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[1] in the activities.

[1] *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

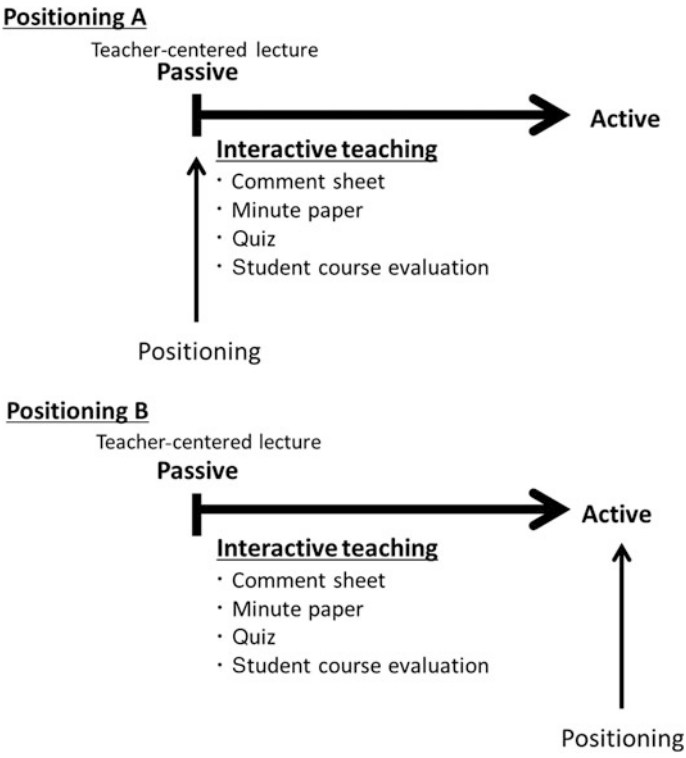

Fig. 5.1 Transition from Positioning A to Positioning B in active learning

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[2] 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.

[2]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

Deep approach
• 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
Surface approach
• 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)

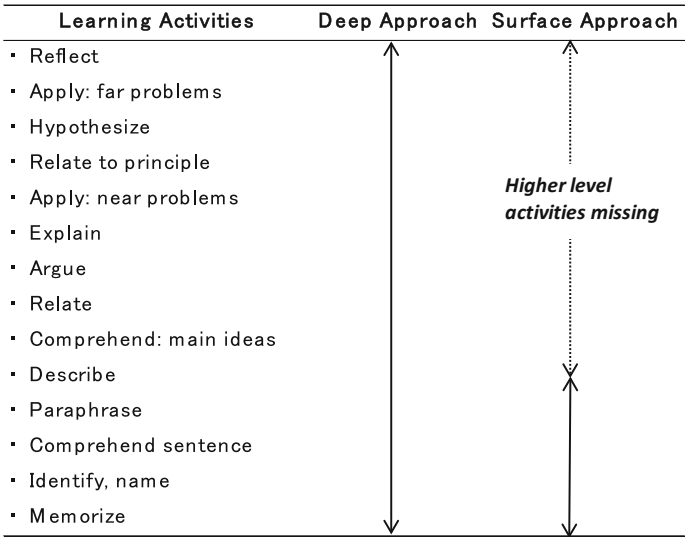

Fig. 5.2 Approaches to learning characterized by the "verbs" of learning activities. *Source* Adapted from John Biggs and Catherine Tang, Teaching for Quality Learning © 2011. Reproduced with the kind permission of Open University Press. All rights reserved

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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