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ANEKA-based Asynchronous and Synchronous Learning Design and its Evaluation as Efforts for Improving Cognitive Ability and Positive Character of Students

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Abstract: Quality of cognitive abilities and increased positive character of students in following a learning process during *social distancing* can still be realized even though the implementation is done from home. This can happen if a good learning design has been formed. Based on that situation, the purpose of this research was to show the existence of innovation in the form of a learning design that combines *asynchronous* and *synchronous* learning strategies by inserting *ANEKA* concepts. The method for developing this learning design was *R&D* which uses *4D* design (*Define*, *Design*, *Develop*, and *Disseminate*). Subjects who were involved in evaluation toward learning design were four experts. The location of this research was conducted at one of the IT Vocational School in the North of Bali region. Data collection techniques used questionnaires. Data analysis was conducted through a comparison technique between the effectiveness percentages of learning design with categorization based on the range of effectiveness percentages. The research results showed the effectiveness level of *asynchronous* and *synchronous* learning design based on *ANEKA* was included in the very high category with a percentage was 89.00%.

Index Terms: Learning Design, *Asynchronous*, *Synchronous*, ANEKA, Evaluation.

1. Introduction

Learning during *social distancing* requires teachers and students to learn from home. Learning activities carried out from home are expected to continue to be able to realize the learning process like commonly done in schools. Efforts that have been made by various schools to realize the learning process during *social distancing* are online-based learning [1].

Several online-based learning strategies that can be used included: *synchronous* and *asynchronous* [2]. *Synchronous* learning is face-to-face learning done by teachers and students at the same time by online mechanisms [3-5]. *Synchronous* learning during *social distancing* can be done using *Meet Google*, *Zoom*, *Webex*, or other webinar facilities. *Asynchronous* learning is online learning that is carried out not simultaneously which can be accessed by students without any boundaries of space and time [6-9]. *Asynchronous* learning during *social distancing* can use *WhatsApp* group facilities, email, *e-learning* platforms (*Moodle*, *Schoology*, *Kelase*), and other online learning platforms.

Although *synchronous* and *asynchronous* learning strategies have been carried out in learning from home, in reality, those strategies have not been optimal in realizing a quality learning process. Ideally, the learning process can be said to be of quality if the learning activities have been able to improve students' cognitive abilities and enhance positive character in students.

In general, learning at home using *synchronous* or *asynchronous* strategies can be said to be effective is used to realize students' cognitive improvement. This is confirmed by the statement of Al-Samarraie in 2019 [10]; Carmo & Franco in 2019 [11]; which stated that the use of *synchronous* learning strategies facilitates interaction between teachers and students through face-to-face or online using video conference. Besides, *synchronous* learning is equipped with various sources of knowledge that can be accessed easily through internet facilities, to increase students' understanding (cognitive abilities) about teaching materials that have been given by the teacher.

If seen from the side of students' attitudes, *synchronous* or *asynchronous* learning strategies are not effective because it's not carried out seriously by students. One example of an attitude that shows un-seriousness is students

commit cheating while participating in *synchronous* learning using *Meet Google*. Some students pretend to actively participate in learning activities by still login into the meeting room, but the fact they play truant by mute the microphone and turn off the camera facilities provided at *Meet Google*. Another example that shows students' bad attitudes is students using internet facilities to look for negative things and not seriously looking for other sources of knowledge to support subject matter and assignments given by the teacher.

Some of the innovations offered to solve those problems included: 1) inserting the concept of local wisdom in the use of online learning platforms so that student's attitude can be observed in the learning process; 2) activate the camera on the online platform automatically during the learning process; 3) inserting the *ANEKA* concept into *synchronous* and *asynchronous* learning strategies so the cognitive ability and positive character of students can be measured properly.

One of the best innovations were offered to solve that problem was to create a design that combines *synchronous* and *asynchronous* learning strategies with the *ANEKA* concept. Based on that innovation, the thing to be achieved in this research is expressed through research questions.

The research question in this research was how the effectiveness of *ANEKA*-based *synchronous* and *asynchronous* learning design was used in the learning process during *social distancing*? The main purpose of this research was to show the existence of innovation in the form of an effective learning design used as a basic guideline in realizing an increase in cognitive abilities and the positive character of students in the learning process during *social distancing*.

2. Literature Review

This research is motivated by the research was conducted by Shahabadi & Uplane in 2015 [12] that showed the merging of *synchronous* and *asynchronous* strategies to facilitate quality learning processes even though only through the online system. The meaning and quality of face-to-face learning in the classroom can still be felt through a *synchronous* strategy even though it is not done directly in the classroom. Material transfer and searching for learning resources can also be done through *asynchronous* strategies without being limited by space and time. However, the obstacle in Shahabadi & Uplane's research was that students' positive attitudes were not demonstrated yet in the *synchronous* and *asynchronous* learning process.

Perveen's research in 2016 [13] showed *synchronous* and *asynchronous* integration is preferred by students in the learning process. The *synchronous* and *asynchronous* combination is well and clearly shows the relationship between technology, pedagogy, content, and the context of learning design. However, Perveen's research obstacle had not yet to insert the local wisdom that is used to determine the extent of students' perceptions and their positive attitudes in following the *synchronous* and *asynchronous* learning process.

Arasaratnam-Smith & Northcote's research in 2017 [14] showed the advantages of online learning environments as unique media that are packaged in *asynchronous* and *synchronous* forms. The advantages of *asynchronous* learning are that allows students to provide deeper responses without any time restrictions and without the direct social pressure that normally occurs in *synchronous* learning. The advantages of *synchronous* learning are that allows students to respond directly when face to face. The obstacle of Arasaratnam-Smith & Northcote's research was that positive aspects had not been shown yet as students' responses to the existence of *asynchronous* and *synchronous* learning.

Dada *et al*.'s research in 2019 [15] showed that *synchronous* and *asynchronous* integration can improve student cognitive performance. However, the research obstacle of Dada *et al*. was the merging of *synchronous* and *asynchronous* had not been able to show evidence of increasing the positive students' attitudes.

Research by Cacheiro-Gonzalez *et al*. in 2019 [16] showed the use of learning platforms that are equipped with *synchronous* and *asynchronous* modes to facilitate distance education. The research of Cacheiro-Gonzalez *et al*.'s also had an obstacle. It had not been specifically demonstrated yet the students' perceptions in increasing their positive attitudes in the following of learning by the *synchronous* and *asynchronous* platforms.

3. Method

A. Research Approach

This research was development research using the *R&D* development method with a *4 D* design consisting of four stages, such as *Define*, *Design*, *Develop*, and *Disseminate* [17,18]. The things were done at the *Define* stage, including 1) front-end analysis, 2) student analysis, 3) task analysis, 4) concept analysis, and 5) determination of learning objectives.

Front-end analysis was carried out to obtain information related to the learning process problems that occur at school. Analysis of students was conducted to find out information related to students' readiness in participating in learning following the learning strategies set by the teacher. The task analysis was conducted to obtain information related to the specifications of the equipment needed in the learning process, and the tasks of the personnel involved in the learning process. Concept analysis was conducted to obtain information related to concepts that would be incorporated into the learning design. The determination of learning objectives was conducted to obtain information related to the main purpose of the learning process using learning design innovation.

The things that were conducted at the *Design* stage, including 1) determining the design components, and 2)

sketching the design. The determination of design components intends to provide information related to the components needed in making a design. The design sketch is intended to display the form of learning design.

The things that were conducted at the *Develop* stage including 1) expert's evaluation and 2) design revisions. Expert's evaluation was conducted to evaluate the effectiveness of the design that was created. Design revisions were conducted to follow up on the advice of experts and the results of the effectiveness percentage that was still lacking. The things that were conducted at the *Disseminate* stage was to disseminate and implement learning designs that had been successfully created at the design stage.

B. Subjects and Research Location

Subjects who were involved in testing the learning design were four experts, including two education experts and two informatics experts. The research location was conducted at one of the vocational school of information technology in the North of Bali.

C. The Technique of Collecting Data

Data collection in this research was carried out by distributing questionnaires to experts. Questionnaires given to experts were used to obtain the data from the expert's evaluation toward learning design.

D. Data Analysis Technique

Data analysis of the expert's evaluation results was done by comparing the effectiveness percentage of the learning design with the effectiveness categorization that follows the range of effectiveness percentage. The formula was used to evaluate the design effectiveness is the following formula of effectiveness percentage [19-25]:

$$EP = \frac{F}{N} * 100\% \tag{1}$$

Where:

EP = effectiveness percentage
F = the frequency of subjects that choose alternative answers
N = total number of questionnaire items

Categorization of the effectiveness percentage results can be divided into several categories, included: a) the very high category is the percentage range of 90%-100%, it means the design does not require revision; b) the high category is the percentage range of 75%-89%, it means the design does not require revision; c) the sufficient category is the percentage range of 65%-74%, it means the design needs to be revised; d) the less category is the percentage range of 55%-64%, it means the design needs to be revised; e) the poor category is the percentage range of 0%-54%, it means the design needs to be revised.

4. Results and Discussion

Referring to the 4D stage that was used in this research, some of the research results were obtained in this research was able to be shown as follows.

A. Results in the Define Stage

1) Front-end Analysis

At this stage the results were obtained in the form of several problems in the learning process that occur in schools (especially during *social distancing*), included:
   a. Students and teachers were difficult to carry out the face-to-face learning process directly in class.
   b. The difficulty of students in obtaining appropriate learning resources independently.
   c. The difficulty of the teachers in controlling the student absenteeism.
   d. The difficulty of teachers in obtaining the right assessment model to determine students who had high cognitive abilities and positive attitudes in the learning process.

2) Student Analysis

At this stage was obtained the information related to the readiness of students to take part in learning during *social distancing*. Students' readiness was shown by the availability of computer facilities and internet access independently in their respective homes to support the implementation of *synchronous* and *asynchronous* learning.

3) Task Analysis

At this stage was obtained the device specification information was needed to support *synchronous* and *asynchronous* learning. Minimum device specifications are needed for the implementation of *synchronous* learning, included: computers, internet access, headsets, and video conference or meeting applications (*Meet Google*, *Zoom*, *Webex*, and others). Minimum device specifications are needed for implementing *asynchronous* learning, included: internet access, laptops or computers, pdf reader applications, headsets, video reader applications (*Winamp*, *Gom Player*, and others).

Besides, at this stage also was obtained information about the tasks of teachers and students in the *synchronous* and *asynchronous* learning process. The task of the teachers in *synchronous* learning during *social distancing* is to guide and provide learning material directly to students through video conferencing facilities. The task of students in *synchronous* learning during *social distancing* is to listen to the subject material is explained by the teachers and ask questions or conduct discussions with the teachers if there is the subject material not yet understood.

The task of teachers in *asynchronous* learning during *social distancing* is to provide .*pdf* format material and learning videos to students through school *e-learning* facilities. The task of students in *asynchronous* learning during *social distancing* is to download subject material available at the *e-learning*, studying the subject material, and complete the assignments given by the teachers.

4) Concept Analysis

At this stage was obtained information about the concept of attitude values that was incorporated into *synchronous* and *asynchronous* learning design. The concept of those attitude values is *ANEKA*. The word *ANEKA* is an acronym for the words of '*Akuntabilitas*' (Accountability), '*Nasionalisme*' (Nationalism), '*Etika Publik*' (Public Ethics), '*Komitmen Mutu*' (Quality Commitment), and '*Anti Korupsi*' (Anti-Corruption) [26,27].

Related to the learning process, the word *accountability* has a meaning that is identical to the attitude of students' responsibility in completing the learning process properly. *Nationalism* is identical to the attitude of students who are high spirits in following the learning process. *Public ethics* is identical to the attitude of students who still maintain good ethics in following the learning process. *Quality commitment* is identical to the attitude of students who try to show the quality of cognitive abilities they have as a result of the learning process. *Anti-corruption* is identical to the attitude of students who are able to avoid negative things that interfere with the learning process.

5) Determination of Learning Objectives

At this stage was obtained information about learning objectives during *social distancing* using *synchronous* and *asynchronous* learning strategies. The intended learning objectives, included:

a. The implementation of face-to-face meetings directly through the application of video conferencing (*synchronous* learning) is expected to be able to maintain the quality of the face-to-face learning process between teachers and students even though it is done in their homes.
b. Transfer of material resources provided by the teacher to students through *e-learning* (*asynchronous* learning) is expected to be able to overcome the difficulties of students in obtaining appropriate learning resources independently.
c. The implementation of learning that combines *synchronous* and *asynchronous* strategies with inserting *ANEKA* concepts is expected to be able to overcome teacher difficulties in controlling students' absenteeism.
d. The implementation of learning that combines *synchronous* and *asynchronous* strategies with inserting *ANEKA* concepts is also expected to be able to overcome teacher difficulties in determining the quality of students' cognitive abilities and students' positive attitudes in the learning process.

B. Results in the Design Stage

1) Determination of Design Components

At this stage, the results were obtained in the form of components needed in making the *synchronous* and *asynchronous* learning design based on *ANEKA*. The intended components included:

a. Teachers and Students

Teachers and students are important components that must exist in this learning design, because as the main actor who embodies the implementation of the learning process. The teachers were persons who function as a provider of learning resources and guided the course of the learning process. Students were persons who function as recipients of teaching material that had been given by the teachers and carried out the tasks instructed by the teachers. Besides, those students were also a benchmark that shows how far the learning objectives were achieved.

b. Hardware and Software

Hardware and software were also very important components as a support platform for the realization of this learning design. The main hardware that was needed to realize *synchronous* and *asynchronous* learning, included: laptops/computers, and internet devices.

The main software that was needed to realize *synchronous* learning was video conferencing applications (*Meet Google*, *Zoom*, *Webex*, and others). The main software that was needed to realize *asynchronous* learning was the *e-learning* platform (*Schoology*, *Moodle*, *Kelase*, and others). Supporting software that was needed to realize *synchronous* and *asynchronous* learning was *.pdf* reader and video reader.

c. ANEKA Aspects

There are 34 aspects of *ANEKA* components that were needed in learning design. The accountability component consists of seven aspects, including: (1) participatory, (2) prioritizing the public interest, (3) neutral, (4) clarity of targets, (5) consistent, (6) honest, and (7) responsibility.

The nationalism component consists of ten aspects, included: (1) transparent, (2) work ethic, (3) tolerant, (4) self-confidence, (5) deliberation of consensus, (6) mutual-cooperation, (7) not greedy, (8) wise, (9) giving help, and (10) kinship. The public ethics component consists of six aspects, included: (1) careful, (2) high integrity, (3) obeying the instruction, (4) polite, (5) obeying the laws and regulations, and (6) respect. The quality commitment component consists of four aspects, included: (1) quality-oriented, (2) innovation, (3) effectiveness, and (4) efficiency. The anti-corruption component consists of seven aspects, included: (1) hard work, (2) discipline, (3) simple, (4) fair, (5) independent, (6) caring, and (7) brave.

2) The Making of the Learning Design Sketch

At this stage, the results were obtained in the form of *ANEKA*-based *synchronous* and *asynchronous* learning design that can be used during *social distancing*. The display of the learning design intended can be seen in Fig. 1.
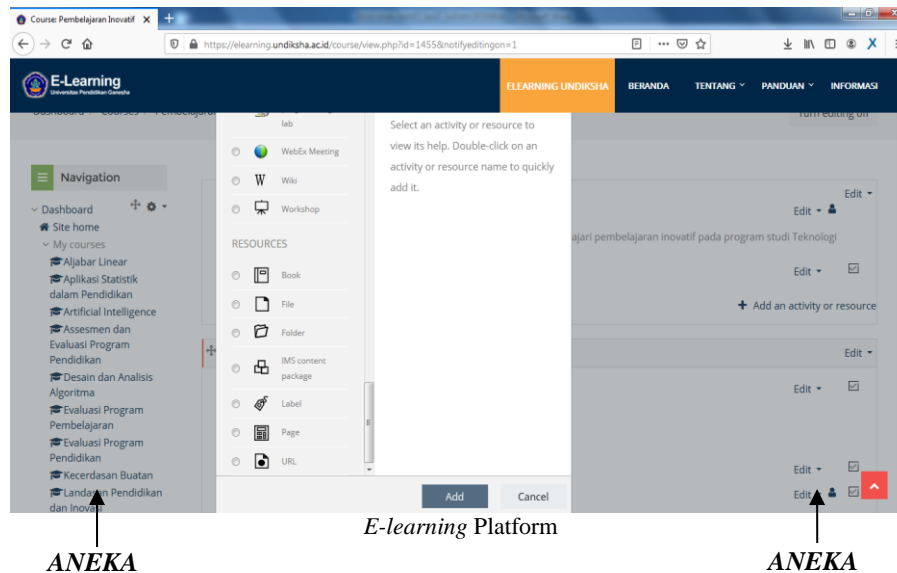

Conference Video Application

E-learning Platform

ANEKA   **ANEKA**
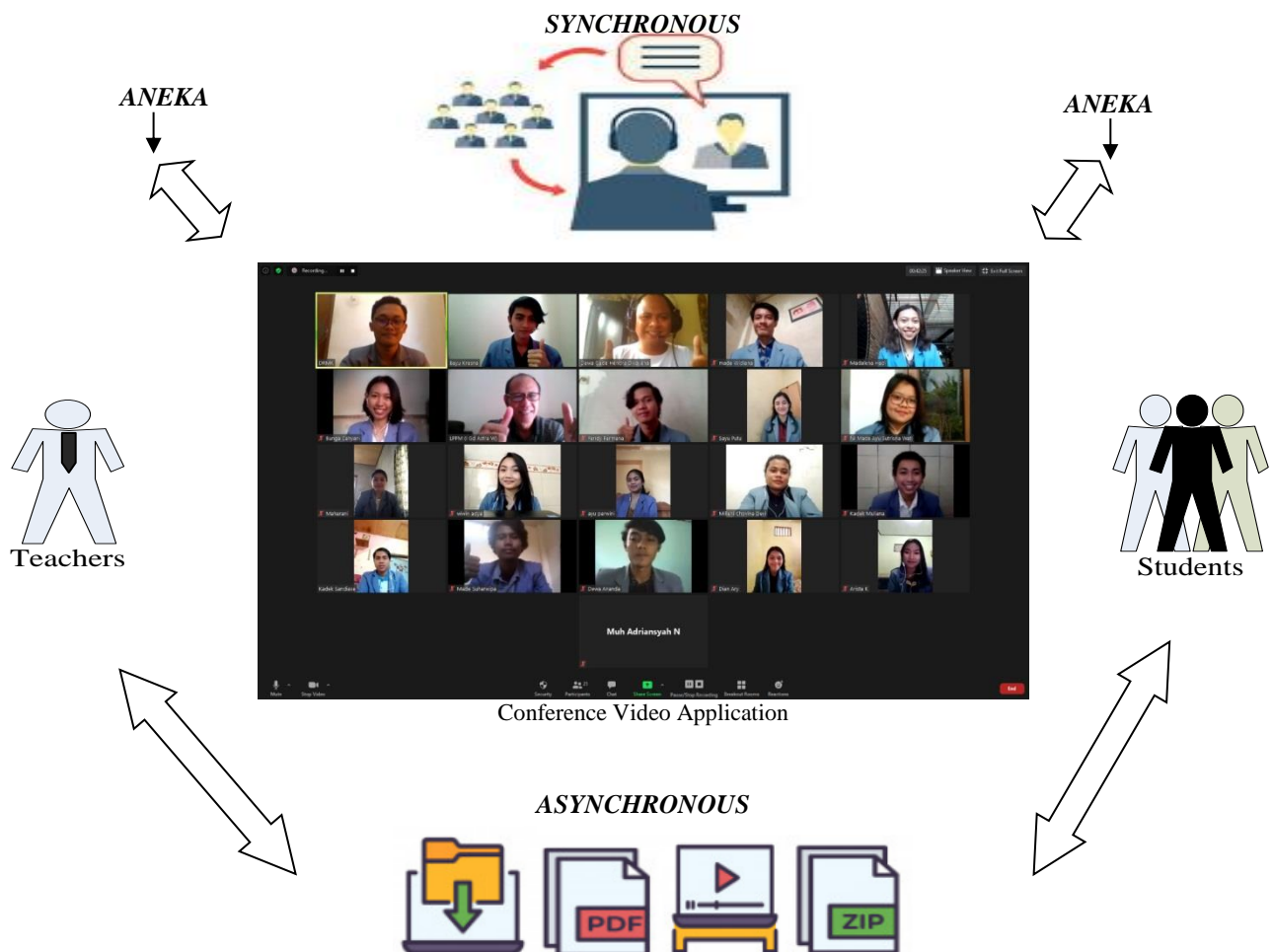
Fig.1. *ANEKA*-Based *Synchronous* and *Asynchronous* Learning Design

Fig. 1 shows a learning design sketch that combines *synchronous* and *asynchronous* learning strategies with inserting *ANEKA* concepts to obtain quality learning outcomes in terms of students' positive attitudes and student cognitive abilities. Based on Figure 1, teachers and students are the main actors in the learning process. Teachers and students can use video conferencing applications (for example: *Zoom*, *Meet Google*, *Webex*, and others) to carry out *synchronous* learning. Besides, teachers can carry out *asynchronous* learning to train students' independence in learning through *e-learning* facilities [28]. *Asynchronous* learning allows teachers to upload learning material in a variety of file formats (for example: *.pdf* files, videos, *zips*, and other files stored in directories) through the storage facilities provided in *e-learning*. The uploaded files can be downloaded and studied by students whenever and wherever they are.

The *ANEKA* concept is inserted into *synchronous* learning to find out the positive attitude of students in following the process of face-to-face learning directly with the teacher through a video conference application. The *ANEKA* concept is inserted into *asynchronous* learning to find out the level of student independence in learning making it easier for teachers to know students who have high cognitive abilities.

C. Results in the Develop Stage

1) Expert's Evaluation

At this stage was obtained the expert's evaluation results towards the *ANEKA*-based *Synchronous* and *Asynchronous* learning design sketch. The evaluation results can be seen in Table 1.

Table 1. The Expert's Evaluation Results towards *ANEKA*-based *Synchronous* and *Asynchronous* Learning Design

No	Respondents	Items-										Σ	Effectiveness Percentage (%)
		1	2	3	4	5	6	7	8	9	10		
1	Expert-1	5	4	5	4	4	5	5	5	4	5	46	92.00
2	Expert-2	4	4	4	4	5	5	5	4	5	4	44	88.00
3	Expert-3	4	4	4	5	4	4	5	4	5	4	43	86.00
4	Expert-4	5	5	5	4	5	4	4	4	4	5	45	90.00
											Average		89.00

Table 1 showed the four experts were involved in evaluating the *ANEKA*-based *Synchronous* and *Asynchronous* learning design sketch. There were ten items of instruments used as tools for evaluating the design effectiveness. The intended instrument items included: item-1 about the availability of a video conference application for conducting *synchronous* learning; item-2 about the availability of an *e-learning* platform for conducting *asynchronous* learning; item-3 about the readiness of the *ANEKA* concept to be inserted into *synchronous* learning; item-4 about the readiness of the *ANEKA* concept to be inserted into *asynchronous* learning; item-5 about the ability of teachers and students to use video conference application; item-6 about the ability of teachers and students to use the *e-learning* platform; item-7 about the reliability of the video conference application in facilitating *synchronous* learning; item-8 about the reliability of the *e-learning* platform in facilitating *asynchronous* learning; item-9 about the completeness of the material content provided in the *e-learning* platform; and item-10 about data security in the *e-learning* platform.

2) Design Revision

Based on the results were shown in Table 1, it appears that the average of effectiveness percentage was 89.00%. This means in general *ANEKA*-based *Synchronous* and *Asynchronous* learning design had been included in the very high category when viewed from the categorization of the effectiveness percentage results. Therefore, it was no need to revise again.

D. Results in the Disseminate Stage

When viewed from the results at the *Develop* stage, generally, *ANEKA*-based *synchronous* and *asynchronous* learning design sketch had ready to be used and disseminated. The distribution of the learning design sketch was done by sending a softcopy of the design sketch to all the heads of IT Vocational Schools in North of Bali so that later the heads were able to instruct the teachers in the schools to implement the *ANEKA*-based *synchronous* and *asynchronous* learning during *social distancing*.

Based on the learning objectives that had been set previously at the *Define* stage, the role of *ANEKA* concepts seems clear. The implementation of *synchronous* learning by inserting *ANEKA* concepts was able to show the quality of learning even though the learning process was carried out from each student's home. This was because there were aspects of *ANEKA* that was able to be used as a measurement tool to monitor the quality of learning to stay awake. *ANEKA* aspects that were used as a measurement of monitoring the quality of learning, included: responsibility, clarity of targets, consistency, work ethic, obeying instructions, high integrity, effectiveness, efficiency, innovation, quality-oriented, disciplined, brave, and hard work.

The aspects of *ANEKA* that can be used as a measurement of monitoring students' cognitive abilities in terms of student absenteeism and independence to learn through *asynchronous* learning, included: honest, transparent, confident, careful, independent, and fair. The aspects of *ANEKA* that can be used as a measurement tool for monitoring students' positive attitudes in *synchronous* and *asynchronous* learning processes, included: participatory, neutral, prioritizing the public interest, tolerant, mutual-cooperation, caring, simple, deliberation of consensus, family, wise, not greedy, giving help, respect, polite, and obey the laws and regulations.

Generally, the results of this research have been able to show the effectiveness level of the *synchronous* and *asynchronous* learning design. In principle, this research results are similar to Dada, Alkali, and Oyewola's research [15] that also showed the research results about the effectiveness of *synchronous* and *asynchronous* learning. The results of this research can be the answer to the obstacles found in several studies were conducted by Shahabadi & Uplane in 2015 [12]; Perven in 2016 [13]; Arasaratnam-Smith & Northcote in 2017 [14]; Dada *et al*. in 2019 [15]; and Cacheiro-Gonzalez *et al*. in 2019 [16] with inserting *ANEKA* aspects into *synchronous* and *asynchronous* learning strategies, so that positive attitudes and cognitive abilities of students can be measured. Aspects of *ANEKA* principally source from the internalization of attitudes values based on local wisdom. In general, *synchronous* and *asynchronous* learning processes that are inserted aspects of local wisdom can realize an increase in students' positive attitudes. This was confirmed by the results of the research of Sofyan *et al*. in 2019 [29] which showed the internalization of aspects of local wisdom into e-modules (where e-modules are one of the teaching materials in *asynchronous* learning) to realize increased positive attitudes and student enthusiasm for learning. The positive attitude of students in *synchronous* and *asynchronous* learning is very important to know to demonstrate the success of the learning strategy implementation. This was reinforced from the results of Keskin & Yurdugül's research in 2019 [30] which showed the importance of student character in influencing the successful implementation of online learning and blended learning.

Limitations in this research were not found yet the most dominant aspects of *ANEKA* which the cause of an increase in the quality of cognitive abilities and an increase in students' positive attitudes in *synchronous* and *asynchronous* learning.

5. Conclusions

This research showed the *ANEKA*-based *synchronous* and *asynchronous* learning design had categorized as a very high level of effectiveness. Therefore, the results of this research succeeded in presenting new knowledge in the form of design used as basic guidelines in carrying out the learning process during *social distancing* to realize increased cognitive abilities and positive character of students. The future work that can be done to solve limitations in this research is to insert the concept of artificial intelligence into the learning design so that later it will be easier to determine the dominant aspects causing an increase of positive character and cognitive ability of students.

Acknowledgment

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