

The Profile ICT Knowledge of Biology Teachers Based on Teaching Experience and Gender

Ria Almareta^{1,*} Paidi²

¹ *Biology Education, Postgraduate Program, Yogyakarta State University, Jl. Colombo No. 1, Karang Malang, Yogyakarta, 55281, Indonesia*

² *Biology Education, Faculty of Mathematics and Natural Science, Yogyakarta State University, Jl. Colombo No. 1, Karang Malang, Yogyakarta, 55281, Indonesia*

**Corresponding author. Email: rialmareta@gmail.com*

ABSTRACT

ICT knowledge is very much needed in the current digital era by biology teacher, because teachers can design and develop technology to help students reach the success in the modern era with an great value of learning. Teaching experience is grouped into four categories, (< 5 years); (6-10 years); (10-15 years); and (>15 years). Gender is devied into female and male teacher. This study aims to know the biology teacher's ICT knowledge profile based on the teaching experience and gender. Respondents in this study were 96 of biology teachers. The instrument in this research using multiple choice tests that have been validated by expert judgement and empirical validity using ANATES. Based on inferential analysis it can be concluded that there is a significant difference between the teaching experience and gender with the ICT knowledge of biology teacher. In the aspect knowledge of media ICT sig 0.003 < 0.005, knowledge of ICT learning resources and knowledge of use LMS, sig 0.000 < 0.005. That means the length long time of teaching and gender affect ICT knowledge of biology teachers.

Keywords: *ICT knowledge, biology teacher, teacher experience, teacher gender.*

1. INTRODUCTION

Information and communication technology (ICT) nowadays has developed very rapidly, in the context of advancing science and technology and the era of globalization, various efforts have been made by the government to make changes and improve the quality of education which is reflected in various policies, especially in the fields of education and technology[1]. In fact, there are still many teachers who are technology blind because they think that learning does not need to use technology, this is due to the teacher's mindset that the use of technology is difficult.

In addition, there are not even opportunities for all teachers to study technology in learning. For example, there are teacher capacity building activities with seminars or training on technology and learning, the school sometimes sends teachers who are proficient in technology, so that teachers who have not had the opportunity to explore knowledge about ICT integration in learning[2].

In fact, technological advances such as the internet can be a learning resource that helps teachers improve the quality of learning. However, there are still many teachers who have not mastered the internet, especially senior teachers [3]. In order for ICT to continue to be

used by teachers, the benefits of training must be in accordance with the needs to overcome everyday problems, because if not then the technical skills possessed will be easily forgotten [4].

For this reason, in line with teacher competency improvement, schools must have a compelling ICT utilization program along with its reward & punishment rules [5]. In order for teachers to use ICT, it is necessary to clearly describe the use of the ICT personally for each teacher, not just the benefit for the school or other parties.

Teachers are one of the main components in the national education system which has a strategic position in realizing the goals of national education, which is to educate the nation's life and develop Indonesian people as a whole [6]. As professionals, teachers must have academic qualifications and knowledge as agents of learning, physically and mentally healthy, and have the ability to achieve national education goals [1].

Education in the 21st century, is required to ensure students have the skills to innovate, skills to use technology and information [7]. Teachers are required to create creative and innovative learning by integrating information and communication technology (ICT) into learning activities to equip students to develop themselves as lifelong learners with information literacy, media literacy and ICT literacy skills [8].

ICT is a technology used to process data, including processing, obtaining, compiling, storing, manipulating data in various ways to produce quality information [9]. ICTs are developing very rapidly in various fields as well as in the world of education. The presence of ICT in the world of education makes it easy for teachers, students, and parents to carry out learning activities [10].

ICT can be applied innovatively at all stages of teaching and learning activities starting from making learning plans, preparing materials, presenting materials, implementing learning using images, videos, animations, or other objects to make learning media more attractive, to learning evaluation. Therefore, teachers can take advantage of ICT in learning, especially high school teachers in Palembang City where the internet network is very strong, supported by students who also have smartphones that can be used to access the internet, as well as supporting regulations.

ICT makes it easy for students to find learning resources and teaching material because it can be accessed anytime, anywhere, and by anyone as long as there is still the internet [11]. Based on this explanation, ICT can be integrated in learning, but teachers must have the ICT knowledge or understanding of what teachers need to master learning using ICT, that is, how someone uses ICT to enhance learning.

The framework on ICT knowledge for teachers is part of various initiatives by the United Nations and special bodies including UNESCO, to promote education reform and sustainable economic development [12]. The use of ICT in education provides a new professional role for teachers, new pedagogies and new approaches in teacher training [13]. The success of ICT integration in the classroom will depend on the ability of the teacher. Future teaching skills will include the ability to develop innovative ways to use technology to improve the learning environment and encourage technology literacy, knowledge deepening, and in generating or creating knowledge [14].

Teachers who are competent in the knowledge creation approach will be able to design ICT-based learning resources and their environment, use ICTs to support the continuous development of students' critical knowledge creation and thinking skills, reflective learning, student support, and create community knowledge for students [15]. They will also be able to play a leading role with peers in creating and implementing their school vision as a community based on innovation and continuous learning enriched by ICT [16].

The success of integrating ICT lies in the thought processes of the teacher such as teacher trust, motivation, and teacher attitudes towards ICT. In addition, the importance of integrated understanding and thought processes of the teacher [17]. Teachers who have a high level of confidence in constructivist teaching are more likely to integrate ICT into learning. Teachers who have knowledge about ICT more often use ICT in learning [18]. Based on this description, the importance

of teacher knowledge relating to the use of ICT becomes an urgent need to become a professional teacher in the 21st century.

A complete description of ICT knowledge that must be processed by a teacher is needed to be able to compete in the future. The focus of this study is to find out the profile of biology teacher ICT knowledge based on teaching experience and teacher gender. The teaching experience are grouped into several levels, namely (<5 years), (6-10 years), (11-15 years), and (>15 years).

The teaching experience is closely related to the teacher's experience in teaching and learning activities, so that teachers with teaching experience have a lot of knowledge about ICT. So, that is can be implemented in learning [19]. The teaching experience is part of the teaching experience, which is a series of understanding and appreciation of something experienced by the teacher in teaching, so that the teaching experience can improve teaching knowledge and skill, especially knowledge in the ICT [20].

In addition to teaching experience that can affect ICT knowledge of biology teachers, gender also influences the ICT knowledge of teachers. This is related to the position of male and female teachers in the world of education [21]. The teaching methods and styles of male or female teachers in conveying learning are also different. Male teachers tend to more easily understand programming in computers so male teachers are more confident using ICT in learning [22].

2. METHOD

The method in this research is a survey, with quantitative descriptive research type. Sampling using random techniques. The research respondents were 96 biology teachers consisting of 23 high schools in Palembang City.

Aspects of ICT knowledge of biology teachers in this study consisted of three aspects, namely: (1) knowledge of ICT media; (2) knowledge of ICT learning resources; and (3) knowledge about the use of LMS. Each aspect measured consists of several indicators and questions consisting of 25 questions. The test instrument was validated first through expert judgment and empirical validity using ANATES.

Descriptive data analysis was to determine the mean and standard deviation so that the biology teacher's ICT knowledge category was based on the teaching experience and gender. The data collection technique used a multiple-choice test sheet, to see the knowledge of biology teacher ICT in terms of gender and the teaching experience of the teacher. Multiple choice test sheets are given to biology teachers teaching grade XI.

Data analysis was done descriptively and inferential. Furthermore, inferential data analysis was carried out using different tests on SPSS to determine the knowledge of biology ICT teachers based on gender and teaching experience, which were categorized into several groups, namely (<5 years), (6-10) years), (10- 15 years), and (> 15 years).

3. RESULT AND DISCUSSIONS

3.1.Result

This study seeks information about the demographic characteristics of biology teachers to assist in classifying

them and then use data to see the difference between demographic characteristics with regard to gender and teaching experience on ICT knowledge in senior high school of Palembang. Data obtained from the teachers are summarized in Table 1.

Table 1. Demographics of Biology Teacher Respondents

No.	Aspects	Category	Total	Percentage (%)
1.	Gender	Male (M)	33	35,87 %
		Female (F)	59	64,13 %
2.	Teaching experience (years)	≥15	54	58,70 %
		11-15	20	21,74 %
		6-10	9	9,78 %
		<5	9	9,78 %

Based on Table 1 it can be stated that from a total of 92 respondents biology teachers who were female were more dominating at 64.13% while male teachers were 35.87%.

The teaching experience is dominated at the level of ≥15 which is 58.70%. This means that respondents in this study were dominated by biology teachers who had been senior in teaching experience.

Table 2. Descriptive statistics of biology teacher ICT knowledge based on teaching experience and gender

Gender	Teaching experience	Mean	Str. Deviation
Male	<5 years	39.50	3.536
	6-10 years	35.33	1.528
	11-15 years	30.86	5.490
	>15 years	22.10	5.594
Female	<5 years	25.43	4.962
	6-10 years	25.83	6.911
	11-15 years	18.92	5.649
	>15 years	14.42	6.290
Total		20.87	-

In this research, ICT teacher knowledge is grouped into several categories and levels based on teaching experience and gender. Male teachers are divided into four levels based on teaching experience, namely male teacher who have

teaching experience <5 years, male teacher who have teaching experienced 6-10 years, male teachers who have teaching experience 11-15 years, and male teachers men who teaching experience > 15 years.

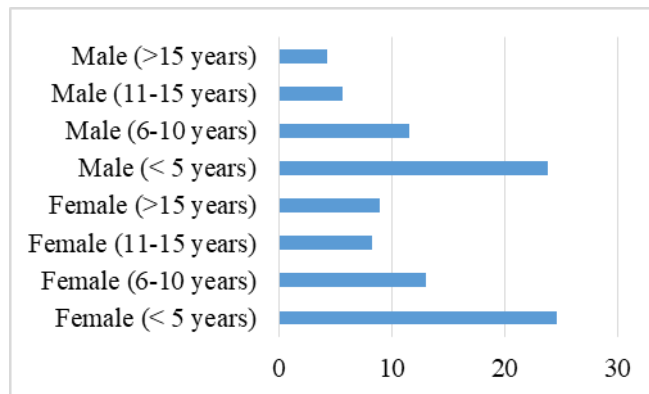


Figure 1. Percentage ICT knowledge based on of teaching experience and teacher gender

The percentage of ICT knowledge based on teaching experience and gender of the teacher. Based on Figure 1, it

can be stated that the percentage of ICT biology teacher's ICT knowledge scores in terms of teaching experience and

gender. To find out the ICT knowledge of teachers based on differences in teaching experience and teacher gender,

different tests are conducted using one way ANOVA, by looking at sig and Fcount.

Table 3. Inferential statistics on ICT knowledge of biology teachers based on teaching experience and gender

Aspects	Gender	Teaching experience (years)	Sig.	F _{count}
Knowledge of media	M	<5	0.003	3.347*
		6-10		
		11-15		
		>15		
	F	<5		
		6-10		
		11-15		
		>15		
Knowledge of learning resources	M	<5	0.000	13.398*
		6-10		
		11-15		
		>15		
	F	<5		
		6-10		
		11-15		
		>15		
Knowledge of uses LMS	M	<5	0.000	9.971*
		6-10		
		11-15		
		>15		
	F	<5		
		6-10		
		11-15		
		>15		

3.2. Discussion

Teacher teaching experience can be obtained as long as the teacher carries out his duties as a teacher in the classroom. This experience is obtained from teaching and learning activities outside the classroom such as attending experiences or seminars and training activities to improve the quality of learning.

Female teachers are also divided into four levels based on teaching experience, namely female teachers who have teaching experience <5 years, girls who have teaching experience for 6-10 years, female teachers who have teaching experience 11-15 years, and female teachers who have teaching experience > 15 years .

Table 2 explains that male teachers with <5 years of teaching experience have the highest average ICT knowledge of 39.50 compared to other level groups. Female teachers who have >15 years of teaching experience have a low average ICT knowledge of 14.42. The average total ICT knowledge of biology teachers in teaching experience and gender is 20.87.

Male teachers who have less than 5 years of teaching experience have the best ICT knowledge, this is because male teachers tend to be more confident using ICT tools so

that it is easy for male teachers to learn knowledge about ICT. Short teaching experience makes information and knowledge about ICTs still up to date. While female teachers who have >15 years of teaching experience have low ICT knowledge because they are too comfortable with teaching that has been adhered to since time immemorial [23]. Besides the age factor so that there is a sense of lack of change, especially in the field of technology.

Female teachers are also preoccupied with household matters so they do not have much time to explore and have knowledge in the field of ICT [24]. Male teachers who have teaching experience <5 years have a percentage of ICT knowledge of teachers 24%, while female teachers who have teaching experience <5 years have a percentage of ICT knowledge of 25%. At the level of teaching duration <5 years between male and female teachers the percentage of ICT knowledge is almost the same, this is due to the teaching experience of the same teacher.

Male teachers who have 11-15 years of teaching experience have a ICT percentage of 6%. Female teachers who have teaching experience 11-15 years have an ICT percentage of 8%. Male teachers who have teaching

experience 6-10 years have an ICT percentage of 11%, while female teachers with the same teaching experience have a percentage of 13%. Male teachers who have > 15 years of teaching experience have a percentage of 4%, while female teachers with the same teaching experience have a percentage of ICT knowledge of 9%.

The results of the data analysis in Table 3 carried out between the gender of teachers (male and female) and teaching experience divided into categories of <5 years, 6-10 years, 11-15 years, and >15 years on ICT knowledge of biology teachers in Palembang, it is known in the first aspect that $F_{count} (3.347) > F_{table} (2.121)$ meaning that there are significant differences between gender and teaching experience about ICT knowledge as a biology learning media. In the second aspect, ICT as a source of learning, expand and update biology teaching materials, there is a significant difference between gender and teaching experience with a calculated $F_{count} (13.398) > F_{table} (2.121)$. Furthermore, for the third aspect, namely the use of LMS to encourage interactive and independent biology learning, the value of $F_{count} (9.971) > F_{table} (2.121)$ means that there is a significant difference between gender and teaching experience.

Table 3 explains that the results of the teacher's ICT knowledge test are based on gender and teaching experience. There is a significant difference between gender and teaching experience towards ICT-based media knowledge in learning. Male teachers have better knowledge of ICT media than female teachers, this is because male teachers also feel more confident and more flexible in knowing information related to information and communication technology [25].

In addition, male teachers are also more creative in making learning media so that it becomes more interesting. So, it can be concluded that there is a significant difference between gender and teaching experience with knowledge of ICT-based media which is implemented in learning [26]. Teachers who have teaching experience for >15 years, both female and male teachers have low ICT media knowledge. This is because the age of teachers who are not young anymore, so that information and use of technology is constrained in learning. Whereas the (>15 years) has a lot of experience or has high flying hours, but it is not accompanied by good ICT knowledge.

Knowledge of ICT-based learning resources is very useful for teachers to add references and expand learning resources related to subject matter [27]. Teachers' knowledge of the use of LMS in learning is also seen based on gender and teaching experience. Male teachers with <5 years of teaching have better LMS knowledge than other groups of teachers. This is because male teachers with a relatively young age have the opportunity to explore technology or applications on more computers [28]. In addition, male teachers tend to be more flexible and understand computer programming languages and to master the internet [29].

4. CONCLUSIONS

The teaching experience and gender affect ICT knowledge of biology teachers. From the three aspects of teacher ICT knowledge all sig values < 0.005 explain that there are significant differences between teacher ICT

knowledge with teaching experience and gender. Teachers who are male have higher ICT knowledge than female teachers. In the ICT knowledge aspects, namely knowledge of ICT media, knowledge of ICT learning resources, and knowledge using LMS. The highest average score is dominated by male teachers. Male teachers have a good understanding of ICT tools, in addition to that male teachers also have plenty of time to learn independently about ICT devices that will be used in learning biology.

The teaching experience affects ICT knowledge of biology teachers in each aspect of knowledge. Teachers who have teaching experience (<5 years) have good ICT knowledge compared to other categories of teaching. On average the longer the teaching experience is, the lower the teacher's ICT knowledge. It is because the age of the teacher and the habits of the teacher are already comfortable with conventional teaching, so they are less interested in information and communication technology.

Increasing teacher knowledge related to the use of Information and Communication Technology (ICT) has become an urgent need to become a professional teacher in the 21st century. Supported by the policy of integrating ICT subjects in the 2013 Curriculum on all subjects increasingly emphasizing the obligation to master ICT by all teachers, not just ICT teachers.

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