Exploration about Teaching/Learning Activities in Universities from the Perspective of Active Learning

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***Abstract*—Active learning is a learner-centered method of learning. This article introduces active learning, explores the research, discusses its value, explores the framework of active learning, offers suggestions for implementing it, and provides some concrete examples of active learning approaches in Universities: Think-Pair-Share, Jigsaw, Class Game, Student debate, PBL.**

***Index Terms*—active learning, constructivism, teaching activity, student subjects**

I. Introduction

Many instructors use lectures as a major part of their instruction in higher education throughout the world, because it provides a convenient and efficient way to deliver knowledge to students. It can be masterful when offered by inspiring teachers because the teachers could provide cutting-edge materials and control the whole process in the classroom. But too often students just sit passively, unmotivated, through the rest of the lesson.

Recently, researchers have shown an increased interest in active learning [1], for a considerable amount of studies provide evidence that active learning also called "learning-centered" or "learner-centered" teaching is an essential component of effective teaching. To learn, students must do more than just listen: They must read, write, discuss, or be engaged in solving problems. Like a Chinese proverb: 'Tell me and I will forget, Show me and I may remember, Involve me and I will understand'. That is to say, students should be active in developing their knowledge.

II. What is Active Learning

Active learning is a learning form that has no single 'agreed' definition. In 1991, Bonwell and Eison published a paper in which they described active learning as "involving students in doing things and thinking about what they are doing". [1] The authors indicate that to learn, students must do more than just listen. They must engage in activities that involve reading, writing, discussing, or problem-solving. Similarly, Renkl [2] asserts that in particular, students must engage in such higher-order thinking tasks and analysis, synthesis, and evaluation. In the same vein, Bean [3] in his book Engaging Ideas: The Professor's Guide to Integrating Writing, Critical Thinking and Active Learning in the Classroom notes that Active learning should transform students from passive listeners to active participants, help students understand the subject through inquiry, gathering and analyzing data to solving highest order cognitive problems.

With their definition of active learning, students must do things and simultaneously think about the work done and the purpose behind it so that they can enhance their higher-order thinking capabilities. A vast number of studies in recent years—particularly in the area of cognitive science, psychology, and neuroscience —have proven that active learning as a strategy has promoted achievement levels and content mastery is possible through active learning strategies. Cognitivism states that what happens in the mind is important. Humans are like computers – new input causes processing which changes the mind. Constructivism (Lev Vygotsky, Jean Piaget) provides that the learner is active in the construction of knowledge and past experiences and culture are very important.

III. Framework of Active Learning

Active learning coordinates with the principles of constructivism which are, cognitive, meta-cognitive, evolving and effective in nature. Studies have shown that knowledge construction relies on previous knowledge of the learners who can realize the process of cognition and can control it by themselves. [4] Therefore, A teacher should make sure that his assessment methods and learning tasks are clearly linked to the intended learning outcomes. Backward design [5] assures constructive alignment. That is starting with the design of the desired

Manuscript received January 12, 2021; revised April 29, 2021.

doi: 10.18178/ijlt.7.2.117-120

endpoint and then working backward to assessment and then learning tasks. This means starting by crafting intended learning outcomes.

A. Designing Intended Learning Outcomes

Because learning is about what students do, not about what teachers do, it's important to design appropriate learning objectives. Bloom's Taxonomy of Learning Objectives helps to build the intended learning outcomes. Bloom's taxonomy is a set of models used to classify educational learning objectives into levels of complexity and specificity. [6] The models were named after Benjamin Bloom, who chaired the committee of educators that devised the taxonomy. Bloom's taxonomy describes the way people react emotionally and their ability to feel other living things' pain or joy. There are six levels in it through the lowest-order processes to the highest. They are Remembering, Understanding, Applying, Analyzing, Evaluating and Creating. The lower the level, the more basic and critical it is. The higher the level, the more complex it is. Each level has some verbs, which make a claim for the demands. Fig. 1 shows an overview of Bloom's taxonomy. Teachers could design intended learning outcomes according to Bloom's taxonomy, the base of students and the nature of the course. Students can evaluate themselves and enhance their initiative in learning according to specific learning objectives.

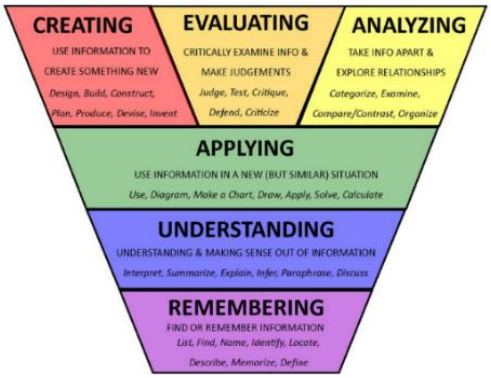

Figure 1. Bloom's taxonomy.

Not all objectives are about thinking. Some are about how students feel and what they value. These objectives address the affective domain.

B. Aligning Assessment with Intended Learning Outcomes

Assessment is about how well students achieve the intended outcomes, not about how well they report back to us what we have told them or what they have read. Constructive Alignment makes sure that assessment methods and learning tasks are clearly linked to the intended learning outcomes. In 2014, Mezirow [7] demonstrated that assessment tasks should be relevant to the intended learning outcomes. Students will be anxious for high challenge and low support. If the challenge is low and the support is high, students can't study independently. Only when the challenge is high and the support is high, can the students make big progress. Therefore, assessment tasks should be relevant to the intended learning outcomes. They should have meaning for the students. They should be motivating and foster further learning simultaneously.

According to Bloom's taxonomy, deeper learning requires an approach that emphasizes understanding over memorization. Assessment tasks are divided into Surface questions and deeper questions. Deeper questions focus on students' understanding and application, and matches deep learning. With clear learning objectives and appropriate assessment tasks, teachers need to design appropriate teaching activities to help students complete their learning and achieve the expected goals. This is Backward Design Process claimed by Mctighe J and Grant Wiggins, which is shown in Fig. 2.

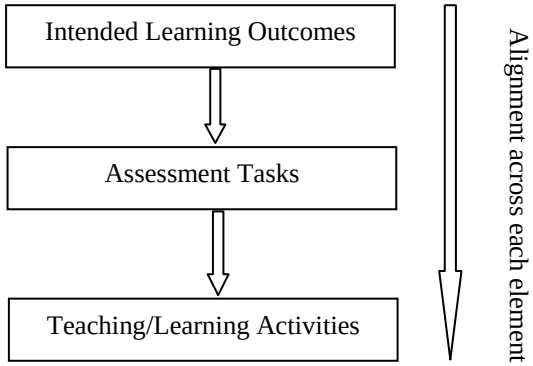

Figure 2. Backward design process

IV. Teaching/Learning Activities

Back to Constructive Alignment, Students should make sure that the learning tasks are clearly linked to the intended learning outcomes. In classrooms, teachers can carry out various forms of teaching activities, guide and attract students to participate in classroom learning activities, and form a good classroom atmosphere for active learning. Active learning can involve individual students in doing things and reflecting on what they have done, or it can involve students working cooperatively in pairs or groups. Numerous studies have shown that introducing active learning activities before, rather than after lectures or readings, results in deeper learning, understanding, and transfer. Some examples of active learning approaches used in universities can include the following.

A. Think-Pair-Share

'Think-pair-share' activity was first carried out by Lyman Frank [8] in 1981. The method is useful for teachers to hear from all students even those who are quiet in class and for students to answer questions in a safer environment. In the activity, the teacher proposes a question according to some knowledge. Students spend about one minute to think about it, which is a thinking stage. After the thinking time, students discuss the question with one or more of their peers. They can combine or adjust their answers. This is the pair stage. Finally, one or more students are chosen randomly to

share the answer with the class. This is the last stage, share stage. In that activity, individual thinking is the base of group discussion. In group discussion, students can have resonance or new thinking and conclusions, and determine the content to be shared in the next stage. The share activity benefits to deeper understanding and memory. Simultaneously, the use of an accountability system, sharing randomly, helps students to bear their own responsibilities.

'Think-pair-share' activity has lots of benefits. First of all, it just needs several minutes. The total time and the time of each part can be flexibly set according to the difficulty of the topic and the feedback of the students, such as 1 minute + 2 minutes + 3 minutes or 2 minutes + 3 minutes + 5 minutes. Secondly, this activity can make students better prepare, make students more actively participate in the discussion, and let students of different types and personalities participate in it. At the same time, it helps teachers to know the students' situation of learning and mastery of the knowledge. Of course, some students are unwilling to share with the class because they are afraid of being ridiculed. Therefore, teachers can use mobile app and other technical means to let students share in a more secure environment, or let students close their eyes and raise their hands to choose answers to share.

B. Jigsaw

Jigsaw is a collaborative learning strategy [9], which originally means "jigsaw game". In this game, a complete pattern is divided into many small pieces, and the players combine the whole pattern according to certain ideas. Constructivism holds that learning is a kind of social activity. In active learning, everyone has his own explanation and construction of knowledge. In the Jigsaw activity, students are active and constructing knowledge rather than being given it. They also bring past experience and personal culture and history to the situation. The jigsaw activity is carried out as follows:

- **Prepare material**: The teacher introduces the general information of the task to be solved to all the students so as to help them understand the task well and arouse their interest. At the same time, the task is divided into different subtasks.
- **Jigsaw groups**: students are put into groups of 3-5. The number of students in each group is consistent with the subtask to be solved. Within these groups, each student is assigned a different subtask. Students are made to realize that they are responsible for the success or failure of the task in their team.
- **Expert Groups**: Students in different groups who study the same content form an expert group. Students are asked to share what they have learned within the expert group. Everyone in the expert group should ensure that everyone else in that group thoroughly understands what they learned. Members express their own opinions, discuss and teach each other, and finally jointly grasp this part of knowledge or reach a consensus.
- **Jigsaw Groups Revisited:** The expert students return to the Jigsaw groups. Each person takes a turn to introduce the content of the part of materials that they are responsible for and the opinions after discussion to other members of the expert group, and to teach other members of the Jigsaw group. Students should ensure that everyone in their group understands every aspect of the task of everyone else in the Jigsaw group. All the students in the group put together the whole learning content.
- **Share the class**: After the students have learned all the contents, they can share them with the whole class. In this way, students can learn and share actively. In addition, in order to tell other students what they have learned, they need more in-depth learning and thinking, so that students can learn more actively. Finally, teachers can test the group as a whole, or individuals in the group. If some content is difficult for students to master by themselves, teachers can explain it to help students acquire relevant skills.

In Jigsaw activities, the students' responsibilities in cooperative learning are to work on the assigned tasks as a cooperative group. Students are dependent on each other for the acquisition of information. Each student is responsible for the success or failure of the others. Thus, Students can become more self-reliant learners and promote peer teaching.

C. Class Game

Class Game is also an effective method of active learning because it not only helps students to acquire knowledge but also lets them enjoy the content of a topic, so as to learn more actively. Integrating interesting classroom games into teaching activities can provide a simple way to motivate students, encourage them to use their creativity and imagination, and deepen students' understanding and mastery of relevant knowledge points.

D. Student Debate

A student debate is an active way for students to learn because they allow students the chance to take a position and gather information to support their view and explain it to others. Instructors choose a topic that can be divided into two or more sides. Group the students according to their own views. Each group of students collects evidence to support their own views and explains to the other party. Students can also change their views. Teachers can give proper guidance, such as respect to students who put forward different views and do not use sarcastic tone and aggressive words.

E. PBL

PBL (problem-based learning) is a student-centered, highly interactive pedagogy in which learners construct new ideas based upon their existing knowledge and which is designed to help students become self-directed learners. [10] PBL has spread rapidly across continents as it gained acceptance across a wide spectrum of professional, academic and educational contexts. In PBL,

students explore a problem called driving problems in a real situation. In the process of exploration, they need to consult literature and learn and apply related discipline ideas and knowledge. The role of teachers is to help facilitate learning and monitor tutorial process. [11] PBL enables students to become the protagonists of individual learning, allowing them to face challenges, solve problems, and cooperate with peers in an autonomous and organized atmosphere. The teacher acts as a consultant for students and evaluates them all the way. PBL emphasizes students' active learning, helps students communicate with their classmates better, and develops their learning skills at the same time.

The principle of PBL is similar, but the specific form can be different according to different problems. Either way, PBL relies on high-quality problems, good grouping, experienced teachers, efficient self-directed learning and evaluation of PBL objectives. The PBL process does not focus on problem-solving with a defined solution, but it allows for the development of other desirable skills and attributes. This includes knowledge acquisition, enhanced group collaboration, and communication.

V. Conclusion

As John Dewey [12] and other researchers have said, active learning is not a fashionable concept, but a learning method that teachers should let students adopt because it takes into account the biological characteristics of learning and goes through continuous research and experiments. Active learning shows that learning is a kind of social activity, and team learning is easier to master the content than learning alone. The content of active learning can be the content that is difficult to learn by oneself, but can learn well with the help of others. The use of effective active learning activities in college classrooms can help teachers and students to use collaborative learning methods for in-depth learning and improve teaching quality.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Dan Dai and Xinggang Zhang conducted the research; Dan Dai wrote the paper; all authors had approved the final version.

Acknowledgment

The authors wish to thank Gary Poole, Pawel M. Kindler, Brett Gilley, Sunita G. Chowrira. This work was supported in part by a grant from undergraduate teaching project of Guizhou University (JG201942).

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