New Education Scheme for College Students through Out-of-Curriculum Project Activities

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Abstract
The college-students project team has been actively engaged in activities aiming to promote interests in science and technology in local regions. Although this is the out-of-curriculum project team, it works as Project-Based-Learning (PBL) activities and provides the student members with effective chances of skill improvements and career developments.

Keywords
Project Based Learning (PBL); Out-of-curriculum Activities; Career Development; Science Education; Technology Education

Introduction
The student project team “Rika-Kobo”, organized by college students, have been actively engaged in various activities, mainly targeting kids, parents and ordinary people and aiming to promote their interests in the fields of science and technologies. This is an out-of-curriculum project team with about 20-25 students in several grades. The total number of their activities per year tends to reach 60-70 in recent each year, which include science classes in primary and/or secondary schools, science classes at other educational facilities, and science experiment events.

Each of their activities provides the student members with Project-Based-Learning (PBL) style experiences. In order to perform so many activities in various styles while realizing participants’ satisfactions in each case, the student members are required to do necessary preparation work with excellent time-management skills, outstanding leadership as well as adequate collaborations. Students in upper grades are likely to guide lower-grade students, and specific instructions from teachers are not necessary. Such self-disciplined activities over several years encourage the student members in their various skills and abilities. Those activities are also helpful for the student members to achieve and/or renew scientific knowledge.

Thus, this out-of-curriculum Project-Based-Learning style activities can be a new scheme for education of college students both for their career development as well as science and technology education.

Outline of the Project Team
This is out of official curriculum, and anyone who are interested can voluntarily join the team anytime, irrespective of their major or grade. Usually when a new school year starts, new members are recruited. Once joined, their membership is not limited to any specific period of time, and most of the student members remain active until their graduation. As a result, the project team always has 20 to 30 student members, including a few postgraduate students.

Although the project is out of the official curriculum, college administration offers financial support (about 1 million Japanese yen as an annual budget) and one laboratory room as a project room dedicated to the activities of this team. Fig.1 shows a photo of the project room, which is large enough for daily activities as well as stocks of various experimental tools and apparatuses.

Examples of the Activities
Activities conducted by this project team include the following categories:
(1) Science Experiment Classes at Local Schools

The project team has several chances to have science experiment classes at local primary and secondary schools. An exemplary photo of such classes is shown in Fig.2. One student member acts as a teacher who leads the overall class. The others act as assistants who explain details of experiment procedures to small groups of children and help them during experiments so as to obtain successful results.

(2) Science Experiment Classes at other Educational Facilities

Science museums and other educational facilities often ask the project team to perform a science experiment class or other related event, usually about 60 to 90 minute long. Main audiences in these cases are typically children in primary-school age and their parents. The student members perform various science experiments which sometimes may not be experienced in typical science curriculum at schools, and provide explanations so as to promote children’s interests.

(3) Participation to Various Events

The project team is often invited to participate in various events, both outdoors and indoors, to provide science experiment demonstrations.

(4) Activities in Response to Local Organizations’ Request

Local organizations, not educational ones, such as a shopping mall or center, sometimes also invite the project team to participate in their events. For example, Fig.5 shows a photo of an experiment event that was held at an extra space inside a local small shopping center. In these cases, audiences may include elderly people in addition to children.

Activities performed by the student project team varies in wide ranges, as explained above. The respective activities have their own specific aims and targets, audience size, as well as locations. This fact means that in order to realize participants’ satisfaction in each of the activities, the student members are every time required to do enough preparation work. Thus, each of their activities provides the student members with Project-Based-Learning (PBL) style experiences.

Fig.6 shows the total number of activities performed by the student project team for each Japanese fiscal year. The graph indicates that the number of activities gradually increased and recently remains at around 60 to 70. Such trend clearly indicates that the activities of the student project team have been widely
Educational Effects of the Activities

As repeatedly explained, the activities of this student project team are out of official educational curriculum. The members have joined voluntarily, and they will not obtain credits from their participation to the project. However, the project seems to provide the student members with important chances of skill improvements and career developments.

In order to see such educational effects, the author regularly asks some questions to the student members of the project team so as to know whether or not some educational effects are actually achieved through the activities. Figs.7 and 8 show some of the results obtained from such questions on October 2013. The number of the students who responded was 18.

Specifically, Fig.7 shows the responses from the student members when asked which skills/abilities they thought have been obtained/improved through participation to the activities. Those skills/abilities were listed and the student members were allowed to make selections without limitation. As can be seen from the results, communication skill and collaboration skill were most selected, while presentation, planning, and problem finding & solving were also likely to be selected. Although any detailed analysis has not yet been performed, active and voluntary engagement of the student members to the outreach style activities with close collaboration with each other are effective for realizing such results.

The activities are also effective for the student members to achieve and/or renew scientific and/or technical knowledge in related fields. Teaching experiences and preparation work are very important for the student members. They often study again what they have learned in classes, and also become eager to know something new, in order to make their teaching and presentation better and more easily understandable even for children.

Fig.8 shows the responses of the student members when asked which skills/abilities they realized was lacking. Scheduling, time-management, as well as leadership were likely to be selected.

From these results, it became clear that through engagement to the project activities, the student members not only have believed that some skills/abilities were obtained/improved but also got chances to realize they are lacking some of those skills/abilities that may be required in their career after graduation. Thus, this style of out-of-curriculum activities can be acted as useful scheme for education of college students.

As important aspects for achieving such educational effects, the following points should be pointed out.

(1) Out-of-curriculum Activates

This point is believed to be the most important. The student members are not externally motivated...
(e.g., getting any credits are not their motivation), but instead they are internally and voluntarily motivated to participate in the activities and improve their various skills/abilities. They do not have to be worried themselves about GPA scores through their engagements to the activities. Thus, they can be very challenging.

(2) The Large Number of Activities

The fact that the project team has to perform so many activities is extremely demanding to the student members, which acts effectively for allowing them to realize necessity of improving scheduling and time-managing skills.

This aspect is also effective because the student members will attend many times similar events at different timing. Even if their performances are not so good in their first or previous opportunities, they can get chances of re-challenging, resulting in their own stepping-up and skill improvements.

(3) Inter-grade Collaboration

Since students in different grades (from the first to final year of undergraduates, and even some postgraduates) are included in the project team, they are likely to teach and learn among themselves. Such atmospheres are very effective for providing them with opportunities of experiencing real active learning. In addition, the student members in upper grades can have opportunities to improve their leadership by guiding and leading the lower-grades student members.

Conclusions

Activities of the out-of-curriculum student project team can provide the student members with Project-Based-Learning (PBL) style experiences and active-learning experiences. As a result, it can effectively act as a new scheme for education of college students in terms of their skill improvements and career development.

REFERENCES


Makoto Hasegawa was born at Tokyo, Japan, on August 14, 1963, and received his B.E., M.E. and Ph.D. degrees in electrical engineering from Keio University, Yokohama, Japan, in 1986, 1988 and 1991, respectively. After spending several years in industry, he is now a Professor at the Department of Global System Design, Faculty of Photonics Science, Chitose Institute of Science and Technology, Chitose, Japan, and currently involved in research on optical sensing techniques, electrical contact phenomena and arc discharges, as well as science educations. Prof. Hasegawa is members of IEEE Components, Packaging, and Manufacturing Technology Society, IEEE Education Society, IEICE (the Institute of Electronics, Information and Communication Engineers), IEEJ (the Institute of Electrical Engineers of Japan), SPIE (the International Society for Optics and Photonics), JSAP (the Japan Society of Applied Physics), PESJ (the Physics Education Society of Japan), and LGESJ (Liberal and General Education Society of Japan).