Investigating an online learning service management on students' learning activeness: A Rasch model analysis

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Abstract

The purpose of this study was to investigate online learning service management (ORNAMENT) for student learning activeness by using the Rasch model analysis. The research method used is the mixed method. Samples for this study were three public junior high schools (PJHS) in Bandung, West Java, Indonesia. The data source are 58, consisting of 19 PJHS X (high quality), 19 PJHS Y (medium quality) and 20 PJHS Z (low quality). For quantitative data, a 7-item questionnaire is used and for qualitative data, interviews were conducted. The results show that almost all data sources, especially PJHS X (100%), agree with all statements on the questionnaire. It can be concluded that through ORNAMENT students' learning activeness can develop. In addition, the learning activeness of PJHS X students is superior to those of the other two schools. Schools can use ORNAMENT, which was developed and adapted to standards and principles, to develop student learning activeness.

Keywords: ORNAMENT, Rasch model, learning activity

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1. Introduction

Some prefer to distinguish differences by describing online learning as 'complete' online learning (Earle & Fraser, 2017; Radmehr & Goodchild, 2022), while others simply refer to the technology media or the context in which it is used (Nacu et al., 2018; Öztok, 2016). Online learning is described by most authors as using technology to access learning experiences (Moore et al., 2011). Online learning can be broadly defined as the use of the Internet in some way to enhance teacher–student interaction (Huang et al., 2020; MacKenzie et al., 2021). Online delivery includes both asynchronous dialogues, such as rating tools and web-based course material delivery, and synchronous dialogues through conferencing tools, such as email, newsgroups and chat groups, which include both classroom and distance learning. Other terms synonymous with online learning are 'web-based education' and 'e-learning'.

With the advent of the Internet and the World Wide Web, learners or students around the world are much more likely to be reached, and today's online learning offers a wealth of educational resources in multiple media, such as real-time between teachers and students (Engelbrecht et al., 2020), and provides the ability to provide both real-time and asynchronous communication between different students. Online learning is gaining popularity due to its flexible access to content and instruction anytime and anywhere (Bazelais & Doleck, 2018; Cheng & Lai, 2020). Online learning overcomes the inherent drawbacks of traditional classroom lessons, especially the inflexibility in using resources, including space and time planning (Doron & Spektor-Levy, 2019; Sit et al., 2005). Benefits of using computer-based tools described in the literature include convenient access to information, flexibility to adapt to student educational needs and cost-effectiveness in providing educational opportunities for a large number of students (Gustafson & Branch, 1997).

Gadbois and Haverstock (2012) discovered new opportunities to provide interactive learning experiences, such as the use of information technology in online learning. Online learning also allows to exchange or share information about learning management in the classroom, which makes it very possible to develop skills among other teachers (Dignath & Veenman, 2021; Schmeeckle, 2003). In addition, educators can share course content, updates to the latest learning applications and communicate directly with learning resources. This allows teachers to connect directly to learning resources on the Internet. Therefore, this allows students to have a more comprehensive research relationship. The relationship between the three components is shown in Figure 1.
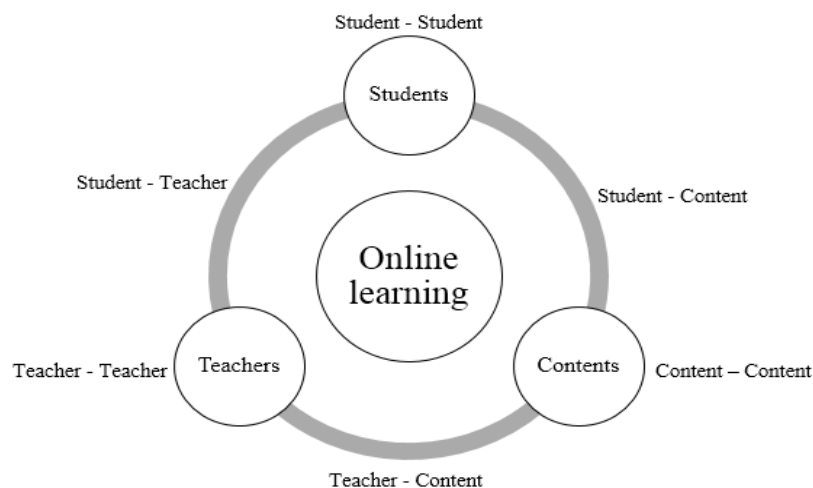

Figure 1. Interaction on online learning between students, teachers and content

Online learning is one form of service, especially learning services. Researchers began research in the service field in the early 1970s, creating various research directions for service management (Badinelli et al., 2012). A critical analysis of the concept highlights a systematic perception that services are exchanged and are not just attributes (i.e., insignificant), rather it needs to be an important concept in designing and managing sustainable, profitable and rewarding relationships in any service exchange (Sewchurran et al., 2019). In the context of education, service management can be interpreted as an effort by an education service provider (school) to satisfy its customers (students, parents and communities) (Lin & Ding, 2009). If customers can feel satisfaction because of the services provided, simultaneously there will be high loyalty from within the customer to use similar services. In this regard, the best way to do this is to show the best performance of the school so that the customer can give enough attention and trust (Akinboade et al., 2014).

The essence of service management in the education must follow the principle of continuous improvement (Ehren et al., 2013; Ling et al., 2021; Saiti, 2010). If not, it should be interpreted as continuous improvement. Schools must be able to establish themselves as service providers in a way that constantly accepts suggestions, complaints and criticisms from customers (Zeithaml, 2000). In this way, quality education is created based on the needs (social demands) of the community. In general, quality education comes from the school's consistent efforts to hear from clients and put them into action (Louis, 2007). In the context of education, of course, good service management needs to be related to set service standards.

In this regard, Tidball (1993) has established five service standards that can meet customer expectations: (1) suitability based on specifications; (2) suitability based on utilisation or purpose; (3) no shortage; (4) time-consuming correct and also appropriate; and (5) at any time ready when needed. To provide the best service to customers, schools must adhere to the principles of service management. This is important because customers can feel a positive atmosphere while using the services provided. In this regard, Erchul and Young (2014) reduced the number of things to consider when implementing service management in the education context. Some of these points are simplicity, clarity, timeliness, accuracy, security, accountability, facility and infrastructure integrity, accessibility, discipline and comfort.

Currently, online learning services are in great demand due to the technological development and the advent of the COVID-19 pandemic, which requires reducing face-to-face interactions. Regarding service management standards and principles, online learning in a school must be considered in order to meet the standards and principles set. Online learning service management (ORNAMENT) should not only be designed based on existing standards and principles, but should have a positive impact on students, including their learning activeness. As we know, a common problem in the learning process, especially in online learning, is the lack of learning activity of students when participating in learning (Jandrić et al., 2021; Nuryasintia & Wibowo, 2019; Price et al., 2021).

Student activity in learning is an important and fundamental issue that all teachers in the learning process need to understand and develop (Gan & Lee, 2016). Learning activities are characterised by optimal intellectual, emotional, and physical participation (Gunawan, 2018; Nuryasintia & Wibowo, 2019). Student activities in the class are activities conducted by the students during the learning process by activating physical and mental aspects and need to be developed by the teacher to achieve the learning goals (Clark, 2012; Prenger et al., 2021). Student activity is influenced by their motivation to learn because, through learning motivation, students engage in activities in the classroom to get what they want (Middleton et al., 2013).

Student learning activities are in general one of the components of a teacher's assessment (Clark, 2012; Fox-Turnbull, 2006; Zeng et al., 2018). Achieving student competence in the teaching and learning process is a measure of learning success. This success can be measured by student activity during the teaching and learning process, such as student enthusiasm for learning, answering questions from teachers, answering other students' remarks, completing tasks set by teachers and presenting work results (Gunawan, 2018; Nuryasintia & Wibowo, 2019). Activity level-related issues arise when students work on a teacher's task and copy the work of a wise friend.

Then, when the teacher asks a question, they will answer silently, unless pointed out by the teacher. The effect of these conditions is a lack of student activity in the learning process, resulting in a more dominant teacher. According to Putri and Mawardi (2017), the student's active involvement in the learning process now reflects optimal learning quality. The involvement of the problem is student-centric learning; the role of the teacher is only as a motivator and facilitator. Lack of learning activity negatively affects learning outcomes because if students are not careful and follow their learning well, they will not be able to understand the materials taught by the teacher.

The activities that children naturally have will develop into a positive direction if their environment provides a good space for the development of the activities (Kirch, 2007). Therefore, an appropriate ORNAMENT is needed to develop students' learning activeness. By investigation of appropriate ORNAMENT, we used Rasch model analysis. The Rasch model analysis, published by Georg Rasch in 1960, is a statistical method for determining the amount of human concerts, attitudes and insights (Rasch, 1960; Samsudin et al., 2020). The Rasch model analysis is a state-of-the-art alternative extension technique that produces measurement levels that comply with the International System of Units standards and can be used as a tool for slicing specific units of measurement and as a good classic (Arsad et al., 2013). Rasch model analysis shows the most suitable method for initial research in the humanities field. Since Rasch model analysis is probability-based, people's responses can be correctly projected across elements that fit the measurement type, using only the constraints of items that are similar in size to the individual constraints (Perry, 2019; You et al., 2018). Therefore, the aim of this study was to investigate ORNAMENT for students' learning activities using Rasch analysis.

1.1. Purpose of the research

This study reports on a study that uses online learning service management in developing students' learning activities, especially during the COVID-19 pandemic. Therefore, the aim of this study was to investigate online learning service management (ORNAMENT) for students' learning activities using Rasch analysis. In addition, this study also compares students' learning activities in three schools that have different quality of education.

2. Methods

The research method used in this study is mixed method, a combination of two research methods: quantitative and qualitative (Creswell, 2014). Through this mixed research approach, we assume that the data obtained are more comprehensive and superior than using only one research method. In the context of the research conducted, we choose a sequential explanatory approach. A mixed method with a sequential explanatory is a study that combines two research models at the same time, i.e., quantitative and qualitative. The first phase uses a quantitative approach, followed by a qualitative approach. In other words, for the quantitative data of this study, the learning activities of the students

were collected based on the questionnaire. Then, a detailed interview was conducted to investigate each variable and indicators provided in the questionnaire.

2.1. Sample

The stratified random sampling method was used for sampling. Stratified random sampling is a sampling technique related to the level (layer) of population members (Teddlie & Yu, 2007). Population elements are divided into several levels (hierarchies) based on their assigned characteristics. In this survey, we adopted the analytical units of each public junior high school in Bandung City, West Java, Indonesia. It represents the layers of quality of education: high-, middle- and low-grade schools. We chose public junior high schools (PJHS) X for high school quality, PJHS Y for medium school quality and PJHS Z for low school quality. Table 1 shows the demographic distribution of the data source.

Table 1. The demographic distribution of the data source

Demographic	Frequency	Percentage (%)
Number of data source by quality of school		
PJHS X	19	32.8
PJHS Y	19	32.8
PJHS Z	20	34.4
Position		
Teachers	52	89.6
Vice-principals of the curriculum	3	5.2
Principals	3	5.2
Online learning		
Full online learning/daring (D)	32	55.2
Blended learning (B)	26	44.8
Gender		
Male	14	24.1
Female	44	75.9
Age		
Below 30 years	8	13.8
31-40 years	32	55.2
41-50 years	11	19.0
Above 51 years	7	12.0
Total	58	100

2.2. Instruments

The instruments used in this study include those for obtaining quantitative and qualitative data. For quantitative data, the instrument used is a questionnaire. The purpose of this questionnaire is to collect information from respondents in the form of experience, personal responses or knowledge about the research topic so that researchers can get an overview of the research topic. In this study, a combination questionnaire, i.e., a combination of open and closed questions, was used. In this study, we used a questionnaire to determine which factors influence a students' learning activeness. In the early stages of creating the questionnaire, there were nine statements. However, after testing its validity and reliability, there were two invalid statements. Therefore, the questionnaire contains seven statements in the final phase. The questionnaire has a scale of 1–5, namely 1 for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree and 5 for strongly agree. These statements are related to students' learning activeness, as shown in Table 2.

Table 2. The list of statements in the questionnaire

Number of statements	List of statements
S1	Students respect the opinions of others
S2	Students have the ability to socialise and work well together
S3	Students like to respond to teacher's questions and instructions
S4	Students dare to explain the results
S5	Students record teaching materials completely and neatly
S6	Students take classes seriously from the beginning to the end of the meeting
S7	Students can present their work well

The instrument used for qualitative data was interview and interpretation of the results with the Rasch model analysis using variable (Wright) maps. In this study, the interview process was carried out in various ways, including informal interviews (not glued to the interview guide) and formal (fixed to the interview guide).

2.3. Data analysis procedure

The questionnaire was distributed to each public junior high school data source in the form of a Google Form. The Google Form has seven statements related to students' learning activities when using online learning. The questionnaire cover sheet warns participants about the purpose of the questionnaire and the confidentiality of the answers. This study uses the Rasch analysis model to analyse the research data. The data on a scale of 1–5 obtained from the results of the questionnaire were entered into Microsoft Excel and then processed using Winsteps software version 5.2.0.0. By using the Rasch model for processing, the ordinal data obtained from the questionnaire results can be converted into interval data, known as logit. The analysis used is by using variable (Wright) maps. This analysis raises the distribution of statements and data sources. Furthermore, this data can be interpreted based on its distribution.

3. Result

Students' learning activeness in this study include activeness in asking and answering questions, problem-solving skills and questions, listening and following the learning process until it is finished.

Based on the results of quantitative data processing on students' learning activeness, the results obtained are as shown in Figure 2.
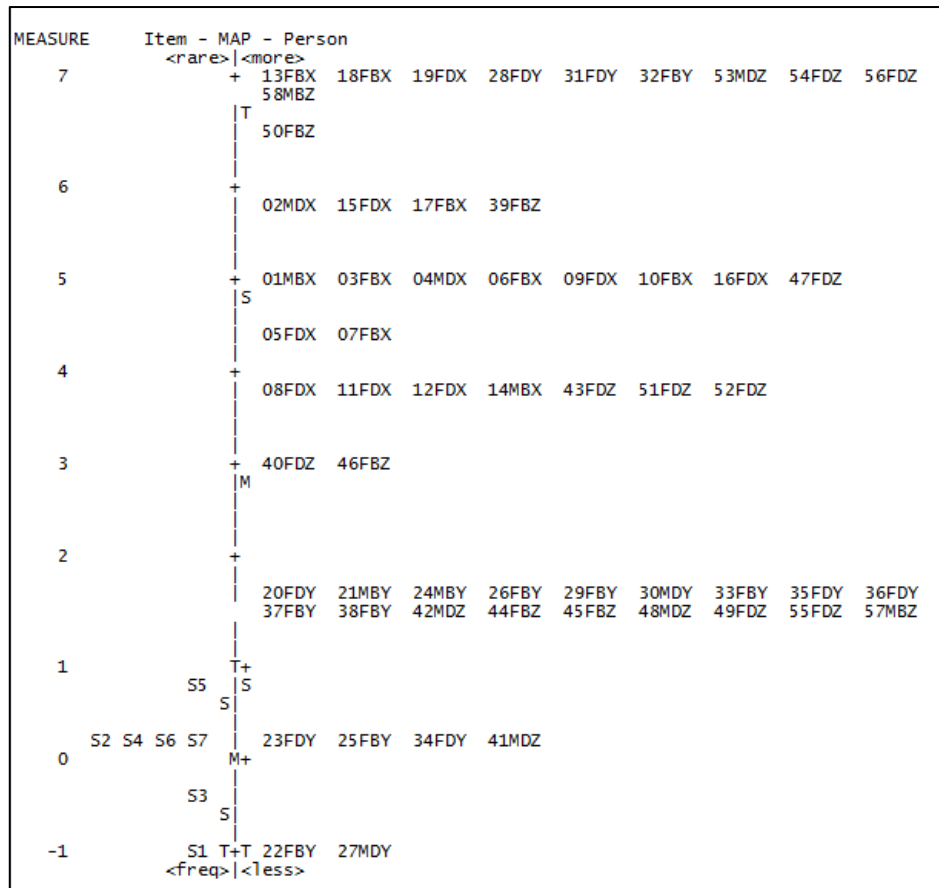

Figure 2. Distribution of data source responses to statements in the questionnaire

Based on Figure 2, the left is the distribution of statements (S1–S7), while the right is the distribution of the data source (01MBX-58MBZ). The symbols of the data source, namely 01–58, are the 1st–58th data sources; M/F is the gender (male/female); B/D is the type of online learning that is carried out (blended/full online); and X/Y/Z is the name of the junior high school. From the distribution, it can be seen that almost all data sources agree with statements S1–S7, except for six data sources (10.3%). The data sources that disagree with this statement are 23FDY–27MDY where they do not agree with statement S5. This means that most of the data sources agree that through ORNAMENT students can develop their learning activeness.

Figure 2 also shows the student learning activeness for each statement. All data sources agree with statement S1, namely, 'students respect the opinions of others'. That is, through ORNAMENT, students can respect the opinions of others. For statements S2, S3, S4, S6 and S7, almost all data sources agree but there are two data sources, namely 22FBY and 27MDY, that disagree that through ORNAMENT students have the ability to socialise and work well together, like to respond to teacher's questions and instructions, dare to explain the results, take classes seriously from the beginning to the end of the meeting and can present their work well. Finally, for statement S5, almost all data sources agree but

there are six data sources that disagree that through ORNAMENT students record teaching materials completely and neatly.
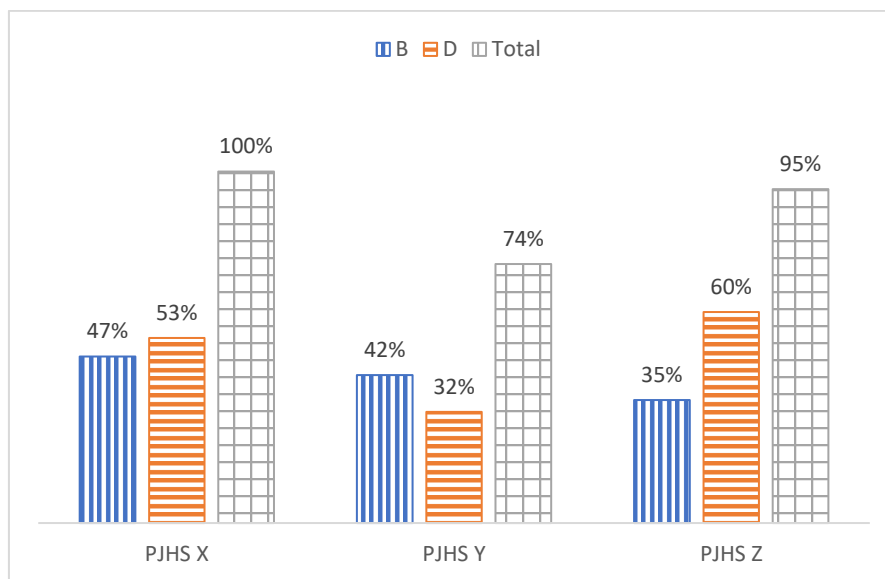

Figure 3. Percentage of data source statements for each school

From this distribution, it can also be compared to the data source statements for each school, as shown in Figure 3. PJHS X has the highest percentage of 100. This means that all data sources in PJHS X agree that through ORNAMENT students' learning activeness can develop. In PJHS Y, only 74% of data sources agree that ORNAMENT can develop students learning activeness. The percentage of data sources in PJHS Y using blended learning (B) is 42 and using full online learning (D) is 32. Because the percentages of B and D are almost the same, it can be said that blended learning in PJHS Y can further develop students learning activeness. In PJHS Z, 95% of the data sources agree that ORNAMENT can develop students' learning activeness. The percentage of data sources in PJHS Z using blended learning (B) is 35 and using full online learning (D) is 60. This shows that learning in PJHS Z uses full online learning more. However, students' learning activeness can also be developed through a full online type of ORNAMENT.

4. Discussion

A fundamental factor influencing learning success is students' learning activeness (Choi & De Vries, 2011; Falout et al., 2016). Learning activeness is an important element owned by students because it involves mental activities, i.e., thoughts and physical activities, which is a combination of actions or simultaneous actions. According to Goldberg et al. (2021), when a student's physical and mental activities are synchronised at the same time, it is an indicator of learning success. Physical activity includes the involvement of parts of the body in designing, creating, playing or working, as well as sitting, standing and listening. Psychological activities, on the other hand, include the ability of students' thinking skills to function properly. This applies to building critical thinking, building one's own understanding and the ability to solve problems and problems faced during the learning process.

In this study, there are three aspects involved in the learning activeness of students. This includes active questions and answers, problem-solving skills and task completion, listening and follow-up to the

completion of the lesson. Based on the results of the Rasch model analysis of students' learning activeness conducted at three schools, we found that the percentage of active learning in PJHS X was in the very high category (100%). On the other hand, PJHS Y was in the high category and the learning activity rate of students is 74%. The percentage of PJHS Z is 95, which is a very high category. These results show that the learning activities of PJHS X students during the online learning process are superior to those of the other two schools.

The vice-principal of the curriculum of PJHS X said the learning activeness of students during the online learning process is very good. This is because the majority of students are very confident that they need to be proactive because the learning process is bidirectional, not just the teacher when learning. Another factor for students to learn positively is better because it depends on the stimulus from the teacher. For example, teachers always remind students to take and complete tasks given by teachers seriously before starting a class. Vice-principal of the curriculum of the PJHS X said, '…we always advise students that in this online learning the task of the teachers is only to function as a facilitator in learning. The teacher only strives for all efforts that are included in their domain, for example providing teaching references, creating teaching content using the multimedia or application-based, making student worksheets and giving assignments that are in accordance with the curriculum set by the school. The rest remains to be returned to the students themselves. The extent to which they are willing to try and strive to welcome the feedback that has been given by the teacher'.

In addition, with regard to learning activeness, teachers should not be the only scapegoat each time a student's grades fail. Many factors influence and contribute to it, one of which is, for example, the involvement of parents. Parents also need to play an active role in raising students' learning awareness (Harris, 2015; Herbert & Bragg, 2021; Khan et al., 2020). This creates a good relationship between the school and parents. The problem that has arisen so far is that parents tend to abandon their children's education. The full burden of parenting should be left to the schoolteacher.

The most effective way to measure a student's learning activeness is to look at the student's involvement during online learning. Based on the data obtained by researchers regarding the learning participation of PJHS X students through interviews with the vice-principal of the curriculum, it was revealed that students' learning participation was in the very good category where out of 1,000 PJHS X students, as many as 900 students or more actively participated. This means that the attendance percentage of PJHS X students is above 90%. In addition, the way teachers measure students' learning activeness during this online learning process is not only to see student participation in learning from the beginning to the end of the meeting, but also others.

Most important aspect is the student's ability to solve problems and complete assigned tasks (García et al., 2016; Hallman-Thrasher, 2017). Problem-solving skills and task completion aspects are the teacher's main considerations in providing the student's grade assessment. In that very situation, teachers do not have the opportunity to measure the comprehension of individual students. Therefore, independent problem-solving skills are certainly needed. Vice-principal of the curriculum of the PJHS X said, '…this is certainly very difficult for students, but with serious effort they will succeed. Of course, if they have problem-solving skills, they will complete the tasks set by the teacher. It will be easier'.

Another less important aspect of the students' learning activeness is the student's ability to answer the teacher's questions (Yeo & Tan, 2014; Zhao & Ma, 2009). This questioning ability is very important for students. Because the teacher is physically on the students' side and cannot explain in detail, the student has to dare to talk to the teacher. The only way students can do it is to have the ability to ask questions. Of course, this is not easy, especially when it comes to topics related to numbers and

arithmetic. Vice-principal of the curriculum of the PJHS X said, '…for certain subjects such as math, we make it easy for students to use the Microsoft Teams learning application, which allows both teachers and students to learn interactively. In addition, this application also makes it easier for teachers to make questions-problems using mathematical equations'.

Blended learning in PJHS Y can further develop students learning activeness compared to full online. This can be due to the balance between online and face-to-face learning. In online learning, teachers can use various learning media and with face-to-face learning students and teachers can interact directly for material that is not understood when online learning (Di Giacomo & Di Paolo, 2021; Marín-Díaz et al., 2021; Torda & Shulruf, 2021). In PJHS Z, full online learning has the highest percentage where many data sources use full online learning. However, full online learning can also develop students' learning activeness if online learning is designed and developed in accordance with the existing standards and principles (Simeon et al., 2020).

5. Conclusion

Students' learning activeness is one of the important things in the success of learning. Students learning activeness is also one of the indicators of student achievement. Based on the results of the research that has been carried out, through ORNAMENT conducted at three PJHS in Bandung, it can be concluded that through the precise ORNAMENT can develop students' learning activeness. All aspects of students' learning activeness, namely active questions and answers, problem-solving skills and task completion, listening, and follow-up to the completion of the lesson, were approved by the three schools. The three schools also have a high percentage. This indicates that either through full online or blended learning, students can develop students learning activeness. PJHS X has the highest percentage of active learning which can be caused by the high school quality. The majority of the students are very confident that they need to be proactive because the learning process is bidirectional, stimulus from teachers, involvement of parents and others.

From the results of this study, there are a number of recommendations to create an optimal online learning service. The first is the readiness of teachers to operate technological devices and online learning media. This is very important to note because the fact is that there are still many teachers who are not yet proficient in using technology. The best effort to overcome this problem is that teachers must have the initiative to upgrade themselves. The trick is to take the time to experiment (try and error) until you can.

In addition, they can also ask for help from other parties, such as fellow teachers, family or by taking private courses. Teachers must have a high innovative attitude by exploring effective online learning models. The operational step is that teachers must dare to try using online learning applications that are synchronous (two-way), such as Microsoft Teams or Zoom Meetings. In addition to teachers, schools can also play a role in providing stimulus to teachers in improving online learning management and conducting regular monitoring and evaluation of teacher performance. Finally, the school IT must also maximise the school website as a centre of learning system. Therefore, online learning can be carried out centrally. Schools can use ORNAMENT, which was developed and adapted to standards and principles to develop students' learning activeness.

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