International Journal of Evaluation and Research in Education (IJERE)
Vol. 11, No. 1, March 2022, pp. 392~402
ISSN: 2252-8822, DOI: 10.11591/ijere.v11i1.21458

Techno self online learning PEVAR as a new learning alternative: Paradigm and construction

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Article Info

Article history:

Received Jun 11, 2021
Revised Jan 2, 2022
Accepted Feb 4, 2022

Keywords:

Online learning
Online technology
PEVAR learning model
Self learning
Techno self learning

ABSTRACT

This article aims to build paradigms, strategies, and stages of learning models that can reduce learning barriers. The learning process can benefit changes in cognitive, affective, and psychomotor aspects for the better. This research was conducted because it saw the reality of the problem of low learning achievement. This was qualitative study employed induction approach. The analysis of generic analytic style employed as theory development. This research found an online independent learning model consisting of five stages: preparation, exploration, verification, analysis, and reflection called PEVAR. Techno self online learning PEVAR offers a technology-based self-study alternative. Techno self online learning PEVAR is built based on the paradigm of behaviorism, constructivism, and cognitive. This learning model increases learning achievement, which is marked by increasing students' affective, cognitive, and psychomotor abilities. The strategies used to achieve the goals are commitment, discipline, motivation, confidence, creativity, activity, effectiveness, and efficiency in learning.

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1. INTRODUCTION

Self-learning is an individual's ability to know something on their initiative without the dependence of other individuals. Self-learning is an active learning activity driven by an intention or motive to master competency to solve a problem, and it is built with the knowledge that already has. Self-learning is a process where students are involved in identifying what needs to be learned. The self-learning process can take advantage of technology as an active and efficient learning solution [1]. Information technology can be accessed at any time, simplify the learning process. Information technology can be helpful as a solution to learning problems faced by students. In a study, it is stated that technology has a huge role in education [2]. As reinforced by other studies' results, it is found that technology can improve student achievement and benefit teacher performance [3]–[5].

Online sites that contain educational information can be used as a learning resource. Online sites can be accessed by students at any time so that students' learning is not limited by time and space. The existence of information technology turns out that changes student learning patterns that have been happening so far. The learning process carried out conventionally face-to-face with teacher assistance has turned into online learning that teachers do not have to mentor.

Self-learning strategies free students to learn adapted to self-control and responsibility. Students learn to express self-control by seeking and committing to achieving goals tailored to personal interests, talents, and aspirations [6], [7]. Self-learning requires confidence, courage, and determination to energize learning goals. Students develop these traits to manage time and effort in finding the resources they need to carry out learning. Learning outcomes are influenced by internal and external factors [8]. Internal and external factors influence them in students. Internal factors that come from within students consist of motivation, talents, interests, discipline, self-management, self-assessment, and health. External factors are the facilities used in the learning process. Technology is an external factor that can affect learning outcomes. These factors greatly influence the self-learning process causing problems.

The main problem of education is the low achievement of student learning outcomes. Students have difficulty in understanding and mastering the material, so that their learning outcomes are low. Learning problems cause learning objectives have not been achieved optimally. Students in achieving learning objectives must be able to carry out the learning process effectively and efficiently to increase the power of thought towards mastery and understanding of the material. A study stated that almost half the number of students in one class were weak in critical thinking [9]. Lack of practice is one of the causes of difficulties in using critical thinking skills when students read [10]. Students who have low critical thinking skills will hamper their creativity in learning so that their learning achievement is low [11].

The forms of technological media used in learning are mainly in the form of screens that emit light, such as computers, laptops and cellphones, if used for a long time and continuously cause eye fatigue. The sense of sight that is weakened will impact reducing students' motivation to learn and think. Students in online self-learning are often found inconsistent in using computer media. Cell phones are not only used for learning but are used for playing games. The impact of students in playing games, among others, will be addicted so that learning tasks are not done. The dependence of students on playing games also weakens students' motivation to learn [12]. Self-learning, there is also leniency in the achievement of learning objectives, resulting in the low achievement of quality standards for learning outcomes. Face-to-face conventional learning has limitations in various aspects. Teachers are limited by time in delivering material, causing students to have limited interaction in-class learning. Students experience high levels of stress when they are tired of following rigorous learning from morning to afternoon. Conventional learning in the classroom requires a schoolroom or building and facilities to meet students' and teachers' needs. The cost of maintaining expensive school facilities and infrastructure has increasingly motivated educational institutions to implement a self-learning system for their students.

Online self-learning can be used to solve student learning problems. It is relevant to the development of online technology that is increasingly needed by students [13]. The basic assumption of independent learning is that humans live life to learn from birth to death, so it is necessary to develop talent potential by utilizing technological developments [14]. Students who can manage self-learning activities properly can face obstacles and difficulties [15], [16]. Students able to find alternatives and solve their problems to maintain productivity in self-learning.

Self-learning is a phenomenon in various schools that apply distance learning based on self-learning [17]. The integration between technology and the learning process is a necessity in the necessary technology, which is increasingly becoming a habit in education. The exciting features in various online media make students more interested and motivated to learn to provide exciting learning that includes cognitive, affective, and psychomotor aspects. Learning outcomes are said to be of quality if the ability of these three aspects is ideal. The purpose of the self-learning model is to optimize students' cognitive, affective, and psychomotor aspects so that it requires appropriate strategies and steps for self-learning in online learning.

This article is the important to build paradigms and construct new learning models resulting from reflections on technological developments that make it easier for students to learn. The abundance of online learning resources must be utilized to improve student achievement. The focus of the discussion in this article is the study of online-based independent learning. Online-based independent learning behavior can be carried out at school, at home, or in the community. Online-based independent learning can be used as an alternative to learning for students so that this learning model becomes a solution to learning problems. The learning process that can be done independently and utilize online technology is expected to increase learning motivation, resulting in quality learning and can improve student achievement.

2. RESEARCH METHOD

This was qualitative research employed induction approach. The design used in the induction approach is to negotiate the relationship between empirical reality and theory [18]. The three significant theories used as the basis of thought are educational philosophy, educational technology, and self-learning. The three theories collaborate with logic that emerges from real experiences or conditions to expand knowledge about techno self online learning preparation, exploration, verification, analysis, and reflection

(PEVAR) to find new theories. Logic and experience are tools to validate knowledge about techno self online learning PEVAR. The sources of experience in this article are actual self-learning and online learning from the research results. The analysis used in this article is the generic analytic style. Generally, generic analytic style analysis aims to build a theory [19]. This article aims to build a techno self online learning PEVAR consisting of paradigms, strategies, steps, and learning outcomes. The analysis procedure is carried out to build the theory through the following stages:

a. Researchers build initialization with self-learning materials and online learning. Initialization is obtained from listening to and reading theories about educational philosophy, educational technology, and self-learning. This process is done carefully as a basis for looking for something new in learning. The results of this stage are important notes as memos to record impressions and observations to help the next stage. The record of building the initialization at this stage is divided into four: paradigm, strategy, stages, and learning outcomes.
b. The researchers determine the theme and pattern of techno self online learning PEVAR from important notes in the initialization process. The formation of themes uses an inductive model, where specific notes are concluded to be general. In summary, from the first four notes, the general categorization is as: i) Notes on paradigms: behaviorism, constructivism, and cognitive; ii) Strategy: commitment and discipline, motivation and confidence, creativity and activity, effective and efficient; iii) Stages: preparation, exploration, verification, analysis, and reflection; iv) Learning outcome: cognitive, affective, and psychomotor.
c. The researchers did the coding by conceptualizing the results from stage two. The research contextualized new findings at this conceptualization stage that could be used as theory techno self online learning PEVAR. Then compare the techno self online learning PEVAR theory with other findings that have previously existed. This stage also uses the typology used in techno self online learning PEVAR, explained in detail and depth.

3. RESULTS AND DISCUSSION

3.1. Learning paradigm

Learning is a process of looking to find something that is considered a need. Self-learning is a process where students take the initiative to diagnose their learning needs, formulate learning objectives, identify resources for learning, select and implement learning strategies, and evaluate learning outcomes [20]. Paradigm techno self online learning PEVAR uses a collaboration of three approaches: behavioristic, constructivist, and cognitive. According to Thorndike, learning is a process of interaction between stimulus and response [21]. A stimulus can lead to learning activities such as thoughts, feelings, or other things captured through the sense organs. At the same time, the response is the reaction that students give when learning in the form of thoughts, feelings, or actions [22], [23]. Techno self online learning PEVAR is a learning model that can be seen from stimulus and response.

The stimulus in techno self online learning PEVAR is in online media that students use to learn. Information on knowledge in online media evokes student responses. The process of receiving and analyzing these information sources is a student's response to stimuli in online media so that it can be seen that technology is a stimulus. At the same time, techno self online learning PEVAR can be called a response. In constructivism, philosophy has an assumption that knowledge is the result of human formation itself [24]. Humans construct their knowledge through their interactions with objects, phenomena, experiences, and environments [25]. According to the constructivist theory, students must build their knowledge. Students construct their experiences as a basis for constructing their knowledge. To understand and apply knowledge, they must work to solve problems, find everything for themselves, and develop new ideas based on learning outcomes.

The cognitivism theory argues that a person's knowledge is obtained based on thought [26], [27]. The cognitive approach used as the basis of techno self online learning PEVAR is thinking students' thinking in storing information and retrieving information from memory to solve learning problems. According to cognition theory, when a person receives new information or experiences, the information will be modified to suit his cognitive structure. This process is called assimilation. On the other hand, if the cognitive structure must be adjusted to the information received, this process is called accommodation [28]. So assimilation and accommodation will occur when there is a cognitive conflict or an imbalance between what is known and what is seen or experienced [29], [30]. This cognitive process is widely used by techno self online learning PEVAR in the analysis step so that students' thinking patterns in analyzing something occur in the structure of their cognitive development.

3.2. Learning strategies

The learning strategy is a systematic plan of action using various methods to achieve the specified learning objectives. The strategy is prepared by considering various actual conditions faced in the learning process to be implemented. Strategy techno self online learning PEVAR to achieve learning objectives can be seen in Figure 1.

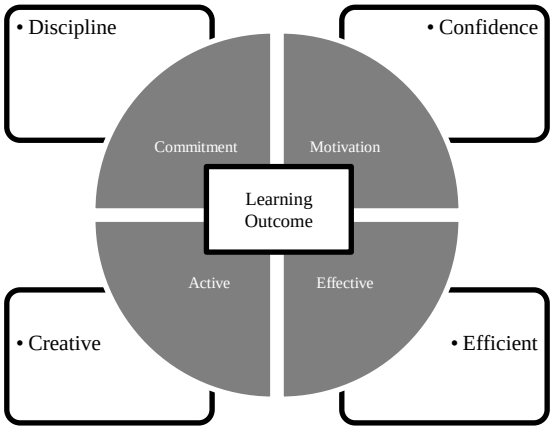

Figure 1. Learning strategies

Students need a commitment to be successful individuals [31]. Commitment is an aspect that can generate a strong desire to learn. Building a commitment to learning is an effort of students to maintain continuity to learn continuously. Commitment attitude is a form of responsibility of students who must learn [32], [33]. Self-learning requires individuals who can promise themselves because students promise to do their best, study material, do assignments, and get used to literacy not only because they feel obliged but as a need. Students are committed to self-learning, so they do not have a dependence on other people. The role of online media will replace dependence on other people. Commitment to self-learning has several components: i) Intention and sincerity in intellectual and emotional management in carrying out self-learning activities; ii) As a form of responsibility towards oneself, learning is necessary and is responsible for using online media to support the learning process; iii) Knowledge gained from learning is dedicated to those in need; iv) As a form of agreement to oneself to achieve success in learning; v) Students' responsibility in carrying out self-learning continuously.

Commitment attitude in self-learning must be accompanied by discipline because commitment without discipline will not be implemented optimally. Good learning discipline will create a comfortable atmosphere when learning activities [34]. Students disciplined in learning will carry out learning activities regularly and seriously without coercion [35], [36]. A conducive and comfortable learning atmosphere in the classroom helps optimize potential and make it easier to achieve learning goals. Self-learning requires a high level of discipline. Individual discipline in carrying out regular learning, discipline to focus on learning using online media, and online content other than learning information sources. The attitude of self-learning discipline can produce behavior: i) Consistency in seeking knowledge to find something to solve learning problems; ii) Orderly and regularly learn by using coherent and critical logic; iii) Be obedient when looking for information sources so that the sources of information sought do not deviate from the material needed. The biggest challenge in self-learning is to remain disciplined in learning, even though no other individual supervises the learning process. The absence of a supervisory function from other individuals causes self-learning to need firm discipline and commitment.

Motivation in self-learning is essential because motivation encourages learning enthusiasm and vice versa. Without motivation, it will weaken the enthusiasm for learning [37], [38]. Motivation is a prerequisite for learning. A student who learns without motivation will not succeed optimally. According to Goleman [39], intellectual intelligence (IQ) only contributes 20% to success. In comparison, 80% is the contribution of other strengths, including emotional quotient (EQ), namely the ability to motivate oneself, overcome frustration, control impulses, regulate mood, empathy, and the ability to work together. Maslow's theory of needs [40] describes a hierarchical relationship with various needs, in which the aspect of first needs is the basis for emerging needs. If the first need has been satisfied, then human begin to want to satisfy the next need.

The first hierarchy of self-learning that must be met is physical needs. Students will learn that the mind and body are in good condition [41]. After physical needs are met, students need a sense of security and comfort. Avoid situations students are threatened. The facilities and infrastructure used by students in self-learning are well fulfilled. The computer or mobile device used is not harmful to student learning activities. The light setting of the computer or cellphone screen must be comfortable to the eye. The safety factor of the equipment is crucial because damaged online media devices threaten students' self-learning. After all, it will hinder the learning process. The following hierarchy of motivation needs is ownership and affection, such as the need to feel valued and valued. A student who has met his self-esteem needs will be confident, feel valuable, feel healthy, feel able to do something, and feel useful in his life. The most important or the highest need, that is, if all needs are met individually, they will feel free to show their full potential. The basis for self-actualization includes knowing and understanding to satisfy the most basic cognitive aspects of self-learning.

Some people think that creativity is more valuable than intelligence. This opinion can be understood considering that in today's life, challenges and problems are increasingly complex. Humans need to look for new innovative ideas before finding a solution, and without high creativity, it is tough to realize. Creative students are better at developing reasoning power and finding solutions to various learning problems [42], [43]. Developing the potential for creative thinking will build high self-motivation for positive attitudes [44], such as a strong willingness to learn, high self-confidence, and thinking critically. Creative students have a perspective that the learning process lasts a lifetime or long-life education for everyone. Students who apply it show changes in behavior for the better. The characteristics of creative students in self-learning include: i) Always have ideas in thinking and learning activities, making it easier for students to find learning solutions; ii) Students have the skills to use and make suitable learning media. Students can publish their learning results in online social media, such as YouTube, website, Facebook and WhatsApp, to be known and used by others; iii) Students often do experiments to understand and find something new; iv) Students have a nimble attitude, so they never procrastinate on assignments and quickly solve problems.

Creativity will be maximized if an active attitude accompanies it. Students who are creative but not active cannot achieve learning success. The concept of constructivism is that students who are actively learning are always looking for knowledge, information, or skills. Self-learning activities are carried out by observing, investigating, reading actively, and actively listening [45], [46]. Students who are active when thinking critically can find anomalies, weaknesses, mistakes and find solutions. Active students can create stability in the long-term memory system and can communicate the results of their thoughts [47]. Students express opinions, explain something, discuss, present reports, and display their work for others' comments are evidence and signs of active learning. Students who learn actively always comment (not only ask for comments), conclude the learning process, correct mistakes or deficiencies in the learning process, and conclude learning material in their own words.

Self-learning requires effective work so as not to exploit labor in learning. The key to effective learning is to understand something with logical thinking. When students understand the material with logical thinking, their meaning will be easy to understand and stored in the brain's memory [48]. Learning effectively can be called meaningful or memorable learning. It is different when learning by memorizing, the process that is passed will be longer, and it is easy to forget. Independent learning prioritizes individual behavior in all learning activities so that students can learn effectively.

Online media can help self-learning effectively and efficiently [49], [50]. Efficient self-learning is learning by minimizing effort but getting maximum results. Learning with fast and precise time is one indicator of learning efficiency. Learning by minimizing places, facilities, and infrastructure can also be said to be learning efficiently. The user can also see an efficient way of learning the learning method used. Techno self online learning PEVAR is learning that does not take up too much space. Learning resources are not physical but electronic or virtual. Techno self online learning PEVAR does not require an enormous budget in managing facilities such as in schools.

3.3. Learning stages

The techno self online learning PEVAR model is a learning model that prioritizes self-learning. The self-learning stage that education experts have developed has four stages: Dependent, Interested, Involved, and Self-directed [51]. This stage has shortcomings because it has not been explained in detail about the need for thinking skills [52]. Techno self online learning PEVAR tries to build the stages of the self-learning model in sequence and requires students' thinking abilities. The stages can be seen in Figure 2.

Quality learning is learning that must be prepared so that the learning process runs smoothly without obstacles. The principal preparation in learning is to determine learning objectives. Learning objectives are a set of results to be achieved in the learning process. Students set target goals to be achieved, which will later be used as benchmarks for learning [53]. The benefits of learning objectives are that students can know what

will be studied, what material will be prepared, and what equipment is needed in these learning activities. By understanding the learning objectives, students know the ability to understand the material to be studied. Mental readiness affects the process of achieving learning goals. Mental readiness is influenced by several factors, including the student's anxiety. Less intelligent students have more anxiety than students with high abilities. Learning preparation is also manifested in the form of preparing the required facilities. The facilities and infrastructure, and equipment for online learning media used in self-learning must be well prepared. Learning facilities are all needed in the teaching and learning process, both mobile and immobile, to achieve learning goals to run smoothly, regularly, effectively, and efficiently. Internet access, as the primary support in online learning, must always be available. Students must adapt to operating online media to be used. Individuals whose resilience to technology can adapt to technological developments can learn new learning media [54]. The preparation stage's last activity is planning for self-learning from the beginning of the learning process to the end of the study. Good learning is well planned so that it will facilitate students' steps in learning.

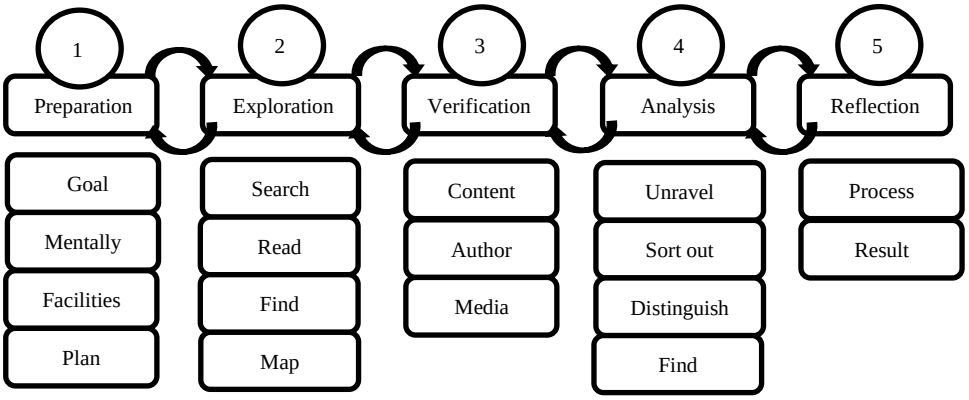

Figure 2. Techno self online learning PEVAR stages

Learning can be defined as a process of finding something new that has never been known. The individual learning process starts with getting information. Exploration is an activity to find and collect and manage information using the media. Exploration, also known as search, is the act of searching to find something. At this stage, students search, read, discover, and map. The search for information sources is essential in the exploration stage. Students try their best to get as much information as possible. Information on self-learning can be found easily in various online media. This very abundant source of information is selected according to the needs of the material being studied. The next activity after obtaining learning resources is mapping information into parts that have in common. Students identify content relevant to the required subject matter. Mapping is done to make it easier for students to categorize information sources as the primary material in the learning.

Verification is an examination of the accuracy of information [55]. Validation is one way of verifying information. Definition of validation is a measure that shows the level of correctness of the information [56], [57]. Sources of information that have been discovered during the exploration stage must be verified. Information verification is carried out because of the large amount of information available in online media. The development of increasingly easy technology impacts everyone's freedom in creating content or information sources. Everyone can easily create content in online media, so verification is essential to investigate this information's validity. The information used as a learning resource must come from trusted online media. Reliable indicators include the media consistently publishing accurate information, which is a reference for many people. The author of the information must be verified by examining the scientific expert's educational background and capacity. Checking the information content is very important in the verification stage. The quality information content is information based on accurate data and research. The benefits of verification can provide information on the quality of the information found to achieve learning outcomes optimally.

The analysis is a fundamental stage that significantly determines the quality of the information system being developed. The analysis is an activity of thinking to decompose something into smaller components to recognize the signs of the components, their relationships with each other, and their respective functions in one integrated whole [58], [59]. The analysis aims to obtain a more detailed understanding and can be used as a basis for making decisions based on conjectures, theories, or predictions from something

that has been previously understood. An in-depth understanding of a matter cannot be obtained easily. Therefore, the analysis will require systematic steps in its implementation. In self-learning, students sort, parse, differentiate information that has been verified to be classified and grouped according to specific criteria and then look for the meaning and its relation. Students break down a problem into parts. Thus, the arrangement appears clear, and then the essence of its meaning can be found. Students compare the information with other information. With this comparison, the similarities and differences in information will be known about each information's advantages and disadvantages. After comparing, they are then connecting between one information and another. Students search for information about how the relationship between each information can affect each other until they find new constructs so that something new is formed that can solve problems.

Self-reflection is essential for students in self-learning because students can improve the implementation of learning by doing this. Students will be honest when reflecting because there is no supervision [60], [61]. Reflection is an effort to think deeply about what has been done [62], [63]. Students think again about the learning that has been done. Reflection can also be done by measuring yourself against the learning experiences that have been implemented. Reflection is a process of reviewing experiences by describing and evaluating the learning that has been done. Reflection will find the strengths and weaknesses of a material. Weaknesses and shortcomings that have been recognized will be minimized by reconstructing the self-learning process, while the supporting factors for successful learning become habits. The principles of self-learning reflection carried out by students include awareness to improve the quality of learning. Self-assessment during reflection is done critically. Assessment is carried out comprehensively from the beginning to the end of the learning process. The results of the assessment are used as suggestions for improving quality learning.

3.4. Learning outcome

Learning is a process of changing human personality, which increases the quality and quantity of behavior, such as increased understanding, knowledge, thinking power, attitudes, habits, skills, and other abilities that come from the material being learned. Self-learning classifies learning objectives into three elements, namely the ability to think, the ability to manage feelings, and the ability to work. Based on Bloom's theory, the learning process is categorized into three cognitive, affective, and psychomotor aspects, as shown in Figure 3 [64], [65].

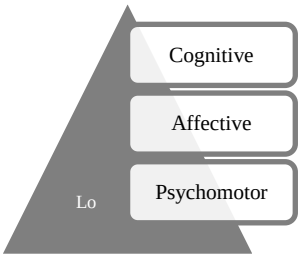

Figure 3. Techno self online learning PEVAR learning outcome

The cognitive aspect of self-learning is based on all the information received and stored in the brain [66], [67]. The cognitive aspect consists of six levels starting from the lowest level: remembering, understanding, applying, analyzing, evaluating, and the highest level is creating. The six cognitive levels can be used as a standard for measuring techno self online learning PEVAR learning outcomes. Every student has different strengths and abilities, so that learning outcomes are also different. At the highest level, techno self online learning PEVAR can reach creating levels. This can be seen at the end of the analysis stages, which ends up constructing something new. In the affective aspect, techno self online learning PEVAR learning outcomes can be measured by Bloom's affective classification level, which consists of receiving, responding, appreciating, organizing, and characterizing. These five affective aspects can be achieved if all techno self online learning PEVAR strategies can be implemented optimally. A healthy attitude of commitment, discipline, motivation, and self-confidence is one of the techno self online learning PEVAR strategies that can generate affective respect and characterization abilities. Other affective attitude abilities are also reflected in other techno self online learning PEVAR strategies, including being creative, active, effective, and efficient, leading to affective attitudes of receiving, responding to, and organizing.

The primary indicator of psychomotor aspects is physical movement skills. Psychomotor aspects include movement behavior and physical coordination, motor skills, and individual physical abilities [68], [69]. Techno self online learning PEVAR learning outcomes on the psychomotor aspects are based on five categories: imitation, manipulation, precision, articulation, and naturalization. One of the active verbs to imitate is to obey. The techno self online learning PEVAR commitment strategy can fulfill the psychomotor aspects of imitation. In the manipulation aspect, techno self online learning PEVAR, can reflect this aspect because students can sort something, identify, mix, implement. In precision, students who use techno self online learning PEVAR can see the ability to operate learning media. If the learning equipment and media are operated imprecisely, they do not get the information needed. Even the equipment used can be damaged. In the articulation aspect, techno self online learning PEVAR has a standard ability to adapt to technology, combine information, formulate information, and solve problems. The highest point of techno self online learning PEVAR results can be equated with the naturalization aspect, namely the student's ability to manage to construct something.

4. CONCLUSION

Techno self online learning PEVAR is a learning process that prioritizes students' independent learning ability, which is integrated with online learning media technology. Techno self online learning PEVAR has three learning paradigms that form the basis of the learning program. First, the behaviorism approach has a role in changing student behavior due to independent learning experiences. Both constructivism approaches are tasked with producing students who have the ability to think to solve the problems at hand. The three cognitive approaches are used to work for students in independent learning, namely the process of storing information and retrieving it from memory. The collaboration of the three paradigms results in five stages of the techno self online learning PEVAR process. Preparation is the first step for students to learn independently to plan learning goals. The next stage is exploration, by searching for learning sources and information. The third stage is to verify the source of information based on the validity of the source. The next stage is to conduct a critical analysis of the learning resources and information that have gone through the screening at the verification stage. The final step is a reflection by assessing yourself on what has been learned, which is based on learning objectives. In achieving learning goals, techno self online learning PEVAR develops three cognitive, affective, and psychomotor abilities. In addition, commitment, discipline, motivation, self-confidence, creativity, activity, effectiveness, and efficiency are techno self online learning PEVAR strategies in achieving learning goals.

Techno self online learning PEVAR has implications for independent student learning behavior. Students can plan to learn independently. Students can choose online learning resources and learning media independently. The learning process can be carried out flexibly according to the time and place of students. Learning evaluation can be carried out independently. By using the techno self online learning PEVAR students can manage and control learning independently. The rapid development of technology in the field of education from time to time can be beneficial for Techno self online learning PEVAR because the learning model uses online learning resources and online social media. In the future, more and more online learning content will be found on various online social media, so that it can support the implementation of Techno self online learning PEVAR.

ACKNOWLEDGEMENTS

This study is supported by doctoral scholarships from the Ministry of Religion of the Republic of Indonesia.

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