IJID International Journal on Informatics for Development, *e-ISSN :2549-7448*
Vol. 8, No. 1, 2019, Pp. 16-19

Information Technology as Science: A New Model for Learning

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***Abstract*—The integration of learning and Information Technology (IT) currently has a good impact on education. Besides making it easy, IT also provides opportunities to achieve learning goals anytime and anywhere. Many studies have discussed how to achieve successful learning through IT. IT here only serves as a support for learning, not as a science. This research develops a model or instrument used to achieve learning success by placing IT as a science. As a result, a learning model was successfully developed by combining several perspectives related to IT; students (Background, desire, and skill), teacher (teaching), and institution (infrastructure).**

Keywords-IT; Model; Success; Learning

I. INTRODUCTION

An increasingly advanced era requires people to master ICT skills as a necessity because IT can increase the productivity of human resources and make them better prepared to face competition. For these needs, many institutions organize educational innovations (schools or universities) by training students, whether done inside or outside the classroom, through the integration of information technology [1]. The learning innovation process is commonly called E-learning. This innovation utilizes computer devices or online learning as a supporting media for conducting distance learning [2].

Previous research found that ICT-integrated learning success factors put more emphasis on IT infrastructure factors used in learning as a media for storing and delivering information to students [2]–[7]. In addition, institutional factors also play a role in managing learning media [4], [7]–[9] and regulating the rules implemented there [5], [10], [11].

This research develops a model or instrument used to achieve the success of IT learning. The instrument development process is based on factors that influence the application of IT in learning and learning IT as a science. As a result, there are several factors that influence the learning model developed: those from students as learning participants, lecturers as instructors, institutions as organizers of learning and infrastructure as supporting the learning process.

II. RELATED RESEARCH

The research that has been done is more about discussing the use of IT as a support in the learning process. In this case, according to Anshori [9], ICT is a role as a tool in administrative learning activities. The themes discussed are about E-learning, namely learning with the help of computer-based websites or mobile phones [3], [6]–[8], [12]–[14] and distance learning online [2].

In this study, many factors were found to be successful in learning using IT. Of course, the IT infrastructure factor used in learning is an important thing that must exist and run well [5], [7]. In addition, system support or applications that are used to store and process information are also determining factors [9]. Support from learning institutions in managing finance for IT investment needs (software, hardware, brain ware) [4], [5], [8], [9], regulatory management [5], [10], [11], and cooperation with other parties are influential factors in the learning process [15]–[17].

From the previous studies, there has not been much development of the model used for the success of ICT learning. Learning is not only about institutions and infrastructure but also about the dominant factors to determine the success of learning. These factors are examined based on the relationship between learning and ICT. Through a literature review, the results of the research that will be conducted are expected to be able to fill in the part of the factors used to achieve the success of ICT learning.

III. METHODOLOGY

According to Anshori [9] IT has three main functions in learning activities, namely: (1) ICT as a tool for learning administrative activities (processing words, processing numbers, graphics, staffing, finance); (2) ICT as a science that is taught (informatics, information management, computer science); (3) ICTs as materials and tools for literacy. In this research, technology is interpreted as something that is learned as well as a tool to learn it. The research referenced in Table 1 is related to IT learning [9]. Furthermore, the grouping of criteria is carried out which are important factors in each study.

TABLE I. REFERENCES ON MODELS SUPPORTING THE SUCCESS OF ICT LEARNING

Variable	Definition	Reference
Background	The condition of students is related to their background to take part in ICT learning	[1]–[3]
Desire	Something that describes the reasons for students who come from themselves so they are willing to take part in ICT learning	[3]–[9]
ICT Skill	The condition of how students are able to use ICT before participating in ICT learning	[3], [8]–[17]
Infrastructure Facilities	Everything related to material, IT components in the form of software and hardware used during the ICT learning process	[1], [2], [12], [17]–[21], [4]–[11]
Teaching Process	Processes related to teaching and the delivery of ICT knowledge to students	[1], [2], [16], [19], [20], [3], [4], [6], [7], [9], [10], [13], [15]
Institution	Conditions related to the business and habits of the institutions that hold the ICT learning process	[3]–[5], [9], [12], [13], [16], [17], [20]

IV. RESULT

Figure 1 presents a model produced from previous research by dividing it into several perspectives, namely students'/teaching participants, institutions/organizers, and instructors/teachers/lecturers. The perspective here can be categorized as a stakeholder or who plays a role and is responsible for each of the learning success factors. For more details of each extract, it will be explained and further divided into several factors below.

A. Background

The background from the student's perspective is the condition of students regarding their background in participating in ICT learning. Perception of ICT learning influences students during their learning [12]. In addition, the educational background of students also influences the learning they follow [4], [18]. For example, students who were or were educated in boarding schools sometimes experienced technological gaps

compared to general students because the lessons taught were more inclined to override technological material. [22].

B. Desire

Desire is something that describes students' reasons or other things so that they are willing to take part in ICT learning. Desire regarding intention and motivation. Intention as a goal or intention that becomes the background of participating in ICT learning activities [18], [19] and motivation as something that becomes a driving factor in following ICT learning [2], [3], [8], [11]. Desire as a representation of the intentions and motivations of students participating in IT learning provides significant learning success even though students come from study programs that are not related to IT [6], [7], [22].

C. IT Skill

Skills are the ability of students to use ICT before participating in ICT learning. This is related to the experience of how long students use ICT [6], [10], [13], [19], [21], [22]. As well as the skills/abilities students have in using ICT [3], [6], [14], [17], [18], [20], [21]. If students already have IT skills, it will be easier to follow and achieve learning goals [10], [12], [13], [16].

D. Infrastructure Facilities

Infrastructure facilities are all things related to materials, IT components in the form of software and hardware to support the ICT learning process. Starting from the conditions / conditions related to IT hardware / software tools used in ICT learning [2]–[8], [19], [21]. In addition, modules are used as material in ICT learning [9]–[12], [14], [15], [19] and the class conditions / conditions used for ICT learning [5], [23]. IT infrastructure used by IT learning institutions should have good standards so that students do not experience difficulties in using IT devices [23]. The development of effective information technology infrastructure should facilitate fast web access, suitable computers, learning services such as modules and a comfortable classroom environment [5], [9], [21].

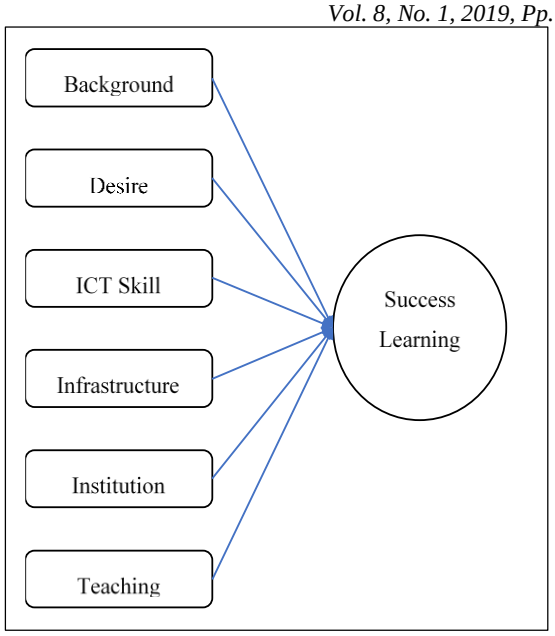

Figure 1. Model of the success of ICT learning

E. Institution

Institutions as providers of ICT learning activities are responsible for the efforts and habits that have been carried out regarding ICT learning. Institutional support for ICT learning in terms of human and technical resources, as well as finance [3], [5], [7], [13], [14], [18]. Owned financial conditions regarding supporting ICT learning activities [4], [5], [7]–[9]. Rules in learning used to manage management and implementation of learning [5], [10], [11], the culture that exists in learning institutions [10], [17], and cooperation built by institutions to conduct learning better ICT [15]–[17].

According to [24], institutions that lack in developing the right business education model can make it difficult and reduce the enthusiasm of learning students. In addition, a bad cultural condition can make learning lower such as not timely and undisciplined [17]. Institutional management who are unable to find the necessary resources, determine the structure of technology, model education, and establish cooperation with other educational institutions [5]. For this reason, institutions that conduct IT learning must have official planning and policies for better technology education [25].

F. Teaching Process

The teaching process is related to the delivery of ICT knowledge by instructors or lecturers to students. The factors related to teaching are as follows: mastery of the details of the material from the instructor [11], [18], clear and complete teaching / delivery [6], [11], relationships communication built by the teacher in delivering ICT learning material [2], [11]–[13], [17] innovation and creativity conducted by teachers in teaching ICT [5], [7], [17], and the duration of time used for learning activities [12], [13], [15], [20]. In the learning process,

the instructor should not only have the skills to understand the material but also have sufficient skills to motivate students to take part in learning [9].

V. CONCLUSION

The model developed is based on several interrelated perspectives in the learning process. Managed linkages can lead to the success of IT learning. The model developed is different from the model of learning that uses ICT only as a support for learning. This model combines several sides with stakeholder perspectives in the learning process. The combination process is used to determine the characteristics of each actor (student & teacher) without ignoring the role of the institution as an organizer and infrastructure as support in ICT learning.

Some recommendations can be made to deliver the success of each factor in IT learning. Recommendations for institutions as organizers of IT learning should also pay attention to factors from the student side, namely IT skills, background and willingness discussed above to adjust the learning objectives and conditions of students. Also, pay attention to the financial condition of institutions for appropriate IT investments and pay attention to the process of recruiting prospective teaching staff [5], [20]. For teaching staff, there is a need for TOT (Training of Trainers) activities to increase the ability to provide learning to students [20]. In addition, the duration or time of learning needs to be considered so that it remains in accordance with the prescribed curriculum without ignoring students in understanding the material [13], [19].

The recommendations and suggestions for the next study are to further explore the indicators of the IT infrastructure factors and the good state of the institution to achieve successful IT learning with a combination of existing models. The next study also is testing the model at an institution that organizes IT learning. This needs to be done to test the hypothesis of the factors contained in the model so that they can be known to influence in the real world.

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