The social media whatsapp to support physics learning problem solving on online tutorial activities in distance education

Widiasih¹,²*, A. Permanasari³, Riandi⁴, and T. Damayanti⁵

¹Sekolah Pascasarjana, Universitas Pendidikan Indonesia, Program Studi Pendidikan IPA, Jalan Dr. Setiabudi No. 229, Bandung 40154, Indonesia 
²Departemen Pendidikan Fisika, Universitas Terbuka, Jl. Raya Pondok Cabe, Kota Tangerang Selatan 15418, Indonesia 
³Departemen Pendidikan Kimia, Universitas Pendidikan Indonesia, Kota Tangerang Selatan 15418, Indonesia 
⁴Departemen Pendidikan Biologi, Universitas Pendidikan Indonesia, Kota Tangerang Selatan 15418, Indonesia 
⁵Departemen Ilmu Sosial dan Politik, Universitas Terbuka, Kota Tangerang Selatan 15418, Indonesia

* widiasihbela@gmail.com; widiasih@ecampus.ut.ac.id

Abstract. One of the subjects that must be taken by distance education students of Physics of Universitas Terbuka (UT) is PEFI4201 Physics Learning Strategy. The average score obtained by students in PEFI4201 courses is low. To master the concept of this course students are given learning assistance services in the form of online tutorial (tuton) in addition to studying the module as the main teaching material. However, the students’ activity in the tuton is less encouraging. Thus the social media WhatsApp (WA) is required to enable students to follow the tutons. The purpose of this research is to describe WA communication process in support of tutons implementation. The method used in this research is descriptive qualitative and quantitative to analyze WA communication process in support of tutons implementation. The results of this study obtained that WA strongly supports student activeness in tutons. Communication occurring from 28 August to 29 October 2017 consists of academic administration 6.67%; reminder 22.42%; explanation of material 62.42%; and technical explanation elearning 8.48%. Two-way communication can work well through WA, because WA is more familiar to be accessed anywhere, anytime. If the student is late to access every step of the weekly learning activity on the tutons, be reminded through WA. Progress of individual progress in completing discussions and tuton assignments informed through WA with the intent to motivate students to immediately follow the discussion and complete the tuton task. Thus it can be concluded that social media WA can support tuton activities.

1. Introduction

Physics is part of Science. Science Learning prepares students to have a body of thinking, thinking skills, critical and creative thinking. Learning Science such as to support the development of human resources to have skills according to the 21st century are: critical thinking, problem solving, and the concept of Science; Communication and Collaboration Skills; Creativity and Innovation Skills;
Information and Communications Technology Literacy; Contextual Learning Skills; Information and Media Literacy Skills [1].

Era of technology in the 21st century, Universitas Terbuka (UT) are challenged to become the best Cyber University organizers in Indonesia. This is outlined in UT's strategic plan through 2020. UT establishes three development focuses: 1) Year 2018, UT aims to meet the needs of quality services for students; 2) Year 2019, UT strengthens community recognition and acceptance of UT; and 3) Year 2020, UT became the frontiers of education innovation, as a center for innovation research and development of various mode of technology-based learning and dissemination of innovation [2].

To meet the quality of service to students, UT provides learning assistance in the form of online tutorials for all courses, including physics learning strategy course (code: PEFI4201). Physics learning course must be in accordance with the demands of 21st century learning, including information and communications technology literacy, information and media literacy skills, and the solving problems in science concepts. Tuton is an example of implementation of Information and Communications Technology Literacy, and Information and Media Literacy Skills.

This courses PEFI4201 is difficult. This is evident from the distribution of student scores in 2013-2016 as follows, grade E (8.08%), D (40.42%), C (32.93%), B (8.68%), and A (1.5%) [3]. The previous research, it is known that student had difficulties in learning science, especially integrated science. Students' problem solving skill was still not in good category. This suggests that there is a gap in current capabilities with the wishes of students, where they are less able to solve them [4]. Allegedly, it was caused by unqualified students in planning lessons that refer to alternative solutions to problems [5, 6, 7].

Since the existence of tuton from year 1990 until now still needs to be done improvement. Efforts are made to increase student participation through discussion to problem solving and tuton tasks, initiation material development, and optimizing the empowerment of OER. However, the participation rate is still low. This is apparent from the PEFI4201 tuton in the 2016.2 semester of 42 tuton participants, only 38 participants were actively following the tuton. Most students only view, do not send tuton assignments or post and or respond to discussions.

Efforts to increase the use of tuton system continue to be done. This is evident from some research results about the tuton. One of the research results revealed that the effort to increase the participation of tuton participants can be done with social media such as FB and WA [8]. Other research revealed that integrating WA applications in English learning can improve the ability of learners [9]. The technique WA produce a significant effect on the writing skills of students [10]. However, the results of this study have not seen a pattern and planning in the utilization of WA to be empowered in the tuton system. Thus it is necessary to develop WA application utilization pattern in empowering the tuton students to be more actively participate in the tuton. For that done a study The Social Media WA to Support Physics Learning Problem Solving on Tuton Activities in Distance Education.

WA is a popular messaging app used by Android smartphone users. WA is not only used to send messages, but can be used to call and send pictures/photos, video and audio. In addition, the WA also provides group features that allow for group discussion [11]. WA Messenger is a popular technology that is very potential to be utilized as a learning tool. In WA Messenger there is WA Group that is able to build a fun learning related to various discussion topics provided by the teacher [12]. WA Messenger can not be separated from Net Gen or digital generation who always wanted the update of various internet-based technologies. Recent empirical data show that Net Genes have collaborative learning blends, do not respond well to lecture learning, want information they can receive individually, and always want a variety of learning materials that can be accessed easily through technology [13]. WA is a Mobile Learning or modification of knowledge or skills through the use of mobile technology, anywhere, anytime and resulting in modification of the behavior [11].

2. Experimental Method
The research was conducted using Mixed Methods Research Design with Embedded Experiment design. Mixed Methods Research Design is a method of collecting data and analyzing data by combining qualitative and quantitative research used together in one study. Qualitative and
quantitative methods are used together to complement each other. Embedded Experiment Design includes the pre experimental, experimental, and experimental data analysis stages [14].

In this paper we will explain the results of the implementation stage using pre experimental method. 30 participants were involved in this implementation stage; in which 21 participants of which become WA group participants. For the data of the participant tuton analyzed qualitatively in the form of participant response in communication in tuton and WA. The Data From the overall response of students selected and grouped and reviewed the contents of communication conducted. The Data in the form of communication tuton and participants from 28 August 2017 to 29 October 2017 will be asked for advice and opinions from the pedagogic experts. The task data of the tuton were analyzed quantitatively with mean to distinguish between tuton before being combined with WA and tuton combined with WA.

3. Result and Discussion

The results of this study consists of two parts: 3.1) Implementation of WA communication that supports tuton activity; 3.2) types of communication in support of tuton activities.

1.1. Implementation of WA communication to support of tuton activity

Tuton PEFI4201 aims to equip science teachers or advanced school physics in order to be able to apply the concepts of Physics learning strategy. To achieve these competencies, Tuton activities each week consists of studying initiation materials, conducting discussions. Efforts to increase student activity in online tutorials are done by adding communication through WA. To illustrate that the difference in tuton activity supported by WA social media communication, it is compared between the 2016.2 tuton with tuton 2017.2 which can be observed in the following table.

<table>
<thead>
<tr>
<th>The Weekly activity</th>
<th>The Activity tuton in 2016.2 (before using WA)</th>
<th>The Activity tuton in 2017.2 supported by WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuton activities</td>
<td>Studying the module material by doing the following activities:</td>
<td>Establish a group on 28 August 2018 and deliver the objectives; introduce myself;</td>
</tr>
<tr>
<td></td>
<td>Studying the Initiation Material is a module summary</td>
<td>Remind students to start tuton activities; studying initiation materials, studying OER, following discussions; and doing tutorial tasks;</td>
</tr>
<tr>
<td></td>
<td>Learn relevant material sourced from OER</td>
<td>Inform anyone who has responded to the discussion and who has already done the tutorial task;</td>
</tr>
<tr>
<td></td>
<td>• Do Discussion</td>
<td>Answering student questions related to technical implementation of tuton;</td>
</tr>
<tr>
<td></td>
<td>• Completing the task of Tutorial</td>
<td>Remind students that it</td>
</tr>
<tr>
<td></td>
<td>Tuton activities</td>
<td>Send email to students asking HP to form WA group;</td>
</tr>
<tr>
<td></td>
<td>• Send messages through the tuton system to start tuton activities</td>
<td>For 8 weeks, students learn initiation materials, follow discussions, work on online tutorial tasks.</td>
</tr>
<tr>
<td></td>
<td>• For 8 weeks, students learn initiation materials, follow discussions, work on online tutorial tasks.</td>
<td>Result</td>
</tr>
<tr>
<td></td>
<td>Result</td>
<td>Students who actively follow tuton as many as 29 from 29 people (100%).</td>
</tr>
<tr>
<td></td>
<td>Students who actively follow tuton 38 of 42 students (90.48%).</td>
<td>Student participation in tuton activities is still somewhat low at 58%;</td>
</tr>
<tr>
<td></td>
<td>Student participation in tuton activity is</td>
<td>Some students</td>
</tr>
</tbody>
</table>
Table 1. Activities in tuton and communication through social media WA

<table>
<thead>
<tr>
<th>The Weekly activity</th>
<th>The Activity tuton in 2016.2 (before using WA)</th>
<th>The tuton activity in 2017.2 supported by WA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WA communication activities in 2017.2</td>
<td>Activity tuton 2017.2 (utilizing WA)</td>
</tr>
<tr>
<td>still a bit low ie</td>
<td>has been a few days</td>
<td>who do not pass</td>
</tr>
<tr>
<td>the highest 58%</td>
<td>since the discussion forum was opened but</td>
<td>the course repeat</td>
</tr>
<tr>
<td>• Some students</td>
<td>no student has responded.</td>
<td>in 20172 become good value</td>
</tr>
<tr>
<td>do not pass the</td>
<td>• Post discussion on WA forum, because at 5th</td>
<td>La Ode from E to A;</td>
</tr>
<tr>
<td>course (E grades)</td>
<td>week has lasted 5 days,</td>
<td>Anggun Eka from E to A-</td>
</tr>
<tr>
<td></td>
<td>but no student posted post discussion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provide feedback on student posts in WA;</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 above shows that communication through WA starts from forming WA groups; inform group objectives; remind students to actively follow tuton; answer student questions related to technical implementation of tuton; giving feedback on tuton material questions. Communication through WA implies an increase in student tuton activity as seen in the following chart.

Figure 1. Tuton activities

Figure 1 shows that during the tuton 2016.2 has not taken advantage of WA communication. The percentage of students involved from tutorial assignments was 38%, 36%, and 38%, respectively. While the students involved in the discussion ranged from 0% about the physical learning strategy up to 52% about the general procedures of learning. In the tuton 2017.2 supported by WA. For that happened the increase in student involvement in doing tuton tasks successively to 45%, 38%, and 41%. Similarly, students involved in discussions increased between 21% of physics learning strategies to 79% of general learning procedures. Thus the tuton combined with the WA improves student engagement in tuton work and discussion. This is in line with research conducted which states by using WA to improve the construction of the social environment. The role of the tutor turns into a facilitator and mentor who provides guidance [10]. Neither does the student's role change from receiving the information to the information generator. Thus the students actively mensharing information according to the material. In addition to the implications for increased student
involvement, WA communication also has implications for improving students' skills in solving learning problems, as stated in the following section.

![Bar chart showing problem solving skill](http://science.conference.upi.edu/proceeding/index.php/ICMScE/issue/view/3 | ICMSCE 2018)

Figure 2 shows that problem solving skill of physics learning strategy in 2016.2 is 91, respectively; 93; and 94 increased in 2017.2 respectively to 98; 94; and 96. Task 1 measures problem-solving on concepts: general instructional procedures, basic teaching skills; methods and approaches in physics learning. Task 2 measures students' ability to solve learning problems: media and learning models. Furthermore, the task of tutorial 3 measures students' ability in solving the problem of learning syllabus, learning strategy, and worksheet development. This increase occurs due to the integration of tutor and WA communication. This is in line with Ta'amneh's [9], research, that WA communication can improve the ability of concepts, including the ability to solve problems of physics learning. The problems in this study are packed in the form of learning cases such as the situation in real class [15]. Stages in solving learning Science problems requires high-level thinking skills that identifying important information; linking the information; analyze the cause of the problem; develop alternative the problem; analyze the strengths and weaknesses of each alternative; choose the most effective alternative [16]. In discussion section, to achieve the desired objectives, students solve science learning problems through various ways or stages [15, 17, 18, 19].

### 1.2. The types of communication to support tuton activities

Overall significant data from WA group communication to support the implementation of tuton that occurred from 28 August to 29 October 2017 are listed in the following table. Table 2, shows that there is a wide range of WA communications in support of tuton implementation starting from the academic administration of 6.67%; explanation of tuton implementation technique 8.48%; reminder 22.42%; explanation tuton material 62.42%. From the data shows that the interaction of communication between human to communication technology system, in this case WA technology. This is in line with the opinion [19] the interaction of human communication with technology systems is characterized by the interactivity, digitalization, narrowcasting, virtuality, Asynchronous.

<table>
<thead>
<tr>
<th>Type of communication WA</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>academic administration</td>
<td>11</td>
<td>6.67</td>
</tr>
<tr>
<td>technical tuton</td>
<td>14</td>
<td>8.48</td>
</tr>
<tr>
<td>reminder</td>
<td>37</td>
<td>22.42</td>
</tr>
<tr>
<td>explanation of material</td>
<td>103</td>
<td>62.42</td>
</tr>
<tr>
<td>total</td>
<td>165</td>
<td>100%</td>
</tr>
</tbody>
</table>

![Table 2](http://science.conference.upi.edu/proceeding/index.php/ICMScE/issue/view/3 | ICMSCE 2018)
a. The examples of academic administrative communication

b. The example of technical communication of tuton implementation

c. The example of communication tuton material

d. The example of communications reminder to do the task and to actively discuss

Figure 3. Sample of interaction communication in WA

Figure 3 shows that WA communications to support tuton activities include academic administration, eksplonation technical tuton, reminder to do tsk and to active discus, explanation of tuton material. Students feel the WA gives them the possibility to express themselves freely in an unlimited environment thereby eliminating the characteristics of low participation constraints [20]. In addition, with WA students learn technical skills by sharing and searching for information.

Communication learning through WA is also included in the form of e-learning. States there are two main models of distribution in e-learning include synchronous and asynchronous [21]. Distance Learning combines both e-learning models, the synchronous model in which the learning process has been determined that the time is only 8 weeks in one semester. While the asynchronous model includes providing initiation materials, links to other sources, and discussion forums that can be used to interact with Tuton participants as well as with Tuton tutors that among others solve learning
problems. Students are less used Tuton, because they are not familiar with the tuton system and barriers in the internet connection [22].

Student response to tuton combined with WA is very positive. According to students, the implementation of tuton is supported by communication through WA group. This is reinforced by the opinion one of student who stated "Yes mom, thank you for making this group, hopefully it can ease to tuton activities"

4. Conclusion

Tuton combined with communication through WA can increase student involvement in tasks; increase student involvement in discussions; and improve students' ability to solve physics learning problems. The types of capabilities that support the tuton implementation consist of academic administration, technical tuton activities, reminder of task and tuton discussions, explanation tuton material. For that it should be in every implementation of tuton is supported by WA group to help facilitate communication.

5. References

[1] BSNP 2010 (Jakarta: Badan Standar Pendidikan Nasional)
[3] Data SRS Pusat Pengujuan Universitas Terbuka
[16] Straубhaar J and LaRose R 2002 USA : Wadsworth Group
[17] Santrock J W 2008 (Jakarta: Prenada Media Group)
[18] Nakin J B N 2003 Disertasi University of South Africa