory and practice of diagnosing, treating and preventing mild dental caries and periodontal disease in ordinary adult patients
	Understanding the importance of oral health	Theory and practice of individual dental hygiene guidance
	Learning how to control infection	Acquisition of basic assistance techniques of conservative dentistry
	Self-awareness as an oral health care provider	
Third year	<b>Diagnosis, treatment and prevention of advanced oral diseases</b>	<b>Understanding and dealing with the elderly and disabled</b>
	<b>Basic understanding of social welfare and social security</b>	
	Theory and practice of diagnosing, treating and preventing advanced dental caries and periodontal disease in ordinary adult patients	Understanding and dealing with the physical and mental characteristics of the elderly and disabled
	Theory and practice of group dental hygiene guidance	Acquisition of basic assistance techniques of oral surgery and prosthodontics
	Acquisition of basic assistance techniques of pediatric dentistry and orthodontics	Understanding of welfare for children, the elderly and the disabled
	Understanding of social welfare and social security	
Fourth year	<b>Practical oral health promotion from the perspectives of the individual and society</b>	
	Synthesis of knowledge, skills and attitudes through clinical practice and practice in social welfare situations	
	Understanding and practice of community dental health services	
	Understanding of the medical care provision system and the medical insurance system	
	Increased awareness as an oral health care provider	



**Fig. 10.2** Curriculum at year level

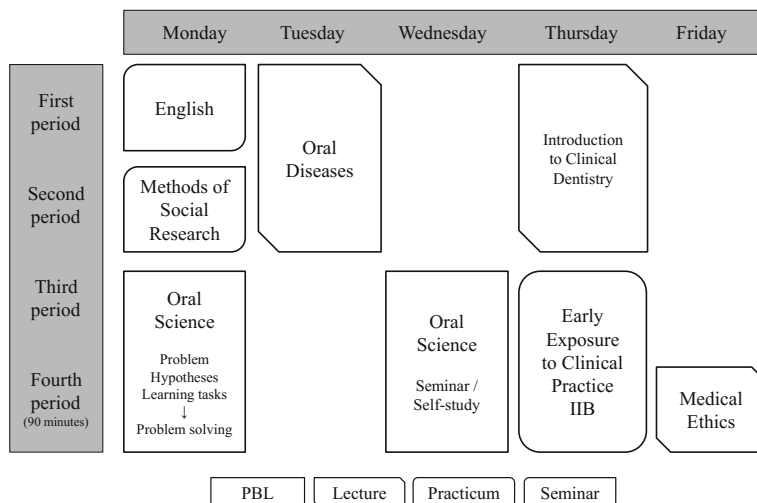
academic year basically comprises two semesters, but because subjects are organized with a view to facilitating student learning, the result could also be described as a loose four-quarter structure.

Next we turn to the weekly curriculum, using the example of the first semester of the second year (Fig. 10.3).

The Monday afternoon subject is ‘Oral Science’ PBL (Fig. 10.4), and in the fourth period, students identify their problem, generate hypotheses and set learning tasks. They use periods when they have no classes or once they have gone home for self-study and collecting information on learning tasks from the Internet and from technical books. ‘Oral Science’ on Wednesday afternoons is a seminar on a topic related to the learning tasks. During ‘Oral Science’ in the third period on alternate Mondays, students use their newly-acquired knowledge to solve their problem (Fig. 10.5). In the fourth period, students tackle the next scenario, launching the next learning cycle.

### *Scenario Design*

Scenarios are designed by teachers based on actual cases. The purpose, objectives, and desired learning tasks are laid out for each scenario. The important thing is for students to consider learning tasks and the order in which these will be addressed,



**Fig. 10.3** Curriculum at week level

**To extract or not to extract, that’s the question.**

Ms. Ayako Suzuki is a second year student at Niigata University dental school. She has been going to the dentist since two months ago. One day, the dentist told her looking at her panoramic radiograph. “Hmm. You’ve got impacted wisdom teeth of the mandible and why don’t you extract those on the next visit?” She knew that she had it on the right hand side because she could see a part of the tooth crown just a little bit behind the second molar but did not realize regarding the left one. She has never experienced any complications nor symptoms with these teeth though. She recalled that a senior of her school told her that the extraction of impacted wisdom tooth might be very tough and risky.

**Fig. 10.4** An example of the scenarios in the course ‘Oral Science’

so that through their accumulated learning from the various scenarios students ultimately achieve the educational objectives for the subject or come to comprehend the disease concept. For example, to help students understand a particular disease, we start by creating a concept map, considering what parts of that concept map we want students to master and in what order, seeking to put together scenarios that will embed the new knowledge within the student’s existing cognitive structure and progress learning in such a way that students naturally recognize the disease concept. Other key points in scenario design are authenticity (whether the scenario is frequently encountered in general dental practice), whether the level of difficulty is appropriate for an undergraduate curriculum, whether integrated learning through multiple basic and clinical subjects is possible, whether learning tasks are far too numerous for the amount of time available for self-learning, and whether efforts have been made to incorporate audio and visual media to stimulate student interest.

**Group learning in the fourth period on Monday afternoon**

1. Students are supposed to identify the facts from the scenario. Then, they discuss the questions that they cannot answer precisely and problems they should solve based on those facts.  
e.g.,  
➤ Why the dentist recommends to extract the impacted wisdom teeth?  
➤ What are the risks of wisdom tooth extraction and why?  
➤ To extract or not was a very difficult decision for Ayako to make.
2. Students are supposed to answer the questions based on their own knowledge and experience through a group discussion and develop hypotheses and solutions.  
e.g.,  
➤ Oral microbial might cause the inflammation.  
➤ I've heard that extraction of wisdom tooth of the mandible might result in paresthesia of the lower lip.  
➤ When Ayako would understand necessity and risks of the extraction precisely, she could decide what she should do.
3. To proof the validity of the hypotheses and solutions they developed, students are supposed to set up some learning tasks.  
e.g.,  
➤ Etiology, symptoms and spread of oral inflammation.  
➤ Mandibular nerve tracts and those names.

**Individual learning outside class**

4. Students are supposed to collect information on the learning tasks from the Internet and from technical books.

**Group learning in the third period on next Monday**

5. Each student is supposed to bring their searched results back to their group and try to improve their understanding through the discussion.  
e.g.,  
➤ Was the information reliable?
6. Students are supposed to verify their hypotheses and solutions.  
e.g.,  
➤ Should Ayako accept the extraction of her wisdom teeth?  
➤ What kind of information is missing for her to decide to extract or not?

**Fig. 10.5** PBL exercise in the case of the scenario in Fig. 10.4

## ***Facilitator Development***

Because PBL is based on small-group learning, it requires numerous teachers, and all Faculty of Dentistry teachers and graduate students (not only from the Department of Oral Health and Welfare, but also from the Department of Dentistry) serve as facilitators. Having everyone participate, whether they specialize in basic or clinical subjects, or whether they are professors, associate professors, lecturers or assistant professors, reduces the individual load, and sharing the load equally amongst those staff makes it easier to gain their cooperation. We have a range of academic staff, with some focused on research while others emphasize clinical practice, for example, but serving as a facilitator is regarded as the minimum educational contribution in the Faculty of Dentistry, and is also scored highly as an educational achievement when it comes to tenure reviews. What this also means, however, is that the facilitators participating in each group change frequently, drawing complaints from the students.

Facilitator development and teaching continuity are therefore major issues. We hold a facilitator briefing at the beginning of every academic year, explaining the facilitator's role, how PBL works, and key points in guiding students, and this information is also provided in the form of a facilitator guide. The content of group learning is also recorded each time and stored in the facilitator guide so that the next



facilitator will know what was discussed at the last group learning session. In addition, because, for example, a welfare-related scenario might be difficult for a facilitator who is not a welfare expert to understand, the facilitator guide also contains scenario commentaries as a teaching reference.

In 2004 when PBL was first introduced, we held a multi-day training workshop for all academic staff, but we reached the conclusion that the ability as a facilitator can ultimately only be developed in the classroom, so these workshops are no longer held. Facilitator development through actual practice appears to be more effective, such as having new academic staff work in tandem with experienced facilitators in the classroom, or setting up opportunities to discuss teaching methods among facilitators after they have participated in group learning. Almost 10 years since the introduction of PBL, we now also have graduate students who have come through PBL-based undergraduate training participating as facilitators, and they appear to be bringing their own undergraduate experiences and reflections with them.

## How Students View PBL

To fully grasp students' views of PBL, a survey was conducted of Department of Oral Health and Welfare graduates (Ono et al. 2011).

The survey targeted a total of 56 students: 17 graduating from the first class in 2007, 20 graduating from the second class in 2008, and 19 graduating from the third class in 2009. Questionnaires about the curriculum and about classes were handed out in March to fourth-year students who had completed their graduation assessment. The survey gathered students' views using a four-point scale multiple-choice format along with free-response questions, looking at satisfaction with the curriculum as well as the meaningfulness of a PBL-based curriculum.

The purpose of the survey was explained to students, who were also told that they were free to choose whether or not they cooperated in the survey. A total of 50 students (89.3%) consented to participate: 17 from the first class (100%), 18 from the second (90.0%) and 15 from the third (78.9%).

In terms of satisfaction with the curriculum, responses were generally favorable, with an average of 70.0% of students across all three classes giving a positive assessment ("satisfied" or "somewhat satisfied"). The reasons they gave included: "The PBL curriculum," "The small-group format," "Because the program covered both oral health/dentistry and welfare," "The curriculum allowed plenty of time for self-study," and "The curriculum focus wasn't on national exams." Some students also expressed dissatisfaction, such as "There weren't enough lectures," "Some years were much busier than others," and "Not enough was done to prepare us for national exams."

Overall, students found active, integrated and experience-based learning to have been valuable, and an average of 82.0% of respondents—88.3% from the first class, 77.8% from the second, and 80.0% from the third—agreed that PBL as the focus of

the curriculum was “valuable” or “somewhat valuable.” Many comments were made to the effect that the PBL focus established the habit of self-learning and boosted problem-solving abilities and interpersonal skills, such as “I acquired the habit of researching and studying by myself,” “I acquired the capacity to engage with an issue,” “I have retained what I learned,” and “Engaging in discussion made me more proactive.”

In addition, as noted earlier, the Department of Dentistry also brings in PBL in the fifth year, and fifth-year student assessments in 2004 and 2005 saw 83.7 and 84.6% of students respectively finding the experience “valuable” or “somewhat valuable” (Ono et al. 2006). A survey of 2005 fifth-year students on completion of their year of dental clinical training following graduation saw that percentage hold at a high 79.1%, with comments including “Learning to engage in my own research and study was useful when faced with problems in a clinic,” “Learning through self-study helped me to retain the information, and I experienced good recall during training,” and “I learned to work with others” (Ono et al. 2009).

Because students had gone through primary and secondary education with the knowledge transmission method, there was initially concern that they would struggle with speaking up in a group-based learning context (Maeda et al. 2003), but many students in fact embraced PBL. A PBL literature review notes that there are also reports of a strong student preference for PBL over lectures (Albanese and Mitchell 1993).

## Assessment of PBL Learning Outcomes

### *The Ability Assessment Issue*

The above 50 graduates from the Department of Oral Health and Welfare were given a questionnaire on the learning outcomes expected by the time of graduation—more specifically, levels of achievement in 29 items from the four criteria of knowledge and understanding, professional expertise, attitudes and dispositions, and generic skills—with respondents choosing from among the four-point scales of “understand,” “understand somewhat,” “don’t really understand,” and “don’t understand.” While there were some disparities between graduating classes, a high overall ratio of students responded that they either “understand” or “understand somewhat.” More than 80% of students (inclusive of those who responded “somewhat”) felt that they could “independently identify the problem, gather, analyze and integrate the necessary information, and solve the problem” (Ono et al. 2011).

Assessment of learning outcomes can therefore include indirect assessments like the one where students themselves are asked what they think they can do. However, there is a question of the extent to which the results of such indirect assessments actually reflect student abilities. Direct assessments that require students to

demonstrate what they can do are clearly essential. At the Niigata University Faculty of Dentistry, student knowledge and understanding has been assessed through written examinations at the end of the semester, while problem-solving ability and interpersonal skills are evaluated by the facilitator during group-based learning sessions. However, there was some doubt as to whether proper assessments could be made when one facilitator was simultaneously evaluating seven or eight students while also providing learning support. Moreover, it was impossible to evaluate students who were silent during group learning. As introducing PBL but at the same time being unable to properly assess the abilities developed through that learning might even reduce student motivation, a new assessment method had to be developed as soon as possible, not least to ensure alignment between ability goals and assessments.

As an aside, the pass rate for the national dental hygienist examination from the first through the third class was 98.0, 85.0% in the case of the national social worker examination, judging from which students would generally appear to be acquiring the basic knowledge required of dental hygienists and social workers.

### *Development of the ‘Modified Triple Jump’*

The triple jump is an assessment method proposed by McMaster University in Canada in 1975 for assessing problem-solving and self-learning abilities in PBL (Blake et al. 1995). It comprises a three-step exercise undertaken by the individual student and the tutor in the same format as the usual PBL learning process, whereby the tutor replaces the Steps 1 and 3 of group learning and assesses the individual student accordingly. More specifically, in Step 1, the student reads the scenario and identifies the problem from the facts given in the scenario, proposing solution strategies. The student can ask the tutor for additional information that the student considers necessary, and the tutor also prepares additional information for the scenario. In Step 2, to test his/her solution strategies, the student goes off to the library to gather reliable information and engage in self-directed learning. In Step 3, the student goes back to the classroom and integrates the knowledge gained through Step 2 with their existing knowledge, explaining his/her solution to the tutor.

The validity of triple jump assessment, particularly face validity, is regarded as high in that the assessment mirrors the usual PBL format. Moreover, having various experts develop a triple jump scenario together and/or subjecting the material to expert scrutiny is said to ensure high content validity. However, reliability is considered to be generally low due to subjectivity in the assessment process, the absence of peer review of the exchange between the student and the teacher, the possibility of the teacher missing the student’s explanation in the course of an oral exchange, the quality of assessment materials, the student’s personality (e.g., extroverts or introverts), and the assessor’s skill level (Mtshali and Middleton 2011). In addition, because the triple jump requires time for the student to engage in self-directed study, assessment is also time-consuming, imposing a considerable

burden on the teacher (Newman 2005). Consequently, the triple jump tends to be paid little attention these days, and is used at few universities. However, because no assessment method has yet been found to replace the triple jump that is valid, reliable and feasible, in 2012 we began looking at how the triple jump could be modified with the aim of developing a new PBL assessment method. We placed particular emphasis on developing a formative assessment at a pre-determined point in the process, and on making assessment a meaningful experience for students.

As with the original triple jump, Step 1 of the modified triple jump requires the student to identify a problem from a scenario, propose solution strategies and identify learning tasks, but that process must be written down on a worksheet within 60 min. In Step 2, the student has one week to not only undertake the necessary research but also consider the solution strategies in the light of his/her research results and formulate a solution, with that process again noted on a worksheet (Fig. 10.6). Compared to Steps 1–3 of the original triple jump, the modified triple jump assesses Steps 1 and 2 from worksheets rather than from an oral exchange, with the use of a rubric in the assessment. In Step 3 of the modified version, the scenario is recreated through a student-teacher role play, with a rubric again used to assess the process through implementation of the solution. The whole process including feedback on assessment results is usually concluded in 15 min (Fig. 10.7). Introducing worksheets into Steps 1 and 2 enables multiple students to be examined at the same time, and while it takes time to assess the worksheets, the teacher is confined to the assessment site for a far shorter period. The use of a rubric for Steps 1 and 2 and then again for Step 3 promises to boost assessment reliability. In fact, as we will explore below, the generally high level of reliability amongst assessors when students were assessed using the two rubrics suggests that the modified triple jump has resolved the problem of assessment reliability that has traditionally plagued the triple jump (Ono et al. 2014).

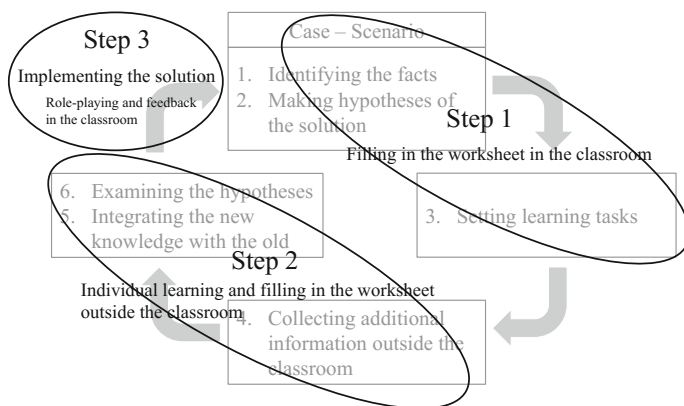
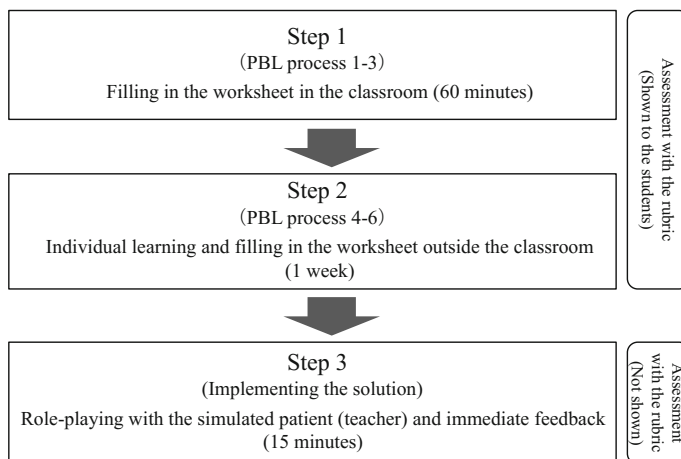


Fig. 10.6 PBL process and steps of the modified triple jump



**Fig. 10.7** Structure of the modified triple jump

### ***Introduction of the Modified Triple Jump into the Curriculum***

In the first semester of 2013, a modified triple jump assessment was conducted of 24 second-year students from the Department of Oral Health and Welfare.

As noted earlier, the subjects for that semester are ‘Human Body Mechanism’ and ‘Oral Science,’ so we created a new scenario related to that learning content for the triple jump assessment (Fig. 10.8) as well as a worksheet for Steps 1 and 2 (Fig. 10.9), the rubric used to evaluate worksheet responses (Table 10.2), and the rubric used in Step 3 to evaluate the role play (Table 10.3). Because students can ask the teacher partnering them in the role play for additional information they think necessary in implementing their solution, we also prepared that additional information.

The rubric for Steps 1 and 2 tracks the PBL learning process across the six stages of (1) identifying the problem, (2) conceiving solution strategies, (3) setting learning tasks, (4) learning results and resources, (5) examining solution strategies, and (6) proposing a solution—with those stages from identifying the problem through to setting learning tasks equating to Step 1 and learning results and resources through to proposing a solution equating to Step 2. Three levels of descriptors are provided, but because those students not satisfying Level 1 requirements are assessed as Level 0, there are effectively four levels. Level 3 is the level which the university expects students to have reached by the time they complete their education in the Department of Oral Health and Welfare—in other words, fourth-year students. This is a generic and longitudinal rubric which can be applied to a range of assessment tasks (Matsushita 2012).

**Am I a failure as a dental student?**

You're a second-year student at the Niigata University Faculty of Dentistry. Your specialist subject classes began in April, and you're studying anatomy and physiology. However, you're still not used to the new PBL method, while the subject matter also seems to have suddenly become much more difficult, so at the moment you're battling with both the workload and anxiety.

One day, Akira Sato, a friend you met through a university club who is currently a third-year student at the Engineering Faculty, comes up to you with a swollen left cheek. Apparently, he had a wisdom tooth on the left side of his lower jaw extracted three days ago at the nearby dental clinic, but his lower lip still feels paralyzed on the left side, so he can't even tell if he has a breadcrumb stuck to his lip. He also hasn't been able to open his mouth very wide since the operation and the left side of his throat hurts when he swallows, so he's having trouble eating.

Because you're a dental student, he's hoping that you can tell him why this is happening, but you don't know how to answer him so you say nothing. He looks worried and says, "Maybe next time then," going off to talk to another friend. Watching him walk away, you kick yourself that as a future dental hygienist you couldn't at least offer a few words of advice or sympathy.

**Fig. 10.8** Modified triple jump scenario

**Step 1**

- 1.1 List the facts presented in this scenario. Use circles and arrows to indicate how these facts relate to each other.
- 1.2 Based on those facts, describe the problem in this scenario, and explain why it is a problem.
2. Determine your goal (what you hope to achieve) in relation to the problem, and describe your solution strategy (what you will do to achieve that goal). Explain the thought process that produced your solution strategy, linking it to your learning and experience so far.
3. Identify what knowledge and information you will need to solve the problem, and explain why that learning is necessary.

**Step 2**

4. Describe your learning results and note your information sources (technical books and other publications you have quoted, websites, etc.)
- 5.1 Consider the effectiveness and feasibility of your solution strategy. If you need additional knowledge and information for that purpose, please undertake that additional learning.
- 5.2 If you decide that none of your solution strategies are appropriate, go back to the work in 2 and repeat the process of designing a solution strategy and engaging in learning, adding this information in red pen.
- 6.1 Based on your work in 5, describe your solution to the problem.
- 6.2 If you need additional information from the tutor in order to implement your solution in 6.1 more effectively, note that information and why you need it.

**Fig. 10.9** Modified triple jump worksheet for Steps 1 and 2

The Step 3 rubric assesses role-play implementation of the proposed solution, and comprises the four dimensions: gathering additional information (gathering additional information and reformulating the problem), integration of information (integration of additional information and correction of the preexisting solution), sympathetic attitudes (sympathy for a partner), and communication (expressing the solution in the way that partner can grasp). Therefore it is a task-specific rubric

**Table 10.2** Rubric for Steps 1 and 2 of the modified triple jump

Dimensions	1. Identifying a problem	2. Conceiving solution strategies	3. Setting learning tasks	4. Learning results and resources	5. Examining solution strategies	6. Proposing a solution
Explanation of dimensions	Identifies the problem based on the facts of the scenario	Determines the objective of the solution and proposes a number of solution strategies	Sets out the necessary learning tasks to solve the problem	Learning tasks undertaken using credible resources	Considers the effectiveness and feasibility of the solution strategies	Proposes a solution to the problem
Level 3	Identifies and explains the problem based on the facts of the scenario, including potential causes	Proposes a number of solution strategies and explains the process by which they were developed, linking them to the student's learning and experience to date	Clearly identifies learning tasks and explains their necessity from their relation to the proposed solution strategies	Exploits and selects various available resources based on their credibility, obtaining correct information	Compares a number of possible solution strategies with regard to the effectiveness and feasibility of each, while also noting their limitations	Proposes a reasonable solution appropriate for the scenario situation and realizes that additional information is needed to effectively implement the solution
Level 2	Identifies and explains the problem based on the facts of the scenario	Proposes a number of solution strategies and explains the process by which they were developed	Identifies learning tasks and explains their necessity from their relation to the proposed solution strategies, but misses some key learning tasks	Selects resources based on their credibility and generally obtains correct information	Compares a number of solution strategies with regard to the effectiveness and feasibility of each	Proposes a reasonable solution appropriate for the scenario situation

(continued)

**Table 10.2** (continued)

Dimensions	1. Identifying a problem	2. Conceiving solution strategies	3. Setting learning tasks	4. Learning results and resources	5. Examining solution strategies	6. Proposing a solution
Level 1	Identifies the problem but provides an insufficient explanation	Proposes solution strategies but gives an inadequate explanation of the process by which they were developed OR proposes only one solution strategy	Learning tasks are vague, with the student failing to pinpoint what needs to be learned OR the student fails to adequately explain the necessity of the identified learning tasks	Does not pay sufficient attention to selecting credible resources, with various errors in the information obtained	Does not give sufficient consideration to solution strategies OR does not compare a number of solution strategies	Unable to propose a solution OR there are contradictions and illogical jumps between the proposed solution, learning results and/or conclusion
Level 0	Students not satisfying the Level 1 criterion shall be given a zero					
NOTES	The problem in this scenario was that the student was unable to register the other person's unease and give a proper answer to his question. The cause was presumably that the student wasn't accustomed to PBL, and while he/she was studying anatomy and physiology, he/she had not yet	Solution strategies to this scenario are: to explain in anatomical terms the mechanism whereby wisdom tooth extraction and conduction anesthesia of mandibular nerves can cause desensitization of the lower lip; to explain in physiological terms from the	There are four key learning tasks: methods used to extract mandibular wisdom teeth (including anesthesia) and possible complications; the mandibular nerve tract and the area it supplies; the spread of inflammation and the regional anatomy (muscles	The various available resources include academic papers, technical books, textbooks, experts and the Internet	If all the proposed solution strategies are deemed inappropriate and the students repeat the learning process, they should be assessed including the second round of learning (indicated in red)	The solution for this scenario is for the student to explain from a specialist perspective the possible causes of desensitization of the lower lip, trismus and odynophagia occurring after wisdom tooth extraction, while displaying sympathy at the other person's

(continued)



**Table 10.2** (continued)

Dimensions	1. Identifying a problem	2. Conceiving solution strategies	3. Setting learning tasks	4. Learning results and resources	5. Examining solution strategies	6. Proposing a solution
	achieved a deep understanding of the acquired knowledge	perspective of the spread of inflammation the mechanism whereby trismus and odynophagia (swallowing pain) can occur after wisdom tooth extraction; and to display sympathy at the other person's anxiety and eating difficulties	and spaces); and a sympathetic attitude			anxiety. In terms of additional information, students might ask about the state of the wisdom tooth, the use of conduction anesthesia, the extraction process, and the progression of symptoms

**Table 10.3** Rubric for Step 3 of the modified triple jump

Dimensions	7. Implementing a solution			
	7-1. Gathering additional information (gathering additional information and reformulating the problem)	7-2. Integration of information (integration of additional information and correction of the preexisting solution)	7-3. Sympathetic attitudes (sympathy for a partner)	7-4. Communication (expressing the solution in the way that partner can grasp)
Explanation of dimensions	Through conversation with the friend, the student gathers the additional information needed to explain the symptoms that have appeared and, if necessary, reformulates the problem	The student synthesizes useful information in terms of explaining the causes of the symptoms that have appeared, including additional information, altering the proposed solution where necessary	The student responds with sympathy to the friend's anxiety and eating difficulties	The student explains the causes of the friend's symptoms in simple terms
Level 3	Accurately gathers all the additional information needed to explain the symptoms that have appeared, including the state of the wisdom tooth, the use of conduction anesthesia, the extraction process, and the progression of symptoms	By synthesizing additional information gleaned from the friend, the student achieves a deep and flexible understanding of the symptoms from the relationship between the wisdom tooth extraction and the mandibular nerve tract, and between masticator space and the spread of inflammation caused by wisdom tooth extraction	Responds to the friend's anxiety and eating difficulties by expressing sympathy and encouragement and also answering the friend's question, indicating willingness to provide further help any time he/she can	Considers how to organize the topics based on their content and relevance and provides a simple explanation tailored for understanding
Level 2	Gathers some of the additional information needed to explain the symptoms that have appeared, including the state of the wisdom tooth, the use of conduction anesthesia, the extraction process, and the progression of symptoms	By partly synthesizing additional information gleaned from the friend, the student achieves an adequate understanding of the symptoms from the relationship between the wisdom tooth extraction and the mandibular nerve tract, and between masticator space and the spread of	Responds to the friend's anxiety and eating difficulties by expressing sympathy and encouragement and also answering the friend's question	Generally manages to appropriately organize the topics, but some problems with expressions and the usage of technical terms in terms of ensuring understanding

(continued)

**Table 10.3** (continued)

Dimensions	7. Implementing a solution			
	7-1. Gathering additional information (gathering additional information and reformulating the problem)	7-2. Integration of information (integration of additional information and correction of the preexisting solution)	7-3. Sympathetic attitudes (sympathy for a partner)	7-4. Communication (expressing the solution in the way that partner can grasp)
		inflammation caused by wisdom tooth extraction		
Level 1	Only gathers a minute part of the additional information needed to explain the symptoms that have appeared, including the state of the wisdom tooth, the use of conduction anesthesia, the extraction process, and the progression of symptoms	Without synthesizing additional information gleaned from the friend, the student only understands the symptoms from the relationship between the wisdom tooth extraction and the mandibular nerve tract, and between masticator space and the spread of inflammation caused by wisdom tooth extraction as textual data	Merely recognizes the friend's anxiety and eating difficulties and focuses primarily on answering the friend's question	The way the topics were organized was confusing and the explanation was difficult to understand OR the student simply read out what he/she had prepared beforehand
Level 0	Students not satisfying the Level 1 criterion shall be given a zero			
NOTES	Check that the student is not simply engaging in conversation but rather asking intentional questions	Assess the student on the content of his/her explanation	Assess the student from both verbal and non-verbal perspectives	Do not include elements such as speech habits, tone of voice, or conversation speed in the assessment

dependent on the scenario (Matsushita 2012). For additional information-gathering and information synthesis, the thinking process of revisiting and revising the proposed solution based on the additional information from the role-play partner is assessed. While the process is basically the same as for Steps 1 and 2, because it is closer to a clinical situation and requires students to think on their feet, Step 3 presents a high level of difficulty.

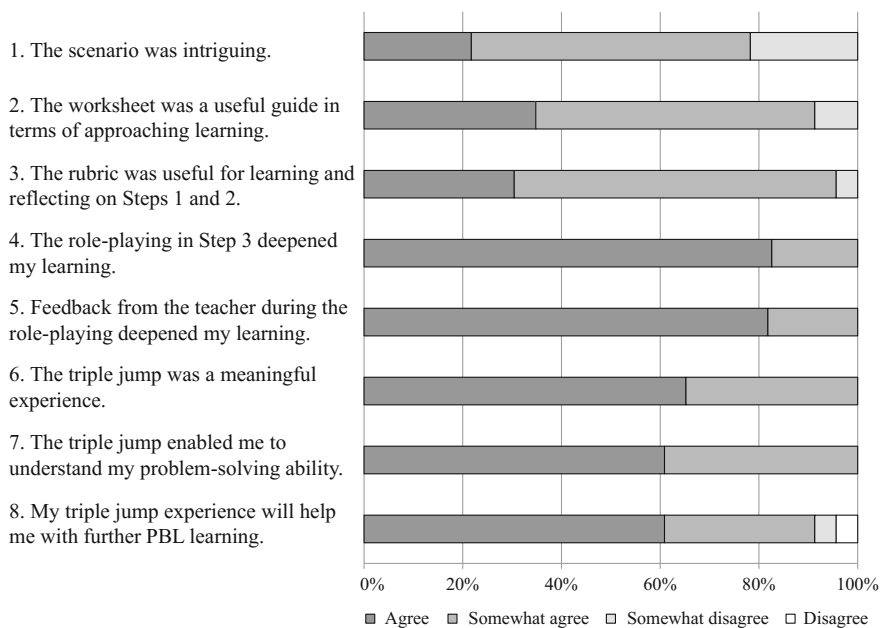
Having explained to students the purpose and procedure of the modified triple jump, we conducted Step 1 for all students together outside ordinary class hours three months into the semester in which PBL was introduced. After Step 1, students were instructed to do Step 2 by themselves, and told when and where to submit their worksheets. We began Step 3 one week after the deadline for worksheet submission, assessing six students per day over four days, with students able to choose their examination date. Assessment of the worksheets and role plays was conducted by three teachers who had been involved in teaching students from the Department of Oral Health and Welfare in the first semester of their second year. One of the authors of this paper was a partner of the students in the role play. While the modified triple jump is a formative assessment, student participation is a requirement for sitting the semester-end examination, which comprises a summative assessment.

### *Learning Effects of the Modified Triple Jump*

To gauge the learning effects of the modified triple jump, we conducted a questionnaire survey of students on completion of Step 3. The purpose of the survey and the voluntary nature of participation were explained to students, who were also informed that neither their cooperation in the survey nor the nature of their responses would have any impact whatsoever on their grade or their promotion to the next year. The survey offered four levels of response—"Agree," "Somewhat agree," "Somewhat disagree" and "Disagree"—to eight statements: (1) The scenario was intriguing; (2) The worksheet was a useful guide in terms of approaching learning; (3) The rubric was useful for learning and reflecting on Steps 1 and 2; (4) The role-playing in Step 3 deepened my learning; (5) Feedback from the teacher during the role-playing deepened my learning; (6) The triple jump was a meaningful experience; (7) The triple jump enabled me to understand my problem-solving ability; and (8) My triple jump experience will help me with further PBL learning. At the end of the survey, students were asked to provide their views and impressions.

Of the 24 students, 23 submitted their responses, providing a response rate of 95.8%. Overall, most comments were positive, and in particular, more than 80% of students chose "Agree" in response to questions (4) and (5), while none responded "Somewhat disagree" or "Disagree." More than 60% of students chose "Agree" in response to questions (6), (7) and (8), which, including those who responded "Somewhat agree", represented a value of more than 90% (Fig. 10.10).

Having analyzed the views and impressions on the modified triple jump that were provided by 16 students, we divided these into the five categories of



**Fig. 10.10** Learning effects of the modified triple jump

(1) nervousness and sense of achievement; (2) imagining of actual practice and deepening of learning; (3) understanding of the PBL learning method and the student’s own current ability; (4) desire to participate actively in PBL in future; and (5) recognition of the triple jump as a meaningful experience. In other words, students engaged themselves in the triple jump with nervousness and a sense of achievement, with the experience imagining a sense of actual practice and deepening their learning. It contributed to their understanding of the PBL learning method and their own current ability as well as to solidifying their desire to participate actively in PBL, leading students to consider the triple jump a meaningful experience (Ono et al. 2014).

## Toward Deep Active Learning

The concept of learning outcomes began attracting widespread attention from Japanese higher education when the above-mentioned CCE report “Towards Building Undergraduate Education” labeled learning outcomes on completion of undergraduate studies as ‘graduate attributes’ and called for assessment of those graduate attributes. The report marked the formal introduction into Japanese higher education of outcome-based education that focuses more on what students have learned than on what teachers teach (Matsushita 2012).

PBL and other forms of active learning are effective ways of going beyond the acquisition of knowledge and understanding to develop higher-order, integrated abilities such as problem-solving ability and interpersonal skills, but direct assessment of such abilities is not easy. Even where universities introduce active learning out of a sincere desire to help students grow, they are almost inevitably faced with the thorny issue of how to evaluate learning outcomes. The method of evaluation used seems to tacitly inform the student of the teacher's real priorities (Matsushita 2007). In terms of boosting student motivation in relation to active learning like PBL, it seems important to avoid taking the easy way out with evaluation methods and instead strive to construct alignment between learning objectives and assessments.

Moreover, rather than the assessment process serving the sole purpose of assessment of learning, it should ideally also provide students with a learning experience, in other words, assessment as learning. With the modified triple jump, for example, recreating a scenario in Step 3 and tasking students with actually implementing their proposed solution on the tutor as a friend/patient helped students to understand the scenario problem as problems which they are likely to face in society and at work, engaging them in deep learning.

Advancing active learning to the level of deep active learning requires close attention not only to the curriculum, teaching materials and the learning environment, but also to assessment, and particularly to the conduct of *assessment as learning*. The modified triple jump discussed in this chapter is a method developed to assess the learning outcomes of students who have studied using the PBL method. This performance assessment combines a worksheet-based written task with a performance task in the form of a role play, and uses two different types of rubric. We hope that this exercise provides a useful reference for readers.

## Summary

- The Niigata University Faculty of Dentistry introduced problem-based learning (PBL) into the curriculum as of 2004 in order to develop students' problem-solving ability in the context of dental education. PBL is combined with lectures, practicums and seminars in semester and weekly schedules with a view to enabling students to integrate knowledge gained from lectures and other classes into their PBL to achieve deep understanding.
- The success of PBL relies not just on the curriculum but on creating authentic scenarios with an appropriate level of difficulty, as well as sharing the facilitation burden across the whole teaching team and developing their facilitation skills.
- The results of a questionnaire survey targeting graduates revealed that students liked the PBL-based curriculum, and a high proportion felt that they had achieved the expected learning outcomes. However, the lack of proper assessment of problem-solving and other higher-order integrated abilities fostered

through PBL had the potential to reduce student motivation. Developing a new assessment method was therefore an urgent task, not least to ensure alignment between learning objectives and assessments.

- We developed the modified triple jump as a means of directly assessing problem-solving ability in PBL. The modified triple jump is a performance assessment that combines a worksheet-based written task with a performance task in the form of a role play, using two different types of rubric. It brings greater reliability to the assessment of students' ability, while the introduction of a worksheet reduces the assessment burden on teachers.
- The results of a student questionnaire survey reveal that the modified triple jump is functioning not just as an assessment of learning but also as assessment as learning, with the assessment process itself providing a learning experience for students and directing them toward deep learning. Assessment has an important effect in terms of advancing active learning to the stage of deep active learning.

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# Chapter 11

## New Leadership Education and Deep Active Learning

Mikinari Higano

In 2006 I launched an undergraduate leadership program, the very first one in Japan that included mandatory courses (Higano 2013). Although I was not familiar with the concept of active learning until around 2010, in retrospect, what I had intended and what I actually implemented were both truly active learning experiences for students. In this chapter, I would like to discuss the following propositions: (a) that the new leadership education is a good example of active learning, (b) that almost all active learning and leadership education are in fact homologous, (c) that (deep) active learning can be redefined from the perspective of students' leadership, (d) that learning being "deep" means learning achievements can be utilized anytime, anywhere, without the support of the teacher ("training wheels"), and (e) that new leadership education theory can be a powerful tool for (deep) active learning theory.

### What Is New Leadership?

"Who comes to your mind when you think of a leader?" This is a typical question to start the first session of a leadership course for MBA students and business-major undergraduates. In such cases, students will usually respond with various individual examples including the famous samurai commander, Nobunaga Oda, or the American civil-rights organizer, Martin Luther King, Jr. Others would cite their parents or their former high school teachers. The leadership teacher would classify

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these examples from several perspectives (authority, vision, etc.) to highlight the students' ideas of leaders, and then move on to the topic of the difference between leadership and leaders. However, leadership training at many Japanese companies may not require such an introduction because a leader for them is a person with authority or someone in management, whereas leadership is often defined as the skills and knowledge such a person should have.

However, it is becoming gradually clear that leadership comprising the top layer of an organization (or the upper class alone) is incapable of readily adapting to drastic changes in the environment or of creating necessary, innovative changes. For this reason, some companies have recently moved away from the idea that only those with authority should exercise leadership to a condition whereby *everyone* should exercise leadership.<sup>1</sup>

This is more so for foreign companies. If everyone demonstrates leadership, it means that even those without the authority to give orders should also be demonstrating leadership, and this differs from the generally accepted idea of leadership in Japan. However, even in Japanese companies, leadership in multinational teams is likely to be required in more and more situations, and thus spontaneous leadership that can be exercised without authority is expected to become the global standard. Therefore I believe it is better to alter the definition of leadership so that it is consistent with the global standard rather than conforming only to the local Japanese meaning.

### ***Emergent Leadership***

How does a person without authority exercise leadership? It starts when an organization must achieve certain goals and somebody realizes that he/she should cooperate and work together with colleagues. The organization here can be a company, a household, or a local community. Leadership can sometimes emerge among total strangers (e.g., when someone suddenly collapses on a street, a bystander immediately calls for an ambulance while a second bystander responds by administering artificial respiration, etc.). Such leadership without authority is called emergent leadership and is differentiated from appointed leadership (leadership that occurs upon appointment by authority) and elected leadership (when a leader is chosen by election). Often more than one person exercises this emergent leadership and so the situation may result in "shared leadership".

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<sup>1</sup>A survey titled "*Kigyō no rīdashippu kaihatsu ni kansuru chōsa hōkokusho* [Study regarding leadership development at businesses]" was carried out by the College of Business, Rikkyo University, in 2010 (targeting 500 listed Japanese companies, 500 unlisted Japanese companies, 200 foreign companies, etc.). According to the survey, the job categories in which companies require employees to exercise leadership are: executives (86.1%), managers (94.1%) and middle-ranking and young employees (79.2%), in addition to which 34.7% of the companies also required new hires to exercise leadership.

### ***Too Many Cooks...***

When a Japanese person hears that it is acceptable to have multiple leaders, he/she immediately thinks of the old saying, “A ship with too many skippers would climb a mountain.” It’s a Japanese version of “Too many cooks spoil the broth” and probably means that if a ship has too many skippers, it would cause confusion in the chain of command and run the ship aground. However, the reason why a ship with multiple skippers would not sail properly is not just because it has too many leaders but also because the skippers lack true leadership (Iga 2012, pp. 68–70). If there were a complete consensus with regard to sailing a ship safely to a particular port, skippers who have true leadership skills would devote themselves to the same tasks as ordinary crewmen, regardless of who gives the orders. But this does not happen if there is a skipper who prioritizes his enjoyment of giving orders over the successful operation of a ship—in other words, a skipper who lacks leadership. On the contrary, no obstacle is seen as insurmountable when all members in an organization can possess leadership skills. In fact, the more members there are exercising true leadership, the easier it is for a group to achieve goals.

### ***Leadership Without Authority***

According to comments on earlier drafts of this paper, the concept of “emergent (and shared) leadership” is so different from the traditional idea of leadership in Japan that it is better to avoid calling it leadership at all. However, I would disagree. I believe that it is preferable to continue calling such a condition *leadership*, and to explain that leadership does not in fact have anything to do with unquestioned authority. Omitting the word “leadership” merely bypasses the issue; and besides, there is no better word for it because, again, shared leadership is becoming the global norm. And those who assert that emergent leadership should not be called leadership usually assume that leadership is linked to charisma and/or authority. And while the word “leadership” does not always refer to emergent leadership, it is observed that even in the U.S. it still appears that leadership more often refers to “authority” (rather than charisma)—more so than in Japan. (As an indirect example, “leadership” in English can even be a collective noun meaning “leaders” or “those in charge of administration.”) In other words, people in both countries tend to misinterpret leadership as applying to authority.

How does leadership from outside the framework of authority manifest itself in a company? Let’s begin by defining leadership, for the time being, as an act of sharing a vision or a goal by getting others involved.

First of all, when leadership occurs among employees of equal rank, it could be termed as leadership disassociated from titles, or leadership without authority. Moreover, leadership exercised by a subordinate toward a superior or senior (e.g., a situation where the subordinate might formulate an idea and then request the

cooperation and support of the superior or senior) is also an example. The same can be said about this type of leadership when demonstrated by a young employee toward other employees, including superiors in other divisions in a company-wide project team. And what about cases outside the company? In relationships with the company's clientele, the client can be similar to a superior, a subordinate, or an equal. In each case, shared leadership is applied between both employee and client. In short, leadership must be exercised at any time inside and outside a company. However, the personal risk in exercising leadership depends on whether the organization officially recommends such leadership. If it is not recommended yet someone attempts to exert shared leadership anyway, it may not be welcome at all—even if it brings good results from the market. If emergent leadership fails to create desired results, the situation would become even worse. By contrast, however, if a company officially promotes leadership without authority, such an organization might offer leadership training to young employees and would therefore communicate and stress the importance of leadership upon hiring.

### *The Three Minimum Elements of Leadership*

If leadership depends on neither authority, title, nor charisma, then what is required to justify the description “leadership”? Although we may need to define the conditions for leadership, no one theory really exists in this regard. However, you cannot start leadership training without applying some theory. As there is no decisive theory available, it would be desirable from an educational perspective to first teach one theory that is easy to understand and have students use it to sort out their own experiences and exchange feedback, then teach another theory sometime later. In this sense, the ideal theory to be taught first may be Misumi's (1966) Performance-Maintenance (PM) Theory of Leadership (PM Theory). But with this theory we often face a situation where it is difficult to grasp which of the two elements (performance or maintenance) should be used in categorizing a particular action—because actions often correspond to both. For this reason, I would like to explain the Three Minimum Elements of Leadership. I adapted these from Kouzes and Posner (1988), and it is even better known than PM Theory, so it is easier for students who carry out group work to learn and review the theory on their own or to give feedback to peers. Instead of proposing a new leadership theory, what I am doing here is merely extracting a part of an existing theory for a specific purpose. It would not be suitable for other purposes, and I am of course anticipating the argument that there are other important elements to leadership.

The first element of the Three Minimum Elements of Leadership is to define and establish a clear goal (“setting the goal”). If there is no goal, there is no need for leadership. This goal can be something the person thought up for him/herself or something the person is adopting that someone else came up with originally. The process of acting as a team can also involve multilayered goals by time period, such

as the goal for a one-hour meeting, the goal through tomorrow, or the goal through the next week.

The second element is to obviously lead others by taking actions in person to achieve the goal (“setting the example”). Granted, if the process ends here, the person is working on the goal alone, and this cannot be called leadership.

The third element is to share the goal so that it is not only the person him/herself, but also others who act, and to help to eliminate the factors that make it difficult for others to act (“enabling others to act”).

If a person lacks any one of these three elements, it cannot be said that the person exercised leadership in the group work by students, but as long as these three conditions are met, it can be stated that the person took at least some sort of leadership role.

In students’ group work, we sometimes see cases in which a person satisfies the first and second conditions but cannot meet the third one, and as a result he/she completes the task almost alone and considers other team members to be “free riders” or “social loafers.” These are often cases where the person who completed the task on his/her own finds him/herself proceeding alone because he/she failed to make others aware of the goal or failed to provide the support necessary for others to work toward the goal.

As noted above, there are many other elements or conditions of leadership, such as resilience and the ability to make hard decisions. But the three elements we just discussed are so essential that if any of the three is absent then the term, then “leadership” simply does not apply. This is why we call these the “minimum” elements.

## **New Leadership Education Generates Active Learning in a Broad Sense**

Some business schools, both graduate and undergraduate, offer leadership courses. Some are interactive, providing opportunities for active learning, but others are not, primarily comprised of lectures by recognized political and business leaders. Lectures alone do not facilitate active learning in our sense. This is also true for every specialized field, outside business and leadership.

By contrast, for leadership development in the new sense to become effective, it is necessary to implement courses using active-learning methodology. The teacher will typically design the course so that the PDCA (Plan, Do, Check and Act) cycle as below should occur:

First, the students themselves try demonstrating leadership

- they receive feedback from other students and the teacher regarding their performance
- they review their own leadership performance based on the feedback

- they formulate their own leadership performance improvement plan,
- they adopt improved leadership behavior and
- the process is repeated.

It is a teaching and learning method that incorporates student leadership into learning.

## **Deep Learning Can Happen During the New Leadership Education Course**

### ***Linkage with Other Courses***

If a course designed to cultivate new leadership is offered by a particular college, one way to link it with specialized subject courses is to arrange a problem-solving project for students and set forth a problem that requires the application of knowledge in other specialized courses to solve it. For example, in the college of business, you can design a project in which students can leverage their knowledge in specialized subjects such as marketing and accounting. In other words, specialized courses are for input, and the leadership course is where the students use pre-existing knowledge as output. To be sure, using that knowledge is an important and exciting element for students, but they should always keep in mind that the ultimate goal of the course is leadership development.

### ***Significance as Career Education***

Leadership education also facilitates deep learning in cases other than knowledge-linkage with other courses. For example, a student may feel uncomfortable working with certain teammates, thus making collaboration difficult. Such a situation can happen frequently. But what if the student, with the help of the teacher, realizes that the problem occurred because the teammates and/or the student him/herself simply lacked leadership skills and/or knowledge? Then, if both of them could successfully agree on a common goal and advance to the other two elements of leadership, they might make a good team. Such experience can result in a valuable contribution to his/her career in the sense of how it can change a student's approach to life, not just in the classroom but also after graduation. This is essentially deep learning because it can change the way a person interprets past experiences and his/her subsequent way of life (Matsushita 2009; Mizokami 2013).

In this sense, deep learning can occur as long as a leadership course succeeds in cultivating leadership among students, and this applies even if the course is offered not within one specialized department or college, but across several diverse campuses, or if it is offered as an extra-curricular subject by a student affairs facility or a student counseling center.

## *Linkage with Sports and Music Activities*

Lessons in leadership development can be implemented in conjunction with sports activities, such as college and intermural sports, or in musical competitions. For deep learning in leadership to take place, it is important to set a high goal, to act, to give and receive feedback, and to improve upon previous experience. In the case of sports activities, there is the clear goal of winning a competition, and the members are required to contribute to the team during that competition and practice by taking on leadership roles even if they do not benefit from traditionally appointed authority roles, just like students who contribute to their teams during group work in a leadership class.

## **Active Learning Is Based on the New Leadership by Students**

If just some of the students in a class demonstrate the new leadership without authority, it would be easier for them to promote active learning, even in different settings apart from leadership courses. When one of them formulates a question, exhibits doubt, or shares an idea, he/she will voice it without hesitation, which in turn will stimulate other students, who will also begin to offer input and other relevant remarks. Students who share the goal of maximizing learning of the entire classroom (setting the goal) will speak up (setting the example),<sup>2</sup> which will then boost a communal sharing of the goal to maximize learning and to understand that it is safe to speak up. This feeling is conveyed throughout the classroom, turning the academic setting into a learning community (enabling others). And it can all start with any student who demonstrates such leadership. In that sense, it is emergent leadership without authority. In this case, leadership based on authority and title would be the leadership of a student who is appointed by a teacher or chosen in an election (class leader). It would cause no problem for learning even if the two types of leadership coexist. (Admittedly it would be an issue if the class leader feels that his role has been interfered with and resists it, but this would mean only that the quality of leadership is poor).

Again, this idea may apply in almost any class setting. If there are as few as two students in the classroom who are eager to learn and involve other students, their impact is even stronger than that of the teacher. Every teacher may have memories of a lively classroom, which usually reminds him/her of some particular students. Were those students not eager to learn, and was their enthusiasm not influential upon other students as well? If a classroom has such students—not necessarily one

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<sup>2</sup>Some students might raise their hands for other reasons, such as showboating purposes. The initial motive to raise a hand does not have to be “sharing the goal.” It is also acceptable if the ultimate goal of the class is shared during the leadership process in the classroom.

extraordinarily outstanding student, but even a number of students with smaller influence speaking up in response—that too would make for an outstanding class. This is exactly what students' leadership and peer-learning mean. In that sense, active learning assumes leadership on the part of students. No matter how hard a teacher tries to facilitate a successful class, active learning will not occur unless some of the students take on a leadership role.

Therefore, certain implications for curriculum design in colleges (as well as junior high schools and high schools) must be considered—for example, if a school wants to energize its classes using active learning, then perhaps it needs its students (and also its teachers!) to acquire rudimentary leadership skills or to create an environment that enables new leadership.

To be sure, if student leadership remains confined only within the classroom, it also means leadership was not learned deeply. However, when students who learned to demonstrate leadership in a classroom take the skills *outside* the classroom and leverage them in other areas of their daily lives, deep learning will then manifest itself. The goal, therefore, remains unachieved if students find themselves in a situation where they can speak up only in a class taught by a particular teacher. It is necessary to take new leadership to the level where the students can exercise it inside *and* outside of the school. When this is achieved, it can then be called deep learning through leadership education.

## **Support for Active Learning as Leadership Education: An Alternative Definition of Active Learning**

From what we have discussed so far, it is obvious that support for active learning is very close to leadership education. In other words, a teacher's preparation for facilitating active learning means almost the same as the preparation for facilitating students' leadership in a classroom. It includes teachers acquiring such skills as action learning,<sup>3</sup> counseling, and coaching.

From here we can proceed to an alternative concept: active learning as learning through student leadership. A student—often with the help of the teacher—sets the goal of maximizing learning in the classroom through the actions of bravely making relevant observations and comments and asking questions (setting the example), which will then deepen his/her understanding.<sup>4</sup> Having been influenced by the first student's actions, other students will then contribute to the class by making their own observations and inquiry. As a result, active learning is enabled, and the

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<sup>3</sup>Action learning (Marquardt 2004), which sounds close to active learning, also has an aspect of building the environment and assisting students' leadership. However, action learning is totally different from active learning, and is a kind of group coaching template for acquiring the capability to ask questions, coach, and facilitate.

<sup>4</sup>See note 1 above.



process is leadership itself. Moreover, this definition of active learning is not derived from format-based theories, such as those that specify “a class format that incorporates activities including group work, discussion and presentation.” It is instead a definition that explicitly includes learning through the reciprocal actions of students, making it intrinsically more important even than the definition “the collective term for teaching and learning methods that incorporate students’ active participation in learning” (Mizokami 2013). Excluding the element of “reciprocal actions of students” would suggest a vision in which students attend a unilateral class in a large venue, such as a lecture hall, where they actively and positively (but individually) go to the teacher at the end of class or during office hours. But then, are these really examples of students engaged in active learning as discussed earlier?

In addition, the concept of active learning as learning through leadership allows a teacher to check the existing classroom situation against the Three Minimum Elements of Leadership one by one, making it easy for him/her to understand what has already been achieved and what has not yet been achieved. A checklist would consist of these questions: (1) whether the goal of maximizing everyone’s understanding in the classroom (as well as sub-goals required for achieving the primary goal) is shared, (2) whether one of the students would make the first observation or ask a question, and (3) whether additional students are also commenting and asking questions and whether necessary assistance is provided to facilitate such participation. This allows teachers to take concrete measures depending on what is lacking. As noted before, these measures are extremely similar to leadership education itself. That is, if students share the goal of maximizing learning in the classroom and receive assistance to exercise leadership, this immediately serves to promote active learning. Naturally leadership is only a part of the learning goal of the course, but if a teacher tries to create active learning in the classroom alongside teaching specialized content, the support provided by the teacher for that purpose has to have some elements of leadership education.

## **The “Training Wheels” Metaphor: Meaning of Deep Learning**

Now when and how does “deep learning” occur in active learning class? Let me start with leadership course taught in an active learning way. The key issue is whether the class had an impact on the student’s perception and behavior *outside the classroom*. Once students were outside the classroom, there would be no teacher to encourage them to speak up and no peers to compete with. Whether they can still demonstrate leadership outside the class will determine to what (if any) extent the leadership course has enabled deep learning. And even if it has, what will happen when such a student enrolls in a unilateral lecture-style class at a future time? Will he/she be the first student to raise a hand and ask a question? And how would he/she act outside the lecture hall when spending time with friends, working a

part-time job or an internship, or interacting with parents or family at home? If the student can demonstrate leadership in these situations, we can say that leadership education brought deep active learning—in other words, “getting involved with others while learning deeply about the target world, linking the knowledge acquired with previous knowledge and experiences, and carrying it on into subsequent life.”

In the cases of leadership education classes, if the issue of leadership is understood or demonstrated solely inside the classroom, students will practice and function based only on the teacher’s preparations, a situation akin to riding a bicycle with training wheels attached.<sup>5</sup> But if a student can exercise leadership outside the classroom, the student is riding the bicycle without training wheels. I have explained in section “[Deep Learning Can Happen During the New Leadership Education Course](#)” that new leadership education is likely to generate deep active learning. I have also cited as examples its potential in terms of career education, linkage with specialized courses, and application to sports. However, these are also cases related to riding a bicycle without training wheels—i.e., playing the leadership roles outside the classroom and the course. (A junior student demonstrating leadership in a college sports club characterized by rigid hierarchical relationships would be like the student removing the training wheels and pedaling up a steep, winding road, which would be an advanced step).

So how does the life of a person change if he/she can ride a bicycle without training wheels? With regard to leadership itself, he/she will be able to demonstrate leadership to a stranger (or to people ranking higher in authority). In addition, as the person has experienced active learning in the introductory physics class (or it could be history, law, writing, etc.) and knows that it was effective, this same person is aware that learning new knowledge and skills can be made effective by gathering people and studying together, which boosts engagement, and he/she will voluntarily play the role of a facilitator who organizes active learning—another rewarding advantage of deep active learning.

In order for such learning to take place, adjustment of the training wheels is important. A child new to a bicycle cannot maintain balance easily and the training wheels often touch the ground. As the child gets used to it, however, the training wheels touch the ground less frequently and somebody (typically the parents) will gradually raise the supports of the training wheels a bit so that they would not touch the ground unless the bicycle tilted by a great margin. As a result, the child would come to rarely use the training wheels, but would still feel safe knowing that the bicycle is unlikely to fall over because the training wheels are still there. Finally one day the training wheels will be removed and the child will be able to ride it without any physical assistance.

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<sup>5</sup>The training wheel metaphor is very close to “scaffolding” in cognitive psychology. However, I would still like to use training wheels here for two reasons. The first reason is that a bicycle would not move unless you pedaled it and it is therefore suitable for a dynamic concept such as leadership. The second reason is that the metaphor (front and rear wheels) is convenient when explaining the relationship between the leadership course and other specialized disciplines.

The training wheels can be compared to the assurance of safety and encouragement provided by the teacher so that students can exercise leadership in the classroom. If it works well and students feel free to offer input and questions, the teacher has to gradually raise the training wheels. That is, reduce the frequency of encouragement and lower the level of the safety net.

The silent class (Heifetz and Linsky 2002; Parks 2005) can be used to create an environment without training wheels in a classroom. Typically, one day in the latter half of a term of learning leadership within a carefully prepared environment, the teacher comes to the classroom but sits down and does not say anything. At this point, if the students demonstrate what they achieved in the class thus far and organize an activity to learn from each other without getting help from the teacher, that is a condition in which the training wheels have been removed and they have the potential to do the same even after leaving the classroom. Conversely, if the class descends into a state of chaos or students request that the teacher say something, they still need the training wheels. The teacher is transmitting a message through this silent class that once the students graduate, every day will be like this silent class and they have to exercise leadership on their own to continue learning. (Alternatively, a teacher may carry out the silent class at the beginning of the term and make the students recognize that they cannot learn anything without the teacher at that point).

There is one way to extend active learning outside the classroom and after graduation, instead of keeping it within the classroom, and to lead into deep active learning. That is for the teacher and students to recognize the training wheels in the classroom (the teacher's preparations and arrangements to assist students in demonstrating leadership) as just that—a set of training wheels. From there, both parties agree to gradually reduce their dependence on the training wheels. The silent class is a clear way to convey this idea.<sup>6</sup>

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<sup>6</sup>Instead of extreme methods like holding a silent class without notice, there are other methods used in leadership education as part of the process of gradually raising/removing training wheels. For example, (1) there is the method of officially allowing students to handle the running of the class. This is equivalent to notifying the students that there will be a silent class the following week and deciding who will be the facilitator in advance. In addition, (2) students can keep a leadership journal (a class journal). When a student becomes capable of demonstrating leadership in a discussion group, or in other contexts during the class, he/she records what kind of leadership behavior he/she demonstrated. Furthermore, the student might share that information with certain peers or the entire class itself during the past week, and then receive feedback designed to encourage him/her to exercise leadership outside the class or college/school. Initially one tends to witness the phenomenon of students being forced to demonstrate leadership behavior so that they can enter it in the journal, which is like putting the cart before the horse. However, it still has a significant effect in terms of making demonstration of leadership a habit.

## Quiet People and Active Learning

Finally, I would like to mention whether deep active learning is the only way that leads to deep learning. The definition of deep learning does not include leadership or social learning such as learning with friends. A person who is good at studying and thinking quietly alone (an intelligent introvert) may more easily attain deep learning from unilateral classes. If this is true, it would mean that it is not always the case that the best way to achieve deep learning is through active learning. Even if active learning is effective for many students, there are some who do not require it and even some who find it distressing. So it would be better if the teacher, or the instructional designer, clearly intends to offer active-learning assistance together with. If he/she does not, however, it could force some students to make an unnecessary detour to achieve deep learning (i.e., to follow a path that forces them to acquire leadership skills that are not part of their learning goals).

That said, from the perspective of leadership education itself, students can learn that high value is attached to the type of leadership that recognizes that such introverts can always exist in a class and can make use of extroversion and introversion as forms of diversity, like gender and cultural differences. In addition, there is an interesting report stating that when an introverted person comes to have a title and authority, the person makes a good match with extrovert subordinates (Cain 2012).

It seems that introverts are often advised to try and become a little more extroverted, but introversion is not an abnormality or a disease that has to be cured. Moreover, given the argument that quite a number of introverts can take actions similar to extroverts when they feel it is important, it may be extremely valuable for introverts to receive leadership education (instead of making efforts to become an extrovert). This is a topic I would like to explore in the future.

## Summary

- The new leadership advocated in this chapter is leadership that does not have anything to do with a title, authority or charisma. It can be described as leadership if action is taken to involve others by pointing out the goal. This leadership includes the three minimum elements of (1) setting the goal, (2) setting an example, and (3) enabling others.
- A course that cultivates new leadership naturally facilitates active learning. Moreover, active learning in general is based on students' leadership in the classroom, and a teacher's assisting students in learning actively in courses other than the leadership course is actually similar to the introductory part of a leadership development course.

- Therefore, learning through students' leadership is an alternative definition of active learning. This definition includes the social aspect of learning and has the advantage of making it easy to prepare a list of the elements necessary to assist students.
- How deep active learning can succeed depends on whether the students become capable of organizing learning, without the assistance of a teacher, outside the college and after graduation, through the process of gradually removing the training wheels.
- However, it poses a danger for introverted students to be forced into active learning without including leadership cultivation as part of the learning goal, as it could be a distressing detour for such students. Conversely there can be great value in teaching leadership education to introverted students after clearly sharing and explaining the learning goal.
- As just described, leadership education theory is a powerful, new tool for active learning theory and deep learning theory.

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