Comparison of ICT literacy capabilities of physics teachers in state and private schools in Merauke Regency

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Abstract. ICT literacy is need for a teacher to adapt to the industrial revolution 4.0. This study aims to compare the ICT literacy of physics teachers from public schools with private schools. This type of research is descriptive research. The method of data collection is the filling of ICT literacy questionnaires by physics teachers. Respondents consisted of 14 physics teachers from public schools, and 5 private school teachers. Data are analyzed quantitatively and expressed in percentage form. The results of the analysis show that the ICT literacy of physics teachers in private schools is better than teachers in public schools. The first section in your paper

1. Introduction

Physics is a field of science that has an important role in the development of technology today. This important role of physics makes it one of the disciplines that must be taught in secondary school. However, some physics material is too abstract so it seems difficult to understand at school. The teacher has an important task in providing and presenting learning media that aims to visualize an abstract physics material. The development of technology has a positive impact on the world of education, especially in the learning process of physics.

Physics teachers can use technology to present learning media. The benefit of using Information and Communication Technology (ICT) in physics learning is that it can visualize abstract and imaginative material through computer simulations [1]. Therefore, current learning requires teachers to have critical thinking skills, digital literacy knowledge and abilities, information literacy, media literacy and mastering ICT [2]. These demands are very important to face learning in the area of industrial revolution 4.0. For the education world to remain relevant to the era of industrial revolution 4.0, teachers need to integrate learning outcomes in three fields simultaneously and integrated into the fields of old literacy, new literacy, and scientific literacy [3]. The old literacy movement only focuses on improving the ability to read, write and count. While new literacy focuses on digital literacy, technology literacy dab human literacy [3–5].

The ability expected in new literacy is ICT literacy skills. This capability is a type of ability to utilize information, communication and media technology. The aims is to improve the performance of daily activities through analyzing information media and creating media that are suitable for communication [6,7]. Current learning content is expected to be able to fulfill the skills of the XXI century which include: 1) learning and innovation skills, 2) digital skills, and career and life skills [7].

Physics learning is a learning activity related to nature, natural law and doing proof to find a new concept that comes from an old concept that has been owned [8]. Because it is learning that contributes greatly to the development of technology, physics learning must be held interactively, pleasantly, and

can motivate and build students' independence [9]. The form of presentation can be in the form of media or multimedia. The multimedia model in question can be text, audio, simulation and animation [10].

The realization of multimedia models can only be made by utilizing ICT. The role of ICTs in the world of education [11] includes: 1) enabling interaction between teachers and students, 2) developing learning programs, 3) using intermediary services to support learning, and 4) developing learning resources. ICTs in physics learning has many benefits, including: 1) being able to present abstract and imaginative material through computer simulations [2], 2) making it easier to learn physics concept especially matter which is abstract and submicroscopic [10], and 3) improve critical and generic thinking skills [12–14]. It can only be used if they have good ICT literacy skills.

ICT literacy skills are the ability to use ICTs and media. The aim is to improve performance and daily activities by analyzing information media and creating media that is suitable for communication [3–5]. ICT literacy is centered on high-level thinking skills in considering information, media, and technology around the environment [14]. The increasingly rapid technological development requires everyone to have critical thinking skills, knowledge, and digital literacy skills, information literacy, media literacy and mastering ICT [2].

Challenges for the world of education to utilize technology in learning. The challenge lies in the teacher's capacity to use ICT effectively in the classroom [11]. Teachers must be able to collaborate with ICTs in implementing learning. This collaboration is a learning trend in the XXI century. Learning that was previously teacher-centered is now collaborative learning [15]. Thus, teacher must be able to choose, design, and develop learning media.

The selection and development of learning media are one of the sub pedagogical competencies that must be mastered by prospective teachers. A prospective teacher must also be able to understand the types of media, the principle of media selection, and the steps of media selection [16]. A teacher's literacy capability can only be measured through proven indicators. The way to test ICT literacy skills in through testing skills in using ICT. Glasgow Caledonian University in the United Kingdom outlines the skills aspects of using ICT. These aspects consist of 1) the basics of computer/network use, 2) electronic mail/ e-mail, 3) word processing, 4) information retrieval, 5) the basics of worksheets (spreadsheets), and 6) combining various applications [17].

The literacy skills of ICT teachers, especially physics teachers are needed in the era of industrial revolution 4.0. The hope is with ICT literacy skills, teachers can produce graduates who re competent and have high competitiveness. The use of ICT by physics teachers in the learning process in Merauke Regency is still not optimal. This was identified as one due to the low literacy skills of ICTs. Every teacher has different ICT literacy skills. Therefore, this study was conducted to compare the literacy skills of ICT physics teachers in public high school / Madrasah Aliyah / Vocational Schools in Merauke Regency.

2. Method

This type of research is descriptive research. The aim is to describe the symptoms, events, and events that occur at the present time [19]. The population in this study were all upper secondary schools in the Merauke Regency, which numbered 25 schools. The sample was selected using the Stratified Random Sampling technique, by grouping the population into two large groups, namely the State and Private high school level. The samples taken came from 12 state and private high school level. Data collection is done by using a questionnaire to see the responses of respondents. The teachers involved in this study were 19 people consisting of 14 state school teachers and 5 private school teachers. Data analysis was performed using descriptive statistical analysis techniques. Data from students' responses are analyzed to obtain the percentage with the following equation.

$$\Pr ecentage = \frac{TotalScore}{MaximumScore} \times 100\%$$

(1)

After obtaining the percentage of each aspect of ICT literacy, then interpreted according to the results criteria [18] presented in Table 1.

Table1. Interpretation of Percentage Results

Percentage (%)	Category
0% – 20%	Not Very Good
21% – 40%	Poor
41% – 60%	Good Enough
61% – 80%	Good
81% – 100%	Very Good

The results of the interpretation then concluded how the comparison of ICT literacy skills of physics teachers at state and private high school level.

3. Result and Discussion

ICT Literacy is one of type of skill that is "mandatory" owned by all stakeholders involved in the world of education, especially educators (teachers and lecturers). The reason is that ICT literacy skills have become part of the growing educational framework of the XXI century. At present all activities of human life have been directed under industrial developments. The world has now entered the fourth phase known as the 4.00 industrial revolution.

Current education has also been directed following the era industrial revolution 4.0. Indonesia has made the Indonesia National Qualifications Framework (KKNI) the foundation for the development of the basic and middle-level curriculum to suit technological developments in the era of industrial revolution 4.0. This also certainly has an impact on the preparation of teacher education curricula in tertiary institutions as institutions for distributing education personnel (LPTK). The application of a curriculum that is following the KKNI requires that teachers have good ICT literacy skills.

The questionnaire in this study developed into seven aspects, consisting of, the basic of computer / network use (aspect 1), electronic mail (aspect 2), word processing I (aspect 3), word processing II (aspect 4) information retrieval (aspect 5), the basic of the worksheet (aspect 6), and integrating various IT applications (aspect 7). These seven aspect are then developed into 40 statements to represent each activity that describes ICT literacy skills. The questionnaire of this study aims to measure the literacy skills of ICT physics teachers in state and private schools according to these indicators.

The results of the analysis show that the average percentage of ICT literacy skills of state and private school physics teachers is 87% and 90% respectively. Both are in the "very good" category. However, the average ICT literacy skills of private school physics teachers are high than state school physics teachers. A comparison of ICT literacy skills based on its aspects is presented in Figure 1. The information obtained from Figure 1 is that the ICT literacy skills of state and private school physics teachers are on average "very good".
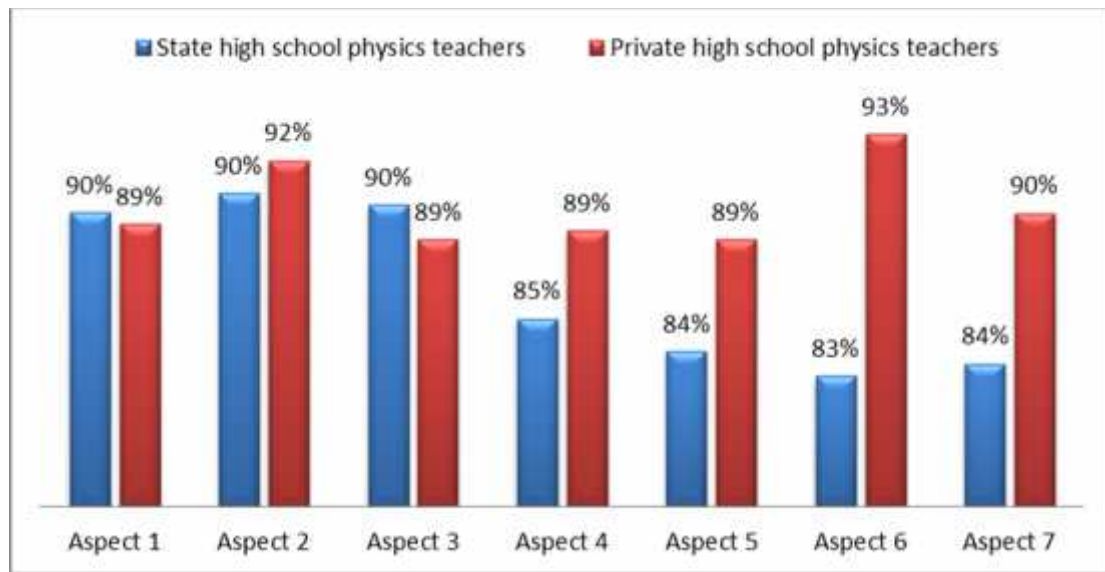
Figure 1. Graph of Comparison of ICT literacy based on aspects

Comparison of the first aspect is the basics of computer/network usage, the ICT literacy skills of state school physics teachers are 1% superior compared to private school physics teachers. Furthermore, related to the aspect of electronic mail, private school physics teachers excel at 2%. A comparison of the third aspect, namely word processing I, was surpassed by the state school physics teachers. The fourth to seventh aspects are overtaken by private school physics teachers. Percentage of excellence in each word processing II is 4%, information search is 5%, the basic of work 10%, and integrating various IT application by 6%. Based on the advantages of each of these aspect, information was obtained that school physics teachers were "superior" to their ICT literacy skills compared to public school physics teachers.

4. Conclusion

The results of the data analysis explained that teachers from private schools had the same ability as teachers from public schools for the aspects of the operation of ICTs, processing email, and word processing I, However for other aspects, namely word processing II, information retrieval the internet, the basic of employment, and the use of various IT applications to support learning, private school teachers are superior to state school teachers. This result can be a reference for researchers and policymakers in making training to improve ICT literacy for teachers in Merauke Regency.

Acknowledgment

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