



Effectiveness of Learning Assistants on Student's Active Learning in college STEAM courses

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Abstract

In this study we identified the effectiveness of Learning Assistants in enhancing college students' active learning in STEAM and other courses. A learning assistant is an undergraduate student who supports and facilitates students' learning in the assigned course through the guidance of a course instructor. More universities in Japan have been introducing own learning assistant programs, and they had been uniquely developed in the last twenty years. But the effectiveness of Japanese LA program had not been researched in detail yet. To analyze that, we conducted a common student survey at three universities to ask students who took courses with LAs and received more than 860 answers. We found major supports from LAs were giving advice for group discussions and group activities. And students highly evaluated the existence of LAs in classes because LAs made themselves easy to ask questions and participating in activities during class time made easier. They would feel easier to ask questions to LAs rather than to course instructors. In conclusion, our survey revealed the value of the LA program in all three university courses with active learning.

Keywords: Learning Assistant, STEAM Education, Active Learning, Student Survey

1. Introduction

The program of learning support by undergraduate student assistants has developed uniquely in Japan. When Keio University opened a new campus in the suburbs in 1990, there were only first-year students and Keio were not able to hire graduate students for TA. The university therefore decided to hire a good undergraduate as an assistant and named it Student Assistant (SA). SA was a paid job and the role was to support teachers and students in class. This was a program that embodied Keio founder Yukichi Fukuzawa¹'s concept of *hangaku hankyo* (learning while teaching, teaching while learning). Fukuzawa thought that it was important for those who had learned earlier to teach those just beginning to learn. Keio University had another reason to hire undergraduate SA students in 1990. The new campus was the first campus in Japan to fully introduce computers and the Internet, and the number of faculty was not enough to teach computer operation to more than 1,000 freshmen students. SA at this time was not specially trained. Only high-performing students were nominated by faculty to become SAs, and they supported other students' assignments.

In 2000, the Higher Education Bureau of Japanese Ministry of Education published a report, "Measures to Enhance Student Life at Universities -Aiming to Create Universities from the Standpoint of Students". In this report, it was desirable that, not only graduate students but also senior undergraduate students should be actively given opportunities to be learning assistants in education. Also from the 2000s, Japanese universities have made an effort to qualitatively shift from education that teaches knowledge to education that focuses on growing competencies. With this shift, Japanese university education has begun to change. It aimed not only at academic skills but also transferrable generic skills through active learning such as group work, discussion, and project-based learning. However traditional college professors who accustomed to one-way lectures are not good at teaching this type of classes. Therefore, some universities have started to hire high competent undergraduate students as in-class facilitator, supporter and assistant. In this paper, undergraduate students who fulfill such roles are referred to as learning assistants (LA). Especially departments that don't have a graduate course have to hire LAs.

¹ Fukuzawa founded a school for western studies in 1858 in Edo (Tokyo), which became the oldest institute of modern higher education in Japan, Keio University.



The learning assistants have brought various benefits to students, faculties, departments, and themselves. However, there is few studies in Japan yet that measured these benefits quantitatively. As LA program costs money, university management demands to show its effectiveness. The purpose of this study is to clarify the educational effects of supports by undergraduate Las in active learning classes and to compare STEAM and other courses.

2. Related Researches

Stade organizes the benefits of introducing LA into classes by classifying them into four groups: faculty, students, LA themselves, and Institution as shown in table 1 [1].

Table 1. Benefits of LA Program at the University of Colorado Boulder

1. Benefits to faculty who use LAs	2. Benefits to students in courses that use LAs
<ul style="list-style-type: none"> <input type="checkbox"/> LAs can help faculty learn and understand about active learning and other evidence-based teaching "best practices." <input type="checkbox"/> LAs can help faculty design tasks and activities. <input type="checkbox"/> Faculty can use LAs as "virtual students. (Faculty can test lesson plans and ideas on LAs.) <input type="checkbox"/> LA program connects faculty from different departments, encourages collaboration and sharing of ideas. 	<ul style="list-style-type: none"> <input type="checkbox"/> LAs facilitate active learning, which has been shown to improve grades, retention, confidence, etc. <input type="checkbox"/> LAs have learned the course material quite recently, so they are often better able to relate to students' difficulties in learning. <input type="checkbox"/> LAs provide extra help (they have office hours in a "help lab," they can run review sessions, and so on). <input type="checkbox"/> Students in classes with LAs generally do better and learn more.
3. Benefits to the LAs themselves	4. Benefits to departments and institutions
<ul style="list-style-type: none"> <input type="checkbox"/> The best way to learn a subject is to teach it! LAs have the opportunity to learn a subject more deeply. <input type="checkbox"/> LAs get experience teaching. Some are inspired by the LA experience to become teachers. <input type="checkbox"/> By reflecting on teaching and learning, LAs learn more about themselves and their own education. <input type="checkbox"/> LAs make important connections with faculty. <input type="checkbox"/> LAs get course credit for their content and pedagogy courses. <input type="checkbox"/> LAs get paid. <input type="checkbox"/> LAs have an impressive experience to put on their resumes. 	<ul style="list-style-type: none"> <input type="checkbox"/> An LA Program can transform departmental culture. <input type="checkbox"/> By having an LA program, departments are engaging more actively and thoughtfully in teaching their undergraduates. <input type="checkbox"/> Teaching becomes more respected. <input type="checkbox"/> Faculty see that some of their best students become LAs, and this helps faculty recognize the value and intellectual merit of teaching.

The Colorado learning Assistant Program began in 2001 at the University of Colorado Boulder. Their Learning Assistants are undergraduate students, too. LAs facilitate discussions among groups of students in various classes through the guidance of weekly preparation sessions with faculty. To become LAs, they need to take pedagogy course. The program implemented mostly in STEM departments and is focused to improving the quality of education. Otero and Finkelstein showed that the LA Program has significantly increased the number of STEM majors earning secondary teaching certifications [2]. Moreover, Gray, Webb and Otero compared K-12 teachers who served as learning assistants (LAs) as undergraduates to colleagues that were certified through the same teacher certification program but did not serve as LAs. The former LAs used significantly more reformed teaching techniques than their colleagues who were no LAs [3]. Alzen, Langdon and Otero indicate that "exposure to LA support in any STEM gateway course is associated with a 63% reduction in odds of failure for males and a 55% reduction in odds of failure for females in subsequent STEM gateway courses" [4]. The University of Colorado is a key member of the Learning Assistant Alliance (LAA), and their LA program's purpose seems to focus STEM education and teacher training pedagogy.

Kansai University in Osaka is a large private university with 30,000 students. In 2006, the Center for Teaching & Learning provided 138 SAs to support faculty members in various classes in all 10 departments. There were 623 faculty members using SA in the fall semester of 2007. Iwasaki et al. conducted a questionnaire survey with faculties and SAs about the status of SA utilization, the effects of SA, and effects and challenges of SA program. As a result, 89% of faculties satisfied with the use of SA and students who worked as SAs felt that their media literacy and business manners had improved [5]. Kawachi and Sugimori also conducted the student survey at Kanazawa University. The survey target is the students in courses that use Active Learning Advisors (ALAs). ALAs are graduated students and undergraduate students over sophomore. They support and facilitate students' learning in the assigned undergraduate course under the guidance of a course instructor. The survey result showed more than half of the students consider ALAs' supports effective for enhancing their learning [6].



3. Method

These studies all described the effects of LA program at one university. So in this study, we conducted a common student survey at multiple universities, University A, B and C in Japan, in ordered to examine the differences between programs at different universities and the differences between STEAM courses and other courses.

University A has introduced the LA program in the first-year seminar, the sophomore seminar and information literacy for freshmen course in its commerce department. Those two seminar courses are mainly PBL with a small group work, and the number of students in one seminar is about 30 and one teacher and two LAs are assigned. The information literacy course covers subjects ranging from the introduction of computer operation to quantitative data analysis. The number and composition of teacher and LAs are the same as the seminar courses. University B also use LAs for their first-year seminar courses in the business department. The number of students of the course is less than 30, and only one LA is assigned to each seminar. In the survey, class size information could not be obtained. University C introduced one LA to each of the art expression classes for freshmen in its art department.

What all three universities have in common is that LA Program is introduced mainly for courses for freshmen students. Those courses are divided into several classes, in each class one faculty member teaches common contents of the course with one or two undergraduate LA students. The pedagogy lessons for LA held at the three universities would be different. Table 2 showed the outline of the survey.

Table 2. Student Survey

	Course Title	year	# of classes	# of students
University A	Information Literacy	Freshman	11	256
	Freshmen Seminar	Sophomore	11	243
	Sophomore Seminar	Freshman	11	236
University B	First-Year Seminar	Freshman	Unknown (1)	84
University C	Art Expression	Freshman	3	48
Total			37	867

4. Results

In the survey results, we focused on the level of LA activities and educational effectiveness of LA supports, which students in the courses subjectify answered. Fig. 1 showed the differences of level of LA activities in each course.

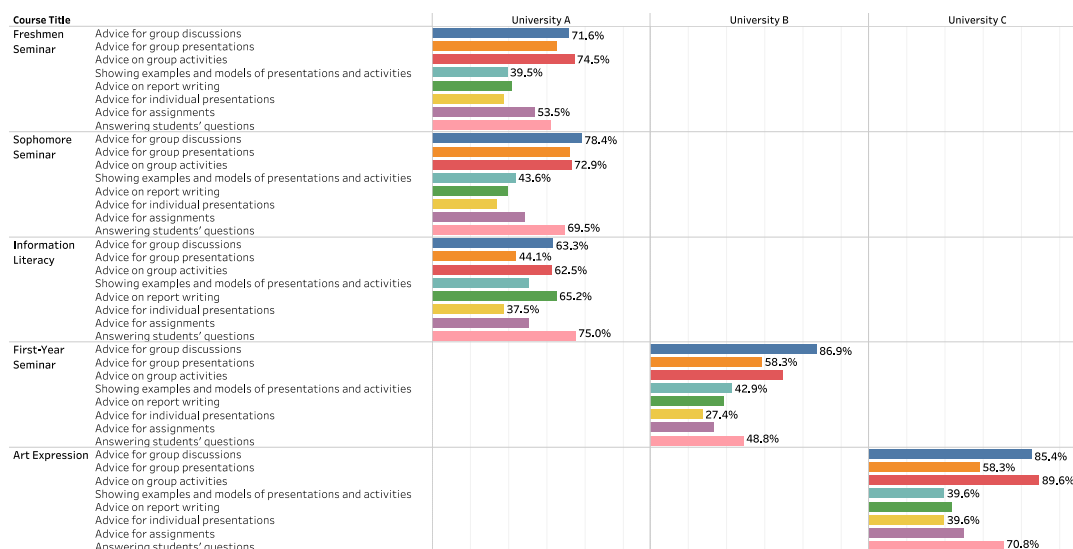


Fig 1. Level of LA activities



The major LA supports common to the three universities are giving advice for group discussions and group activities. Giving advice for group presentations and answering students' questions are next highest. Therefore, from this survey it turned out that the main role of LAs at these three universities was to support and facilitate group activities in these entry level courses. However, the information literacy in University A showed a different tendency that advice on report writing was much higher than other.

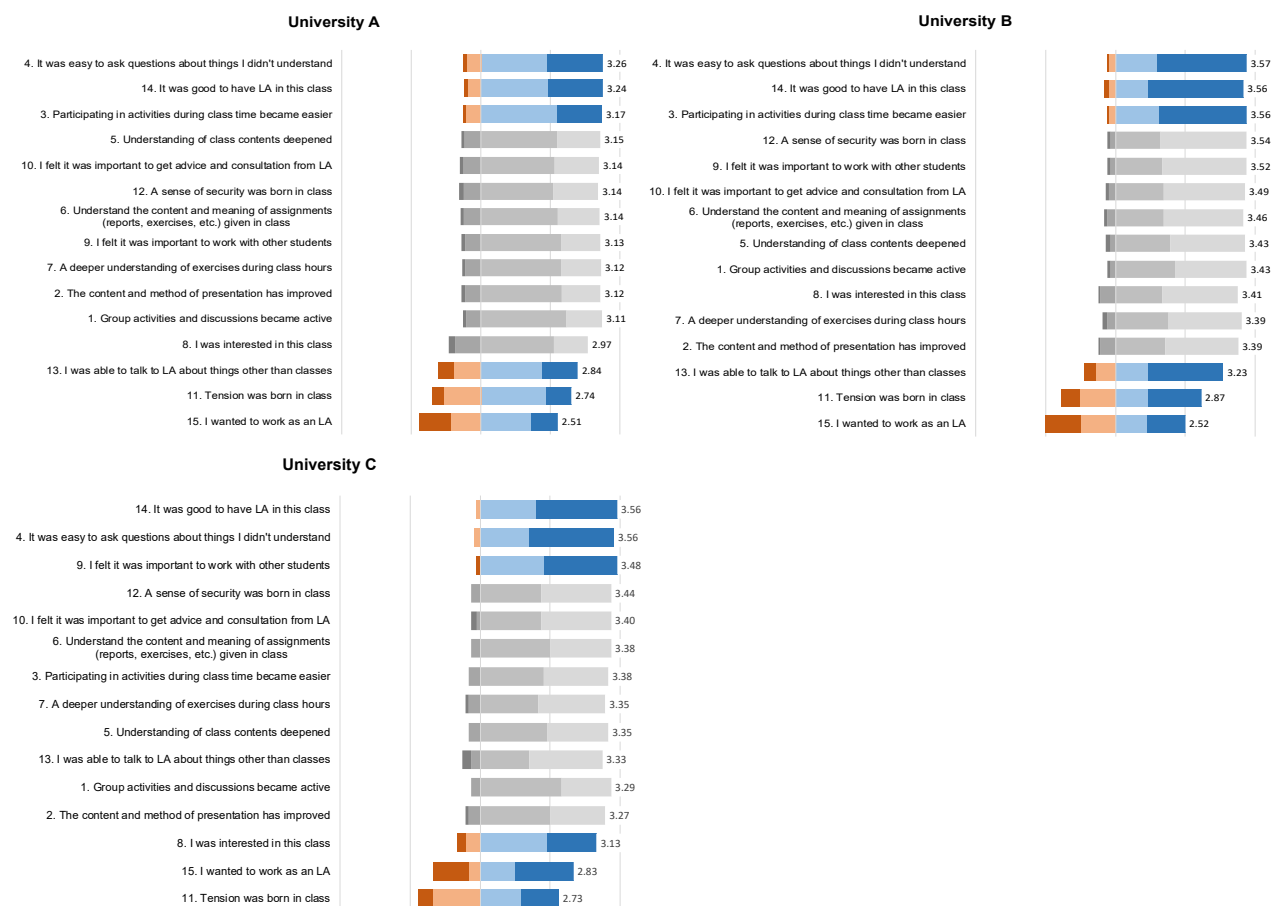


Fig. 2 Effects of LA

In Fig. 2, the educational effects of LA supports were showed. Students responded with a five-point scale for each effect LA provided. The top three effects of University A and B are same; "4. It was easy to ask questions about things I didn't understand", "14. It was good to have LA in this class" and "3. Participating in activities during class time became easier". In University C, "9. I felt it was important to work with other students" ranked third. On the other hand, students gave the least value to these effects; "15. I wanted to work as an LA", "11. Tension was born in class" and "13. I was able to talk to LA about things other than classes". It turns out that recognizing the positive effects of LA are different from wanting to be LA or having a personal relationship with LA.

5. Discussion

The results of this survey are limited to these three universities. But we have shown from the survey that the effectiveness of the LA program is quite common, regardless of the university or course content. LA Program works effectively in active learning in introductory courses. However, factors such as how to increase its effectiveness could not be clarified from this survey.

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