The impact of research-based learning on student’s academic performance and motivation

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Abstract. Undergraduate students often have difficulty in finding the updated research topic for their undergraduate thesis. This is due to students have less knowledge about research in a particular field because they are less familiar with scientific articles. This work, therefore, proposed an implementation of research-based learning and measured students’ academic performance and motivation. The study is conducted in four stages which are the plan, do, check, and act. Research-based learning is conducted based on its syntax. Paper and pencil test is then performed to measure students’ academic achievement and a survey is devoted to determining students’ academic motivation. The results show that most students obtain satisfied score and they feel comfortable to join a class with research-based learning.

1. Introduction
Inquiry-based learning (IBL) can be generally defined as a range of learning methods that are determined by a process of inquiry [1]. IBL generates other Problem-based learning, project work, field-work, and case studies can be classified as IBL. The characteristics of IBL includes learning particular disciplinary research methodologies [2]. On the other hand, undergraduate research is a part of the curriculum which also comprises learning research methodologies and producing research that imitates the forms of knowledge invention and dissemination in a specific field. Integrating research-based learning in undergraduate’s curriculum is, therefore, becoming increasingly embraced. In this work, this integration is further defined as research-based learning (RBL).

The benefits of RBL for undergraduate students are increasing (1) student interest in knowledge, (2) confidence, (3) learning spirit, (4) learning achievement, (5) management, communication, and organizational skills, (6) motivation and enthusiasm, (7) interest in continuing studies to a higher level, (8) developing leadership skills, and (9) English proficiency. Students who actively participate in the learning process in encouraging research ideas which, if acted upon, will result in publication [3]. In contrary, some students are less motivated to participate in RBL.

In addition, undergraduate students have difficulty in finding the updated research topic for their undergraduate thesis. Therefore, students come to faculty adviser thesis without preparation research ideas. Some students submit thesis titles around topics that have been done by senior students. This is due to students have less knowledge about research in a particular field because they are less familiar with scientific articles.

Students are less interested in reading articles in English due to limited language skills. This can be performed by providing "coercion" to students in the form of the task of reading journals / English
articles from accredited Journal. Then, students are asked to report the results of reading activities of the journal/article in the form of oral and written.

This study is devoted to undergraduate students of Information Technology Education in Learning Strategies subject. Students are divided into small groups of two persons, given a journal to read and report. When some students made presentations, others listen carefully and ask some questions for presenters.

2. Related Works
The aim of research-based learning (RBL) is that lecturers help students to build strong intelligent and applied connections between research boundaries and the students’ own learning [4]. The benefits of RBL are:

- Introducing students to the disciplines’ values, practices and ethics
- Confirming course content comprises advanced research findings
- Increasing students’ understanding of how their field contributes positively to society
- Developing and enhancing students’ skills and capabilities such as critical and analytical thinking, information retrieval and evaluation; and problem-solving
- Offering better opportunities for teaching and learning approaches such as inquiry-based and experiential methods that have been associated with constructive learning outcomes for students.

RBL is a theory referring to a variety of learning and teaching strategies that link research and teaching [4]. The best-practice in research-based learning includes:

- Research outcomes informing the curriculum
- Research-process based methods of teaching and learning
- Acquiring to use the tools of research
- Exploiting a complete research context

In RBL, research is regarded as an idea which supports teaching at various levels. In addition to integrating outcomes of research into the curriculum, it includes evolving students' knowledge of processes and methods of inquiry and making a comprehensive research.

3. Methodology
This work is quantitative research and is performed in four stages which are the plan, do, check, and act as depicted in Figure 1. The details of each step are described as follows.

Figure 1. Research steps
3.1. **Plan**

In detail, the preparation of the study includes the actions undertaken to prepare the conducting research. The types of activities undertaken are as follows [5].

- Study literature on research-based learning, measurement of student response, and learning strategy learning materials.
- Initial data collection on student characteristics, then formulates indicators to measure the success of learning in accordance with the basic competencies that have been set.
- Preparing learning tools which consist of scenarios or lesson plans, student worksheets with the contextual approach, learning media, and test.
- Preparing and developing research instruments, which consist of observation sheet of students’ activity during lecturing and questionnaire of student responses to the implementation of lectures.
- Validation and revision of instruments. Validation is performed by a competent learning expert. Based on expert input, the research team subsequently revised the instrument.

3.2. **Do**

This stage is a description of the action that will be conducted by researchers as an effort to apply research-based learning in the course of Learning Strategy. Research is conducted by applying the syntax of research-based learning.

- Plan learning activities which are combining the trending research topics into curriculum and providing examples to students about problems, solutions, and research results based on the teaching experience
- Choose the latest research publications which are conditioning the research topic with the theories being discussed in the lecture and providing an example of the dynamics of research on how the problem is done before and after research
- Conduct learning activities related to the research topic which comprises investigation and explanation about problem on which the research is conducted, analysing methods, arguments, and results presented in journal articles, giving conclusions in accordance with journal articles read, providing advice according to the results of the analysis and evaluation of students' understanding [6-7].

3.3. **Check**

In the check stage, we evaluate each process of aforementioned research-based learning. The results are compared against the expected targets or goals from the planning stage.

3.4. **Act**

This stage is also defined as an adjusted stage. It describes what improvements should be performed to the plan for the next cycle based on check stage results.

4. **Results and Discussion**

4.1. **Student’s Academic Performance**

After attending lectures with research-based learning, students' knowledge is measured by written tests at the last meeting. Students are given about 25 items and asked to answer on answer sheet which has been provided within 50 minutes. Students' answers are corrected and the results obtained in Figure 2. 13% students gain score 51-60, 11% of them gain score 61-70, and 39% of them get score 71-80. The rest of them get 81-90 which is 21% of them and the remaining students gain 91-100. This implies that research based learning can be implemented to help students receive high academic performance.
4.2. Student’s Academic Motivation
Furthermore, we conduct a survey to measure student’s academic motivation during the implementation of research-based learning. The results of students’ academic motivation are described as follows.

4.2.1 Is the atmosphere of teaching and learning activities conducive to learning?
The student's responses are 50% stated occasionally, 27% stated always, and 23% stated frequently.

4.2.2 Do you ask when you do not understand the material that the lecturer has taught?
The students' responses are 85% stated sometimes, 14% stated frequently, and 4% stated always.
4.2.3 *Are you proactive in following the teaching and learning activities?*

The students’ responses are 68% stated occasionally, 27% stated frequently, and 5% stated always.

![Figure 5. Response to question #3](image)

4.2.4 *Do you always do what the lecturer asks?*

The students’ responses are 41% stated sometimes, 32% stated frequently, 4% stated always, and 23% stated never.

![Figure 6. Response to question #4](image)

4.2.5 *Are you comfortable with learning through international journals?*

The students' responses are 45% stated comfortable, 45% said less comfortable, 5% stated very comfortably, and 5% said uncomfortably.

![Figure 7. Response to question #5](image)
5. Conclusion
From the results of data processing concluded that the research-based learning has been implemented in accordance with the syntax of research-based learning. Students are mostly (68%) proactive students in the learning process in the classroom. 85% of students actively ask questions and 41% always do the task. From the results of tests conducted to students to measure knowledge about Learning Strategy, obtained 39% of students get the score between 71-80, 21% get the value of 81-90, 16% get the value is 91-100, and the rest gets a value between 51-70.

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