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A Procedural Model for the Design of Informatics Competency Proficiency Assistance Systems Based on Ubiquitous Learning

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ABSTRACT
Many concerns from the world of work that the competence of graduates, especially in the field of informatics, is inadequate and not crucial to the needs of the workforce, because the performance of the learning outcomes of the curriculum is not synchronous between the world of education and the world of business. Thus, needs bridges to meet the needs of the business world and education world through competency proficiency. The research aims are to generate a procedural model that show procedural steps that will guide when developing an assistance system for the competency proficiency test. We combine the model with blended/hybrid learning as learning alternative in the era of industrial revolution 4.0. The Research and Development approach and the characteristics of the model developed in this study broadly combine three interrelated system development models, namely the Borg and Gall model as the backbone, Hanafin and Pack as the process of learning interaction and the Waterfall model as the creation of a companion application system. We also pay attention to the relationship between the share of academic, professional associations and government regulation in the form of the National Framework Scheme Indonesia (SKKNI) to the application of the results of this research is a Companion Certificate Diploma (SPKI) can do together. A procedural model is a development method of a mentoring framework which bridges industry and campus-based Ubiquitous Learning.
***Keywords**: assistance systems, procedural model, Ubiquitous Learning, blended/hybrid learning, learning innovation*

BACKGROUND

The use of ICT in various fields of human life impacts on increasing needs will graduate in ICT. Seeing the growing trend in the field of Information Technology, of course, requires human resources that are not small and have a capable ability to master technology. Both State and Private Universities are competing to be able to convey scientific information in the field of Information and Communication Technology, with advantages and local wisdom from the Informatics campuses.

Technological change needs capital, and its advocates should compete for resources from the same pool as others; thus, there is a trade-off that makes most investors wary of change.[1]. 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 necessary because of what we know today[2]. Understanding how to connect learning resources is as important as learning content because knowing what we need to do tomorrow is more important than what we know today. However, the huge 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, several reports from the world of work indicate that the skill of graduates, especially in the field of informatics, is inadequate and is not essential to the needs of the workforce.Most students are not ready to use, not ready to work, as the world of work so wishes, because the details of the learning outcomes of the program are not synchronous between the world of education and the world of industry. As stated by Suparman, that there is no link and match concept or the relevance of graduates' competencies to the needs of graduates (the workforce) due to the lack of an in-depth study of the competency needs of graduate users at the time the universities compiled the curriculum.[3]

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) Minimal 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 high 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 rupiah for each test in the informatics field certification profession. (5) There has not 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 minimal test information on technical 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.[1] Recent studies have focused on developing Ubiquitous Learning technology, especially learning using experimental methods.[2][3][4] Chiou et al.[5] formulating navigation support problems to find learning pathways for each learner for ubiquitous learning that is context-aware and proposes two navigation support algorithms by considering learning and navigation efficiency, indicating that the proposed algorithm can better facilitate the use of active learning and efficient from learners and the realization of learning outcomes than other methods.

LITERATURE REVIEW

The Concept of Development of Learning

Models usually describe the whole concepts that are interrelated.[1] In other words, the model can also see as an attempt to concretize, and at the same time, a theory is an analogy and representation of the variables contained in 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. Miarso expresses the definition of the model. The model is a representation of a process in the form of graphics or narration, showing the principal elements and structures. In this case, it is possible to interpret the narrative model into graphic form, or vice versa.[2] So from this definition, it can be concluded that the model is a thought process and the components contained in it, which represented in the form of graphics 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 principal elements and structure. This research is developmental research regarding 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 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 interpret 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.[3] [4]

The Mentoring System Assistance

The 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 improvement assistance. 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.

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 current range and practice determine the Mentoring System. Each project college finds its definitions and limitations and shapes its thinking based on its 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 learning support

Student needs	Provider role	Standards for tertiary education	Instructions
Helps identify the strengths and weaknesses of learners themselves and develop action plans	Ensure learning support needs of students from underrepresented groups Learning support needs of students from underrepresented	groups assessed systematically in all programs	Summary of support needs of students from underrepresented groups
Opportunities to improve weaknesses through tuition or additional practices	Effectively support students with learning difficulties or disabilities in mainstream and separate specialist programs	There are strategies to meet learning support needs from these students	Policies and strategies for learning support across colleges and evaluation of learning support and tutorial programs
Access to personal support	Create a system tutorial that meets the needs of all learners Give access to professional counselling The	effectiveness of learning support for students from underrepresented groups evaluated including the use of learners' views	Individual learner support plans Individual action plans, tutorial policies and frameworks
Individual meetings with tutors to review progress	Monitor the effectiveness of learning support	All students are satisfied with the quality of support they receive.	Records of counselling service summaries

Source: Green, M. and L. Milbourne (1998)[1]

Mentoring systems are trained and instructed to circulate the class during *think-pair-share activities* or groups to engage in discussions with student groups. 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.[1] Mentoring systems are more trained and task 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.[1] While this shift in pedagogy has led to an increase in student learning outcomes[2], the positive effects of the Mentoring System have not distinguished from active learning. To determine the effect that the Mentoring System will go beyond student-centred learning modalities that integrate active learning.

LEARNING INNOVATION

In the creation of learning innovations, the most important is the willingness and desire of teachers to change the *image of* learning as a compulsion into a need, by bringing students to enjoy the beauty and attractiveness of the subject matter studied can only be done if the teacher carries out 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 the concepts learned with concepts that already exist in cognitive structures[1], and the opinion of Bruner (1991) which states learning will succeed better if it is always associated with the lives of people who are learning (students)[2]. Logically it can be understood that we will learn if the content has something related to our daily lives and the words or sentences that hear are *familiar* to our heads. Through this learning, innovation hopes that there will be improved learning practices in a better direction. This change does not have to happen practically, but slowly but surely. Improvements to the process are significant so that the resulting output is genuinely high quality [3]. 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[4]. When education is lifelong learning once in a lifetime, as a closed environment is now an open environment, as a single-mode institution now converted into a multi-modal institution, formerly independent institutions are now networked institutions, once a single curriculum has evolved into a cross-border curriculum. Earlier, the static and rigid curriculum has now become a dynamic and flexible curriculum. [5]. Previously, the current linear curriculum turned into a multi-dimensional curriculum, whereas content-based learning today turned into competency-based learning.

Similarly, with the transformation of the learning process, formerly teacher-oriented has now switched to student-oriented, before the reactive learning process has become constructive, before the passive learning process has become involved, the formerly independent activity learning activities have now become interactive activities [6]. First of all, the actual learning process is now changing to literal. All real changes, both from changes in the learning process and the process of the education unit in the new learning paradigm, cannot be separated from the understanding involved, it requires the willingness to open hearts and open the mind.

UBIQUITOUS LEARNING

Ubiquitous learning will help in the organization and mediation of social interactions everywhere, and whenever this situation might occur.[1] The increase in wireless telecommunications capabilities has accelerated its recent evolution, open networks, increased continuous computing power, improved battery technology, and the emergence of flexible software architectures. With these technologies, individual learning environments can embed in real life every day. 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-centred 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 much 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 visibility weaker.

Ubiquitous learning can also define as a new learning paradigm that promises students to study anytime and anywhere, using the benefits of ubiquitous computing[1]. To avoid a misunderstanding among researchers in describing Ubiquitous Learning using the word "anytime and anywhere" through learning to use ubiquitous computing technology, and study conduct proposing a new definition in which Ubiquitous Learning is a learning paradigm [2]. Proposing a new definition in which Ubiquitous Learning is a learning paradigm that occurs through the Ubiquitous Learning computing environment that allows learning to happen to the right things in the right place and time in the right way. However, as mentioned by Hwang [3], there is no clear definition of learning everywhere because the learning environment changes rapidly over time. The assumption that can make is that many researchers have different views in defining the definition of Ubiquitous Learning. Therefore, the definition of Ubiquitous Learning needs to clarify 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

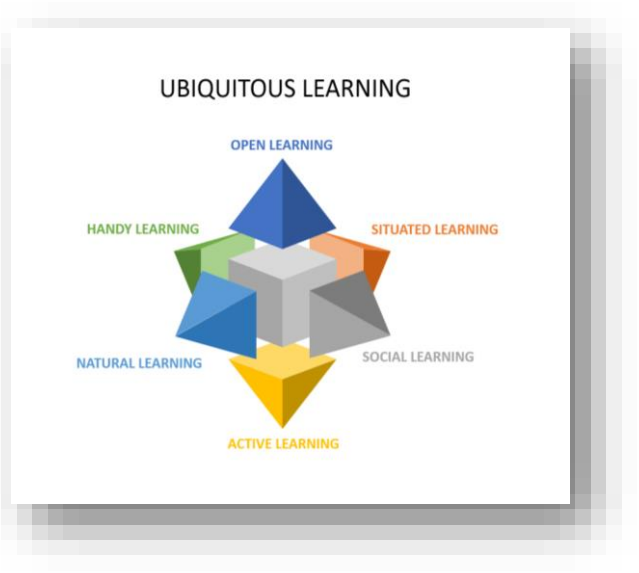

Figure 2.1 The Ubiquitous Learning

SYSTEM PROCEDURAL

Model Borg & Gall model chose because it has flexibility and flexibility for researchers to develop ideas and put them in real product development work, this can see in Figure 2.2

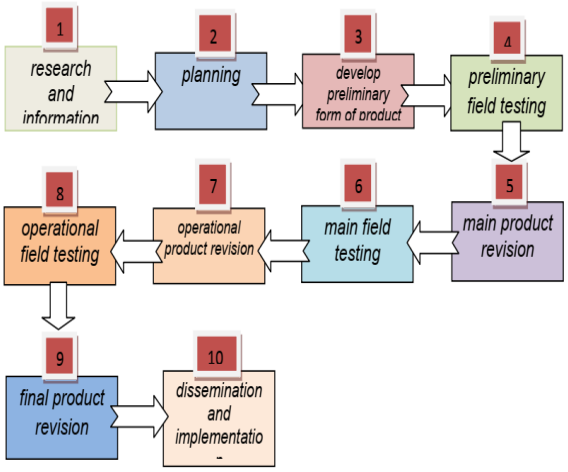

Figure 2.2 Borg & Gall Method as Tulung Backs of the

Ten stages The development of Borg & Gall stated that research procedures 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.[1] Concerning the stages of Borg & Gall, this study stopped at the seventh stage, namely limited scale field trials.

The next steps and processes of the procedural model can see in detail in Figure 2.3

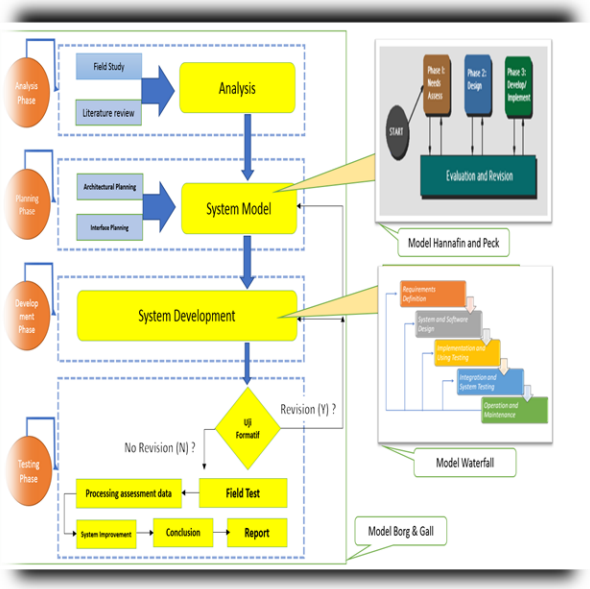

Figure 2.3. Procedural Model of the Proficiency Test System

So that the procedurally created system will look at the mechanism as follows: For prospective participants who want to study the test eye to take first, can do this by accessing this teaching material openly (*online*), and can do the test try to do a simulation working on the problem questions that will test. 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 concurrently tests 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 use for data filling in the accreditation form of the university. System development in this study can see in Figure 2.4.

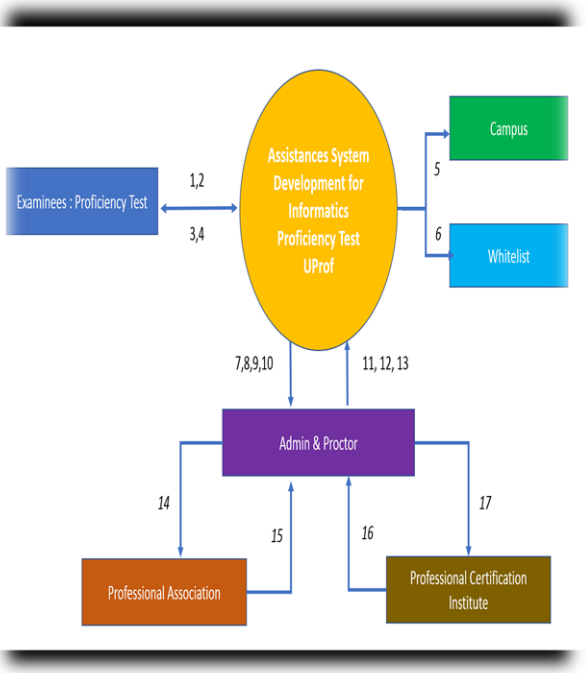

Figure 2.4 Context Diagram Development Assistance System

Description:
1:Participants get Login and enter into the system
2: Study modules & Exam Materials and Implement Certification Test
3: Provide User ID
4: Provide Certification Test Results
5: Provide Test Results to 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 U-Learning
14, 15: Providing Test and Administrative Report
16,17: Providing an Update on Eye Questions for Tests

THE RESULTS

The concept of building a mentoring system in information proficiency testing as seen in figure 3.1

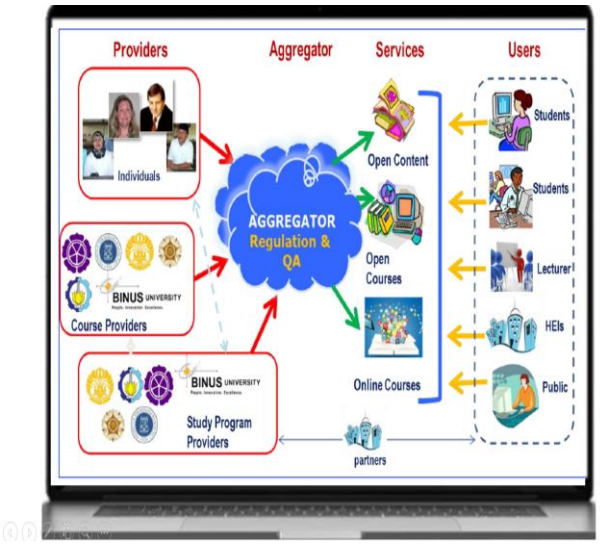

Figure 3.1 Conceptual Model Design in the Development of Assistance Systems for Proficiency Test for Informatics Competency Based on Ubiquitous Learning

While the application of the concept design model of the proficiency testing assistance system can be made with a web-based application or mobile, as can be seen in Figure 3.5

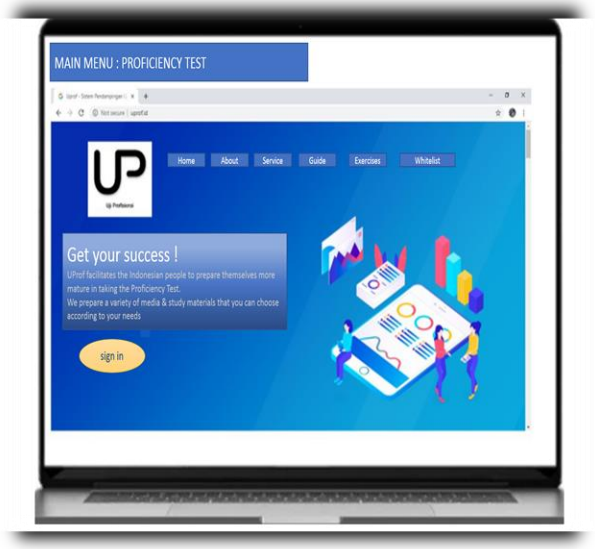

Figure 3.2 Implements Conceptual Model Design in the Development of Assistance Systems for Proficiency

After the stages carried out, here are the final result in applying the design model concept, as seen in Figure 3.3.

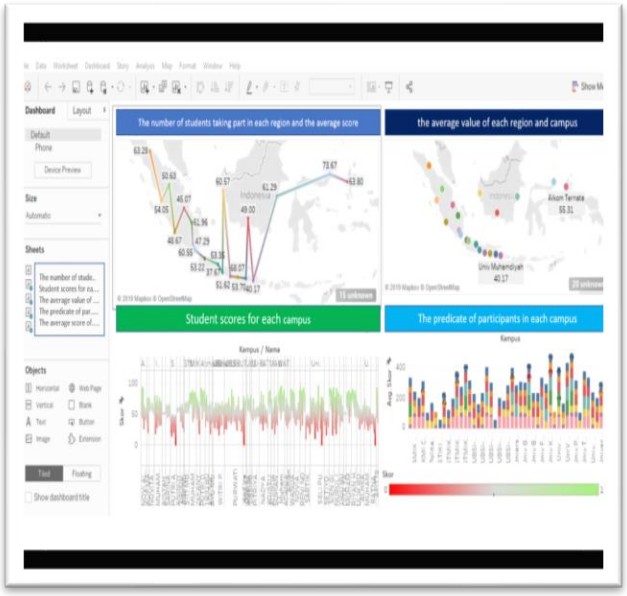

Figure 3.3 The results of applying the concept of the Proficiency Test System Design Model

CONCLUSION

Different ways to combine a range of teaching materials to deliver in the form of education technology, including how to provide materials in compliance with the Indonesian National Qualifications Framework (SKKNI) requirements in the form of online training operated as an independent learning method or as a companion system to take computer skills tests. Innovative learning assistance framework models using Ubiquitous Learning have a potential opportunity to work together with academic learning, such as education and business, to meet the needs of industry requirements and learners with trained skills in informatics. Besides, business processes that can handle in more detail and more generally can produce a good business process that fosters an entrepreneurial spirit. This institutional model is also a real step forward in the development of a framework for disseminating information to university students and connecting the scientific world of learning to the business world.

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