DOI: 10.36315/2019v1end059
Education and New Developments 2019

DESIGN OF A SUPPORTING SYSTEM FOR EDUCATIONAL IMPROVEMENT WITH ACTIVE LEARNING APPROACHES

Yuriko Ishida[1,2], & Ryuichi Matsuba[2]
[1]*Graduate School of Instructional Systems, Kumamoto University (Japan)*
[2]*Research Center for Instructional Systems, Kumamoto University (Japan)*

Abstract

As is well-know the role of instructors has changed from conventional “teaching of academic expertise” to "offering new learning to students" in learner-centered education paradigm. Recently, with the spread of active learning practices like experience-based learning in higher education, facilitation or consultation skills, and project management skills have been recognized as necessary teaching techniques for any instructor. In such educational approach instructors are demanded to build up closer relationship between students than that in the conventional lecture style, because it intimately influences on both students' outcomes and educational effects in the approach. Unfortunately, most of instructors provide guidance or coaching to their students empirically without acquiring necessary skills described above. So, it is important to clarify the responsibilities of instructors and the essential knowledge and teaching skills for implementation of the experience-based learning approaches. We have conducted to study about supports for instructors practicing the experience-based educational approach, particularly focus on STEM education, in both educational and technological aspects. In the present paper, we show our study about frequently confused issues or cases of instructors in experience-based approach, and also show design concept and functions to be installed on developing portal site.

Keywords: *Educational improvement, knowledge base, active learning, service learning.*

1. Introduction

Recently, the word of “active learning practices” including case studies, group projects, peer teaching (e.g., Wieman 2017, Silberman 1996) becomes to be popular for training students to acquire independent-minded learning literacies like self-regulation, reflective thinking (e.g., Ertmer and Newby 1996, Ryan and Ryan 2013). As an active learning style, many of higher education institutions employ practice experience learning styles like discovery learning, field work, project-based learning (PBL), and service learning. As is well-know the role of instructors has been changed from conventional “teaching of academic expertise” to "offering new learning to students" with spread of the learner-centered education paradigm.

There are some differences in attention for implementation between traditional lecture style and practice experience style (e.g., Reigeluth, Beatty, Myers 2016, EMNAS 2018). In the latter instructors are demanded to build up closer relationship between students than that in the conventional style, because it intimately influences on both students' outcomes and educational effects in the approach. The instructors of the practice experience style, here and hereafter experience-based learning, are usually responsible for facilitation to share progress and results towards project goal, and provide guides or supports to students' activities (e.g., Andresen, Boud, Cohen, 2000, Prince, 2004).

With increasing interests of active learning practices, implementation of experience-based learning throughout institution are gradually increasing. In some practices, instructors share teaching techniques and know-how derived through their efforts, and are consulted about individual efforts with each other. Unfortunately, such remarkable practices are very few. In usual instructors hold own teaching method and know-how obtained through his/her practices by themselves, and would not share among faculty members. There are many Web sites publish educational resources including teaching method, and highly suggestive advices (e.g., UBC, SERC), but such publications may be inaccessible for ordinal faculties/instructors, particularly beginner of experience-based learning approaches, because they often cannot catch issues to be improved or, in some cases, cannot recognize their implementation has a problem demanded revision. So, it will be helpful for faculties/instructors engaged in implementation of

active learning, particularly beginners, to provide a portal site concentrated on course design and management for the experience-based learning.

We were involved in both course design and management of a PBL practice in a technical college for two years (Ishida et.al., 2017). From the two years practices, we found there are some issues that instructors frequently encounter during encouraging student leaning in the practice. Then on the basis of our observation and earlier studies for implementation of active learning, we have conducted to study about supports for instructors practicing the experience-based approach in both educational and technological aspects. In the present paper, we show our study about frequently confused issues or cases of instructors in experience-based approach, and also show design concept and functions to be installed on our developing portal site.

2. Perceptions from a PBL Practice in a technical college

Our PBL practice in a technical college (engineering) was a compulsory subject for second to fourth graders about 520 students belonged to 4 departments, and was offered them for two semesters. In the implementation we divided our students into 62 project teams consisting of 8-9 students with mixed grades, and all faculty members into each team as a coordinator. As the main purpose of this subject is we require the students to acquire generic abilities for a full-fledged member of society, like problem solving, collaborative working skills. The students started to make a theme of own project team (finding issues to solve), then planned to solve the issues. At the end of second semester they evaluated own project by themselves. The works of the instructors were 1) facilitating progress assigned project including logistics, 2) encouraging reflection activity for each student, 3) evaluation of project member's individual activity by hearing with a rubric.

In an effort to improve our practice, we conducted a questionnaire to all instructors at the end of the second semester of the first and the second trial. On the first trial, we asked them to reply in a free-form statement about a problem or a bother during this PBL practice period. The following three categorized responses were common comments:

1. About extent of the instructor's interposition to student activities

Example: * Nothing happened in the team, and the solidified air flowed
* I felt that the project theme selected by the students was too easy, but I could not correct it to appropriate way
* If the project has a difference between the plan and the implementation status, To what extent may I modify the project? When may I do that?

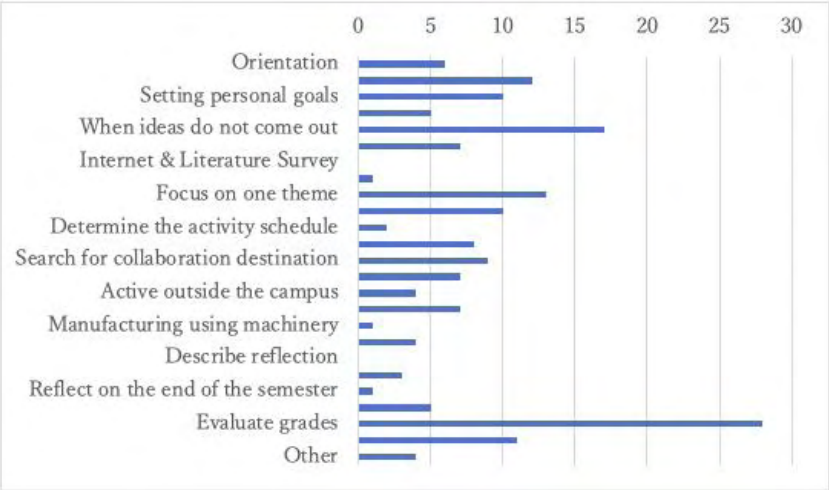
2. About project management

Example: * When I pointed out the necessity to revise a plan of the project, by consensus of the team they continue to take inappropriate way.
* Make sure students know how to work and achieve their goals in a given time.

3. About facilitation (How to proceed discussion. Create relationships among members.)

Example: * At the beginning of the project, all members were in silence. I bothered how to break down.
* The students actively exchanged own ideas, but they did not catch conversations
* Sometimes the remarks of the member did not come out.
* I feel it is difficult to dialogue with the students

Figure 1. The scenes when the instructors were bothered in judgment.



At the end of the second trial, we asked the instructors to choose up to five of 23 scenes whether they would provide suggests an advice (interpose to a students' activity) to the project team or not. Figure 1 illustrates the response of the questionnaire. The most frequent response was about grade evaluation. They also bothered in the case no student presented ideas/opinion, then it reflected on ambiguous project theme with unclear goals. Though the latter might depend on poor preparation of students, the presented results indicate that the troubles are essentially caused on instructors' insufficient knowledge and teaching skills for implementation of the experience-based learning. From the two questionnaires, we consider that it is important to clarify the responsibilities of instructor in the learning approach, and to provide an environment for any instructor in order to learn such knowledge and skills.

In addition to the questionnaires described above, we carried out the hearing research from several instructors, and also analysis of student course evaluation questionnaire. Then we found there are various issues depending on empirical value of coaching and/or learning experience in PBL approach. Many of beginners could not envisage students' activities in progress of the learning approach, so that they could not make preparation for facilitation (coaching) of his/her responsible project. The instructors with a certain experience were unable to decide to give a commitment to management of the project.

There are many factors for success of a project, such as quality of outcomes, accurate process management, fruitful cooperation with outside collaborators. The experienced instructors understand failure factors empirically, so they said, if they caught student's mistake, they could not decide whether they should point it out or not. It is interest for us most of instructors despite the empirical value assess student's learning progress by try and error method. We have incorporated the results of the survey in making concepts and design a portal site for instructor supporting, particularly focus on beginners.

3. Design of a supporting portal site

The reason why the instructors encounter the confusing scenes when they correspond to student's activities in experience-based learning approaches is that they have not pay much attention to such learning supports in the conventional lecture style. Even in the classroom lecture, we often employ discussion type activity, but we have little thinking what content we may facilitate discussion among students seriously. We often deal with an open-end issue without clear solution in experience-based learning approach. So, it becomes to be important to set specific and adequate targets for achievement including learning goals and aims employing the learning approach, while we pay attention to interests and motivation of the students carefully.

With the spread of active learning style in higher education, facilitation and project management have been recognized as necessary teaching skills for any instructor, though it takes a considerable amount of time for training to master these skills. As we described previous section, we observed that many of colleagues lost his/her specific tactics for coaching at same or corresponding situations in our practice because of insufficient knowledge and skills for learning supports in the experience-based learning. Therefore, we consider that development of a portal site collected various cases and know-how about implementation of the experience-based learning approaches has profound significance in help of any instructor, particularly with a little experiences and inexperienced instructors for the approaches. We show schematic diagram of developing portal site in Figure 2.

Figure 2. Schematic diagram of supporting portal site for instructors.

We expect that the site is accessed to obtain knowledge and techniques during they deal in the course in order for appropriately encouraging student's leaning via the experience-based approaches. So we adopt the following concepts and functions in developing portal site:

1. The portal site divides the entrance by empirical values of the experience-based learning approaches; inexperienced, within 3 years experiences, over 3 years experiences.
2. It is consisted of four major categories to review own actions for student supports: facilitation for student's activities, project management, selection of activity place / project theme, and learning evaluation. These categorize comes from analysis of the questionnaires' responses.
3. The contents of the site are helpful techniques, know-how, good practices with ingenious attempts. Developing materials are composed principally of tactics taken in the situations we observed (see Fig.1), because most of them may frequently arise in any practice experience style learning.
4. Suppose a user cannot take the appropriate category from the four, the site equips him/her another path to offer suitable tactics or relevant contents.
5. The portal site has a functionality for posting ingenious attempts that a user they carry out in his/her practice. The database of the site automatically sorts out the posted data into the four categories with use of tags set by the poster.

4. Concluding remarks

We have described our ongoing study about development of a supporting system for educational improvement in active learning approaches. On the basis of perceptions obtained from implementation of a problem-based learning in a technical college and earlier studies for implementation of active learning, we have conducted to study about supports for instructors practicing the experience-based approach in both educational and technological aspects. In the present paper, we have entirely focused on to show our observational study for frequently confused issues or cases of instructors in experience-based approach, and design concept and functions to be installed on our developing portal site. We now continue to extract information (knowledge) and tactics (coaching skills) for encouraging student activities, and also learning design in practice of the experience-based learning that are basic data presenting via the portal site. This is an ongoing study so we will conduct to revise and brushing up our data, and also design appropriate user interface of the site, because our target users are beginner of experience-based learning so we envisage that they cannot find suitable data by themselves. We expect our system will be helpful for any instructor participating practices of active learning.

References

Andresen, L., Boud, D., Cohen, R., (2000). Foley, G., Ed., *Understanding Adult Education and Training*, 2nd Ed. Sydney: Allen & Unwin, 225-239

Engineering, and Medicine National Academies of Science (2018). *How People Learn II: Learners, Contexts, and Cultures*, Washington, D.C., USA: National Academy Press.

Ertmer, P.A., & Newby, T.J., (1996). The expert learner: Strategic, self-regulated, and reflective, *Instructional Science,* Vol. 24, Issue 1, 1–24.

Ishida, Y., Kajimura, Y., Matsuba, R., Nemoto, J., and Suzuki, K., (2017). Development of a PBL Guideline and a Worksheet Based on Principles of Service-Learning, *Journals of JSiSE (Japanese Society for Information and Systems in Education)*, Vol34(2),196-201. [In Japanese]

Prince, C., (2004)., Does Active Learning Work? A Review of the Research, Journal of Engineering Education, Vol. 93, Issue 3, 223-231.

Reigeluth, C.M, Beatty, B.J., Myers, R.D., Eds., (2016). I*nstructional-Design Theories and Models, Volume IV: The Learner-Centered Paradigm of Education*, London, UK., Routledge.

Ryan M.E., & Ryan, M., (2013). Theorising a model for teaching and assessing reflective learning in higher education, *Higher Education Research and Development* Vol. 32, Issue 2, 244-257.

SERC, Pedagogy in Action, Connecting Theory to Classroom Practice, https://serc.carleton.edu/sp/library/index.html

Silberman M., (1996). *Active Learning: 101 Strategies to Teach Any Subject*, Boston, MA, USA: Allyn & Bacon.

UBS, Centre for Teaching, Learning and Technology of the university of British Columbia, https://ctlt.ubc.ca/resources/

Wieman, C., (2017). *Improving How Universities Teach Science: Lessons from the Science Education Initiative*, Cambridge, MA, USA: Harvard University Press.