

# Thorndike's Theory for Improving Madrasah Teacher's Creative Thinking and Publication

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## ABSTRACT

The purpose of learning is to find out what is not yet known. Besides, it also gets used to solving problems. Learning increases the brain's work power when dealing with problems. In addition to solving problems, it is also expected to be able to produce useful work. The research method used is literature study, by examining related theories to formulate new ideas that are expected to be applied. The result is that learning theory is one of the theories adopted and applied in education. One of them is Thorndike's theory of learning, which initiated experiments on nearby animals. As a result, these animals were able to improve activity with the stimulus provided. Humans are expected to provide more with the similarity of living things to humans and more perfect than animals when given a stimulus. The response that appears later can be something useful. One of them is increased creativity and publicity. Through this learning theory, it is able to increase one's level of creative thinking and also produce works. Work is needed so that self-existence is elevated and science is increasingly honed.

**Keywords:** *Learning theory, Thorndike, Creative thinking, Publications*

## 1. BACKGROUND

Teachers are special people who have certain skills and also include professional work. With many other professions, the profession as a teacher is unique compared to other professions. There are two uniqueness of being a teacher [1]. First, the teacher's assignment. The teacher is a conveyor of knowledge and a form of student personality that is useful for himself and the environment. Second, responsibility. After the assignment is completed, the teacher is then responsible for completing the teacher's task. The correlation between duties and responsibilities is closely related to the abilities required to carry out the profession as a teacher.

The specific teacher's task in a formal education environment is to direct students in teaching and learning activities to achieve the learning goals. So that teachers are required to be able to deliver learning material in accordance with the learning plan. The teacher's ability should be improved and the quality of the material to be delivered must be maintained. Learning activities refer to the principles of teaching science. So that teachers are

motivated to always improve their abilities in their capacity and the capacity of classrooms with students.

A teacher has important tasks, both carrying out professional duties and those related to service assignments. The teacher's duties are divided into three parts: duties in the professional field, duties in the humanitarian sector, and tasks in society [2]. These three tasks are carried out together harmoniously and flexibly.

The first task is a professional task that makes a teacher attached to society [3]. The role is significant because it improves education quality. The second task is a humanitarian task, which can be done by providing the others' needed benefits. Meanwhile, the third task is a social task that makes teachers ordinary people who need to live with other people.

Besides those three tasks, teachers need the learning theory to assist them in teaching in the classroom. The problem that arises is that in delivering the teacher's material, it only refers to the guidebook with student worksheets. With books and worksheets, the teachers' instructions will follow what is written on the sheet.

The weakness is the guidelines on the sheet are too short. Also, the materials should be delivered fastly, regardless of the students' understanding. Moreover, problems arise when some materials are skipped and replaced by the next easier materials, which then, badly, students could not understand and remember the delivered materials. Because indeed, the learning objectives are not adjusted to the capacity of teachers and students. The teacher must provide a stimulus according to students' and teachers' abilities to achieve goals and responses. It is where the need for a theory that is able to help teachers and students achieve learning goals.

Furthermore, the learning materials should also be archived so that documents can be used for comparison in the next lesson. It should have become teachers' routines. What teachers do not often do is publish their documentation. Learning is carried out only as a formality task and there is no renewal in learning.

Hence, the researcher would like to seek ways to increase teachers' and students' capacity through critical thinking and publication. Dare to create new things for the teacher and convey the learning results in the form of scientific publications. It is to increase the capacity of self and encourage other teachers to make innovation in learning.

## 2. RELEVANT STUDIES

The first study talks about behavioristic learning theory. It is a rational-empirical-quantitative [4], and it is due to the secular-positivistic-materialistic world view. The theory states that humans are mechanistic-deterministic, making humans as robots in a less spiritual learning process. To reduce this weakness, it is necessary to have scientific publications that can be enjoyed by others. If this happens, it will make the teacher excited and not willing to act like a robot.

The most important part of behaviorism learning theory is input and output in the form of responses. These two parts are what can be measured. In other works, the teacher's response is called a stimulus that wants to answer students. However, in this work, the teacher's stimulus is also called a response, because the teacher's stimulus is also based on the initial response given by students when starting learning. So, everything that teachers and students do should be measurable. So that to increase positive behavior, teachers must give a positive response in every lesson they do.

Based on the research results using the Hierarchy Process Analysis (AHP), priorities for improving teacher competence are (1) Moral screening of prospective teachers. (2) screening of teacher quality, (3) including teachers in character building training. These three things become the focus so that students will be able to acquire knowledge and character, as the goals of national

education. Here, the teacher can use a behavioristic learning theory.

Another study was from Firdausi. The study concluded an increase in students' thinking skills after going through MEA learning (Model Eliciting Activities) indicated by a gain index of 0.35. The student's ability shows level 4 which means it meets the level of student creative thinking indicators. This study focuses on the MEA learning model on students' creative thinking skills. As a basis, the teacher's learning in this study provides a new color in learning. It is in line with the research that will be carried out in research that teachers must provide innovation in learning for satisfactory results, namely by increasing student abilities after participating in learning [5].

The third research was about the relationship between this learning theory and Islamic law [6]. In this research, he compared Muslim education by Al-Ghazali and behaviorism by Skinner. It was about the interconnection between religion and life. It could be said that his parents and teachers influence a child. The silence of the parents' heart will have a good impact on the children as students. Good morality in a student is influenced by good education supported by supporting facilities and infrastructure, especially education in the family because home is "almadrasatul uula".

Meanwhile, Skinner argued that the environment provides a stimulus to humans, known as the operant conditioning system. The system theory occurs without being preceded by a stimulus, but the effect of reward/reflection occurs. If the reflection given is something positive, it will produce a supportive stimulus. Conversely, if the reflection that occurs is something negative, it will be able to erode the stimulus resulting in attenuation or something unpleasant. It means that the initial stimulus will produce a continuous response that determines the stimulus and subsequent responses. Both Al-Ghazali and Skinner provide direction regarding the attitudes and characteristics of the teacher in the discussion.

Fourth study was on Project-based learning (PBL) models resulting [7]:

- a. The use of project-based learning models can improve students' creative thinking skills.
- b. In addition to students' creative thinking abilities, it is also accompanied by an increase in students' problem solving abilities after the application of PBL learning.
- c. So that with the increase in students' creative thinking skills and students' problem solving abilities, it will create a positive influence when students solve problems.

The similarity desired in this study is the increased ability of students during the learning process, in addition to increasing teacher activity in planning learning

according to the field. Activity here means that the application of learning strategies cannot be like in general.

Teacher professionalism by looking at teacher learning outcomes compared to other teacher learning outcomes [11]. In order to help improve a teacher's professional abilities, the government replaced the old curriculum with the 2013 curriculum. This form of change is a form of innovation in the world of education. The aim is to give students the ability to survive to face the challenges and developments of the times while still upholding good morals. This is in accordance with the objectives of this study, which is to provide skills and knowledge to teachers, so that when they return to teaching they will get professional teacher souls.

One indicator of teacher professionalism is doing something unique and immortalized in the form of scientific publications [12]. Regarding this publication, it has become a decree from the center which all teachers who teach in the classroom, whether from low, medium, or high levels, have to do it. With this decision regarding publication, it requires every teacher to practice writing about something he has done, the easiest is about learning that is usually done every day.

According to Salam, to practice publication skills, it begins with the stage of giving a pretest [13]. Followed by the delivery of material and ended with a posttest. Of course, the posttest results must obtain a value according to predetermined criteria. To see this value, one can see the results of works published either nationally or internationally.

### **3. RELEVANT CONCEPT OR THEORY**

#### **3.1. Thorndike Theory of Learning**

Edward Lee Thorndike is an American. He is an educator as well as a psychologist. The beginning of his research was carried out on animal experiments, before carrying out research on humans. This is done as a step to see how much success in conducting research. According to Thorndike, departing from his experiments that the interaction process in which there is a stimulus and response is called learning. Stimulus is anything that can lead to learning activities that can be captured by the five senses. Meanwhile, the response is an activity that results from a given stimulus. Both of these can be feelings, thoughts or movements. So that what is called learning is a real change in behavior that can be observed and measured as a result of learning activities [14].

According to behavioristic learning theory, the main aspects of learning are the presence of stimuli and responses. The stimulus is given as an encouragement to students to do certain things that have been planned by the teacher. The point is to increase achievement and shape character. While the response is a response or

reciprocity from the results of the stimulus. This response will later become a benchmark for the quality of learning. This theory is often found in the world of education, such as giving gifts to students who succeed in doing something, or giving sanctions to students who commit mistakes / violations. Present and sanctions that become a stimulus, this response is awaited by the teacher for the impact of a stimulus [15]. This kind of learning is expected to be able to foster a hard work attitude and full of enthusiasm in students.

The learning theory above can be concluded. The conclusion is that the learning process runs without conflict, the assumption that one is better than one's own is something that is not needed in education. So that in learning about the meaning of self-development through a gentle attitude and looking at problems in several angles, it is adjusted to the problems at hand [16].

#### **3.2. Stages of Behavioristic Development**

The basis for development is the existence of criticism in thinking. The initial activities formed in the first time period will determine the degree of adaptation to life in the future. Life begins with the life of a baby. Babies are individuals who learn from their parents about beliefs. This really depends on the pattern of parenting and giving from the parents. Meeting the initial needs is more established according to the needs of the baby. However, there will be some patterns that are not fixed. Some of the possibilities include [17]:

- a. Individuals will get help to experience change. Assistance can be in the form of guidance or giving directly to individuals.
- b. Individuals will experience changes if they can do something new. What is new here does not mean something that does not yet exist, but something that initially he has never found and done and finally obtained.
- c. Individuals will experience change that comes from themselves who are passionate about change.
- d. The developments that have been experienced by the parents are used as the basis for making changes to their children. This is due to the parents' view of the future after what the parents experienced. This flow believes that an optimal environment is able to provide optimal individuals who are suitable and able to survive and struggle in the era of the times.

#### **3.3. Creative thinking**

One thing that is very important for students is having the ability to think creatively. Especially in studying formal subjects that provide various evaluation questions. This creative thinking ability requires students

to be able to solve a problem by understanding and mastering the problem to be solved. With this ability, students are expected to be able to solve problems on their own terms and in their own way [8].

The ability of students to solve problems has an impact on learning outcomes. If students are able to solve a problem, students will be enthusiastic in learning. Motivation is what will encourage students in learning activities. This motivation can also weaken students. The ability of teachers is needed so that students are always motivated to learn. Therefore, the teacher in providing motivation will not know the time so that students always want to learn. With motivation in every lesson there will be fun learning [18].

Creative thinking has several benefits. One of them is someone who is able to achieve above average achievements of other students. This achievement is obtained through the habits of students who are able to provide unusual but precise problem solving. Outperforming other students who are only fixated on monotonous solutions. Creative thinking is two-faced or two-faced combination thinking. The term here includes positive duplicity, namely judges and leaders. Judges because their thinking techniques are rational, analytical and logical, while leaders are impulsive, imaginative and intuitive. The habit in class is that children are asked to find solutions with one answer so that students cannot be taught as judges and leaders. Students should be trained with the form of questions that provide various solutions but still correct. Children will open their minds and horizons, as if their wings are stretched to make everything possible [19].

### **3.4. Teacher professionalism**

As a professional teacher by the State it is proven by the existence of an educator certificate. These professionals are in formal education starting from early childhood education to tertiary level. The process of appointing professional staff is in accordance with statutory regulations. Law No. 14 of 2005 on teachers. The law defines the meaning of professional. Professional is an activity that aims to earn income to fulfill life with skills that meet certain standards and require a professional education.

Teachers do not only apply in the formal environment, but also in social life where the teacher is. The image as a teacher remains attached to the teacher. The image of the teacher as a role model in the surrounding community. The attitude of the teacher will always be the center of public attention in their daily social activities. Teacher services in the community, the teacher's way of increasing knowledge, giving direction to students so that in the social environment there are figures who become role models and give directions. Even personalities such as the way teachers dress are in

the spotlight of society as examples of socializing. This makes teachers a broad concern for the community.

## **4. DATA MINING METHODS AND TECHNIQUES**

The research method of literature review or literature study contains theoretical theories that are relevant to research problems. The problem in this study is to determine "Application of Thorndike Learning Theory to Increase Creative Thinking Ability and Publications." In this section an assessment of the concepts and theories used is based on the available literature, especially from articles published in various scientific journals. Literature review serves to build concepts or theories that form the basis of study in research [20]. Literature review or literature study is an activity that is required in research, especially academic research whose main purpose is to develop theoretical aspects as well as aspects of practical benefits [21].

### **4.1. Type and nature of research**

Judging from the type of research, the type of research used in this research is library research or library research, which is research carried out through collecting data or scientific papers aimed at research objects or data collection in the form of literature, or analysis carried out to solve a problem which basically rests on a critical and in-depth study of the relevant library materials. Before conducting a review of library materials, researchers must first know with certainty about which sources the scientific information will be obtained. Some of the sources used include; text books, scientific journals, statistical references, research results in the form of a thesis, dissertation, and the internet, as well as other relevant sources [22].

### **4.2. Data Collection Methods**

The method of collecting research data is taken from data sources. What is meant by data sources in research is the subject from which data can be obtained. If the researcher uses documentation, then the document or note is the source of the data, while the contents of the research subject's notes or research variables [23].

### **4.3. Data Analysis Techniques**

After the entire data is collected, the next step is the writer analyzes the data so that a conclusion is drawn. To obtain correct and precise results in analyzing data, the author uses content analysis techniques. Content analysis is a research that is in-depth discussion of the content of written or printed information in the mass media. Content

analysis can be used to analyze all forms of communication, both newspapers, radio news, television advertisements and all other documentary materials [24]. Meanwhile, the connection with the discussion is as one of the writer's efforts to facilitate understanding by analyzing the truth through the opinions of the scholars, which then take the meaning and essence of the opinions of the scholars regarding alms.

## 5. DISCUSSION

The teacher designs classroom learning. The learning objectives are contained in a learning plan that is equipped with a learning scenario. All things related to learning must be able to be predicted by the teacher. Therefore, the results of learning must be realized with a mature learning percentage.

### 5.1. Thorndike Theory

#### 5.1.1. Definition

Thorndike pioneered the theory of connectionism, views that the basis for learning is the association between sense of impression and the impulse to action [25]. This means, behaviorism toeri, better known as the contemporary behaviorist, views that learning will occur in children, if children have an interest in the problems at hand. Students in this context are faced with the attitude of being able to choose the right response from a variety of possible responses. This toeri illustrates that student behavior is controlled by the possibility of receiving external rewards or reinforcement, which has a relationship between behavioral responses and the effect of gifts.

For teachers who agree with behaviorism theory, this assumes that student behavior is essentially a response to the past and present environment, and all learned behavior [26]. Looking at this assumption, what exactly is the teacher's main task? Namely, how teachers are able to create a learning environment (classroom or school environment) in students that can allow reinforcement for students. The environment in question here can be in the form of certain objects, people, or situations, all of which can impact the appearance of the child's behavior in question.

At first, education and teaching in the United States were dominated by Thorndike's (1874-1949) Thorndike's theory of learning called "Connectionism" because learning is a process of forming connections between stimuli and responses. This theory is often called "trial and error" in order to assess the response that exists for a particular stimulus. Thorndike based his theory on the results of his research on the behavior of several animals, including cats, and the behavior of children and adults [27].

The theory of connectionism is a theory that was discovered and developed by Edwar L. Thorndike based on experiments he conducted in the 1890s. This experiment uses animals, especially cats to determine the learning phenomenon [28]. Based on the above experiments, Thorndike concluded that learning is the relationship between stimulus and response. That is why connectionism theory is also called "S-R Bond Theory" and "S-R Psychology of learning". Besides that, this theory is also known as "Trial and Error Learning". This term refers to the length of time or the number of mistakes in achieving a goal. If we look carefully in Thorndike's experiment, we will find 2 main things that encourage the emergence of the learning phenomenon. First, that motivation is very vital in learning. Second, if a response produces a satisfactory effect, the relationship between stimulus and response will be stronger. Conversely, the more unsatisfactory (disruptive) the response's effect, the weaker the stimulus-response relationship will be [29].

#### 5.1.2. Characteristics of Thorndike's theory of learning

The learning theory put forward by Edward Lee Thorndike is called Connectionism theory or it can also be called Trial and Error Learning. The characteristics of learning with trial and error are:

- a. There are motives to drive activity
- b. There are various responses to the situation
- c. There is the elimination of failed or incorrect responses
- d. There are progress reactions to achieve goals [30].

According to Thorndike, educational practice must be studied in a scientific direction. Educational practice must be linked with the learning process. According to him, good teaching is knowing what you want to teach, meaning knowing what material to give, what response to expect and when to give a gift [31]. There are several rules that Thorndike made regarding teaching, namely:

- a. Pay attention to the student's situation
- b. Pay attention to what response is expected from the response
- c. Create the response relationship on purpose, don't expect the relationship to happen on its own
- d. Other situations are the same do not heed if it can break the relationship.
- e. If the intention is to create a certain relationship do not make other relations of the same kind
- f. Make the relationship in such a way as to get real action

- g. Create a learning atmosphere in such a way that it can be used in everyday life [32].

### 5.1.3. *The laws used by Edward Lee Thorndike*

There are also from the results of Thorndike's experiment, 3 main laws are known, namely:

#### 5.1.3.1. *Law of Exercise*

This law contains 2 things, namely:

- a. The Law of Use, which is a law which states that the relationship or connection between stimulus and response will be strong when used frequently. In other words, the relationship between stimulus and response will be strong solely because of training.
- b. The Law of Disuse, which is a law which states that the relationship or connection between stimulus and response will be weak if there is no training.

This principle shows that testing is the first right in learning. The more often a lesson is repeated, the more solid the learning material is in students. In practice, of course, various variations are needed, not just any repetition. And the timing of the frequency distribution of tests can determine learning outcomes [33].

The law of this exercise contains 2 kinds of laws, namely 1) law of use, namely the relationship will become stronger if there is training, and 2) law of disuse, that is, the relationship will become weakened or forgotten if the exercise is stopped. This law implies that the learning process in children (skilled if asked to practice, can explain when asked, because the child often practices skills tests or is always reading), will succeed or not be successful is determined by how much and effective the exercise is received. The more often and more students do the exercises, eventually he will become more skilled at doing them. The more often students read or repeat the material being studied, the more they will know and understand.

Meanwhile, the law of results implies that the stronger and / or weaker a relationship is as a result of the response taken. This means that a gift received by a child or a satisfactory learning achievement can be achieved, which will result in the repetition or continuation of the response or action in question. The reason is because what he does is understood so that it will be able to bring gifts or bring success.

#### 5.1.3.2. *b. Law of Effect*

This law also contains 2 things, namely:

- a. an action / action that results in a feeling of satisfaction (pleasant) will tend to be repeated, on the

other hand, an action (action) which results in a feeling of dissatisfaction (unpleasant) will tend not to be repeated again. This shows how the results of the action affect the action itself.

- b. In education, this law is applied in the form of rewards and punishments. Rewards cause people to tend to want to do the action that resulted in the reward, whereas punishment tends to cause someone to stop the action, or not repeat the action.

#### 5.1.3.3. *The law of readiness*

This law describes the readiness of individuals to do something. What is meant by readiness is the tendency to act. To achieve the best possible results, it is necessary to have the readiness of the organism concerned to carry out this learning. There are 3 circumstances that indicate the validity of this law. That is:

- a. If there is a readiness in the organism to act or behave, and if the organism can perform that readiness, the organism will experience satisfaction.
- b. If the organism has the readiness of the organism to act or behave, and the organism cannot carry out this readiness, the organism will experience disappointment.
- c. If the organism is not prepared to act and the organism is forced to do so, it will cause an unsatisfactory condition [34].

Besides the learning laws stated above, an important concept from Thorndike's theory of connectionism learning is called Transfer of Training. This concept explains that what children have learned now must be used for other things in the future. In the context of learning the concept of transfer of training is very important, because if this concept did not exist, what would be studied would be meaningless.

Therefore, what students learn at school must be useful and can be used outside of school. For example, children learn to read, so reading skills can be used to read anything outside of school, even though at school they are not taught how to read the newspaper, but because the letters taught in school are the same as the letters in the newspaper, reading skills at school can be transferred to read a newspaper, to read a magazine, or read anything. In addition to the three main laws above, Thorndike stated that there are 5 additional laws, namely:

- a. Law of Multiple responses, where individuals try various responses before getting the right response.
- b. Law of attitude, namely the learning process can take place if there is positive mental readiness in students.
- c. Law of partial activity, namely individuals can react selectively to the possibilities that exist in certain situations. The individual can choose the main things and base his behavior on the main things, and leave the small things.

- d. Law of response by analogy, that is, individuals tend to have the same reaction to new situations, or in other words, individuals react to situations that are similar to the situation they faced a while ago.
- e. Law of associative shifting, namely the response attitude that individuals have can attach to new stimuli [35].

According to Thorndike, learning will take place on students if students are in three kinds of learning laws, namely: 1) The Law of Readiness (law of readiness to learn), 2) The Law of Exercise (law of exercise), and 3) The Law of Effect (law of influence). The law of readiness to learn is a principle that describes a situation where the learner (student) tends to get satisfaction or dissatisfaction. In this context there are 3 situations that might occur [25]:

- a. If a conduction unit is ready to conduct, conduction with that unit will bring satisfaction.
- b. If a conduction unit is ready to conduct, but not conducting, it will cause dissatisfaction.
- c. If a conduction unit which is not ready to conduct is forced to conduct, then the conduction will cause uncertainty.
- d. Characteristics of Thorndike's theory of learning

According to Thorndike, learning can be done by trial and error. This trial and error can be done when a person does not know how to respond. The characteristics of trial and error learning are as follows:

- a. There is a motive in someone who encourages to do something.
- b. A person tries to make various kinds of responses in order to fulfill his motives.
- c. Responses that are felt that do not match their motives will be eliminated.
- d. Finally, one gets the most appropriate type of response.

Thorndike also stated the principles of learning, namely:

- a. When a person is faced with a situation which for him is new, various kinds of responses will be carried out. The response sometimes varies until the person concerned gets the correct response.
- b. What is in a person, be it in the form of experiences, beliefs, attitudes and other things that already exist in him also determines the achievement of the goals to be achieved.
- c. In a person, there is actually the potential to make a selection of important elements from those that are less or not important until finally they can determine the appropriate response.
- d. People tend to give the same response to the same situations.
- e. People tend to relate the responses they are good at with certain situations when they realize that the responses they are good at with these situations are related.

Students' learning process will occur if the child is in a state ready to learn (interacting with the environment). Among the indicators of a child who is ready to learn are:

- a. Children can understand and understand other people (teachers, friends, and other people at school). In this condition, the child will not feel strange, or have no friends to ask for help, as if he were at home close to his parents.
- b. Children dare to say what is on their mind, thoughts or desires (because there are people who will protect and serve them, for example want to pee backwards, don't have stationery, miss books, and the like)
- c. Children can understand and be able to do what the teacher instructs or teaches.

## **5.2. Think creatively**

### **5.2.1. Definition**

Thinking is training ideas in a precise and accurate way that starts with a problem [36]. According to Solso, thinking is a process where new mental representations are formed through information transformation with complex interactions of mental attributes such as judgment, abstraction, logic, imagination, and problem solving [36].

Creativity is a process or ability that reflects fluency, flexibility and originality in thinking, as well as the ability to elaborate (develop, enrich, detail) an idea [37]. This definition places more emphasis on aspects of the change process (innovation and variation). According to Sternberg, a creative person is someone who can think synthetically, meaning that he can see relationships where others are unable to see him, who has the ability to analyze his own ideas and evaluate the value or quality of his personal work, is able to translate theories and abstract things into practical ideas, so that individuals are able to convince others about the ideas they will work on [37].

Creative thinking is the individual's ability to think about what everyone has thought, so that the individual is able to do what everyone has never done. Sometimes creative thinking lies in innovation that helps oneself to do old things in new ways. But the point is, seeing the world through enough new eyes that new solutions emerge, that is what always adds value. Based on the description above, it can be concluded that the notion of creative thinking is a person's ability to create new ideas or ideas so that he feels capable of being able to achieve shared goals in life [38].

Most creative students use analogical thinking because they can see relationships that other students are not seen. Ordinary students also often think analogically, but analogical thinking carried out by creative students is characterized by its extraordinary, strange, and sometimes irrational nature. Creative thinking has several mechanisms or processes that must be passed.

According to psychologists, there are five stages of creative thinking, including:

- a. Orientation; problems are formulated, and aspects of the problem are identified.
- b. Preparation; trying to gather as much information relevant to the problem as possible.
- c. Incubation; the process of pausing when various problems are faced with dead ends. But even so, the thought process continues in the subconscious mind.
- d. Illumination; when the incubation period ends with finding a solution to solve the problem.
- e. Verification; stage to test and critically assess the solution to the problem proposed in the fourth stage.

Actually, the ability to think creatively is basically owned by everyone. Creative thinking is the ability to create new and original ideas. Even people who feel unable to create new ideas can actually think creatively, as long as they are trained. For that, it is necessary to know in advance about how to think and think creatively.

### 5.2.2. *Factors Affecting Creative Thinking*

Creative thinking thrives when supported by internal and situational factors. Creative people have many different temperaments. Wagner was arrogant and pretentious; Tchaikovsky was shy, quiet, and passive; Bryon is hypersexual; Newton was intolerant and short-tempered; Einstein was humble and humble. However, three aspects generally characterize creative people [37]:

- a. Cognitive abilities: this includes intelligence above average, the ability to generate new ideas, different ideas, and cognitive flexibility.
- b. An open attitude: creative people prepare themselves to receive internal and external stimuli.
- c. A free, autonomous, and self-confident attitude: creative people want to present themselves as best and as they want, they are not bound by conventions.

This causes creative people to be considered "eccentric" or crazy. Apart from psychosocial environmental factors, some researchers point to other situational factors. Maltzman stated that there is a confirmation factor from the environment. Dutton mentioned the availability of special things for creative humans, and Silvano Arieti emphasized the isolation factor in fostering creativity. Point number 3 brings us to the situational factors that promote creativity.

Historians note that there were times when creativity flourished; for example, Islam during the Abasiyah era, Italy during the Renaissance. It is well known that in totalitarian countries creativity in the world of science is turned on, but creativity in the world of literature or the social sciences is inhibited. Creative thinking only develops in an open society, is tolerant of "crazy" ideas, and provides opportunities for everyone to develop themselves. A society that demands obedience to create

authority, demands uniformity in behavior, respects primordial loyalty, but kills outstanding achievements, it is difficult to generate creative thoughts.

### 5.2.3. *Characteristics of Creative Thinking*

Someone is said to be creative, of course there are characteristics that are more related to skills, attitudes or feelings. Based on the results of research that shows creativity expressed by [37], the following are the characteristics of creative thinking in students:

- a. Fluent Thinking Skills Judging from how the behavior of children who like to ask a lot of questions, answer with a number of answers if there are questions, have many ideas about a problem, fluently express their ideas.
- b. Flexible Thinking Skills (Flexible) Judging from how the child's behavior provides a variety of unusual uses of an object, provides various interpretations (interpretations) of an image; story; or problem, give consideration to situation; different from what others gave.
- c. Original Thinking Skills Judging from how the child's behavior thinks about problems or things that have never been thought of by others.
- d. Detailed Skills (Elaborating) Judging from how children's behavior develops or enriches the ideas of others.
- e. Skills to Assess (Evaluate) Judging from how children's behavior determines their own opinion about something.
- f. Having Curiosity Judging from how the child's behavior questions everything.
- g. Imaginative. Judging from how the child's behavior makes stories about places that have never been visited or about events that have never been experienced.
- h. Feeling Challenged by Plurality Judging from how the behavior of children looking for solutions to a problem without others' help.
- i. Having the Dare to Take Risks Judging from how the behavior of children who dare to defend their ideas and are willing to admit their mistakes.
- j. Having Respectful Nature Judging from how the behavior of children who respect their own rights and the rights of others.

## 5.3. *Thorndike's Learning Theory for Creative Thinking Ability Improvement*

### 5.3.1. *Training Session*

Creative thinking begins with the process of finding a problem. The problems that have been obtained will be formulated so that something is created and looks that need to be solved / resolved. Problems can also be in the form of questions that need to be worked on. From this

problem, it becomes clear that there are certain parts that need to be solved for the problem.

The problem solving process will create something new in a person, so that the learning process is running. This will encourage cognitive attitudes in a person. However, new things will not appear automatically if there is not enough motivation. Activity drivers can be in the form of patterns or motives that indicate that the problem needs to be resolved and has a solution.

As a process of driving activity, it is necessary to have regular exercise. Continuous exercises can be done by collecting as much data as possible regarding the problems at hand. References are needed so that the path to solving a problem is visible. The required data is open to the responses contained in the surrounding environment. Things that arise when the problem-solving process is an important key that is possibly related to the right way of solving it.

### 5.3.2. *Result*

The openness of a person's thinking attitude can result in the data obtained to be piled up and mixed between important information and information that has nothing to do with it. In this case, it is necessary to have a process of eliminating the data obtained so that it will reduce the required data. The required data will be deepened while irrelevant data will be stored as knowledge and possibly used in other activities.

When the filtering process of mixed data, incubation is necessary. Calm down so that thoughts can stay focused and be able to solve problems. It can also be used as a break in problem solving by staying focused on the problem. With this calming process, it will be able to determine strategic steps in solving a problem.

This attitude is also self-based. Keeping in position in solving a problem. Focus on what has been done. Ensuring that the data he has obtained are the data needed in solving problems. Data that is needed for a positive reaction that can lead to solving other problems that will occur.

### 5.3.3. *Readiness*

The calming process will produce a ready attitude to take the Next Step. The data collected and which are useful for problem solving are visible and separate from other data. The data obtained shows that the problem-solving steps are leading in the right direction and towards reaching the goal.

The next stage is to conduct a testing analysis of the problem and data on problem solving. These results will show that the problem can be resolved in the right steps and according to the procedure. Achievement in solving

problems can increase positive reactions in solving subsequent problems.

If in solving the problem, there are still inaccuracies in retrieving data to solve the problem, then it can be replaced with other data that was previously obtained. This kind of thinking will also help increase a person's level of critical thinking so that he does not necessarily accept the process that is being done. Any mistake made will lead to appropriate action to solve a problem.

Not short in training one's creative thinking level. However, this kind of thinking is very necessary, because the problem will always be there to be solved. If trained in creative thinking, then the next problem is just adjusting the previous solution by adding certain data that is needed. With that, someone will be able to increase their creativity, so that they can produce a work.

## 5.4. *Thorndike Learning Theory for the Improvement of the Ability to do Scientific Publications*

Publication is one of the activities of a person to show his existence in the form of works. The work that is made is in the form of writing the results of research or the results of thoughts. From this paper will be published in a journal or in book form. This paper also shows that a person has expertise in a certain field. This also keeps his memory so that it is always honed to be used and developed. So that in order for the world to know him, humans must work.

As perfect creatures, humans must work. Work is not just work [39]. By working and creating, humans become complete human figures. A good human being is what is useful for other humans. Humans who work are able to change or change their environment for the better. Not quite the opposite, causing damage to the environment. By working, humans will be immortal. His name will be remembered and remembered by many people. Because his creations have benefited others.

God created man as the caliph on earth. The duty as caliph is a noble task. It's not easy and it's not easy to be a human being, but don't make it difficult and heavy either. As a good caliph he certainly will not cause damage to the earth. Work in accordance with their respective fields. Work according to your ability while continuing to develop and increase your abilities. Early failure is a valuable lesson for creative and innovative humans. Creative and innovative humans are always unsatisfied. Feeling satisfied quickly will only dull human thought and creativity. Don't also want to get praise from other people for the work that has been created.

Publication is the main activity in a scientific community which has an important role, namely to

improve the progress of science, the principles of a writer and the standards in the researcher [40]. A researcher is a reflection of the results of his research publications. Through publication, a researcher communicates and interacts with other researchers, exchanges opinions and research results. From the results of the research, there will be suggestions and criticisms that enhance the quality of the research carried out.

Publication activities have the aim of presenting original and natural research results of his own work as a scientific contribution [40]. The results of this study will show the results of research that are in accordance with the research being carried out, which can then be enjoyed and utilized by subsequent researchers. From the results of this study, scientists interact with each other to take the meaning contained in other people's research. As a writer, you must make publications with new cases that have not been done by other researchers.

The work process goes through several stages. The main way is to dare to work in any form. From the creative thinking process, it is possible to produce a work that is worthy of being enjoyed by the general public. The more works he makes, the more his existence will increase. A person's scholarship will be more recognized by the works he makes. Being recognized as a figure who is able to solve problems and produce works is something that art experts crave.

Fame will always make him ready to face new works that are more needed by others. Conditions like this will make someone increase their creativity so that they can always produce works. Because the results of continuous training so that someone has the ease in completing and producing a work.

Publication is carried out in scientific journals or in the proceedings of a conference. Most scientific journals are published in a year, published twice or every semester, while proceedings are held once a year. Scientific journals and proceedings have similarities in terms of the review process from experts in their respective fields. And the difference is that scientific journals do not have a presentation and discussion process, while there is a process for conferences. The most important part of an article is the discussion and research findings section [40]. This section will make and show the uniqueness of the other research. This section will describe the conditions of the research subject when the activity takes place.

If you already have a picture in your work, you need reasons to encourage that the work you create is a work that is needed by yourself and others. Helping to solve someone's problem will help him develop a problem by being accustomed to thinking creatively.

Publication is an activity to disseminate information that has been done [41]. It works to manage information until it is shared with public. It is also called an activity

to introduce and also promote research results. In carrying out publication activities, some steps must be taken, namely determining the publication's purpose, mentioning things that can be improved. Choose the media that will be used in publishing the work that has been created.

To filter the driving activities, do not discriminate against the responses that arise from the environment or oneself. The desire to work is high because the importance of the work is so important. The responses that appear are sorted, and the sections related to the work he is making are taken. The publication is a way to show that someone owns the work. It shows that he has certain abilities in certain fields. Someone will be known in the form of work and indirectly his ideas help solve someone's problem.

## 6. CONCLUSION

Both creative thinking and publication enable them to solve problems and show their existence in science. The stages in creative thinking and publication begin with an iterative process of practice. There may be a failure in it, but it makes a person get what he needs by solving the problem at hand. It is the result of someone's hard work in finding a solution. Solving problems can make a person ready and confident in carrying out their duties.

Learning during a pandemic increases creativity because many new things are being done, especially in learning. With the online learning model, it becomes a challenge to be able to make students understand without having to meet in person. An attitude of creativity is needed.

In addition, by documenting teaching materials in a structured way of delivery, the document can be published in articles, which can be used for self-actualization and develop writing skills.

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