Profile of early ICT capabilities of prospective physics teachers through basic physics learning in Makassar

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Abstract. This study identifies the initial ICT skills and basic competencies of learning technology for students in learning basic physics. This research was conducted in three different universities in Makassar Indonesia. The research instrument is a test instrument for the basic competency test of learning technology, and a non-test instrument in the form of a learning technology capability questionnaire. The results showed that the average percentage of student learning technology competence in three tertiary institutions in Makassar was level 1 with a percentage of 94.39%; level 2 57.50%; level 3 78.17%; level 4 67.77%; level 5 76.03%; and level 6 67.55%. This shows that the competency of student learning technology for level 1 is in the very good category, and levels 3 and 5 are in the good category. While at level 4, and 6 are in the medium category, while at level 2 it is still in the bad category. The initial ability of learning technology on the attitude aspect is in the high category while the social emotional aspect is also in the moderate category. This shows that the use of learning technology really needs special attention to the social emotional aspects, especially ethics. Therefore, it can be said that the relationship between the initial ability of student learning technology and its use as a medium for learning basic physics is very close. The ability of good learning technology will have the potential for the use of good learning technology.

1. Introduction

The demand for change in the field of education in 21st century learning is known as the concept of educational innovation for the future. Education is very demanding integration of technology and also humans in learning. In line with that, the challenges of future teacher candidates are closely related to how their technology is able to solve problems and face the challenges of globalization [1].

In addition, 21st century learning directs prospective teachers to make learning technology a source of learning, one of which is by using internet access. The internet is an unlimited source of information [2]. Besides being able to use learning technology as a source of learning, students are also required to be able to create creative and innovative learning that is integrated with IT. According to [3] creative and fun learning is very important, because it can help the achievement of learning goals well. The

ability of students to integrate learning technology significantly influences learning activities, processes and outcomes.

Basic physics learning according to [4], has the characteristics of physical material in the form of facts, concepts, principles, and physical phenomena, besides that basic physics material can be considered simple, but can also be seen as something very complex and complex, therefore need media in learning. One of the media that can be utilized is learning technology-based media. According to [5] learning technology is a combination of information technology and communication technology. Learning technology is a tool to get added value in producing information that is fast, complete, accurate, transparent, and up to date [6]. Therefore, learning technology is also interpreted as a tool that makes it easy for humans to distribute information quickly and effectively, both in the form of programs and equipment.

Some types of technology in learning that are most recognized by the general public are the use of internet and digital media. But actually technology has developed both from hardware such as smartphones, tablets, and in the case of software such as multimedia applications, and others. Learning technology consists of both online and offline technology devices that are divided into hardware and software. Hardware is all physical technology equipment that can be touched. Software is a system that can run or that runs on hardware. Software can be in the form of an operating system, or application program [7].

The development and application of learning technology is beneficial for education in relation to improving the quality of Indonesia's national education. According to [8], the paradigm underlying the integration of learning technology in education is ICT as a technological tool that can be used as an agent in education, learning technology as part of the material, as well as a tool for collecting, managing, storing, investigating, proving and disseminating important information effectively and efficiently.

In studying basic physics, the use of learning technology is aimed at clarifying concepts so as not to be too verbalistic, overcoming constraints of space, time, and senses, overcoming the limitations of basic physical practicum tools, overcoming passive attitudes of students becoming more enthusiastic, simulating physical phenomena that abstract [9].

2. Methods

This research is a qualitative descriptive study. The number of respondents used was 30 students for three different universities in Makassar. The data obtained were collected through test and non-test techniques. The test instrument is in the form of a basic competency test of learning technology for basic physics, while the non-test instrument uses the ICT initial ability questionnaire [10].

The stages of the study consisted of the stages of pre-observation, the second was the stage of observation and finally the stage after observation. Activities undertaken in the pre-observation stage are composing research instruments. At the observation stage is to provide a questionnaire and carry out basic competency tests of learning technology. Whereas in the post observation stage, the activities carried out were to analyze the results of the tests, and the results of the questionnaire. The data obtained were then assessed using the initial ICT capability assessment rubric compiled by the researcher. Then it is processed by determining the percentage of fulfillment of each indicator and categorizing the initial level of ICT capability. The percentage of fulfillment of each initial ICT capability will be spelled out in the following categorization [11]:

Table 1. Category basic competency level in ICT

Percentage	Category
90 – 100	Very High
75 – 89	High
65 – 74	Medium
55 – 64	Low
0 - 54	Very Low

After the data is arranged in the form of grouping each category percentage, After the data is arranged in the form of grouping each category percentage, then analyzed in the form of an average percentage for each level of ICT basic competence.

3. Result and Discussion

3.1. result description

3.1.1. basic competency level in technology, information and communication.

Data on the level of basic competency of learning technology based on the results of the basic competency test of ICT can be seen in Figure 1. From the table it is known that the percentage of students of basic ICT competency in three universities in Makassar is at level 1 with an average percentage of 94.38%; level 2 with an average percentage of 57.50%; level 3 with an average percentage of 78.16%; level 4 with an average percentage of 67.67%; level 5 with an average percentage of 76.03%; and level 6 with an average percentage of 68.68%. This shows that the ability of students at level 1 is included in the excellent category, for levels 3 and 5 are in the good category. While at level 4 and 6 it is still in the medium category, specifically at level 2 it is still in the poor category. Data obtained in accordance with Figure 1.

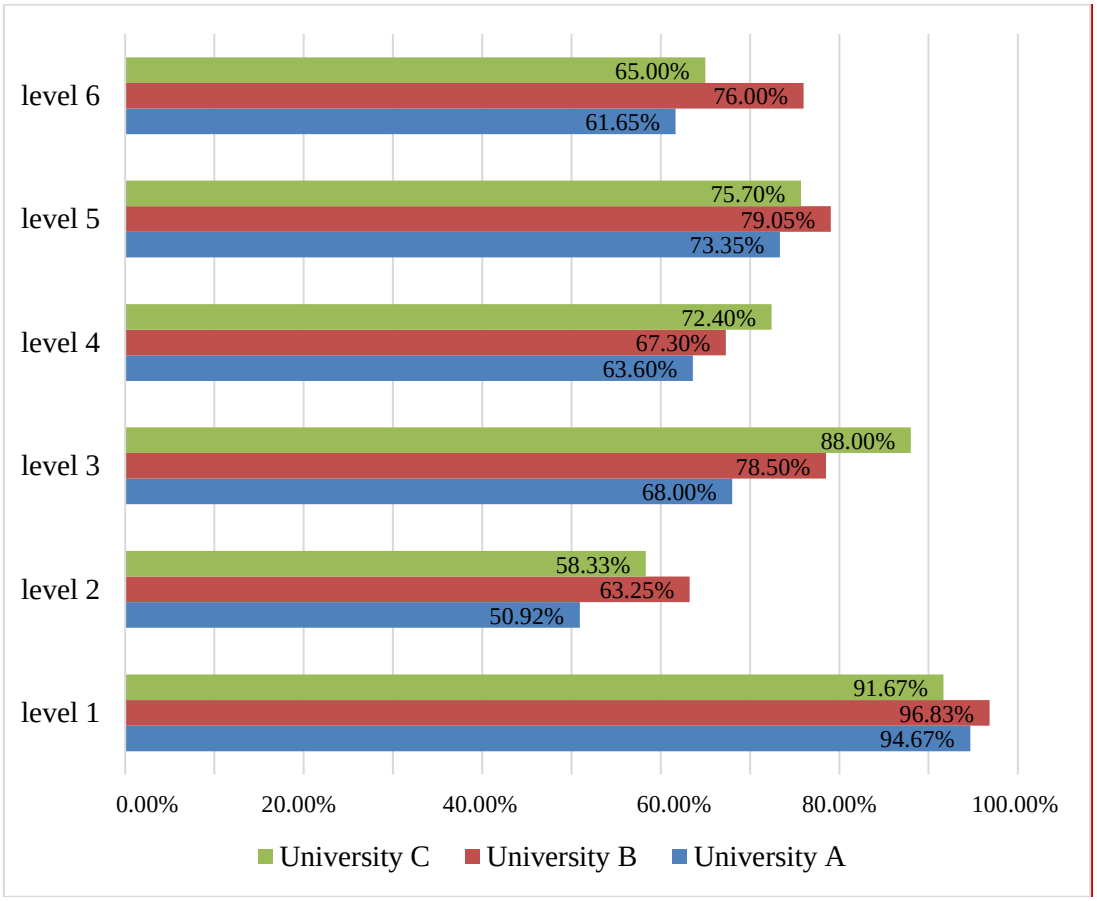

Figure 1. Result of ICT basic competency level test

3.1.2. early ICT ability in learning basic physics. In the use of learning technology for learning basic physics required good initial ICT skills for students in accordance with the demands of 21st century learning. Data on the initial ability of ICT in learning basic physics is shown in Figures 2 and 3.

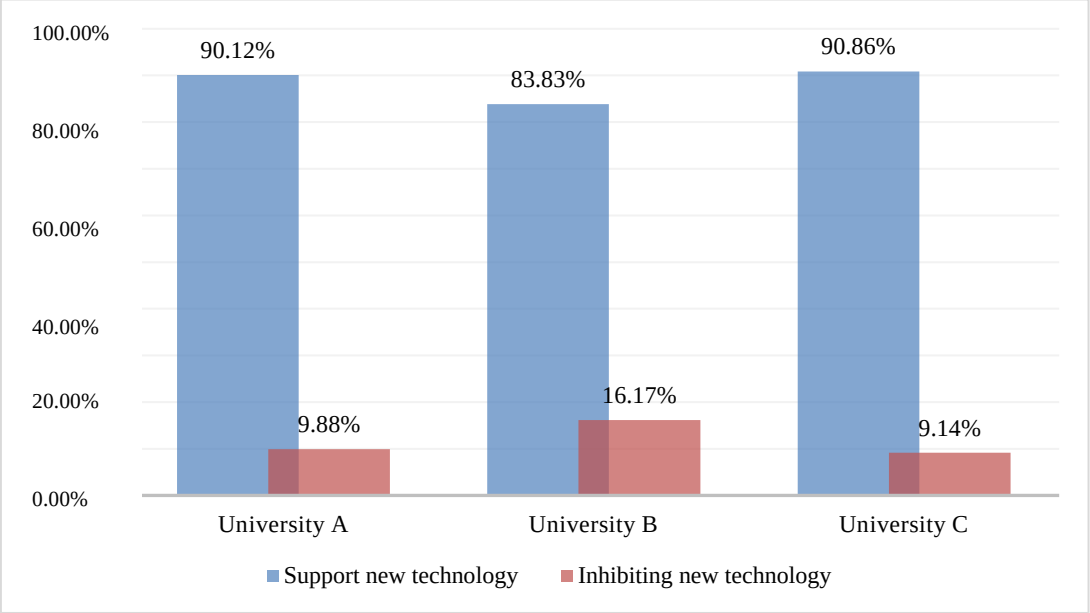

Figure 2. The results percentage of initial ICT skills in physics students on the attitude aspects

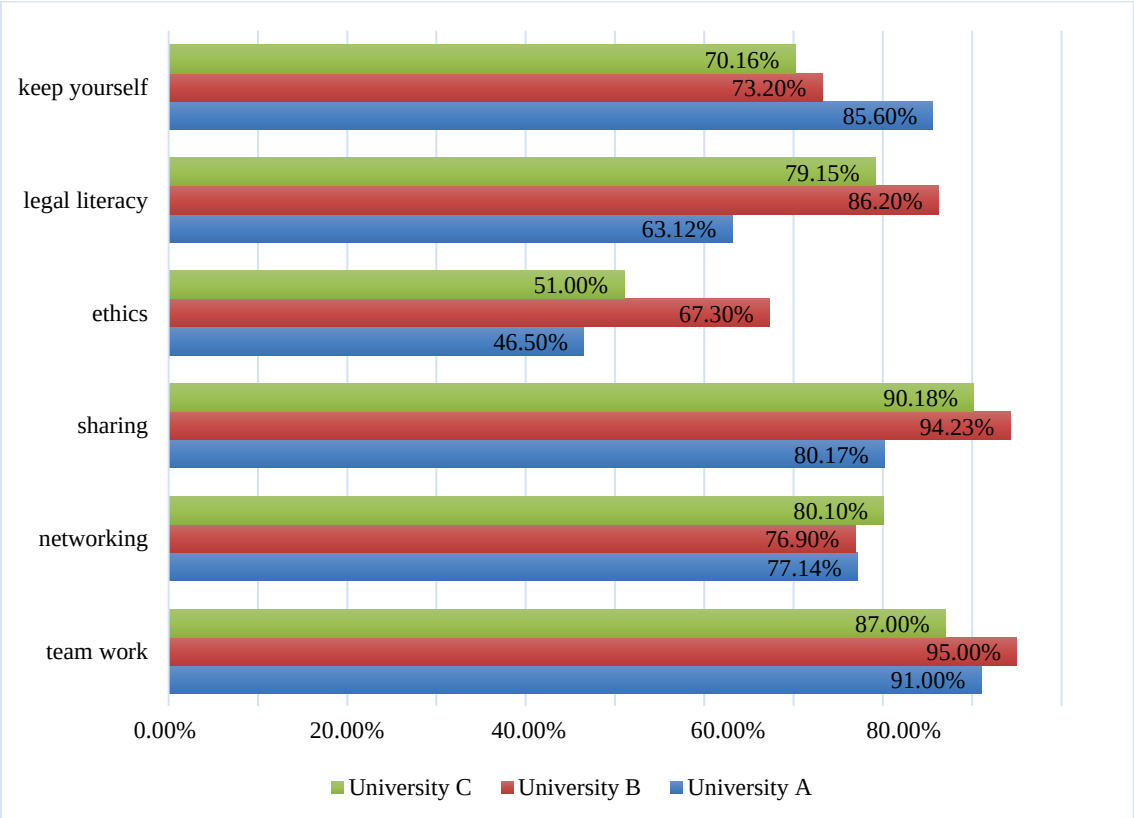

Figure 3. The results percentage of the initial ability of ICT physics students on social emotional aspects

3.2. discussion

In accordance with the data from the test results of the basic competency level of learning technology, the first level relates to basic operating skills in computers, namely University A with a percentage of 94.67%, University B with a percentage of 96.83% and University C with a percentage of

91.67%, with an average percentage of 94.39% this shows that at this level almost all physics students can use computers and laptops for daily learning. The second level is related to search, opening links for learning references with percentages for University A at 50.92%, University B 63.25%, and University C at 58.33%. This shows that at this level is not optimal, one of the main factors found is that the use of technology in learning has not been maximized by lecturers, so there are still many students who participate in learning using manual references as learning material [12].

The third level is related to the use of physics learning software for University A 68.00%, University B, 78.50%, and University C at 72.40%. This shows that at this level students are already in the medium category so it needs to be improved through the development of various other types of media needed by physics students especially in studying basic physics. The fourth level relates to the ability to download information resources and use word processing software and databases to make simple information products with a percentage of results for University A of 63.60%, University B 67.30%, and University C of 72.40%. This means that at this level students are already in the medium category so it needs to be increased again through increasing learning activities oriented to information and communication technology [13]. The fifth level is related to the use of presentation software and the ability to create tables and graphs and sort data using spreadsheets in the medium category with a comparison for University A of 73.35%, University B 79.05% and University C by 75.70%. The sixth level is related to the ability to create learning media and online usage by comparing the results obtained for University A 61.65% University B 76.00% and University C for 65.00% categories of students at this level are moderate.

Based on the results of the initial ICT ability results of physics students, it can be stated that the attitude aspect shows the data that students like the use of learning technology in learning physics with a percentage of interest of 93.3% in Higher Education. A and 91.3% in Higher Education B, and 88.6% in Higher Education C. More than half of students said they felt they learned better with ICT. The results of the respondents stated that learning technology made learning activities more interesting, felt more motivated to learn well, and some said that learning technology allowed them to be independent and free.

Most respondents felt that following the new technology was important. Respondents strongly agree that there is a lot of potential in the use of mobile technology (eg cellphones, PDAs, ipods, smartphones) for learning [14]. According to most students that as prospective teachers must often use learning technology in teaching physics. Based on the respondents 'average answers, the percentage of ICT students' initial ability for students in the attitude aspect is included in the high category. This means that students strongly support the existence of learning technology in their daily activities.

Based on the results of respondents who stated that the average percentage of students who frequently ask questions and do work in groups both small groups and large groups related to the basic physics tasks of their friends using the internet such as WhatsApplication, Facebook, Google Classroom, e-learning, and multimedia by 91.00%. The results of other respondents who stated that the average percentage of students who never copied files illegally (without permission) or in other words were aware of plagiarism was 76.16%, and the average percentage of ethics in using the internet through a website was 54, 93%.

Most respondents (an average percentage of 88.19%) stated that learning technology allows them to share material or teaching materials or other physics assignments online, and this makes it easier for students to do their assignments well [15]. This also has an impact on students by forming various networks or connections not only from the same friends on campus, but also forming networks from outside so that the average percentage of respondents in connection or network aspects is 78.05%. In addition, respondents stated that in the aspect of the ability to protect themselves from negative things about the use of learning technology as a whole was at an average percentage of 76.32%. From some of these statements, it shows that in the aspect of social emotion for ethical indicators is still low for physics students [16]. The low indicator is due to the lack of integration of ethical cultivation in the use of learning technology, especially in learning, especially basic physics.

4. Conclusion

Based on the results of discussions on the initial ability profile and the use of learning technology as a medium of physics learning for physics students at three universities in Makassar, it can be concluded that the ability of student learning technology has reached a good category and the results of basic ICT potential tests related to the ability of learning technology also show that competence ICTs from students are in the good to very good categories. This supports the use of learning technology as a medium so that it is categorized as sufficient. Therefore, it can be said that the relationship between students' ICT abilities and their use as physics learning media is very close. The ability of good learning technology will have the potential for good use of ICT.

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