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# Biotechnology learning profile biology in FKIP Biology Education Study Program Pasundan University Bandung Indonesia

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**Abstract.** Life in the 21<sup>st</sup> century requires a variety of skills that must be mastered by everyone. Achieving 21<sup>st</sup> century skills is done by updating the quality of learning, one of which is learning Biotechnology. Biotechnology is one of the subjects taught in the Biology Education Study Program FKIP UNPAS Bandung which is taught to provide students as Biology teacher candidates who have academic abilities that can apply, develop and disseminate science and technology professionally. The purpose of this study was to determine the learning process of biotechnology that took place for students of Biology teacher candidates in the Biology Education Study Program, FKIP Unpas. The method used is descriptive qualitative with a questionnaire consisting of 18 questions which are a mixture of questions in open and closed forms and also interviews. Some 38 students and 2 lecturers were involved in this study. The results of the study show that the learning process in the Biology Education Study Program, FKIP UNPAS, still uses the classical method with a teaching-centered learning system. But the enthusiasm of the teaching staff to develop themselves is very potential to encourage the improvement of the quality of the learning process in the near future. Evidently, although it is still centered on the instructors, lecturers have used a scientific approach, PPA models and power point media equipped with animated videos.

## 1. Introduction

Profile of Biotechnology learning profile in the Biology Education Study Program FKIP Pasundan University Bandung. Research on the profile of Biotechnology learning is needed in order to know general picture of Biotechnology learning such as what has been learned, what strategies and learning methods have been used, what difficulties students prospective students face in the learning process, what are the needs of students which must be prepared to answer 21<sup>st</sup> century challenges. Similar research is also carried out in Ethiopia [1]. Agustina *et al* also conducted a similar research which was about identifying Biotechnology learning problems faced by teachers in the field and alternative solutions to solve them [2]. This is in line with that expressed by [3] that studies on biotechnology topics are interesting according to students and teachers is of significance as biotechnology has been identified



as a key area of technological and economic importance worldwide yet there is scant literature relating to teachers' and students' interests concerning biotechnology education topics.

This study aims to determine the learning process of Biotechnology of Biology teacher candidates in the Biology Education Study Program, FKIP Unpas. The results of observations are expected to be useful to be used as a basis in determining the strategy of developing learning programs for the implementation of quality learning processes that guarantee the success of prospective teacher students in achieving academic achievement and becoming Biology study teachers who meet high-quality teacher competency standards.

Biotechnology is one of the subjects taught in the Biology Education Study Program FKIP UNPAS Bandung Indonesia which is taught to provide students as Biology teacher candidates who have academic abilities that can apply, develop and disseminate science and technology professionally.

## 2. Methods

The research method used in this study is a qualitative description of a field study with observation techniques. The questionnaire consisted of 18 questions which were a mixture of questions in open and closed forms and also interviews were given to thirty eight students and 2 lecturers who were involved in this study.

Thirty-eight students were VII semester students who contracted Biotechnology courses. The steps was taken in this field study are divided into three stages, namely 1) the planning stage, 2) the implementation phase, and 3) the post-research stage.

The details of the activities carried out at each stage are as follows: First the planning phase includes a formal application for permission through an official and oral letter to the Head of the Biology Education Study Program with a copy to the Head of the Biology Laboratory, subject were lecturer and student respondent, design and manufacture instrument for obtaining data (questionnaire format, interview format, observation table), Designing methods and determining the data needed to answer the problem.

The second stage of the implementation includes data collection activities according to problems in the form of direct field observation data, including observation of teaching and learning processes, as well as observation of facilities and infrastructure, formal data acquisition from the Biology Education Study Program Head and Biology Laboratory Head, especially data concerning student administration, teaching staff, facilities and curriculum, Use of questionnaires to capture student perceptions, formal and non-formal interviews with subject lecturers, and students.

The final three stages include developing theory based on the data obtained and compiling reports. The main questions in this field study are: How does the learning process take place? What approaches, methods and models of learning are most used in lectures? Are there teaching materials for each topic in the course? What media is used in lectures? Is this course accompanied by a practicum, in harmony with the lecture material with practicum material? Can practicum help students improve understanding of lecture material? Is the availability of facilities and infrastructure sufficient to support the learning process? Data analysis is done in ordinary manual calculations.

## 3. Result and Discussion

A number of questionnaires consisted of 18 questions which were a mixture of questions in open and closed forms and also interviews were distributed to 38 students who had take Biotechnology courses. These questions relate to the learning process which includes: approaches, methods and learning models used by lecturers, the media, the material that is difficult to understand, assessments made by lecturers when lectures and the availability of facilities to support the learning process. The following is presented a data table from the results of the student questionnaire analysis.

**Table 1.** Student Questionnaire Results

No	Questions	Answer	Respond	
			Total	Percentage
1.	Is Biotechnology learning that has been implemented so far in accordance with the syllabus and RPS that have been made by lecturers in accordance with the KKNi curriculum?	Yes	34	89.47%
		Some	4	10.52%
		No		
2.	Does Biotechnology learning that has been implemented use a scientific approach?	Yes	34	89.47%
		Some	4	10.52%
		No		
3.	Is Biotechnology learning already implemented using a project-based approach?	Yes	30	78.94%
		Some	8	21.05%
		No		
4.	Is Biotechnology learning that has been implemented using a research-based approach?	Yes		
		Some		
		No	38	100%
5.	Does it use the learning method used for lectures, discussions and question and answer?	Yes	37	97.36%
		Some	1	2.63%
		No		
6.	Are there teaching materials or handouts for each topic in the course?	Yes	25	65.78%
		Some	7	18.42%
		No	6	15.78%
7.	Are learning media used real objects so that they can provide direct experience?	Yes	16	42.10%
		Some	13	34.21%
		No	9	23.68%
8.	Is the media used by virtual media or animation or interactive Multimedia primarily to understand materials that cannot be clearly described as recombinant DNA technology?	Yes		
		Some		
		No	38	100%
9.	Is this course complemented by a practicum?	Yes	22	57.89%
		Some	15	39.47%
		No	1	2.63%
10.	Is the lecture material align with practicum material?	Yes	34	89.47%
		Some	3	
		No	1	2.63%
11.	Can practicum help you improve understanding of lecture material?	Yes	35	92.10%
		Some	2	5.26%
		No	1	2.63%
12.	Is the lab equipped with the MFI / guide?	Yes	17	44.73%
		Some	8	21.05%
		No	13	34.21%
13.	Is evaluation after learning done?	Yes	22	57.89%
		Some	13	34.21%
		No	3	7.89%
14.	Is the availability of facilities and infrastructure sufficient to support the learning process?	Yes	15	39.47%
		Some	22	57.89%
		No	1	2.63%
15.	Are the Biotechnology products that you made the original idea?	Yes		
		Some		
		No	38	100%
17	Biotechnology learning that is implemented can develop creativity and creative thinking skills	Yes	22	57.89%
		Some	13	34.21%
		No	3	7.89%
18	Lecturers give rewards to groups of students who make the most creative products	Yes	17	44.73%
		Some	8	21.05%
		No	13	34.21%

The questionnaire questions were developed based on It would be useful to use laboratory instructional tasks enriched with innovative teaching approaches in teaching biotechnology subjects [4].

Furthermore, after filling out questionnaires by students, interviews were conducted from follow-up questions from the questions in the questionnaire to explore more and more in the information submitted by students in the questionnaire and to confirm the questions in the questionnaire, with the following questions: Interview Questions: What scientific approach has been implemented? Explain!; How is the implementation of project-based learning implemented? What product do you make? is the product useful? How do lecturers direct you in making these products? Where do you get ideas and information on how to make the product (blog / book / magazine / tv / journal)? After completing the product, what do you do with the product? How do lecturers appreciate the product that has been made? Is Biotechnology learning that has been carried out using a research-based approach (meaning that each microbe used to make the product is optimized first so that the right dose / dose is known), explain? Overall how does the Biotechnology learning process lasts for one semester?; What learning methods are most used in lectures? Explain! What media are used in lectures? What is the use of media in conducting lectures? Is the media used can help you understand the material being delivered? How do the lecturers evaluate the learning process? When learning Biotechnology, what part of the material is difficult to learn and understand?: Biotechnology learning is what you expect so that it can equip you as a Biology teacher candidate and prospective entrepreneur?.

The results of questionnaire data analysis on students who have finished take Biotechnology courses show that most students 89.47% stated that Biotechnology learning has been carried out so far according to the syllabus and RPS that have been made by lecturers and in accordance with the KKNi curriculum. Through interviews it was revealed that the lecturers at the first meeting delivered syllabus, RPS and course contracts. As many as 89.47% of students said that Biotechnology learning that has been implemented has used a scientific approach. As many as 78.94% of students think that Biotechnology learning that had been implemented had used a project-based approach and produced products even though 100% of students stated that the products made were not their own original ideas. But 100% of students stated that Biotechnology learning that had been implemented had not used a research-based approach. A total of 97.36% of students stated that the learning method used in most lectures, discussions and question and answer, the magnitude of this percentage after the interview was conducted, especially the larger portion of the discussion questions and answers. The availability of instructional materials or handouts is not optimal for each topic in the course so the answers of students are diverse, namely 65.78% answered yes, 18.42% answered in part and 15.78% answered no.

The use of real-body media shows mixed results, namely those who answered yes 42.10%; 34.21% who answered partially and 23.68% who answered no, this is because on each topic the media used varies depending on the needs and availability of media. Through the extracting of interview information, the use of virtual media or animation, most of the students carry out that in certain materials such as recombinant DNA technology, this media is used. Only for interactive Multimedia especially to understand materials that cannot be depicted in real terms such as recombinant DNA technology and for virtual laboratories 100% of students answered that they had never been used.

Questions about practicum implementation. A total of 57.89% of students stated that this course was accompanied by practicum, only the practicum carried out was still integrated with the theory of not being independent as a practical course. Then 84.7% of students stated that although the practicum was still integrated with the theory, the material carried out by the practicum was in harmony with what was in the theory and strengthened the understanding of the theory (92.10%). However, the practicum has not been supported by the availability of adequate student worksheets (practicum guides) (44.73%). Evaluation after the learning was completed the students' responses varied, of which 57.89% answered yes, 34.21% answered partially and the rest did not. After interviewing, it turned out that not all of the assignments and quizzes or lab reports were given timely feedback and shared with students. As Explained by [5] that Methods for educating students in biotechnology require intensive training in laboratory procedures. The availability of infrastructure facilities is less support the implementation of

learning is in accordance with the statement of students as much as 57.89% stated that some infrastructure facilities support the learning process.

Data and information excavation from lecturers is conducted by direct interviews with questions not much different from those given to students. The results of the interview show that there are similarities, compatibility and suitability of results between students and lecturers.

#### 4. Conclusion

From the questionnaire and interview analysis, next step is planning to develop a Biotechnology lecture program that can improve the ability of creative thinking of Biology teacher candidates, so that based on the results of this measurement can be seen part of the Bio-technology lecture program that needs to be improved, improved, and added to learning even better

#### 5. References

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