APPLYING MODELS AND STRATEGIES LEARNING BASED ON INFORMATION TECHNOLOGY FOR MARCH EDUCATION IN BASIC, MEDIUM AND HIGH EDUCATION INSTITUTIONS

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ABSTRACT

Maritime policy that is promoted nationally by the Government must be balanced with policies implementing Maritime education. Maritime Education Policy has a high urgency to be applied in learning in basic education institutions (Playgroup, Primary school)), medium (junior high school,senior high school, intermediate school, and high (state college/ private college). This urgency needs to be supported by effective, efficient and attractive efforts through the application of information technology-based learning models and strategies that have now reached the level of the industrial revolution 4.0. The emergence of various applications such as distance learning implemented by the Open University, e-learning utilization at various universities to improve learning services, TV-Education broadcasting published by the Ministry of Education and Culture, and other applications that are managed professionally by the private sector such as Ruang- Teachers who are now national and are widely followed by teachers, provide many alternative models and IT-based learning strategies that can be applied to the successful implementation of Maritime Education in Indonesia. The optimal utilization of IT-based learning will provide full support and success to civilizing Maritime Education at all levels of education.

Keywords: *Maritime Education, learning models and strategies, information technology.*

1. INTRODUCTION

When writing the title of this paper, "Information Technology (IT) Based Learning Models and Strategy for Maritime Education in Primary, Secondary and Higher Education Institutions", I was reminded of the book published by AECT and written by Januszewski and Molenda in 2007 entitled "Educational Technology: a Definition With Commentary". It was stated in the book that science and technology (science and technology) always experiences the dynamics of change and development that is so fast and rapid. The dynamics of change and development need to be addressed by practitioners, developers and educational technology scientists who must continually improve their mindset as an innovator through reflective research and practice activities to build methodological constructs that are as good as theoretical constructions. Thus the theory and practice in the field of educational technology will increasingly develop beyond existing traditional concepts.

In the past, research methodology was still limited to the scope of quantitative and qualitative research fields and other forms of other research method disciplines. Along with the development of science and technology (mainly information technology), research activities are now increasingly having very good habits in generating new ideas and evaluative processes to help improve the quality of learning practices. At this time research in the field of learning technology has evolved from research that tries to "prove" that media and technology are effective tools for teaching, to research formulations to examine and test approaches to the application of processes and technology in order to improve the quality of learning. The development of a learning model and strategy is an example of a new breakthrough in creating research formulations in

the field of learning technology in order to improve the quality of learning towards a better direction.

The development of learning models in the field of learning technology has been influenced by developments and changes in learning theory, management of information and communication technology and other fields. The development of the theory of behaviorism, cognitivism and constructivism has changed the emphasis in the field of teaching and learning. The development of technology and communication has changed the flexibility of access to learning, which initially relies on a particular place and time, is now online that can be carried out anytime and anywhere students are. Attention to learners' perspectives, characteristics and ownership of the learning process has also grown and developed with the creation of learning models including new and more innovative learning media.

The theoretical shift has dramatically changed the orientation of the field from the field of design driven by teaching that is dominated by the role of the learner, now developing towards various formats that seek to create a learning environment where students can explore their own understanding. The emphasis of research in the field of learning technology has now shifted from learning design in routine perspective to a learning design environment that is able to facilitate learning.

Given the new paradigm shift in learning theories where there has come a greater recognition of the role of students in ownership and responsibility for learning activities, it is necessary to develop a learning model including the development of learning media that is able to build meaningfulness in learning by facilitating the existence of various kinds of hardware and software from information technology that is growing rapidly. With the rapid advancement of information and communication technology, maritime education can increasingly be applied more effectively, efficiently and highly attractive. Thus maritime characterization through information technology-based learning can be faster and more appropriate to be applied in daily learning activities, so that the mindset that was initially leaning towards the mainland can be changed to a maritime mindset.

1.1. Study and Learning

The conception of learning develops rapidly along with the dynamics of human life and the changing strategic environment. The development of the conception of learning is always followed by the development of learning practices. Thus, learning and learning are two conceptions that cannot be separated and are dynamic in keeping with the changing times.

Learning and learning is not a simple and easy process to be carried out, since the learning process itself involves various internal variables within the learner, and requires external stimulants in the form of efforts to learn the learner. Therefore, an understanding of the learning process is very useful for learners in applying the action of learning. Inaccuracy in implementing learning actions will have a negative impact on students, both on cognitive abilities, psychomotor and affective in a relatively long period of time.

The study of learning theory and learning can basically be divided into two, namely descriptive and prescriptive theories (Reigeluth, 1983 and Landa, 1983). Learning theory is descriptive, because it describes the learning process, whereas learning theory is more prescriptive, because the main purpose of learning theory is to establish learning methods (Degeng, 1989). Learning theory pays attention to the relationship between variables that determine learning outcomes, while learning theory pays attention to how a person influences other people to make the learning process happen.

Learning events experienced by students are strongly influenced by views of the learning process itself. There are three major views on the learning process that developed to date, namely: behaviorism, cognitivism and constructivism. The three approaches to learning theory provide guidance to the level of application in the form of efforts in learning actions. From the third approach of learning theory, learning theory was born.

Behaviorism theory. This theory views learning as a process of behavior change. Learning can be achieved through appropriate behavior from a number of responses or through a reinforcement approach, which is expected to be formed gradually, can be measured and observed. The application of behaviorism theory provides a set of systematically organized learning design instructions and reinforcement values based on the needs of individual learners. Learners as the designer of learning must follow the steps and progress of individual students. Learning objectives are clearly formulated, can be measured and quantified the results, while other processes that occur in the mind are ignored

Theory of Cognitivism. Cognitivism theory emphasizes the study of mental models and processes such as thinking, remembering and problem solving. Key memory structures and their processes are identified, defined as computers of the human memory system. Learning design that adopts cognitive theory focuses on promoting thought activities. The lessons and units are developed by layout arrangement, graphic design, presentation of content framework, etc. The learning design is focused so that it can help students in processing new information.

Constructivism Theory. Since the 1980s, a new view of learning has emerged, namely the theory of constructivism, which views that the learning process is an internal activity of students in building or constructing knowledge. Learners build meaningfulness through the application of knowledge to solve problems, interact with others and through the apprenticeship process. The learning design that adopts the theory of constructivism focuses on the activities of students in interacting with their social environment so that students are able to discover the meaningfulness of their own knowledge.

1.2. Learning Models and Learning Development Models

The model according to the Indonesian general dictionary (2006) is defined as a pattern (for example, references, variations) of something that will be made or produced. The model according to Murdick and Ross (1982) is a depiction of a reality or a planned one. The model according to Seels & Richey (1994) is an abstraction from something used to understand something that cannot be seen or experienced directly. Richey (1986) asserts that the model is a pattern of representation of a reality that is presented with structure and sequence. So it can be concluded that the model is a pattern to describe an abstract reality, and has a structure and sequence.

The model referred to in this discussion is the learning model. Learning media are included in a small part of the learning model. Reigeluth (1983) argues that the learning model is a representation of a learning method that contains a set of integrated learning strategies and is described in detail as a guide in implementing learning practices. The position of the model in the learning variable, can be described as follows:
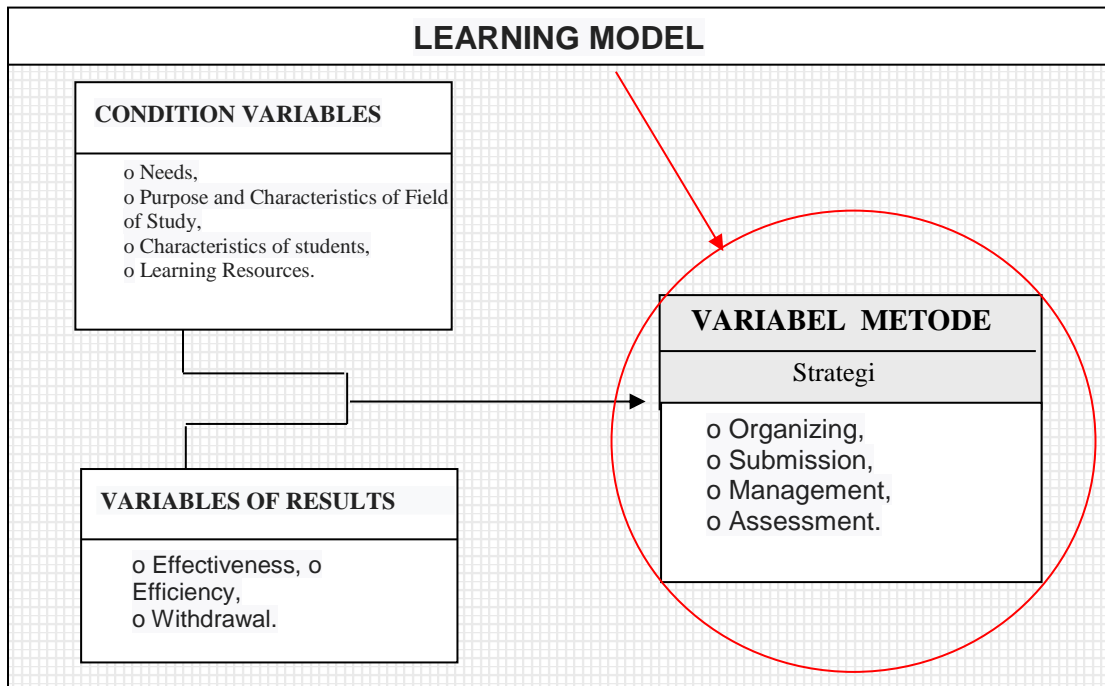
Figure 1: Model Position in Learning Variables
(modification of Reigeluth's thinking (1983) and Degeng (1989).

Model bridges between theory and practice, meaning that the model is translating from theory into a concrete and practical world. Therefore a model is prescriptive. As a model, the entire set of activities is based on theories including: system theory, communication theory, learning theory and learning theory. This means that a model must be able to bridge between theory and practice, where its role can be described as follows:
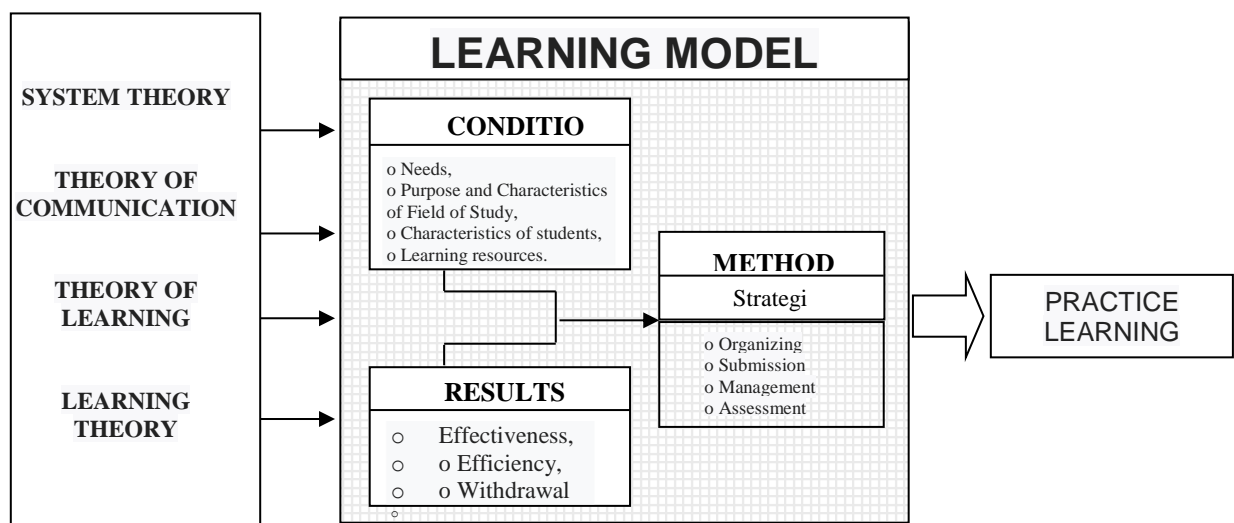

Figure 2: The Model Becomes a Bridge between Theory and Practice
(modification of Reigeluth's (1983) and Degeng (1989) thinking, Rickey (1986)

The learning model is distinguished from the learning development model. The scope of the learning model is a micro-scope, how a learning method with all the strategic procedures is applied and described in detail. The scope of the learning development model is the scope of the macro, how a learning method, selected through a series of analysis processes, is designed, developed, produced, applied, evaluated and installed as a series of learning development processes.

Heinich, Molenda and Russel (1993) describe the development of learning as a process of needs analysis, determining material, setting goals, designing material to achieve goals, carrying out trials and revising programs. Morrison, Ross and Kemp (2004) emphasize that learning development activities describe management functions in a systematic learning plan, including determining and supervising personnel, as well as allocating budgets, etc.

There are many types of learning models. Molenda, et al. (1996), divides into two groups, namely the Micromorf and Paramorf models. Micromorf is a visual model that is physically tangible, for example: Planetariums, Bridge Simulators, etc. Paramorf, is a symbolic model that is described verbally. The Paramorf model is divided into three, covering conceptual, procedural and mathematical models.

Conceptual model, is a model that describes relevant events based on the deductive process of logic or analysis and also the conclusion of an observation. Procedural model, is a model that describes certain steps to carry out a work with certain procedures. While the mathematical model, is a model that describes the relationship of various components in a situation

Gustafson (1981) divides the learning model into four groups, including: (1) Classroom ID Models, which focus on improving the quality of learning components in the classroom, (2) Product Development models, which emphasize more on the goal of producing a specific product so learning runs optimally. (3) Systems Development Models, are systems oriented models. and (4) Organization Development Models, more emphasis on improving the quality of learning outcomes through modification or adaptation of organizations and personnel into a new environment.

Joyce & Weil (1996) divided learning models into four large groups, namely: (1) Social Models, which are oriented to the theory of constructivism. (2) Information Processing Models, which are oriented to the theory of cognitivism. (3) Personal Models, oriented to the theory of cognitivism. (4) Behavioral Systems Models which base on behaviorism theory. In addition to the types of learning models, there are also many types of learning development models, including: Dick and Carey, Jerrold Kemp's, MRK (Morison, Ross and Kemp), Assure (Media Development Model), Degeng, R2D2, Four Quadran, NCFL (Naval Collaboration Flexible Learning), etc

Amory (2007) suggested that every software development should be based on learning theories. Ardhana (2008) added that to improve the quality of educational practice, research is needed on the theory of learning more and more quality. This needs to be done, because as Pogrow said (in Ardhana, 2008), when looking at the history of education reform almost always ends in a worse situation. Why is that? The answer is because the research is not supported by a strong theoretical foundation and quality. In this sense, every activity in the product elements of the learning design must be designed and built using a theoretical foundation as an approach to learning. The theoretical perspective of the learning development models, can be described in table 1 as follows:

NAME MODEL	MARK		
	Theory Perspective	**Developer**	**Re-developer**
Dick and Carey	Behaviorisme	Dick And Carey	
Defence Training Model (DTM)	Behaviorisme	Houston	
Jerrold Kemp's	Behavirorisme	Jerrold Kemp's	-
Mrk (Morrison, Ross And Kemp).	Behaviorisme	Mrk (Morrison, Ross And Kemp).	
Model Pengembangan Media Assure	Kognitivisme	Smaldino, Russells, Heinich, & Molenda,	
Degeng	Kognitivisme	Degeng	
R2D2	Konstruktivisme	Willis	
Four Quadran	Behaviorisme and Konstruktivisme	Cronje'	
NCFL (Naval Collaboration Flexible Learning)	Multiple Learning Perspective	Adi Bandono	

1.3. Development of Learning Models in the Domain of Learning Technology

The conception of learning technology has developed in all fields along with the development of learning and learning theories. Therefore, AECT (2007) in defining learning technology always adapts to the present context, is temporary and is only appropriate for its time. The conception of learning technology is currently defined as "Study and practice of ethics to facilitate learning and improve performance by creating, using, and managing appropriate technological processes and resources. So learning technology is a discipline that has a double meaning that can be as an abstract concept or theory and as a field of practice.

An understanding of theory and practice in learning technology, implies that knowledge must be continually developed and improved through reflective research and practice activities, where the term is also included as the meaning of studies, ie studies that refer to information gathering and analysis activities beyond traditional concepts research. This includes quantitative and qualitative research as well as other forms of other research method disciplines. Strictly speaking, research activities have good habits in generating new ideas and evaluative processes to help improve the quality of practice. Research activities can be carried out based on various methodological constructs that are as good as theoretical constructions.

At present research in the field of learning technology has evolved from research that tries to "prove" that media and technology are effective tools for teaching, towards research formulations to examine and test approaches to the application of processes and technology in order to enhance learning. The development of a learning model is one example of new breakthroughs in creating research formulations in the field of learning technology in order to improve the quality of learning towards a better direction.

The development of learning models in the field of learning technology has been influenced by developments and changes in learning theory, information management, communication and other fields. The development of the theory of behaviorism, cognitivism and constructivism has changed the emphasis in the field of teaching and learning. Attention to learners' perspectives, characteristics and ownership of the learning process has grown and developed with the creation of new and innovative learning models.

The theoretical shift has dramatically changed the orientation of the field from the field of design driven by teaching that is dominated by the role of the learner, now developing towards various formats

that seek to create a learning environment where students can explore their own understanding. The emphasis of research in the field of learning technology has now shifted from learning design in routine perspective to a learning design environment that is able to facilitate learning.

Given the new paradigm shift in learning theories where there has been greater recognition of the role of students in ownership and responsibility for their learning activities, it is necessary to develop a learning model that is able to build meaningfulness in learning by facilitating a variety of technologies that are increasingly developing rapidly.

2. Examples of Learning Model / Strategy Development

Of the many learning development models, on this occasion the author will present several (three) examples of learning development models that are often used as approaches in developing learning models, including: Defense Training Model (Houston, 2006), Degeng (2001), R2D2 (Reflective , Recursive, Design, and Development) (Willis, 2000). The learning development model can be explained as follows:

2.1. DTM (Defense Training Model) Development Model

The Defense Training Model was developed by Houston (2006) for learning needs in the Australian Defense Force. The DTM model has five main elements, consisting of Analyze, Design, Develop, Conduct, and Evaluate. The DTM model is categorized into the ISD (Instructional System Development) model family based on behaviorism theory. The ISD model is now applied to organize learning in the Navy's educational institutions. The five main elements in the DTM model can be described as follows:
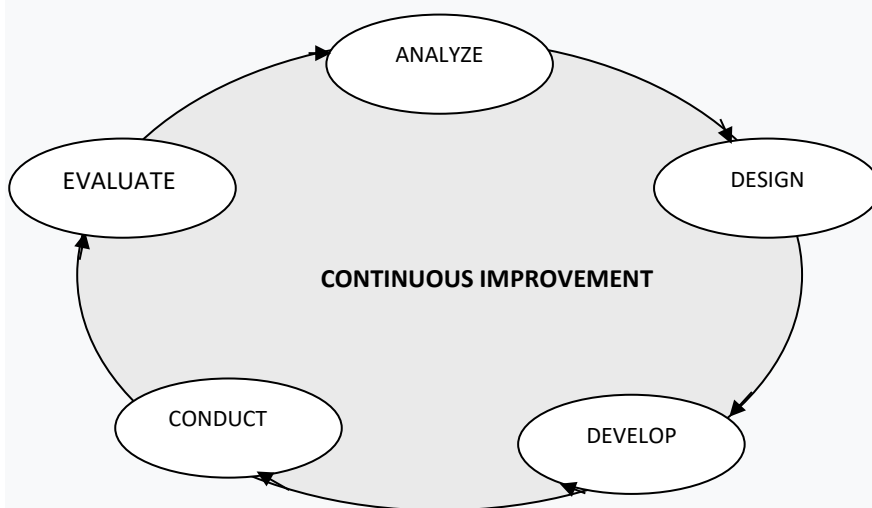

Fig 3: DTM Development Model from Houston (2006)

The DTM model is always preceded by an analysis step (analyze), namely needs analysis. The results of the analysis are used as a condition leading to the design step (design), which is a set of steps specifically planned in the framework of effectiveness, efficiency and relevance to needs. Development (development) is an effort relating to how the material is developed into a product and implemented (conduct) in learning practices. Meanwhile, evaluate (evaluate) to measure the process and results that can be achieved at each stage of the activity. The main idea of the DTM model that is often applied to the development of learning models is the need to conduct a needs

analysis and evaluation activity. Requirements analysis is part of a series of conditions analysis activities that determine the next steps. Evaluation is also an important step to evaluate the process and learning outcomes to be achieved.

2.2. Degeng Development Model

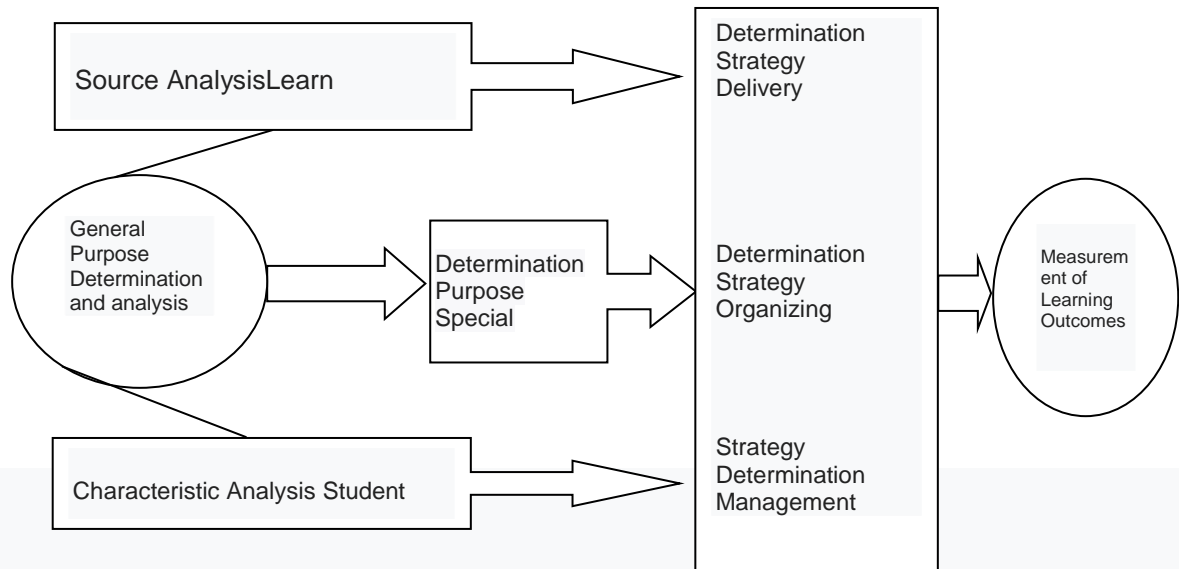Degeng learning development model is based on the paradigm of cognitivism

Figure 4: Degeng Learning Development Mode

The syntax in the Degeng model (Degeng, 2001), can be described as follows:

a. Analysis of Objectives and Course Characteristics. This step is intended to find out what learning objectives are expected, learning orientative objectives: whether conceptual, procedural or theoretical and supporting objectives that facilitate the achievement of the orientative goals. Analysis of the characteristics of the course content is intended to determine the type of content of the course students will learn, whether in the form of facts, concepts, procedures, or principles.

b. Learning Resource Analysis. Analysis of learning resources is an analysis activity to find out the learning resources available and can be used in conveying learning content. The results of the analysis of learning resources in the form of a list of available learning resources that can support the learning process.

c. Analysis of Student Characteristics. Analysis of student characteristics is an activity analysis of individual student characteristics which include talent, learning style, maturity level of thinking, motivation and initial abilities. The results of the analysis of student characteristics include information about individual student characteristics

d. Setting Learning Objectives and Learning Content. Establishing learning objectives and learning content is a step in compiling a list of learning objectives, types and structure of content to be learned by students to achieve the specified learning goals.

e. Establish Strategies for Organizing Learning Content. Strategies for organizing learning content can be carried out, after going through analysis and

determining the types and characteristics of learning content. The choice of organizing learning strategies is strongly influenced by what type of content the course is studied and how it is structured. The results of this step are in the form of establishing models for organizing course content, both at the macro and micro level.

f. Establish Learning Content Delivery Strategies. Determination of learning delivery strategy based on the analysis of learning resources. The results of the analysis of learning resources in the form of a list of learning resources available and can be used to support the learning process. The results of the analysis of learning resources are used as a basis for determining learning delivery strategies. Establish Learning Management Strategies. Learning management strategies are influenced by the results of the analysis of the characteristics of students. The results of the activities of this step are in the form of determining the scheduling of the use of components of the organizing and delivery of learning strategies, motivational management, making notes about student learning progress and learning control.

g. Development of Learning Outcomes Measurement Procedures. The activity of developing learning outcomes measurement procedures includes measuring the effectiveness, efficiency and attractiveness of learning strategies. The level of effectiveness of learning outcomes is measured by the level of student achievement in the specified learning goals.

h. The main ideas of the Degeng model that are often applied to the development of this learning model include: the importance of analyzing the objectives and characteristics of the subject, analysis of learning resources, analysis of student characteristics, setting learning objectives and learning content, setting organizational strategies, establishing delivery strategies, establishing strategies management, and development of procedures for measuring learning outcomes. The basic steps of the Degeng model are often used by developers and other learning scientists in developing learning models.

2.3.   R2D2 Development Model

The R2D2 learning development model was developed by Willis (2000) using the constructivist paradigm or Constructivist Instructional Design (C-ID) which means Reflective, Recursive, Design and Development (R2D2). This model has 7 characteristics consisting of: (1) the process of developing learning that is recursive, non-linear and coatic (chaotic or irregular), (2) design is organic, developmental, reflective and collaborative, (3) goals emerge from design work and develop, (4) general learning development experts do not exist, (5) learning emphasizes learning in a meaningful context, (6) formative evaluation determines, (7) subjective data may be more valuable.

The R2D2 model has 3 focuses, namely (1) Define, (2) Design and Development and (3) Dissemination. An overview of the R2D2 model can be seen in the following image:
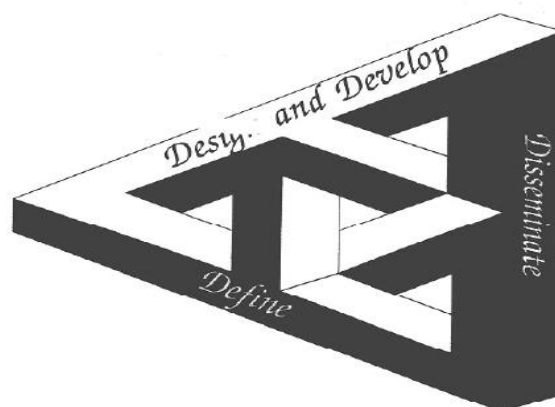

Figure 6: R2D2 Learning Development Model

At the Define stage, a participation team is formed with the task of 3 main activities, including: (1) creating and supporting participation teams, (2) progressively solving problem solutions, (3) developing pronesis or contextual understanding. At the Design and Development stage which is a unit, there are 4 activities carried out, including: (1) choosing the development environment, (2) choosing the format and media, (3) evaluation procedures, (4) product design and development. In choosing a development environment, it is necessary to pay attention to 3 important characteristics, namely power, flexibility, and accessibility with 2 main components including equipment / equipment design (tool of design) and design process (design process). At the design and development stage, a formative evaluation is carried out using a qualitative approach. Product design and development in general, consists of (1) surveillance design (surface design), (2) interpace design in the form of views, user interactions, help and support, and (3) scenarios, namely the sequence of simulation choices and results. At the dissemination stage, there are 4 basic activities, including: (1) summative evaluation, (2) final package, (3) diffusion, and (4) adoption

The main advantage of the R2D2 learning development model which is widely adopted by developers and other learning scientists from this model is the importance of forming a participation team in developing models, design and development activities are an inseparable unit, there are formative and summative evaluations, evaluations are carried out with a qualitative approach , and the characteristics of the model are open and flexible.

3.   Result and discussion

3.1.   Maritime Education.

Indonesia is a maritime nation, with a variety of natural resources, most of which are 2/3 derived from the ocean, and the rest comes from land-based natural resources. Therefore the Indonesian nation is also referred to as a seamen or a maritime nation. When analyzing the legacy of Indonesian ancestors, such as reliefs on the walls of Borobodur, Central Java, there are at least 10 high-mast sails. Not surprisingly, in the 8th century, Indonesian sailors sailed to reach Madagascar on the African Continent, Mainland China, Burma, Sri Lanka and Australia. In the 8th to 16th centuries, three major kingdoms appeared at that time, namely the Srivijaya Kingdom in Sumatra in 683 to 1030, Singosari Kingdom and Mojopahit Kingdom in 1293 to 1478. All three kingdoms were recorded as having a fleet of war (war fleet and commerce) which is very strong and resilient. But along with the fall of the Mojopahit kingdom, VOCs from the Dutch kingdom entered Indonesia, controlled the trade routes of the archipelago and then colonized the Indonesian people for hundreds of years. As a result, a process of decline in the spirit and soul of the nation's marriages and changes in values in Indonesian society. Marine idealism has since changed to continental or continental idealism.

The mindset shift from sea to land was experienced by the Indonesian people for a very long time. So that the Indonesian people now lost their identity as a maritime nation. From the economic side, for the past three decades, the marine sector has always been positioned as a stepchild in national economic development. From the political side, government policies still tend to be in the form of populist symbolic activities but there has been no further action. Although major events have been held to provide encouragement and enthusiasm for the Indonesian people to immediately revive as a maritime nation, but the pace of marine development seems to continue very slowly. The education sector has not yet received maximum attention and the government as a vehicle

for the socialization of marine development. One of the efforts to rebuild the spirit of Indonesian people's happiness is to include maritime conceptions in the national education curriculum, especially in the formal education pathway at the level of basic education (elementary, junior high, MI, MTS), secondary (high school, STM, vocational, MA) as well as high (PTN, PTS). With the inclusion of Maritime Education material as an integral part of the national education curriculum, it is expected to be able to instill a positive image of maritime in children who will later become cadres of the future generation of the nation. The existence of Maritime Education is a form of long-term investment that can lift the image of the Indonesian nation as a maritime nation. Moreover, currently supported by learning media infrastructure that has been based on the internet of things, then Maritime education is applied to each school in each level of education, guaranteed to be more effective, efficient and attractive

Maritime Education in all formal education units listed in the national education curriculum is to inculcate and regain the spirit and soul of the nation's happiness. The form of content in the curriculum, can be in the form of providing maritime education subjects directly or packaged in other existing subjects. If in the form of maritime education subjects it will have consequences for the provision of teachers or lecturers in the field of study. However, if it is included in existing subjects, the education unit does not need to provide teachers or lecturers in the field of study. However, training needs to be prepared for teachers or lecturers whose subjects are to be given maritime content. With the stipulation of maritime material content in the national education curriculum, it is assumed that later all Indonesian citizens will receive maritime education lessons. Thus the continental or land view

will soon erode and will be replaced with a new view of maritime insight

3.2. **Development of Information Technology-Based Maritime Education Learning Model.**

Information technology is developing very fast with the dynamics of hardware and software developments that are also constantly changing. Information technology makes the situation of the learning environment in Maritime Education more flexible. According to Collin and Moonen (2006) dimensions of flexibility can be viewed from several sides, including: (a) Flexible relating to space and time, (b) Flexible relating to the content of the material, (c) Flexible relating to approaches and sources learning, and (d) Flexible relating to the technical delivery of messages. Therefore, in developing a learning model of maritime education based on information technology must be based on the principles of flexible learning.

In flexible learning, it does not limit the movement of students' social interactions. This theory argues that students must be given the opportunity to choose and carry out learning activities, and learners only act as facilitators (Collin and Moonen, 2006). In its development, this theory was developed in internet-based online learning. Flexible learning is a process of giving freedom to move from one learning situation to another learning situation so that an effective learning process occurs. Flexible learning is a strategy that refers to learning activities and emphasizes student choice as the main component (Collin and Moonen, 2006). The provision of a flexible learning environment has now been considered as a new way of looking at learning, where methods and practices can be implemented both classically and online. According to Newton & Ellis (2006) flexible learning is the organization of a flexible online learning environment which is a combination of computer based learning

with distance learning. Hill (2006) asserts that a flexible learning environment is an area that is provided based on the choice of students in conducting learning activities and how students implement learning activities.

From these views, it can be concluded that flexible learning can be used as a basis for developing a learning model of information technology-based Maritime Education. Flexible learning can be done either classically (face-to-face) in the classroom, laboratory or field or online through a network network or remotely via the internet, individually or in groups, independently or guided, by paying attention to choices and desires learners in conducting learning activities that fit their needs. Judging from the characteristics of flexible learning, it can be assumed that the application of flexibility in managing learning will be able to support the successful achievement of competencies as expected. The basis for the use of flexible learning, looks at flexible learning management strategies.

4. CONCLUSION

Which learning development model would be used so that the learning of Maritime Education can take place effectively, efficiently and has an appeal? All types of learning development models can in principle be used to develop a learning model of maritime education based on information technology that is effective, efficient and attractive. The principle that must be considered by a developer and learning scientist is setting goals to be achieved and existing conditions, and then determining which development model is most appropriate.

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