Perception of Prospective Teachers to the Needs of ICT in Chemical Learning in the Age of Digital Transformation

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Abstract. The current era of digital transformation forces teachers to be skilled in learning activities, meaning that they must be able to collaborate between learning activities and the use of ICT devices. The purpose of this study is (1) to find out how the perception of prospective teachers to the understanding of digital literacy based on digital literacy index, (2) to find out the perception of prospective teachers to how the level of idealization of teacher ability in the use of ICT in chemical learning, and (3) to know the perception of prospective teachers to their own abilities in the use of ICT in chemical learning. The sample in this study is all the prospective students of chemical education study program which amounted to 88 zzrespondents. The method used in this study is a quantitative descriptive. Data collection is done through a questionnaire-shaped instrument. The results of the study for the assessment of the digital literacy index of prospective chemistry teachers are assessed from 8 dimensions, namely functional skill and beyond, creativity, collaboration, communication, the ability to find and select information, critical thinking and evaluation, cultural and social understanding, and e-safety. Entirety, the average percentage is 69,6%, with the category fair. Assessment of respondents' perception of how ideally the ability of teachers in the use of ICT in chemical learning is associated with the assessment of ICT capabilities owned by the respondents themselves. From the calculation of the questionnaire assessment, the ability that should be possessed by a teacher the majority of respondents answer that teachers must be proficient in using ICT devices in learning. While the perception of prospective teachers to their own ability to use ICT devices obtained results of 60,6% which fall into the category of average.

Keywords: Written Communication · Learning Physics · Virtual Lab · Video Tutorials

1 Introduction

The rapid development of information and communication technology has brought humans into the internet era, where almost all humans on earth can be connected in one global network. The development of information and communication technology,

M. L. Firdaus and A. Defianti (Eds.): MASEIS 2021, ASSEHR 718, pp. 299–306, 2023.
https://doi.org/10.2991/978-2-38476-012-1_37

especially digital technology and media, has encouraged globalization [2]. The development of digital technology is currently happening so fast and has an impact on the pattern of people's lives [3]. Today, the digital world and the internet are part of the daily life of the younger generation. In this digital era, every individual has the same right to participate [4]. According to Hakim that the development of the internet and information technology has led to the rapid production and distribution of information to users [5]. Currently, digital literacy has become a primary need for society. Digital literacy is the attitude and ability of individuals to use digital technology and communication tools to access, manage, analyze information, and communicate in society. According to Hossein Zainally, "Information and communication technology provides several facilities and possibilities for educational administrators to carry out their duties" [1].

As prospective educators in the future with the development of digital technology, it is hoped that prospective teachers will be able to master digital literacy well and apply it in the implementation of learning activities to achieve educational goals. ICT helps in providing a good communication system in higher education system. The majority of young people who come to university do not have the necessary skills in using the internet and information technology to solve scientific problems, perform different tasks individually or in teams. Students or prospective teachers are good at using social networks, email or skype and surfing the internet. However, their knowledge and competence for the effective use of new technologies in the learning process is still low [6]. Prospective teachers in general often interact with technology but do not necessarily have a good understanding of digital literacy [7]. ICT could potentially facilitate the obtainment of relevant life skills that support the economic and information development process, if it is carefully integrated into education [8]. From the potential and function of digital learning very suitable for improving quality and streamlining processes learning [9].

The term digital literacy in the book Digital Literacy is a term introduced by Paul Gilster, digital literacy is an individual's awareness and ability to use digital equipment and facilities appropriately [6]. Individuals with digital literacy skills are expected to be able to access, manage and analyze digital information, build new knowledge, and communicate with others. In determining the concept of digital literacy, some experts tend to define it as a connection between the skills and competencies needed to use the internet and digital technology effectively [10] According to Koltay digital literacy is the use of information and communication technology by teachers in the learning process with the aim of efficient use of digital media [11]. Kurniawati & Baroroh also stated that teachers are required to master digital literacy in order to be able to adapt to digital trends and the needs of students in the digital era [12]. In other words, increasing the digital literacy of the educational community is very important in a digital learning environment [13].

In the current era of digital transformation, all work demands to be presented through digital devices, such as computers, androids, and so on. The computer device itself can be filled with various kinds of software in which the software supports the learning process, including microsoft office, video, internet, and others. In defining the concept of digital literacy, some experts tend to define it as a connection between the skills and competencies needed to use the internet and digital technology effectively [14, 15]. For this reason, it is important that we know the public perception of prospective teachers on

digital literacy, perceptions of the ideal ability of teachers to master ICT and perceptions of their own abilities in mastering ICT.

2 Method

The method used in this research is descriptive quantitative method with data collection techniques using survey methods. The research subjects were 111 people who were taken using random sampling technique. The instrument used in this research is a questionnaire on the perception of prospective teachers on ICT needs developed by researchers. The data collection technique was done through filling out a questionnaire. The questionnaire distributed to prospective teachers is a questionnaire to see responses or responses regarding the perception of prospective teachers on the need for ICT in chemistry learning in the era of digital transformation.

3 Result and Discussion

The era of digital transformation demands that almost all learning processes occur with the use of digital or it can be said as the era of digital literacy. Digital literacy has various definitions from various skill points of view which are indicators of digital literacy. Digital literacy is related to the ability to understand and apply information from various sources and restate the information [16]. Meanwhile and Shovopa [6] mentions digital literacy is related to the ability to use technology as a basic skill that will make it easier to access information, obtain information, analyze information and integrate new knowledge and skills. Keskin, Ozata. And Banar [17] describe digital literacy into several sub-disciplines, namely information literacy, computer literacy, media literacy, communication literacy, visual literacy and technological literacy.

3.1 Perception of Prospective Teachers on Understanding Digital Literacy Based on the Digital Literacy Index

Based on research that has been conducted with 111 respondents, it can be seen that the perception of prospective teachers on understanding digital literacy is very good. Digital literacy that is important to be mastered by students or prospective teachers in general is information literacy, media literacy, and ICT literacy [18]. The development of digital literacy as an academic demand at every level of education in Indonesia is different, especially in universities. Today's students are more dependent on the use of cellphones because they search Google more often than reading books as references. This shows that the internet provides various needs in finding information [19]. Information needs for students in higher education are related to lecture activities or personal interests that are driven by the fulfillment of certain tasks from lecture activities [20]. The need for information in fulfilling the tasks given by the lecturer can more or less build students' digital literacy (Fig. 1).

Based on the data above, each index has a different response value to digital literacy, so it can be seen that for the first index functional skills and beyond, 45% of respondents

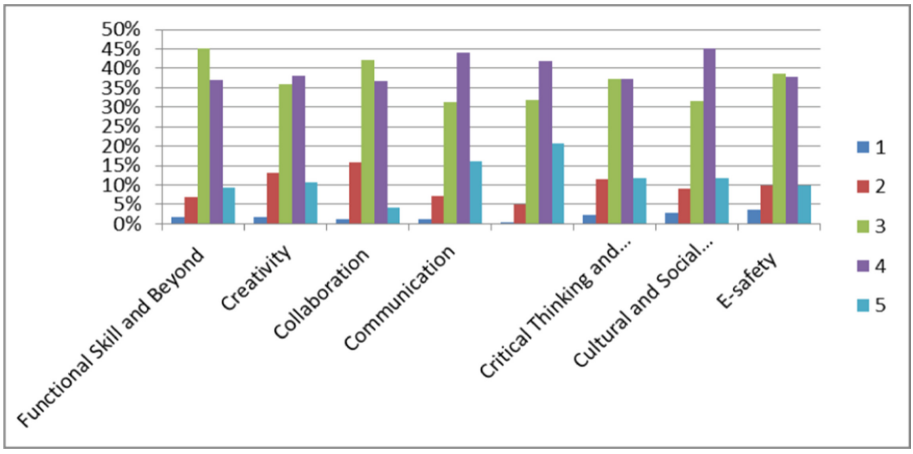

Fig. 1. Graph of teacher candidates' perceptions of understanding digital literacy based on the digital literacy index

are quite capable in the field of ICT to operate computers and access the internet. The second index, namely creativity, data obtained that 37% of respondents are proficient in creativity to make products in various formats and models by utilizing digital technology. This means that prospective teachers are able to think creatively and imaginatively. This statement is in line with the results of research conducted by Emre & Kiyci which states that the use of technological devices by prospective teachers such as computers, mobile phones, tablets, the internet, and social networks both inside and outside the classroom is very beneficial in digital literacy [21]. Furthermore, the collaboration index obtained data as much as 42% of respondents were able to participate in the digital space for activities or the need to expand knowledge. In addition, prospective teachers are able to explain, negotiate ideas to others through the digital space.

The communication index got the highest score of 44%, which means that prospective teachers are able to communicate through digital technology media, understand and understand the audience in the digital space, this means that prospective teachers are accustomed to communicating using applications or connected media involving digital devices and connections internet. In the index of the ability to search, filter and select information, 42% of respondents feel they are able to find and select information in the digital space, meaning that they can understand and choose the best information to be accepted as a source of accurate and clear information. Furthermore, prospective teachers are also able to think critically when dealing with information in the digital space, this can be seen from the data where as many as 32% of respondents answered agree that they are able to contribute and analyze information in the digital space, and are able to think critically when dealing with information in the digital space. Digital space. In the social and cultural understanding index, 45% of respondents feel confident that they have thoughts that are in line with the social and cultural understanding around them. While the last index, namely electronic security, prospective teachers feel they can guarantee security when exploring, creating, and collaborating with digital technology.

Table 1. Persentase perceptions of prospective teachers on how the ideal level of teacher ability and the use of ict in chemistry learning is

Indicator	1		2		3		4		5	
Basic Office	1	1%	5	5%	31	28%	50	45%	25	22%
E-learning	0	0%	0	0%	25	23%	46	41%	40	36%
Vicon	0	0%	2	2%	24	22%	44	40%	41	37%
Video	0	0%	5	5%	26	23%	43	39%	37	33%
Web	1	1%	4	4%	29	26%	47	42%	30	27%
Game	2	2%	12	11%	37	33%	39	35%	21	19%
ICT Asesmen	0	0%	4	4%	28	25%	51	46%	28	25%
Modeling	0	0%	7	6%	34	31%	38	34%	32	29%
social media	0	0%	4	4%	29	26%	50	45%	28	25%

Overall, the perception of prospective teachers on understanding digital literacy based on the digital literacy index can be concluded that prospective teachers have confidence that their knowledge of digital literacy is good, which means that they understand enough that in the current era of digital transformation they are required to be able to utilize technology in any business. This is in accordance with research conducted by Perrotta which states that available digital technology provides significant benefits in the teaching process of teachers, most of the benefits identified by teachers are related to digital technology providing access to various content and learning resources [22].

3.2 Perceptions of Prospective Teachers on How the Ideal Level of Teacher Ability and the Use of ICT in Chemistry Learning is

Perceptions of prospective teachers on the ideal level of teacher ability in the use of ICT in chemistry learning have varied answers. For the overall indicators of teacher candidates' perceptions of how ideal the teacher's ability to use ICT in learning is, the majority of respondents think that teachers must be proficient in using ICT in the learning process. This means that they agree to become a teacher, mastery of Microsoft Word, Powerpoint and Excel must belong to the advanced category. Likewise in terms of the use of e-learning, in the current era of digital transformation teachers must be able to take advantage of the features available in online learning software, so that learning is not only limited to meetings in the classroom. Prospective teachers also perceive that teachers must be proficient in using video conferencing (google meet, zoom, etc.) (Table 1).

Premiere, Camtasia, or others. They also argue that teachers must master web-based learning preparation techniques, design learning games, and also design ICT-based assessments. For modeling, the response of prospective teachers varies on the teacher's ability to use chemical modeling software (chem draw, chem sketch, etc.). There are those who think that the teacher is enough to master it, there are also those who think that the teacher must be proficient and even very proficient. In contrast to that, for the ability to

Table 2. Persentase Perceptions Of Prospective Teachers On Their Own Abilities In The Use Of Ict In Chemistry Learning

Indicator	1		2		3		4		5	
Basic Office	3	2%	19	17%	53	47%	31	28%	6	5%
E-learning	0	0%	9	8%	59	53%	33	30%	10	9%
Vicon	1	1%	13	12%	48	43%	39	35%	10	9%
Video	9	8%	37	33%	45	41%	18	16%	2	2%
web	11	10%	32	29%	46	41%	20	18%	2	2%
Game	32	29%	31	28%	31	28%	11	10%	6	5%
ICT Asesmen	13	12%	22	20%	50	45%	20	18%	6	5%
Modeling	11	10%	33	30%	48	43%	14	13%	5	5%
social media	0	0%	8	7%	34	31%	47	42%	22	20%

use social media (Instagram, Facebook, Twitter, etc.) the majority of respondents agree that teachers must be proficient in this matter.

3.3 Perceptions of Prospective Teachers on Their Own Abilities in the Use of ICT in Chemistry Learning

The perception of prospective teachers on their own abilities in the use of ICT in learning is intended to determine how proficient the prospective teachers are in utilizing ICT in chemistry learning. The indicators asked for are the same as indicators on teacher candidates' perceptions of the ideal level of teacher ability to utilize ICT (Table 2).

Based on the table above, it can be seen that prospective teachers' perceptions of their own abilities in the use of ICT in chemistry learning, they feel they have mastered the use of ICT in learning. For indicators of basic office mastery, e-learning, video conferencing and making learning videos, only 3% think that they do not master the use of the software, the majority of other respondents feel they are quite proficient in mastering the software.

As for the ability to compose web-based learning, the ability to design learning games (android based, desktop, etc.), the ability to design ICT-based assessments, and the ability to use chemical modeling software (chem draw, chem sketch, etc.) there are still prospective teachers. Who feel they do not master the use of these devices, namely there are as many as 15% of all respondents. There are as many as 4% of prospective teachers who feel they are very proficient in mastering the software, the rest perceive that they have the ability in this matter, ranging from slightly mastering (27%) to moderately mastering (39%). In contrast to this, for mastery of social media accounts, respondents are generally already proficient, even very proficient, and no one feels that they do not have the ability to use social media. This indicates that students' involvement with digital media can help students develop knowledge and skills, make high contributions, and develop careers well [23].

4 Conclusion

The final result can be seen that the overall perception of prospective teachers on digital literacy in chemistry learning has very good perception criteria. Prospective teachers also perceive that a teacher must be proficient in mastering ICT in the learning process, both in mastering Microsoft office, making learning videos, and all software that supports the learning process. However, the perception of prospective teachers on their own ability to master ICT is not the same as their perception of how ideally the abilities that teachers should have in the learning process. Where their overall perception of their own ability to master ICT is at a fairly mastered level. This means that prospective teachers are still not fully proficient in mastering ICT tools.

Acknowledgments. This research was funded by the PPKP FKIP Research scheme at Universitas Bengkulu, Indonesia in 2020. The authors would like to thank the facilities provided during the research process.

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