

Explorative study on the application of learning model in virtual classroom during Covid-19 pandemic at the school of Yogyakarta Province

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Abstract. Since Covid-19 was established as a global pandemic and by National Disaster Management Authority established the status of a national emergency, the government enact work from home since last March. This makes the learning process changed from classical learning to be non-classical or distance learning. This could be said to be minimal preparation because distance learning decisions are taken suddenly as non-classical learning solutions following work from home and study from home decisions. This study aimed to determine the implementation of online learning activities during the Covid-19 pandemic in Yogyakarta. The technique samples were taken randomly covering 4 districts and 1 municipality in Yogyakarta. These conditions force all parties to try to maximize the learning process with due regard to all aspects of support. The results showed that sequentially the most widely used applications to assist in distance learning were Google Classroom, What's Application, and Zoom Clouds Meeting. The majority of teachers still apply learning model in virtual learning. The 3 popular learning models to be applied are Cooperative, PBL and PjBL. The teacher states that the learning model applied is very helpful for their work to realize a virtual classroom, helping students to better understand the material delivered, because it follows the systematic syntax on the learning model used. The application of learning models in each meeting in virtual classrooms was arranged varied to optimize learning and maximize the saturation experienced by students. In addition, various learning methods are applied to support predetermined learning models.

1. Introduction

In 2020, the Ministry of Education and Culture in the era of Minister NadiemMakarim was very active in campaigning for the Merdeka Belajar policy. In the midst of this intense policy, we are shocked by the corona virus outbreak (Covid-19). The severity of the COVID-19 outbreak is the greatest public health threat caused by a respiratory virus. Globally, as of 6:30 pm CEST, 30 May 2020, there have been 5,819,962 confirmed cases of COVID-19, including 362,786 deaths, reported to the World Health Organization (WHO). WHO officially announced the COVID-19 corona virus as a pandemic on Wednesday, March 11, 2020. The WHO briefly stated that a pandemic is the spread of new diseases throughout the world that affect many people [1], [2].

The corona virus pandemic that has surrounded the world cannot be suppressed yet, its massive and relatively rapid spread makes people worry. Everyone then took the distance to break the chain of transmission of COVID-19. Social distancing and Physical distancing began to take effect. Social distancing is the practice of increasing the space between people in order to decrease the chance of spreading illness. According to the CDC, spacing of 6 ft away decreases the spread of COVID-19 [3]. Places of worship are now quiet, mass agendas are eliminated, schools and campuses are closed. Community-wide measures include transition to online teaching, businesses temporarily closing, and the widespread engagement of telecommunication. Individual actions

include working remotely, avoiding public transportation, and staying home if you suspect you have been exposed and/or are symptomatic [4].

This is based on consideration if the epidemic reaches the centers of teaching and learning activities, the impact will be very fatal. Based on this, BNPB (*Badan Nasional Penanggulangan Bencana*) as national disaster management authority in Indonesia established the status of national emergency for the Covid-19 case. WHO and House Commission X also urge the government to immediately dismiss all teaching and learning activities in schools for the time being so that the spread of the virus to students can be minimized. Remembering during the classical learning process, teachers and students will be in the room for a long time, and interact with many people while in the school environment and on their way to and from school. Thus, the government enforces work from home and home study policies.

More than two months of school have been closed, but the teaching and learning process continues through activities at home. Teachers teach from their homes, students learn in their homes. This is a shift in the learning process that was originally dominated by classical learning to be non-classical or by distance learning. This distance learning must have the means so that students can still interact to do learning. This interaction can be facilitated by very rapid technological acquiescence, with a wide choice of learning tools which naturally adapts to various factors, including student characteristics including student learning independence, subject characteristics, availability of IT or supporting facilities and other factors.

Although distance learning is not a strange thing, but minimum preparations for this process because distance education decisions are taken suddenly as a non-classical learning solution following decisions from work from home and study from home. The mechanism that can be applied and developed today in Indonesia, in the process of distance education is online education, which uses computers and the Internet as a delivery mechanism with educational and learning contents delivered by online.

In Law Number 20 of 2003 article 1 paragraph I concerning the national education system, stated that education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively build their potential to have religious spiritual strength, self-control, personality, intelligence, noble morals, as well as the skills required by himself, society, nation and state [5]. Based on this, it is sought that virtual or non-classical classes do not reduce the essence of education that is usually done classically or face-to-face. The problem is whether with very sudden preparation related to distance education following the establishment of work from home and study from home policies, teachers can create attractive and varied virtual classes because of their learning model while still implementing Student centered learning. Or does the teacher only give assignments as a form of online learning by relying on student learning independence.

Distance learning chosen as a solution is very dependent on technological progress and student learning independence. Student hopefully could optimize their ability in creative and self study learning so that lecturers are just stay as their study supervisor and facilitator. Information and Communication Technology (ICT) is then used to draw on this as a student centered learning booster in every learning strategy, such as implementing Virtual Class [6]. The application of appropriate learning models in distance learning will affect the achievement of competency indicators. Lots of learning models can be applied, for example Contextual teaching Learning, Cooperative learning, Problem Based Learning, Project Based Learning, Realistic, etc. Based on I Dwi's research, the planning and implementation of learning with Problem-Based Learning (PBL) on implementing scientific learning and understanding of new scientific steps are good. Student learning outcomes are measured through tests with three categories which indicate the percentage of students in completing the lowest test in the problem-solving[7]

Another research had a result that the model of project based learning with virtual media that applied successfully improve the students' creativity in physics learning. The experiment class had a higher creativity increase than the control class. Verbal and figural creativity improved in both classes. Verbal creativity increased higher than figural creativity [8]. In recent years, distance learning has made possible several innovative means to include CL in virtual pedagogical settings. Researchers have reported that group work through computer-mediated collaboration resulted in improved performance, interaction, and critical thinking [9]

Distance learning has facilitated innovative means to include Cooperative Learning (CL) in virtual settings. This study compared the effectiveness of online CL strategies in discussion forums with traditional online forums. Quantitative results revealed no significant difference on student success between CL and Traditional formats. The qualitative data revealed that students in the cooperative learning groups found more learning benefits than the Traditional group. The study will benefit instructors and students in distance learning to improve teaching and learning practices in a virtual classroom [10]

Based on the above discussion, it is thought that the preparation of virtual classrooms in distance learning is very sudden as a result of the covid-19 pandemic. In this study will discuss what applications are used in distance learning while working from home and learning from home. The lack of teacher time in a virtual classroom will make teachers continue to apply certain learning models in distance learning. As happy as the supporting data, it will also support training supported during this distance learning. Therefore, this exploratory research to learn to carry out learning activities as co-pandemic covid -19 in DIY. Samples were taken randomly divided by teachers from 4 districts and 1 municipality in DIY.

2. Method

This type of research is a qualitative study at the level of exploratory analysis. Qualitative research aims to understand phenomena about what is experienced by research subjects such as actors, perceptions, motivations, actions and in the form of words and language, in a special natural context and utilizing various scientific methods Exploratory research is preliminary research, which forms the basis of research which is more conclusive. This research can even help in determining the research design, sampling methodology, and data collection methods. Unstructured interviews are the most popular primary data collection method with exploratory studies. To clarify our understanding of explorative research, this article will review the notion of exploratory research, the types, characteristics, and ways of writing it [11], [12].

The advantages of exploratory research include: 1) researchers have a lot of flexibility and can adapt to changes as research progresses; 2) lower costs needed, 3) can be used as a basis for research, which can lead to further research; 4) enable researchers to understand at an early stage, if the topic is worth investing in relation to time and resources and if it is worthy of further study; 5) help other researchers to find possible causes of the problem, which can be studied further in detail to find out.

The number of respondents in this study were 38 teachers with the following details: 36.8% are natural science teachers, 36.8% are social science teachers, 26.4% are teachers of other subjects. Technique samples were taken randomly covering 4 districts and 1 municipality in Yogyakarta. These conditions force all parties to try to maximize the learning process with regard to all aspects of support. Sampling is done randomly because every teacher must do distance learning during school is closed because of the co-19 pandemic. This study aims to find a complete picture of the application of distance learning through virtual environments without requiring certain factors.

The data collection technique is done by giving a questionnaire through a Google form that contains a number of statements and participants are asked to provide answers according to the reality. The questionnaire also contained a number of statements that accommodated participants' opinions on a Likert scale. As a form of interviewing, the questionnaire also contained a number of questions to complement participant answers in order to obtain detailed and complete data.

This explorative study is included in the case analysis, this is because the researcher aims to be able to understand more about the problem being studied by studying carefully selected examples or cases. Researchers also carefully examine previously published case studies relating to the variables to be examined. In addition to data collected using a questionnaire, researchers also conducted depth interviews with several knowledgeable speakers and developed a virtual classroom in learning. In-depth interviews are used to utilize individual knowledge and experience with information that is highly related to the situation or opportunity. This is in accordance with the purpose of qualitative research, namely to explain the deep-seated phenomena through detailed and deep data collection [13].

In this study qualitative data analysis methods are used, namely data obtained, selected and compiled systematically and then analyzed using various provisions. To test the truth and honesty

of the participants in revealing the reality experienced and carried out, the data checking method is used with triangulation analysis which includes:

- a. Data reduction, namely the process of selecting and simplifying reddish data that arises based on field data or a form of sharpening, classifying, directing, disposing of unnecessary and coordinating data in certain ways so that conclusions can be drawn for verification.
- b. Presentation of data, is the delivery of information that has been prepared for analysis and conclusions drawn.
- c. Drawing conclusions, is a step to find meaning, record order, determine patterns, explanations, cause and effect flow and proportions. The conclusions drawn were also verified during the study. The results of data analysis are always tested for validity, so conclusions drawn are more accountable [14].

3. Result and Discussion

If the curriculum ignores sedimented perceptrs, identity formation, and social construction, and if it suppresses individual visions and dreams in the content and context of education, and if individuals are constantly required to conform to someone else's worldview, then dreams will be repressed, hope will be suppressed, people will incorporate the other's vision of themselves into their own self-understanding, and they may lash out in anger against those systems that exclude their voice. The latter is occurring today as splinter groups vie for dominance and control [15]. So that the transformation of learning from classical classroom into virtual classroom does not shift learning away from the curriculum 2013. We going to start discussing research results based on the research results shown in the figure below:

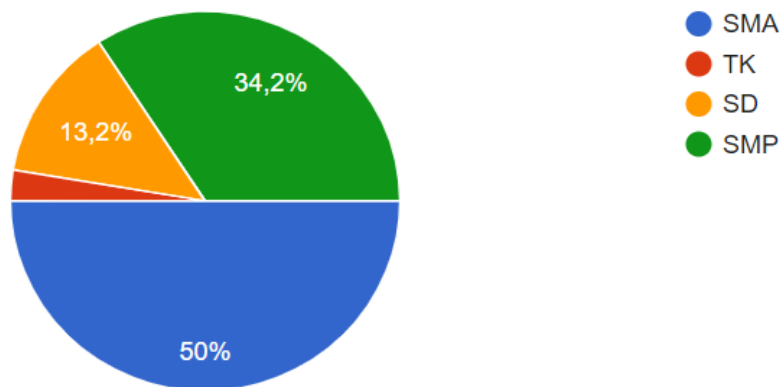


Figure 1. Percentage of Respondents Based On Level of Education Being Taught

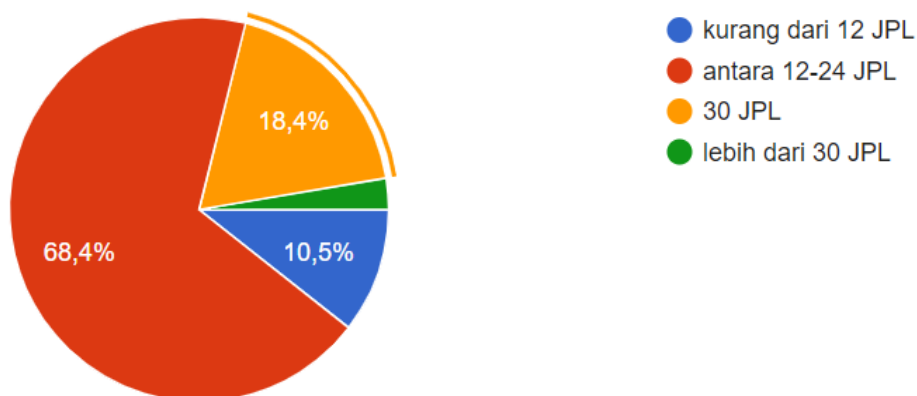


Figure 2. Percentage of Class Hours in Classical Classrooms for a Week

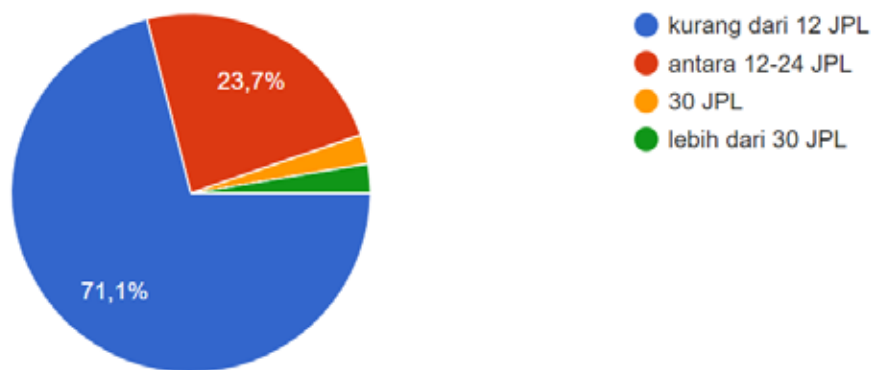


Figure 3. Percentage of Class Hours in Virtual Classrooms for a Week

Based on these data, it is known that the percentage of learning hours in real teaching for one week has decreased compared to the percentage of learning hours in real teaching for one week. The teacher uses various programs or application as a means of creating a virtual cereal class possible by applying the learning model and applying the learning model syntax. This shows that the teacher functions as a facilitator and students who must play an active role in learning activities.

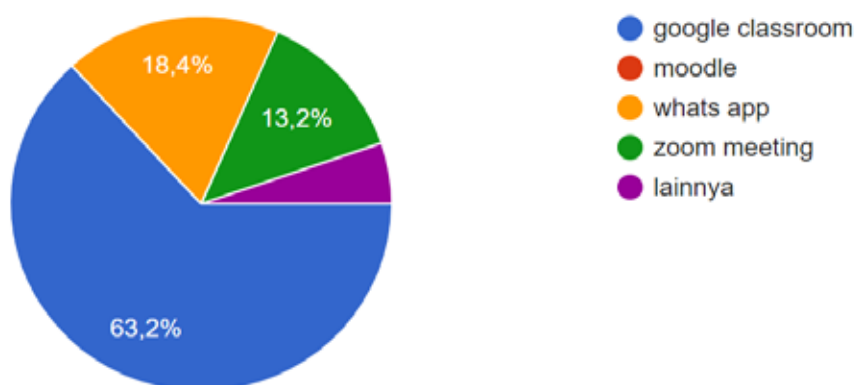


Figure 4. Programs or Applications Used for Virtual Classroom Learning

Based on Figure 4, we know that teachers using variative program or application. Some teachers also combine several programs to complement each other so that learning becomes more effective. Interactions that occur through programs or applications can be divided into synchronously or asynchronously. Synchronous situations provide affordances that allow “realtime” interaction between student and instructor. Synchronous situations are time sensitive but geographically insensitive. In contrast, asynchronous situations do not provide affordances that allow for “realtime” interaction between student and instructor. Asynchronous situations are both time and geographically insensitive.

Research into learning often has implications for teaching; and it is difficult in disciplined research to have two foci. Indeed such bifocal research may not be able to sustain its quality. Inevitably, any research into teaching must take into account the quality and amount of learning that takes place as a result of the teaching. Research into *learning* is again a pressing need. Having said that, research with a focus on *teaching* needs to be encouraged [16]. Learning can be interpreted as an attempt to influence one's emotions, intellectuality and spirituality so that they want to learn with their own will. Learning can also be interpreted as providing stimulus to students and effective interactions so that they have awareness and participate in developing their potential to become human beings who have spiritual and social attitudes, are emotionally intelligent, capable, skilled and independent. Given these interactions, the learning process can be done using a variety of learning models such as data from research that has been done. Each learning model has a syntax or

typical steps in learning that distinguish a learning model from other learning models. So the learning model can be selected by the teacher that is tailored to the learning material and student characteristics used to achieve the learning objectives.

Advances in information and communication technology also enable students to carry out learning activities not only formally or face to face with lecturers, but also can learn through internet media. The concept of learning can be called a virtual class or Virtual Class, where instructors can explain their subjects in front of a computer through a network, can supervise students and can communicate with them via headphones. The concept of Virtual Class offers a more promising opportunity for collaboration, connection, access to information, attractive visualization, and encouraging the parties involved to be more productive and faster in understanding knowledge [17]. In scheduled virtual classes, smartphones or computers / laptops owned by teachers or students must connect to the internet, interaction between students and lecturers is conducted in a separate place with the condition that lecture time remains mutually agreed between lecturer and student. Students who are in class follow the presentation through a virtual web class that also displays the face of the teaching lecturer. If there are questions, students just come forward and ask via the available microphone.

Virtual learning requires the teacher to be able to create self instruction which is intended in self learning by using the learning program that the teacher has chosen. There are several details of student activities in the virtual class system, including: a) opening of the class, here the lecturer gives instructions to students to be absent; b) class closure; c) presentation with video streaming, d) upload and download lecture material to be given; e) making exam questions, the model questions are left entirely to the teaching lecturer; f) check the number of students who attend or join this virtual class; g) provide answers to questions raised by students using a microphone or via chat; h) provide tasks that support the material presented; i) discussion through the forum (optional). while the details of student activities in the virtual class system include: a) absent online using the web provided; b) online evaluation; c) interact with the lecturer in audio visual and or use chat facilities; d) discussion through the forum (optional) [6].

In virtual learning also applies the theory of cognitive learning Jerome Bruner and Jean Piaget based on the assumptions: a) Individuals have the ability to process information; b) The ability to process information depends on the cognitive factors, the development progresses gradually along with the stages of age; c) Learning is a complex internal process of information processing; d) Learning outcomes are changes in cognitive structure; e) Different ways of learning in children and adults, according to the stages [18]

In the context of teacher education, distance learning has more than one aim and audience. It has been used as a *pre-service* teacher preparation method with teacher-candidates, mostly with extensive face-to-face preparation (often as part of a formal dual-mode institution, such as the University of the West Indies). In developing and developed countries, it has been deployed as an *in-service* vehicle to fulfill a mandate to upgrade the knowledge, skills, and qualifications of an existing teaching force. Finally—and predominantly within developed countries—distance education, mainly in the form of Web-based education, serves as a vehicle for *continuing education*, offering enrichment, enhancement, and additional certifications for teachers who have attained at least a minimum level of certification for their content and grade level. Where necessary, we distinguish among these three aims of distance learning in our discussion of distance education models [19]

Table 1. Example on How to Present Your Second Table

Types of Distance Education	Examples
Televisual models	<ul style="list-style-type: none"> • <i>Broadcast television (educational and instructional)</i> • <i>Videoconferencing</i> • <i>Video</i>
Computer-based multimedia models	<ul style="list-style-type: none"> • <i>Interactive video (disc and tape)</i> • <i>CD-ROMs</i> • <i>Digital videodiscs (DVDs/VCDs)</i>

Web-based models	<ul style="list-style-type: none"> • <i>Interactive multimedia</i> • <i>Computer-mediated communication</i> • <i>Internet-based access to World Wide Web resources</i> • <i>Online courses (e-learning)</i> • <i>Online conferences (webcasts and webinars)</i> • <i>Virtual classes/schools (cyber schools) and universities</i>
Mobile models	<ul style="list-style-type: none"> • Hand-held devices • Portable media players (podcasting) • Cell phones and smart phones • Tablets • E-readers

Correspondence learning is part of the opening generation of distance programs (first generation), crossing the end of the 19th and beginning of the 20th century. In correspondence learning the major means of communication are printed materials, usually customized textbooks that contain lesson outlines and exercises. Students complete assignments based on the textbook instructions and “mail” the assignments to the instructor, who provides feedback via first class mail. Second generation the aim of open-universities is reaching off campus students, delivering instruction through radio, television, recorded audio-tapes and correspondence tutoring. Third Generation benefited from satellite technologies and the emergence of communication networks facilitating the delivery of analog and digital content to computer workstations. These technologies also enable new forms of real time interaction with two-way videoconferencing, or one-way video and two-way audio communication. During this generation, CD-ROM products for multimedia self-paced learning were introduced. Additionally, computer networks link instructors and students, enabling electronic communication exchanges based on course material, students learn by reviewing videotapes, audio-tapes, textbooks or multimedia CD-ROMs [20].

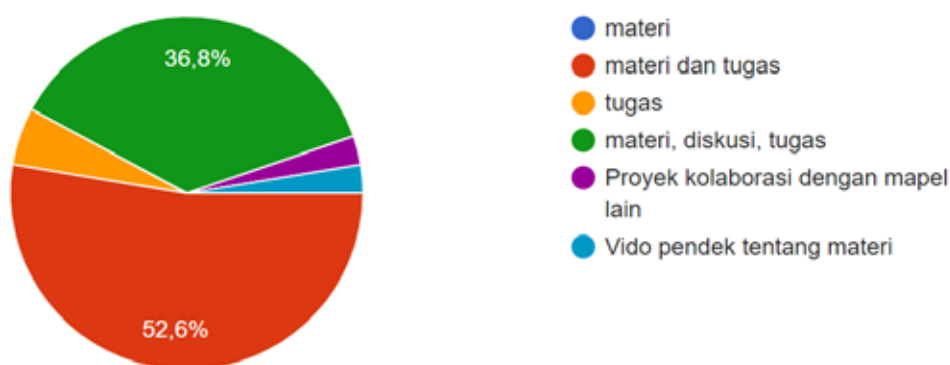


Figure 5. Percentage of Learning Content in Virtual Classes Arranged

Based on research data (Figure 5), teachers continue to make virtual classrooms as real and effective as possible. The content entered into the program or application is complete enough to contain material, discussion, assignments. But there is still one thing that is lacking, which is assessment, even though it is important to assess the achievement of competency achievement indicators that are detailed in the learning objectives. Distance learning is improved capabilities in knowledge and/or behaviors as a result of mediated experiences that are constrained by time and/or distance such that the learner does not share the same situation with what is being learned. From this definition of distance learning flows our definition of distance education. Distance education is formalized instructional learning where the time/geographic situation constrains learning by not affording in-person contact between student and instructor. In person education is

formalized instructional learning where the time/geographic situation constrains learning by requiring synchronous person-to-person interaction [21]. The majority of teachers have also applied the learning model described in Figure 6.



Figure 6. Percentage of application of Learning Models Used in Virtual Classes

Based on research data, there are three learning models most commonly used, namely Cooperative Learning, Problem Based Learning and Project Based Learning (Figure 7)

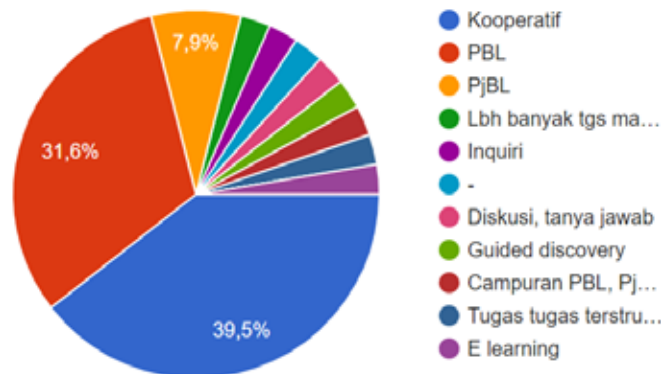


Figure 7. Percentage of Types of Learning Models Used in Virtual Classes

In the first sequence learning model is cooperative learning, Cooperative learning is an approach to organizing classroom activities into academic and social learning experiences. Students must work in groups to complete tasks collectively. Unlike individual learning, students learning cooperatively capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas, monitoring one another's work, etc.). Furthermore, the teacher's role changes from giving information to facilitating students' learning. Everyone succeeds when the group succeeds [22].

Cooperative Learning that has many variants, such as formal cooperative learning, informal cooperative learning and in group-based cooperative learning. Based on depth interview, participant mostly used formal cooperative learning that structured, facilitated, and monitored by the educator over time and is used to achieve group goals in task work. Any course material or assignment can be adapted to this type of learning, and groups can vary from 2-6 people with discussions lasting from a few minutes up to a period. Types of formal cooperative learning strategies include jigsaw, assignments that involve group problem solving and decision making, laboratory or experiment assignments, and peer review work

In the second sequence learning models that are often used by teachers who become participants is Problem-based learning that focuses on the problems faced by students so that there is a common problem-solving process by working together in small groups to find solutions. Problem-solving in PBL with scientific method includes defining the problem, brainstorming process, preparing hypothesis, doing simple research, discussion about phenomenon obtained from observation, and compiling conclusion as a solution of problem-solving. Principles in PBL are student-centered

learning, problems as starting points, working in groups with peers, solving problems sought from various sources, students collecting information and knowledge independently of real life [23].

Problem-based learning (PBL) is an instructional strategy in which students solve a real-world problem. First developed for medical schools, PBL activities are often loosely structured, involve cooperative teaming, anchor all learning to a larger task or problem, and support the learner in developing ownership of the overall problem or task. Tasks are generally complex, involving higher-order thinking. Students must often identify resources, overcome problems with data, and decide upon the content and format of the information gathered [19]. According to Roopashree, learning cycle with PBL model has several characteristics, among others: starting with problems given to students, conducting experiments or data collection activities, identifying concepts that must be mastered to solve problems, reassembling to discuss and share experiences that have been learned, determining collaborative solutions with peers in their group. The problem-solving and learning process, PBL students collaborate to solve the problem and learn in small groups. This collaboration component is to help students develop social, interpersonal, collaborative [24], [25].

Project-based learning is an instructional philosophy in which learning is organized around a question or issue. Learners collaborate to address this issue, find information, and then present their findings. Project-based learning, like problem-based learning, is complex, involves student collaboration, and is characterized by a high level of learner autonomy. Unlike problem-based learning, with which it is erroneously conflated, a project-based approach may not involve a real-world problem (many project-based activities are *simulations* of real-world issues) and is not as loosely structured as problem-based learning [19].

Project-based learning as a dynamic learning model in which students are able to actively explore the real world's problem, get challenged, and get a deeper understanding about an issue. Furthermore, project-based learning is convenient for an interdisciplinary course because naturally it involves different academic skills such as reading, writing, and math. It is also appropriate to build the concept understanding through subject assimilation. These arguments confirm that project-based learning model can be applied in teaching the theme of waste because the theme of waste and its management mixes different concepts such as physics, chemistry, and biology [26], [27].

The stages in the project-based learning activity are: 1) starting with essential questions; 2) designing a project; 3) creating schedule; 4) monitoring the students and the progress of project; 5) assessing the outcome; and 6) evaluating the experience [28]. The teacher must be able to provide direction through virtual classrooms by utilizing various media and features in the application or program used to avoid misunderstandings in the explanation of syntax that impact on the success of projects designed in learning.

During learning process teachers must be able to devise appropriate learning model and media in order to create encouraging atmosphere and to motivate students to actively participate in learning process. Various problems experienced by the students can in fact be coped by choosing appropriate learning model [8]. Although there is much discussion on how to measure social presence in online environments, there is agreement that social presence is crucial in any type of online or computer mediated communication. Effective collaborative learning requires interpersonal interactions [9].

One suggestion that needs to be considered for creating a intact virtual class is progress monitoring through regular formative assessment. Following the initial instruction, the distance instructor administers a quick test that both assesses learners' understanding and reinforces the most important learning objectives. These can be short quizzes; process journals; an e-mail summary of understanding of main concepts; or a "show of hands" in a learning platform such as Zoom Cloud Meeting. Corrective instruction (re-teaching), following the formative assessment, the instructor provides corrective instruction or re-teaching of the skills and concepts in which learners demonstrated difficulty. Re-teaching does not mean employing the same instructional technique as before, but making accommodations in the types of materials used and differentiating instruction by perhaps offering one-to-one tutoring for one set of learners, "think aloud" protocols with another, or peer tutoring with a third. Six key factors that should be kept in mind during course design are delivery and access, control, interaction, symbolic (or audiovisual) characteristics of the medium, social presence created by the medium and human-machine interface.

Data collection in this study was limited to a small research sample; further, the duration of the study was limited. As such, the results may not be generalized across all teachers in DIY. This research is expected to serve as a launching pad for a more extensive study on the topic, with a wider scope in cooperative learning in distance education or in virtual classroom design, use of appropriate technology, and assessment of online student performance.

4. Conclusions

Sequentially the most widely used applications to assist in distance learning were Google Classroom, What's Application, and Zoom Clouds Meeting. The majority of teachers still apply learning model in virtual learning. The 3 popular learning models to be applied are Cooperative, PBL and PjBL. The teacher states that the learning model applied is very helpful for their work to realize a virtual classroom, helping students to better understand the material delivered, because it follows the systematic syntax on the learning model used. The application of learning models in each meeting in virtual classrooms was arranged varied to optimize learning and maximize the saturation experienced by students. In addition, various learning methods are applied to support predetermined learning models.

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