

NEEDS ANALYSIS OF INFOGRAPHIC AS A LEARNING MEDIA FOR PHYSICS TEACHERS IN INDONESIA

*Netty Apriyanti

Mohd Shahril Nizam Shaharom

Suzieleez Syrene Abdul Rahim

Rafiza Abdul Razak

Faculty of Education, University of Malaya

*nettyruny@gmail.com

Abstract: Teachers are required to be professional teachers who have the skills and have basic competencies. One of which is the teacher must be keen in choosing and using the media by utilizing the innovation of educational technology that is sophisticated today. This study aims to identify the needs of infographic media for Physics lessons in high school. Earlier it began with an analysis of the availability of Physics lesson media at a school located in Sambas district, followed by interviews with 25 Physics teachers on infographic media needs. This study is a simple descriptive survey. Data were collected using interview techniques and analyzed qualitatively. Membercheck is used to ensure the validity of the findings of this study. The results showed that based on experience, learning styles of students, and the principle of necessity states that Physics teachers in Sambas district need innovation, especially in selecting and using learning media. All teachers said they really need and are interested in using infographic. They hope to use it to facilitate students in understanding the Physics concept, both in and outside classroom.

Keywords: Needs analysis, infographic media, Physics teacher

INTRODUCTION

Technological sophistication has an impact on education (Christensen, 2002). This is comparable to the turnaround and rapid development of information. One of the impacts is that learning materials and all things related to education will become easier to access and obtain (Artanto, 2016). This condition, affects the habits and culture of education of Indonesia managed for this (Slamet, 2016). More specifically the teaching of Physics in High School today has not achieved good results. For that, it is necessary innovation to improve education in Indonesia, especially in the learning process.

Professionalism is the desired competence or skill of a professional (Oxford English Dictionary, 1995). Based on this, teachers are required to have four basic competencies. First, pedagogic competence, namely the ability of teachers to understand learners, plan, implement, evaluate, and develop appropriate learning for the learners so as to actualize its potential maximally. Second, the personality competence, namely the personal ability of teachers who reflect a stable personality, stable, mature, wise, authoritative, and be an example for learners and noble character. Third, social competence, namely the ability of teachers in communicating and socializing effectively with learners, fellow educators, education personnel, parents / guardians of learners, and the community. Fourth, professional competence, namely the ability of teachers in understanding and mastering the field of study that diampunya widely and deeply.

The Indonesian government demands all teachers to become professional teachers. To achieve this, teachers should be creative and innovate in the process of teaching and learning in the field (in class and or outside the classroom). In this case, the teacher must be observant in choosing and using the media by utilizing the innovation of educational technology that has been sophisticated now, so that learning can be interesting. In addition, the media used should be used to improve students' motivation in learning, of course the use of media that will participate also stimulate students' visual spatial intelligence. With the rise of the visual culture of the web, images, photos and videos into social information forms to share and have been circulating (Kern, 2013; Rainie, 2012; Walter, 2012).

Science that will be taught a teacher to the student is a message that will be communicated in the form of teaching content and education that is in the curriculum poured by teachers or other sources into the symbols of communication both verbal symbols (oral or written words) and non-verbal symbol or visual. Sadiman et al. (2012, p.11-12) states that learning activities are essentially a communication process, ie as a process of delivering messages from a message source through a particular medium to a message recipient. Furthermore, the learning process can be supported with the

help of learning media. This is justified by Hashim (1997, p.4) and Haq (2017) stating that the information or the content of the lesson can use medium/media.

Most schools in Indonesia are still equipped with limited learning media, especially schools that are located in remote areas. The vastness of Indonesia, which consists of thousands of islands, makes education in rural areas require effective and accessible learning media. West Kalimantan as an example. The province has major problems in education, one of which is limited access to education (Akim, 2010, Aswandi, 2016, Ni'am, 2013). More conical to the districts of West Kalimantan province, Sambas district which is a backward, remote and border area, is also experiencing the same thing. The distribution of educational facilities and infrastructures that can not reach the villages spread far apart, resulting in education services in border areas always lagging behind other regions (Poetranto, 2003). In addition, this area is important to get serious attention from the government because Indonesian citizens on the border are a real picture of Indonesian identity against other countries (Depkimpraswil, 2002). Dodds (1983, p.20) stated that posters and flipcharts may be the only visual medium that can be provided for the village community. But its use needs to be careful to integrate with related verbal messages.

Infographics have become a new trend in today's learning approach as it covers many of the components used in the visualization of knowledge and allows knowledge to be presented in a different visual form (Williams, 2002; Yildirim 2017). Infographics is one of the fastest growing fields in the mass media after designers can combine information from the realm of news to cutting-edge computer software to explain stories that text and photos can not tell. Innovation brought about by infographics is the use of visual components and building content in the presentation of information (Dick, 2014).

Based on the background that has been described, a research question appears, "How is the needs analysis of Physics teachers for infographic learning media in high school?". The aim of this study is to analyze the needs of infographic media in learning Physics in high schools. Based on this description, the need analysis for infographic learning media needs to be done to see the level of needs as a learning media that can be used in learning Physics in high school. In this study, a needs analysis was conducted for Physics subject teachers in Sambas Regency High School, because before technology integration was carried out, teachers needed to analyze the suitability of technology with subject matter and student characteristics (Grabe & Grabe, 2004; Keengwe & Anyanwu, 2007; Roblyer, 2006).

METHODOLOGY

Nazir (1983, p.64) divides descriptive research into several types, namely: (i) simple descriptive survey method, (ii) descriptive continuous method, (iii) case study research, (iv) research work and activity analysis, (v) action research, and (vi) library and documentary research. This type of research is a simple descriptive survey research. A simple descriptive survey study aims to derive facts from existing symptoms and look for factual information about social, economic, or political institutions of a group or region (Nazir, 1983, p.65).

The instrument used in this research is the availability sheet of modified Physics learning media from Eliyadi, Marzuki, & Asran (2013) as preliminary information about the availability of Physics learning media. In addition, other instruments used are interview guidelines. Interview guides were made by researchers to address issues found in reaction evaluation, assessment to learning and behavioral evaluation (Kamaruzaman, 2009). All items in the observation sheet have been validated by two experts. Like wise for interview protocols, all question items used in the study are determined by the validity by two experts. For purposes of determining reliability, the Cohen Kappa Index (Cohen, 1968) analysis was used to determine the level of agreement of the unit of analysis with the theme under study. Next, the researcher calculates the approval value (Cohen Kappa Index) of the form received from the experts. Approval value is calculated based on the following formula:

$$K = \frac{f_a - f_c}{N - f_c}$$

Source: Cohen (1968)

Annotation:

K = value of Kappa coefficient

f_a = frequency of approval

f_c = frequency for 50 percent approval expectations

N = the number of units tested for value

To determine the degree of Kappa approval, the values recommended by Landis and Kosh (1977) are used by the authors, as shown in Table 1 below.

Table 1
The Kappa Index value and its interpretation (Landis & Kosh, 1977)

Value of Kappa Index	Interpretation
Less than 0	Very weak
0.00 – 0.20	Weak
0.21 – 0.40	Medium Weak
0.41 – 0.60	Medium
0.61 – 0.80	Good
0.81 – 1.00	Very good

Data collection techniques in this study is to use the observation (class) as a semi-structured interview. In this study, 25 Physics teachers were chosen purposefully. Sugiyono (2012) states that purposive sampling is a technique to determine the investigation with some specific considerations that aims to obtain data more representative. Meanwhile, according to Creswell (2014), in purposive sampling, researchers deliberately select individuals who teach different area in Sambas district, including from teachers who teach in the district itself, teachers who teach in the district to the border area (remote) for the sake of understanding a phenomenon. The study was conducted in 20 July 2017.

After the data is collected through the needs analysis with qualitative approach. The next step is to formulate data that may be many in order to be presented more structured editors and so on can be used as evidence of the backrest in making conclusions (Khan, 2009, p 37). Ali (2010, p.322) states that for the data to give meaning, then in the analysis undertaken steps taken, namely data reduction, expose data, and make conclusions. Data analysis is done by compiling data, exposing it into units, compiling into patterns, choosing which data are important and which will be learned and making conclusions (Ali & Saud, 2013). Target in this research is to reveal the need of infographic media for Physics concepts from perspective of Physics teacher. After the research was done, the researcher collected all respondents to do membercheck to guarantee the validity of this research.

FINDINGS AND DISCUSSION

The result of media analysis that support Physics learning process in senior high school in Sambas district, it is known that the available Physics learning media is very minimal, even there is no picture or other visual media that can be used to support Physics learning. The use of Physics learning media as a source and learning media in addition to Physics subject books can give a good influence on the process of learning Physics, especially in improving the learning achievement of student concepts, which ultimately will improve learning achievement (Apriyanti, Umar, & Tandililing, 2015).

To find out the need of infographic media used to help the process of teaching and learning Physics concepts used a qualitative analysis by identifying answers to interviews of teachers Physics. The analysis included a description of the needs of infographic media from the perspective of Physics teachers who have taught at different schools within the scope of Sambas district.

Before being used for interviews, each question in the interview guide was validated by two experts and in determining its reliability, the researcher used the Cohen Kappa Index analysis.

Table 2
The reliability value of questions that have been made in interview guidelines by Cohen Kappa Index (Cohen, 1968)

Expert 1	Expert 2	Cohen Kappa Index
$K_1 = \frac{35 - 17.5}{35 - 17.5}$	$K_1 = \frac{35 - 17.5}{35 - 17.5}$	$K = \frac{K_1 + K_2}{2}$
$K_1 = \frac{17.5}{17.5}$	$K_1 = \frac{17.5}{17.5}$	$K = \frac{1 + 1}{2}$
$K_1 = 1$	$K_1 = 1$	$K = 1$

Based on the value in Table 1, the Cohen Kappa Index (K) is 1. This value is a value with excellent interpretation. In other words, the unit of analysis made by the researchers is in accordance with the proposed research objectives, based on expert approval.

Interview questions are made up of four parts, namely preliminary questions, transition questions, key questions and closing questions. The preliminary question consists of two questions that concern the self-knowledge and experience (old) teaching that the teacher has gone through. Then, the transition question also consists of a question that asked about their difficulties in teaching the concepts of Physics. Furthermore, the key question consists of nine questions that relate to the teacher's experience with media relevance in teaching the Physics concepts. Also asked about the type and availability of the media and of the interest in the appropriate infographic for the Physics concepts. Finally, a concluding question that contains opinions or suggestions to be directed to other teachers or learners about the Physics instructional.

The similar answers from the interviews among teachers will be grouped and arranged for later conclusions. The description of the experiences of teachers, they have taught concept of Physics and almost all teachers claim always have difficulty for taught some concepts of Physics. From the data available, teachers rarely used media in teaching because the applied learning strategy tends to use the traditional approach or expository thoroughly with lecture method that emphasizes the teacher centered learning, and the learners does not have learning media that can be used by the learner to learning dependently.

Based the interview with the teachers, this study conclude that students learning styles and contents of Physics are best suited to be taught with the use of visual media. This is consistent with research conducted by Yildirim, Celik, & Aydin (2014) which states that visuals also allow situations to be displayed and information to be presented in an organized manner using visual components. In addition, data on the use of computers in learning that can not be optimized by teachers, for example, to create or load learning media. This is contrary to the exposure of the Minister of Education and Culture of the Republic of Indonesia (Mendikbud RI) on the development of Curriculum 2013, teachers are expected to aware of information, aware of media and aware of Information and Communication Technology (ICT).

Teachers are also very interested in infographic media and willing to try the media as soon as possible. Infographics is a new medium for them, which makes them curious and very happy with the idea of applying infographic media in learning, especially in Physics lessons. They hope that this infographic media should be developed to support and provide more understanding to the students. If the students are already familiar with the concept presented, then this certainly affects the achievement of student learning in Physics lessons.

Based on the analysis of interview data that has been done, it can be concluded five themes (Figure 1). As for the themes are Physics teachers have difficulty in teaching the concept of kinematics straight movement, teaching and learning Physics weakness, Physics teacher have constraints in instructional media, facebook for education, and smartphone for education.

On the difficulty of teaching a kinematics of rectilinear motion, the teacher stated that the students did not understand the concept, the teacher was difficult to describe the motion of the object, limited media, and the teacher had limited time. Here are some supportive opinions about the difficulty of teaching straight-line kinematics as physics teachers feel.

Hmmm ... another difficulty I feel is that I have difficulty visualizing or showing directly about object movement and speed and acceleration direction. (A1-PIL37)

Difficulty of teaching from media limitations aspect. To be honest, I feel the media need to help me and my students in the learning process. So, I am very need a media to teaching and learning Physics process. (A13-PIL12)

Then for teaching and learning Physics weakness that happened and felt by Physics teacher that use object in front of eye as media, scientific rank done indirectly, using lecture method, Physics teaching learning does not involve technology in teaching learning Physics, Physics teacher did not prepare learning media, and never try other learning media other than books. Here is a supportive opinion about the teaching and learning Physics weakness that occurred as physics teachers feel.

Most of the concepts I teach used lecture method, though I need the media, I will look and show the students what appeared in front of my eyes, which meant at that moment. If things around do not fit the concepts taught,

I do not use media for learning in the classroom. The important information, there is very little learning media. (A2-P1L22)

The categories included in the restricted teaching media in Physics, ie self-esteem does not have instructional media, schools have no learning media, use powerpoints when Over Head Projector (OHP) available, and not all classes can study with OHP. Then on the constraints to make the learning media felt by the Physics teacher is influenced by several categories, the Physics teacher likes to learn Physics concepts alone, physics teacher has many other jobs, Physics teachers who have just taught, the making of learning media that must follow the rules of development learning media, Physics teachers forget about the development of learning media rules, and no time to make learning media. Here are some supportive opinions about limited learning media and constraints to make learning media that Physics teachers feel.

Our school has no Physics learning media, especially kinematics of straight motion. Even the media in the form of images is not there anymore. (A3-P1L13)

Ooo yes, according to what I learned, making the learning media also can not be arbitrary, there are rules to be done, and we must follow the procedures. Eee ... About that, I did not even know Madam, because I never tried. After studying at college, so I've forgotten many, sorry. (A3-P2L9)

My school has no Physics learning media and so do I. We just used text book for teaching Physics. (A8-P1L10)

Additionally, all the teachers agree if the smartphone is used as a learning tool for students. Besides, social media such as facebook is used to facilitate students access the infographic. Teachers argue that during this smartphone is only used for social media only (less educational), so they declare this is an amazing design, if it can be done very well, because it can utilize smartphones in the world of education and distribution of infographics with facebook will make it easier students to access or obtain such media. Here are some opinions that supports Physics teacher statements about facebook and smartphone for education.

Yes because I believe that my students will be easy to access something from facebook by using their smartphone, so the learning process is not only done in the classroom but out of school can be done. Maybe not just my students, others will also be easy to access. So, sharing their knowledge is very simple and can be wider. (A22-P4L33)

Yes, because I believe my students have such apps and often interact, I mean they often use facebook, included me, hee. In addition, I believe in using smartphones, learning will become more flexible, in the sense that students can learn anywhere and anytime. For the example, I usually bring my smartphone anytime and everywhere i go. (A15-P4L5)

Based on the data, the results of interview from Physics teachers on needs of infographic analysis, as shown in Figure 1. Next, the teacher agreement in need and use infographic can be seen in Figure 2.

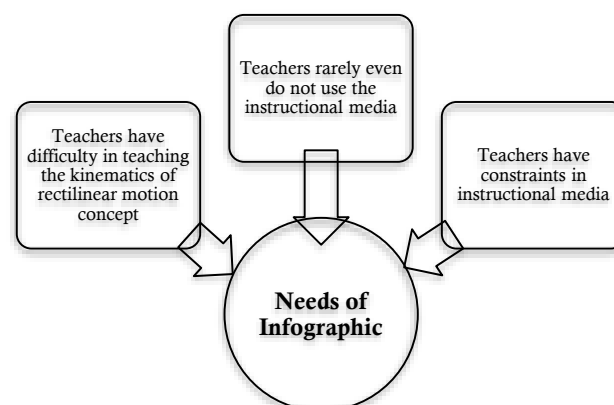


Figure 1: Results of interview from Physics teachers on needs of infographic analysis

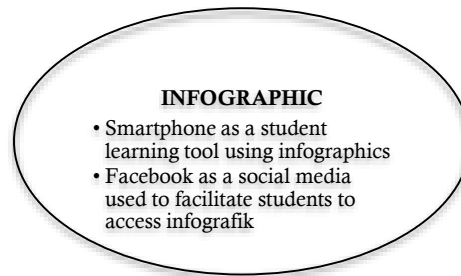


Figure 2: Teacher agreement in need and use infographic

In the process of learning to convey the concepts of Physics, teachers should be able to choose and apply learning media in accordance with the concepts that will be taught. This is very important because learning is the composition of information and environment to facilitate learning (Heinich, Molenda, Russell, & Smaldino, 1996, p.8). Teachers are required to use the tools or media provided by the school in learning and did not rule out that the media in accordance with the times and technology. This is approved by Kaminski (2005) which states the usefulness of technology is very important to give space to teachers to get more information about the advantages and potential use of technology in the classroom. Information and communication technologies are involved in all aspects in a very intensive and interesting way based on their status as objects and media (Silverstone & Hirsch, 2003).

Infographics is a new medium for the respondents, in which a combination of interesting graphs, drawings and colors, which can be applied in Physics teaching, since most textbooks of Physics lessons are dominated by text only and practice questions about Physics concepts are often related to the graph. This is supported by research conducted by Noh & Son (2014) and Yildirim, (2016, 2017) which state the importance of infographics in science education provided or in other words the development of infographics is closely related to educational goals. Through the results of the studies that have been done, it is evident that infographics can improve students' understanding in schools, both scientific concepts and communication skills by enhancing the ability of visual thinking, which has a positive impression on achievement and attitudes toward academic sciences (Noh & Son, 2015).

Learning by using infographic media that will be designed and developed using a smartphone as a learning tool and social media facebook as a means to access the media will enable students to get the media. This makes learning Physics more flexible and provides opportunities for learners to learn independently. Students need a instructional medium that can replace the role and function of teachers as the only source and learning media that can be used independently, enjoy, anytime, anywhere and complete (Apriyanti, Umar, & Tandililing, 2015).

CONCLUSION

Based on the results and data analysis that has been obtained from the interview analysis of infographic media needs on Physics teaching and learning, it can be concluded that all Physics teachers in Sambas District really need infographic media in the teaching and learning process specifically to teach the concept of rectilinear motion kinematics. This must be considered for the sake of fluency and facilitating the learning of Physics in high school. A distinctive feature of the media infographic is that the media infographic will be designed and developed according to the smartphone screen so that the infographics to be developed can be used in the classroom and can also be learning tools for students learning independently. The interesting thing about the infographics that will be developed is that smartphone learning is intended to make Physics learning more flexible, can be applied anywhere and anytime. Another special thing about the infographic is that the infographics will be uploaded via social media, such as Facebook. Thus, students can access infographics easily. These infographics will all be designed and developed in accordance with the opinions and requests of the research subjects on the analysis phase of this need.

Based on this study, there are several findings that can be used as references in the development of learning Physics, especially for the victory of school students, whether done in or outside the classroom. Suggestions in this study are infographic needs analysis on teaching and learning Physics that can be done to students to identify needs and adjust the media and learning styles of students. For further research, to investigate the analysis of these infographic needs with different methods and respondents, and do further research is to develop media infographics to help secondary school students in learning Physics and media can be made by teachers and/or students as alternative media that can help students to understand the concept of physics.

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