Ubiquitous Learning for the Assistance System for Competitive Certification in the Field of Informatics

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Abstract-*Utilization of today's technology in the development and influence with innovation in learning. Improved learning by utilizing various sources of instructional materials, making a changing paradigm of learning increasingly developed. The existence of several internal and external factors in improving human resources in higher education also influences mechanics and design in compiling learning and using technology to facilitate existing learning and improve the quality of learning. Real role within the industry must work together and collaborate with the world of education today. The relationship between the world of education, government and industry today must be truly implemented. Ubuousous learning used in this study aims to bridge the knowledge from the industrial side represented by professional associations in the field of expertise, especially in the field of education, which is implemented in the design of learning, especially basic knowledge for students in informatics colleges in Indonesia. A system built in the Development of Ubiquitous Learning uses a combination of 3 Model Development systems, including: The Borg and Gall model as the backbone and the Hannafin and Pack Model and the Waterfall Model which are run together in the stages of the Borg and Gall Model. In general, the methodology used uses R & D by following existing rules. The results obtained in the form of an Aggregator system to connect and bridge Knowledge from the Academic side and the world of an industry that runs at this time can be used at any time and anywhere. The process is that users or students access with various tools, such as cellphones, laptops and can be accessed using the Web to Mobile applications. The mentoring process can also be applied independently by using virtual class displays, teaching materials to direct & virtual synchronous processes to the application of Independent & Collaborative Asynchronus so that the Ubiquitous Learning system can be used as alternative learning to the process of proficiency testing in the field of Higher Education in Higher Education. Indonesia.*
Keywords: Ubiquitous Learning, Model Development & Research, Mentoring System, Learning Innovation, Educational Technologists

I. INTRODUCTION

The use of ICT in various fields of human life has an impact on the increasing need for ICT graduates. Seeing a trend that continues to grow in the field of Information Technology, requires human resources that have the ability to master technology that qualified. College of both state and private race - the race to be able to convey scientific information on the field of Information and Communication Technology, with strengths and local knowledge of the campus - the campus of Informatics. Technological change requires resources, and its proponents have to compete for resources from the same pool as others; therefore, there is a trade-off involved that makes many stakeholders wary of change (Evans, Michael A. Johri, Aditya. 2008). Technology changes require resources, and supporters must compete for resources from the same source as others; Therefore, there is a trade-off involving many stakeholders who are aware of changes.

Understanding how to connect learning resources are important because of what we know today (Tu, Chih-Hsiung, et al. 2012). Understanding how to connect learning resources is as important as learning content because knowing what we need for tomorrow is more important than what we know today. But the very big problem is, nowadays there are more and more learning curricula on the campus in the field of informatics that is diverse. At the same time, many complaints from the world of work, that the competence of graduates, especially in the field of informatics is inadequate, and not relevant to the needs of the workforce. Many graduates are not ready to use, not ready to work, as desired by the world of work. This is because the contents of the learning outcomes of the curriculum made are not synchronous between the world of education and the industrial world. As stated by Suparma, that there is no link and match concept or the relevance of graduates' competencies to the

needs of graduates (the world of work) due to the lack of an in-depth study of the competency needs of graduate users at the time the universities are compiling the curriculum. (Atwi Suparman, 2014)

Some of the things obtained in the field both technically and non-technically include: (1) There are still few and tend to have no information from the campus stating that graduates from each informatics field study program have value or are competent in their respective fields, both from the side of lecturers and students. (2) Very limited information on cooperation between the world of campus and the published industrial fields in the media, if there are still within the scope of accreditation forms and internal campus only. (3) There is still not much collaboration between professional associations and industry associations in implementing link and match, especially in curriculum development. (4) The cost is quite large in participating in the professional certification test in the field of informatics for participants both students and lecturers ranging from two million rupiahs to tens of millions of rupiahs for each test in the informatics field certification profession. (5) There has not been seen as a system that acts as an aggregator, namely a system that bridges between industrial fields and campus fields, especially in the field of Certification Test in the field of Informatics. (6) There is still very limited test information on industrial knowledge provided by industry associations or professional associations in the field of informatics given to students and lecturers on each campus. (7) The absence of a data that brings together all certification test participants or industry knowledge tests (Proficiency) both those who have followed and have successfully passed the proficiency test. One form of student assistance in learning is Ubiquitous Learning. Many studies have investigated the use of Ubiquitous Learning as complementary teaching techniques to reduce time and location constraints in the learning environment. Chin, Kai-Yi, and Yen-Lin Chen. (2013) Recent studies have focused on developing Ubiquitous Learning technology, especially learning using experimental methods. (Chiou, Chuang-Kai, Judy CR Tseng, Gwo-Jen Hwang, and Shelly Heller. 2010) (Chu, Hui-Chun, Gwo-Jen Hwang, and Chin-Chung Tsai. 2010) (Hwang, Gwo-Jen, Fan-Ray Kuo, Peng-Yeng Yin, and Kuo-Hsien Chuang. 2010) Chiou et al. formulated the problem of navigation support to find learning pathways for each learner for ubiquitous learning that was context-aware and proposed two navigation support algorithms taking into account learning and navigation efficiency, indicating that the proposed algorithm could better facilitate the use of learning effective and efficient learning and realization of learning outcomes than other methods.

II. LITERATURE REVIEW

2.1 The Concept of Learning Model Development

Models usually describe whole concepts that are interrelated. Da Silva, Alberto Rodrigues. (2015) In other words, the model can also be seen as an attempt to concretize and at the same time, a theory is an analogy and representation of the variables contained in the theory. According to Robins, "A model is a reality abstraction; a simplified representation of some real-world phenomena." The meaning of this definition, the model is a representation of several phenomena that exist in the real world. The definition of the model is expressed by Miarso, the model is a representation of a process in the form of graphics and/or narration, showing the main elements and structures. In this case, it is possible to interpret the narrative model into graphic form, or vice versa. Yusufhadi Miarso 2003), So from this definition, it can be concluded that the model is a thought process and the components contained in it, which are represented in the form of graphics and/or narration. The development model is a set of sequential procedures to carry out the design of learning that is realized by graphics or diagrams or narratives by showing the main elements and structure. This research is developmental research with reference to several theoretical studies on standard development procedures and the results of identification and analysis of needs. Learning strategies are still conceptual and to implement them a variety of specific learning methods are used. In other words, the strategy is " *a plan of operation achieving something* " while the method is " *a way in achieving something* ". So, learning methods can be interpreted as a way that is used to implement plans that have been prepared in the form of real and practical activities to achieve learning goals. There are several learning methods that can be used to implement learning strategies, including: (1) lectures; (2) demonstrations; (3) discussion; (4) simulation; (5) laboratories; (6) field experience; (7) brainstorming; (8) debates, (9) symposiums, and so on. Chang, Victor. (2016) (Authority. B, Kardipah. S, 2018).

2.2 Mentoring System

The Mentoring System is more likely to achieve success where institutional culture has moved towards appreciation of educational rights and is inclusive of students, and far from past withdrawal models for assistance in repairs. Learning support which is an integral part of the program but specific in handling identified needs will be more likely to be taken and valued by students. Green, M. and L. Milbourne. (1998) The Mentoring System can include any activity, outside the specified 'content' of the college program, which will contribute to the

attendance, retention, learning, and achievement of individual students. In some cases this will be an integral part of the program; in another other addition. The Mentoring System must involve a college in meeting all learning needs identified both through the initial assessment process and from an ongoing review of student progress. The Mentoring System is determined by the current range and practice. Each project college finds its own definitions and limitations and shapes its thinking based on its own history and expertise. Each has also developed a strategy in response to the combined effects of, and sometimes conflicting, national initiatives, institutional culture, and local needs.

Table 2.1. Recommendations for effective support for learning

Student needs	Role of provider	Standards for universities	Instructions
Help identify the strengths and weaknesses of the learners themselves and develop action plans	Ensure learning support needs of students from underrepresented groups	The need for learning support of students from underrepresented groups was assessed systematically in all programs	Summary of support needs of students from underrepresented groups
Opportunities to improve weaknesses through additional tuition or practice fees	Effectively support students with learning difficulties and/or disabilities in mainstream and separate specialist programs	There are strategies to meet the learning support needs of these students	Policies and strategies for learning support across colleges and evaluation of learning support and tutorial programs
Access to personal support	Create a tutorial system that meets the needs of all students Give access to professional counseling	The effectiveness of learning support for students from underrepresented groups is evaluated including the use of the views of students	Plans for individual support for students Individual student action plans, tutorial policies, and frameworks
Student needs	Role of provider	Standards for universities	Instructions
Individual meetings with tutors to review progress	Monitor the effectiveness of learning support	All students are satisfied with the quality of support they receive	Recording summary of counseling services

Source: Green, M. and L. Milbourne (1998)

The Mentoring System is trained and instructed to circulate around the class during *think-pair-share activities* or groups to engage in discussions with groups of students. They are assigned to bring up student reasoning during the conversation because this practice has proven to be the most effective in generating student reasoning. Knight JK, Wise SB, Rentsch J., Furtak EM Cues matter (2015) Mentoring systems are more trained and are tasked with facilitating collaborative learning in the discussion section by moving through classrooms, engaging with student groups in discussions, and raising student reasoning. Assistance System programs have been implemented in various institutions, usually as part of comprehensive curricular transformation accompanied by pedagogical changes to active learning. Sellami, Nadia, Shanna Shaked, Frank A. Laski, Kevin M. Eagan, and Erin R. Sanders. (2017) While this shift in pedagogy has led to an increase in student learning outcomes Authority. B, Kardipah. S, (2018) , the positive effects of the Mentoring System have not been distinguished from active learning. To determine the effect that the Mentoring System will go beyond student-centered learning modalities that integrate active learning.

2.3 Learning Innovation

In the creation of learning innovations, the most important is the willingness and desire of the teacher to change the *image* learning as compulsion becomes a necessity, by bringing students to enjoy the beauty and

attractiveness of a subject matter that is being learned. This can only be done if the teacher makes learning innovations using the principles of meaningful and enjoyable *learning* (*meaningful learning* and *joyful learning*). In accordance with the opinion of Ausubel (1991) that learning will be meaningful if students can associate concepts learned with concepts that already exist in their cognitive structure (Ausubel, D., Novak, J., & Hanesian, H. 1978), and the opinion of Bruner (1991) which states that learning will work better if it is always associated with the lives of people who are learning (students) (Bruner, J. (1996). . Logically it can be understood, that we will definitely learn seriously if the content of what is learned has something to do with our daily lives and the words or sentences that are heard are *familiar* to our heads. Through this learning innovation, it is hoped that there will be improved learning practices in a better direction. This change does not have to happen in a practical way, but slowly but surely. Improvements to the process are very important so that the resulting output is truly quality (Firdaus R, Wibawa B & Khaerudin, 2019). Currently, it has entered a new period in education, known as the industrial revolution era 4.0, a change in the learning paradigm in the transformation of educational units (Layne, PC, & Lake, P. (Eds.). (2015).). The first learn one lifetime is currently the lifelong learning, formerly enclosed environment is now becoming an open, first institution single mode is now turned into institution mode is plural, formerly an institution isolated today become institutional networking, formerly curriculum single this time transformed into a cross-border curriculum, previously the static and rigid curriculum has now turned into a dynamic and flexible curriculum (Zurweni, Wibawa B, and Erwin, T. 2107) in the past, linear curriculums now turned into multi-dimensional curriculums, whereas content-based learning now turned into competency-based learning . Likewise with the transformation of the learning process, formerly teacher-oriented now has changed to become student-oriented, before the reactive learning process has now turned proactive, before the passive learning process has now become active learning, formerly isolated activity learning activities have now turned into activities collaborative (Smith, S., Brown, D., Purnell, E., & Martin, J. (2014).), in the past it was factual when the learning process changed to literal. All existing changes, both from changes in the learning process and the process of the educational unit in the new learning paradigm, are inseparable from the understanding involved, it requires the willingness to open the heart and open the mind

2.4 Ubiquitous Learning

Ubiquitous Learning will help in the organization and mediation of social interactions wherever and whenever this situation might occur. Abowd, GD, and Mynatt, ED: (2000) its recent evolution has been accelerated by increased wireless telecommunications capabilities, open networks, increased continuous computing power, improved battery technology, and the emergence of flexible software architectures. With these technologies, individual learning environments can be embedded in real-life everyday. Ubiquitous Learning focuses on the learning mission itself. In the context of learning everywhere, learning is a natural and spontaneous activity. What students pay attention to will not be peripheral devices or other environmental factors, but the learning mission itself. In other words, Ubiquitous Learning is human-centered and focuses on learning tasks. Technology can facilitate learning but it should not interfere with learning. For example, today, when we use the internet as a learning tool, we often have to master a lot of technical knowledge to use this tool effectively. This situation will increase the cognitive burden of students, frustrate students, and reduce students' attention. Conversely, in a ubiquitous learning environment, technology is peripheral, even beyond the attention of students. The service functions of the technology are improved, but their own visibility is weaker.

Ubiquitous Learning can also be defined as a new learning paradigm that promises students to study anytime and anywhere using the benefits of ubiquitous computing. Yahya, S., Ahmad, EA, Jalil, KA, & Mara, UT (2010) To avoid the misunderstanding of researchers in defining Ubiquitous Learning learning that uses the term "anytime and anywhere" by "learning to use computational technology everywhere", a study conducted by (Yahya, S., Ahmad, EA, Jalil, KA, & Mara, UT, 2010) proposed a new definition in which Ubiquitous Learning is a learning paradigm that occurs through a Ubiquitous Learning computing environment that allows learning to occur in the right place at the right place and time in the right way. However, as mentioned by Hwang, Hwang, GJ (2006) there is no clear definition of learning everywhere because the learning environment changes rapidly over time. The assumption that can be made is that many researchers have different views in defining the definition of Ubiquitous Learning. Therefore, the definition of Ubiquitous Learning needs to be clarified before applying the term to research to avoid misunderstandings. In the following discussion, the definition of Ubiquitous Learning must focus on learning that occurs anytime and anywhere in the right way with the right content using Ubiquitous Learning computational technology to distinguish it from the broader definition previously.

Figure 3.1 Sist e m Ubiquitous Learning

2.5 Combination of 3 Development Models

The Borg & Gall model was chosen because it has flexibility and flexibility for researchers to develop ideas and put them in the real work of product development, this can be seen in Figure 3.2

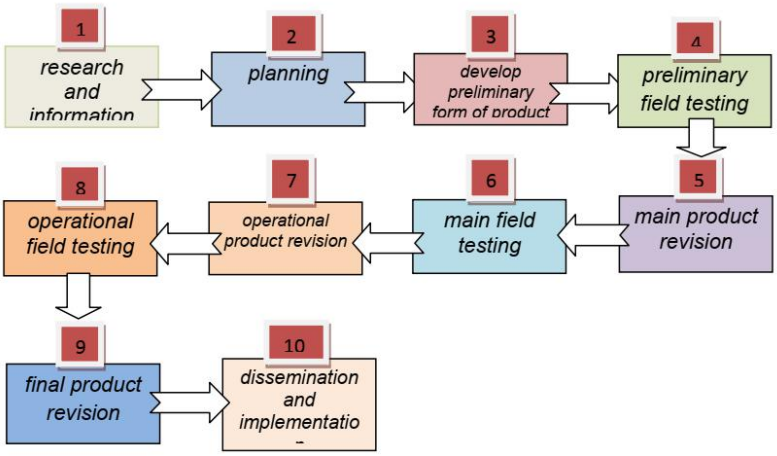

Figure 3.2 Method of Borg & Gall as Tulung Punggun g System

Of the ten stages of development Borg & Gall stated that research procedures basically consisted of two main objectives, namely: (1) developing the product; and (2) test the effectiveness of the product in achieving its objectives. The first objective refers to the development and the second objective refers to the validation function. Walter R Borg, Joyce P Gall, and Meredith D Gall. (2007) Referring to the stages of Borg & Gall, this research stopped at the seventh stage, namely limited scale field trials.

The next steps and processes of the procedural model can be seen in detail in Figure 3.3

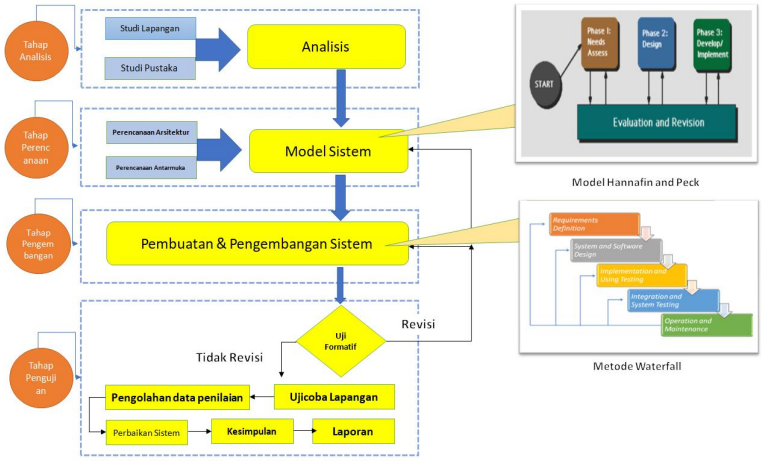

Figure 3.3. Procedural Model of the Proficiency Test System

So that, procedurally the system created will look at the mechanism as follows: For prospective participants who want to study the test eye to be taken first, can do this by accessing this teaching material openly (*online*), and can do a trial to do a simulation working on the problem questions that will be tested. When conducting a test answering a question, the trial participants can see the results and can learn things that have not been answered correctly and can learn again. Once the test participant considers himself capable of answering the question, then the participant can take a certification test by accessing the site that has been prepared and regulated when conducting the test with a *Proctor* or supervisor who is also a test technician in the field, so that the exam can be monitored to minimize fraudulent work and answer the certification test. After being declared graduated with the predicate determined by the Professional & Industry Association, the test participant receives the certification from the association by first paying administrative fees to print the certification. Furthermore, this system can also provide all the results recorded after the test participant has done the test, and can give according to the wishes, such as: Name of the test taker, from the College and what department, take the course, test results as a whole, about what can be answered or not by the test participant, until they know the process of claiming the test participant's certificate. The data can also be given directly to the requesting university and can be used for data filling in the accreditation form of the university. Broadly speaking, system development in this study can be seen in Figure 3.4.

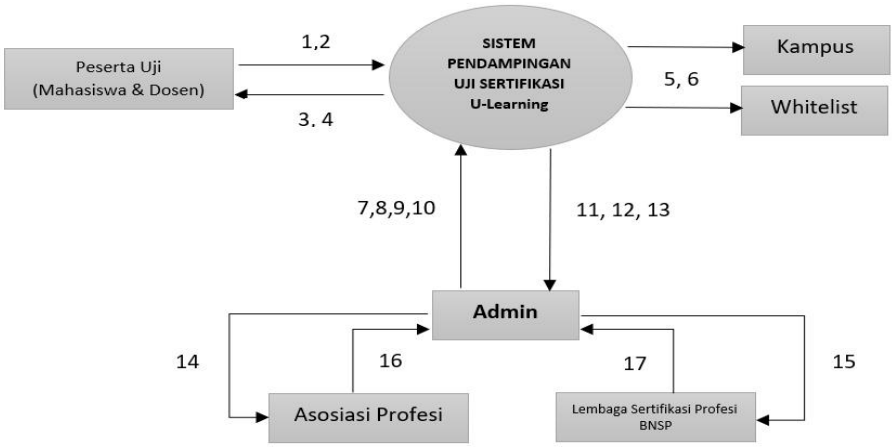

Figure 3. 4 Context Diagram of Assistance System Development

Information :
1: Participants get to log-in and enter the system
2: Study modules & Exam Materials and Implement Certification Tests
3: Provide User ID

4: Providing Certification Test Results
5: Provide Test Results to the Campus
6: Publish Test results to the Web
7, 8, 9, 10: Online System Input, Mobile Application Input, Question Input, Test Eye Input
11,12,13: Update Test Participant Data, Update Questions, Update Test Results by U-Learning
14, 15: Providing Test Results and Administration Reports
16,17: Provide an Update on Eye Test Questions

III. CONCLUSION

Various ways of knitting various sources of teaching materials that are available to be delivered in the form of learning innovations that should have been done, including, how to provide material in accordance with the Indonesian National Qualifications Framework (SKKNI) in the form of Online Learning managed as an independent learning system or as a companion system in order to take the proficiency test in the field of informatics.

The development of a Proficiency Certification Test system by using Ubiquitous Learning , is very likely in the future in terms of the application of collaboration and synergy in the field of learning on campus between the field of education and business / business in accordance with market needs and the ability of students who are competent in the field of informatics. In addition, business processes that can be managed in more detail and broader will produce a good business process in fostering the entrepreneurial spirit. This procedural model is also a real step, the formation of a system for the dissemination of knowledge for students in universities and bridging the scientific world of education with the business world.

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