ORIGINAL ARTICLES

Research Enhance the Teaching and Learning Approved - A Case Study

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ABSTRACT

Effective learning is a life lesson that adopt sustainable components in it and its impact is motivated and able students as well as to the subject being taught. The atmosphere and comfortable learning environment also helped the success of students. Each student motivation in learning can also be generated through the facilities provided and put to good use by students in their learning process. This paper proposes an effective method of teaching and learning through the application of the research component into the curriculum programmed. This can be achieving by developing a versatile laboratory support in carrying out activities such as project workshop, talks, table discussions, mini library, workshop, seminar, space experiments and adequate experiments.

Key words: Research Laboratory, Enhance Research, Lab Project, Education System, Teaching.

Introduction

Recent education has changed the direction: from input based on time and contents to education based on objective which has focused on students’ abilities in implementing something after they finished the learning process. In the other word, it is more focus on learning outcome which become students’ target and destination. Hence, we need to plan forward and choose the best way to achieve the mission. In producing balance and excellent students, university curriculum need to be revised through the Country Education Philosophy, Education Acts (1996), international requirement and education philosophy. Thus, university curriculum must have vision and mission, goals and objectives, learning outcomes, content of curriculum, curriculum content structures, teaching and learning strategy and assessment (Hamid 2004). Among important rules in drafting new curriculum is redefined programmed educational objective (PEO) which reflecting the desired quality of the graduates’ students and it has to be achieved after graduated for a few years. This objective also can increase the quality assurance in the teaching and learning process (Hamid 2004). Besides, program outcomes (PO) need to be revised and measured by using specific measurement during the study program and after graduated (Abdullah et al. 2007). These program outcomes also can identify and evaluate the desired learning outcomes and also produce a balance and excellent graduates. Therefore, both learning objectives and program outcomes need to be prepared in drafting a new curriculum.

Hence, in constructing integrated and relevant of PEO with career requirement, opinions from graduates and alumni also take into consideration through developed online survey. Thus, this paper is presenting survey results based on each PEO statements.

Multipurpose Research Laboratory:

The laboratory has long been important part of the undergraduate or graduate science experience. In my research laboratory also have all essential equipment which causes the students always make the lab as a reference and always want to be in the lab. Other facilities also have function in their posts as well as comfort the students in the lab, such as buying a more comfortable seat as a place of rest by buying at Nilai 3. In the same time, students can also make the laboratories as a second home and facilities chairs and everything in laboratories has attracted my students to sleep there. Therefore, it’s better to them to sleep in laboratory especially to prepare and finished their work or journal than back at late night. Furthermore, my main research is to develop a broadband network connected to the premises to provide audio and video equipment that can be used by students for their entertainment. Every Friday morning they will hold the film which is downloaded from internet with others partners. If they want to discuss something about, the table prepared to help them
discuss the meeting and with this facility and other facilities cause students to more easily spend their time in research. With this facilities and also other facilities (which are not list before) cause students to more easily spend their time in research.

This is also a challenge to a supervisor to attract students to spend more time in laboratory. In this context, the supervisors plays an important role to form the organization patterns especially involving the management of the laboratory which he headed. Supervisor has got an important role to play in management. The supervisor is a part of the management team and he holds the designation of first line managers. He is a person who has to perform many functions which helps in achieving productivity. Therefore, supervisor can be called as the only manager who has an important role at execution level. So, this laboratory is complementary to the student in the course of the study and also evidence of success as a supervisor to supervise a laboratory with good. Therefore, it provides many advantages and also form the personality of students involved in lab activities. So, the advantages of the laboratory include to renew and improve the skills of the students with good quality can be produced. This laboratory also to provide a complete and secure learning ensures that students process with effectively and properly. It also to train and provide guidance to students related to the overall skills and expertise required in this area and also ensure that all students comply with the regulations to establish a disciplined and responsible individual. However, all student activities must be constantly monitored to prevent them to lose their focus. Spectrum Technology Research Group (SPECTECH) developed may conduct the following activities:

**Fig. 1: Activities developed in Spectrum Technology Research Laboratory (SPECTECH).**

Underutilized space in the laboratory and the students also has made the lab as their second home. In addition, a research assistant assigned to monitor and manage the laboratory course and all students accountable, such as maintaining laboratory safety and hygiene. The result are obtained of this laboratory is a major centre to assist learning in class. Photonics technology course, optical communication system, optoelectronics has been using this laboratory for the purpose of exposing students on research and knowledge in the field. Figure 1 shows the photographic laboratories equipped with facilities that helps students to socialize, build knowledge, entertainment as well as the main activity is research. In conclusion the research laboratory uniquely designed and organized can help students to develop their knowledge especially in teaching and learning.

**Embedded Project:**

Project component have 15-30% of the overall student evaluation. It is done in groups and individually. This project can be done in research laboratories easy to obtain raw materials, devices and characterization equipment. Monitoring process is also assisted by postgraduate students. Figure 2 below shows the photography students from the optical communications system course project set to make a simple optical system of wireless communication by using solar cells as a receiver. A project to tap a creativity students and can be laboratory of physical and mental.

**Embedded Laboratory:**

The aim of this activity is to expose students to the world of research in the course of Photonic Technology. The study will be highlighted the exposure of the students to relate theory taught in lectures to practical research conducted in the laboratory. In this course students will be exposed to fabrication techniques such as optical
device by hand (Ab-Rahman et al. 2011b), which is a new device in the Photonics Technology. Two devices namely Splitter and demultiplexes are fabricated using green technology where both devices are key components used in broadband WDM. Installation of these devices is also in the POF-WDM network which is also shown along with the application that is able to contribute to this technology. Students are required to submit learning report. The result of the program can be accessed from these activities were PO6. Figure 4 in Appendix A shows examples of the laboratory setting that exposes students to a green optical device fabrication techniques or environmentally friendly.

Fig. 2: Research laboratories should be developed as a center to work, socialize, learn, talk, entertainment, and others. This can lead students to spend longer than their home or dorm.
Fig. 3: Students work diligently to complete the project laboratory setting.

Fig. 4: Embedded laboratory report which expose student about latest issue and development of new technologies. The activity entitled Green Photonics Technology.
Workshop and Training:

Laboratories are not limited to use for some things but it's as also made into place for workshops n training to students. In my lab all the equipment was available to provide workshop. Indirectly, the programmed can be run without any problems and make the lab more diverse functions. There are a few successful assessments of laboratory course goals. For example, student retention is something that can be measured and its sometimes used a surrogate for motivation. As another example of assessment, the efficacy of laboratory simulations used as prelab activities can be assessed by evaluating the performance of students when they do the physical laboratory exercise. Figure 5 below shows that students listening talk in their workshop and training programmed from the lecturer in lab.

![Fig. 5: workshop and training for students in lab.](image)

Invited Lecture/Researcher:

We have invited an engineer from the industry to give lectures to students on the use technological knowledge in the production of photonic devices. He stressed that the design elements and tools used to design a new optical devices. At the end of the workshop, students are required to use the knowledge gained in a design project which requires them to design a new optical device. Student needs to submit individual reports on the subject of loading new components in this activity. Sometimes guest speakers play an important function, especially in the exchange of ideas and also sharing of new discoveries in new research or studying aspects. Guest lecturer also gets to pass on their knowledge and experience to a large to students and give a new environment. Figure 5 in Appendix B shows a report prepared for the technical talks organized.

![Fig. 6: Mr. Moon showed us how to use optiBPM. He give the example for splitter waveguide (a). The output amplitude when light propagates in splitter waveguide (b). Dr Syuhaime gave some explanation while Mr. Moon showing us steps to use optiBPM.](images)
Conclusion:

Finally, it is useful in distinguishing the use of the laboratory as a learning system is a best method especially to apply three basics types of scope in any particular laboratory or field of development, research and education. Therefore, we also need to know that the development lab is used to answer specific question about the nature of which must be answered before the design process and development can continue. So, the concept of learning and use laboratory by students and supervisors is one of the best methods to develop their study. When students especially undergraduates go to the laboratory, however it is not generally to extract some data necessary for a design to evaluate a new device but they also try to discover a new addition to our knowledge of the world with any research. this is effect from the multipurpose laboratory because they can make their research in a best way. Especially, students go to an instructional laboratory to learn something that practicing engineers are assumed to already know and also find the new things in their research.

Certainly, the central purpose of faculty or school is still to modify nature ethically and economically for the benefit of humankind. The objectives can also recommend and direct to the research laboratories for each teaching by inserting a discipline that has thus far largely been absent and will be appear to be more effective.

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Reference