



# Physical Model of Development of Assistance System Proficiency Test for Ubiquitous Learning-Based Information Competency Competencies

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Supporters compete for resources required for Technological changes, which usually a trade-off, involving many stakeholders, who are aware of changes. Understanding how to connect assets for learning is as important as the content because the knowledge of what is needed for tomorrow is very important. Furthermore, the Mentoring System openly conducted for the proficiency tests, in the field of informatics, which is an alternative in solving problems in the Industrial Revolution 4.0. This article presents a study of open mentoring and also provides answers to how information and communication technology facilitates the education process. The Research and Development characteristics of the model developed, broadly combines 3 interrelated system development prototypes, which include the Borg and Gall as the backbone, Hannafin, and Peck as the interaction process, and the waterfall model serves as the creator of the mentoring application system. However, it is expected that the final results establish a digital learning platform, from national and international standard certification programs, based on the Professions and Competencies, provided by industry and associations. However, other consequences include, to bridge the gap between the industrial world and university, as a physical standard, to obtain evidence from empirical data for Certification. Furthermore, it is also relevant as a Test field of IT based Ubiquitous study, based on its impact, by increasing the competence in the field of informatics, for students and lecturers in Higher Education, department of Informatics and Computer Science Indonesia.

**Keywords:** Information and Communication Technology, Model Physical, Research and Development, Systems Nurturing, Ubiquitous Learning.

## 1. INTRODUCTION

Information and Communication Technology (ICT) is developing in the society, along with increasing human needs, in all aspects of life, as applications and the internet, support daily activities, with information connected at hand. The progression in technology can be in the form of Software and Brainware, which supports the desire of universities to open education and training institutions, as well as Hardware. Furthermore, this advancement directly or indirectly causes people to competitively establish and organize education and study programs, especially in the field of informatics and computer science.

Data from the research carried out by Aptikom (2015), stated the existence of over 170 Informatics Study Programs, under the auspices of 111 Universities in Indonesia, with Polytechnic Status, 226, in 120 Academies, 639, in 246 Colleges, 84, within Institutes and 693, under

318 Universities. However, information obtained from the Undergraduate (S1) study program, as of June 2017, in BAN PT indicated the following study programs: there are 440 Informatics Engineering, 279 on Information Systems, 1 on Informatics Management, totaling 746 undergraduate syllabuses. Furthermore, the number of existing students and lecturers were 41,790 and 2,504 in large State Universities, while 347,302 and 12,661 for Private ones (PTS) respectively.

The use of ICT in various areas of human life has an impact on the increasing need for competent graduates in the field. Hence, observing the advancing trend requires vast human resources, who possess the capability to master it. State and Private Universities compete to be proficient in conveying scientific information, using advantages and local wisdom from its university.

Technological alteration requires competitive resources, obtained by all proponents, from the same collection.

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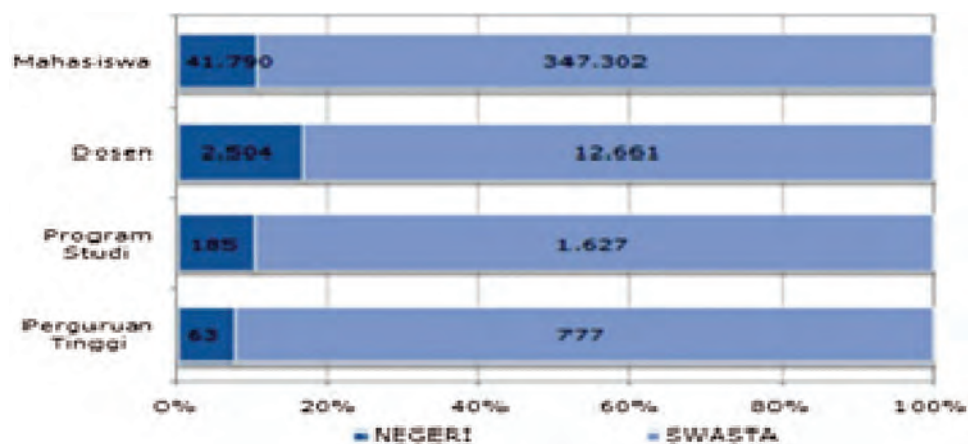


Fig. 1. Data on Aptikom members in 2009.

Source: Directorate General of Higher Education Learning and Student Affairs, Director General of Higher Education, Rakornas Aptikom 2015 Material, <http://belmawa.ristekdikti.go.id/access> 12.9.2017.

Furthermore, this fosters a trade-off, which makes many stakeholders wary of change [1].

Understanding how to connect education resources is important, by what is known today [2], while the knowledge on how to link them is also important, because of its contribution to what is needed for the future. However, nowadays, there is an increase in the learning curricula in the university, in the field of informatics, which are very diverse. Furthermore, many complaints have been recorded from the labor market that the competence of graduates are inadequate, and also not relevant to the needs of the workforce. Many alumni are not prepared, or ready to work as desired because the learning outcomes are not synchronous between the education curriculum and industrial needs.

Suparman stated that there is no correlation and relevance of graduates' competencies to the requirements of the workforce, due to the lack of an in-depth study of the competency desired of graduate, when the universities compiled the curriculum [3].

Based on the initial interview, it was uncovered that there was no measurement mechanism and open material online, to ensure the level of knowledge of lecturers and students was updated, with relevance to the dynamics of rapid industrial change. Therefore, all of these are considered in line with the application of the Indonesian National Performance Competency Standards-Indonesian National Qualification Framework (SKKNI-KKNI).

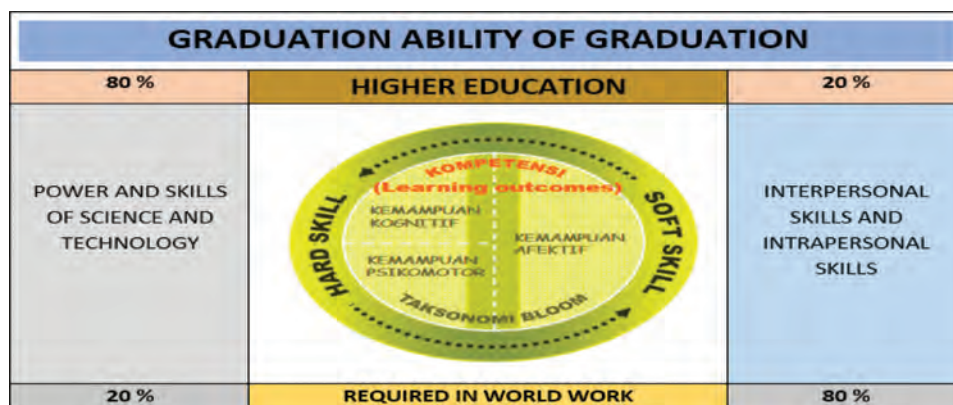
Competence is needed in predicting and determining the required quality and performance of prospective workers [4]. However, there is a gap between the ability of graduates from universities in Indonesia and the appropriate skills needed in the industry or workforce as in Figure 2 below.

Technical and non-technical data obtained in the field include: (1) little information is available from the university, which states the competence of graduates from

each informatics field study program, in terms of lecturers and students. (2) Minimal data on the cooperation between the higher institution and industrial fields published in the media, which states their validity in the scope of accreditation. (3) There is miniature collaboration between professional and industrial associations towards implementing links, especially in curriculum development. (4) The considerable cost of participating in the expert certification tests, required for participants, both students and lecturers, which extends from two million to tens of millions of rupiah for each test in the informatics field. (5) A system that acts as an aggregator, which bridges the gap between both fields, has not been seen. (6) Students and lecturers obtain minimal information on technical knowledge, provided by its professional associations (7) The unavailability of data that brings together all certification test participants or industry knowledge tests (Proficiency), including the successful candidates.

Ubiquitous Learning is a student assistance method investigated by many studies as a complementary teaching technique, further reducing the time and location constraints in the education environment [5]. Recently, studies have focused on developing this technology, especially the involvement of experimental methods [6–9]. Formulated navigation support problems, in an attempt to find the study pathway, that is context-aware and which further proposes two steering support algorithms by considering effectiveness and efficiency and the realization of learning outcomes.

Previous Ubiquitous education models were limited, especially in terms of explaining the behavior of students because they focus on developing and testing experimental approaches in a planned learning environment. Hence, this investigation generally lays emphases on the term itself rather than understanding students' u-learning behavior. However, several studies have considered universal study in the context of English language learning, to improve



**Fig. 2.** Gaps in graduates’ abilities.  
Source: Dikti Belmawa, 2012.

competency skills. Furthermore, it is also deemed necessary to conduct research, on the use of this technique for the system of competency certification guidance, in the field of informatics, where mobile and web access can facilitate learning as well as improve performance.

**2. LITERATURE**

An online platform contains a variety of interactive features, such as discussion areas, test modules, personal blogs, concept study, and cooperative learning, which further inspires users to complete all operations. Furthermore, the scheme has six subsystems, designed for students to conduct with the use of smartphones [10].

The use of Ubiquitous education was in accordance with its characteristics, definitions and functions. However, some researchers suggested that it also motivates students to be more creative and inspiring. Hence, the material and content obtained increases Skills and ability (Expertise), Knowledge and Attitude, and it is further developing. Furthermore, these devices can be applied in the education environment to provide active and adaptive support to students in real-world training [11].

The utilization of this program, which is implemented as a system of mentoring certification testing in the field of informatics, has a direct impact, through the implementation of Law No. 12 of 2012, based on higher education, Permendikbud No.49 of 2014, on its National standards. Furthermore, it also operates Permendikbud No. 81 of 2014, regarding diplomas, competency documentation and higher education profession license in the form of e-certification which are used for Diploma Compliance (SKPI).

**2.1. Concept of Development of Learning The**

The Models usually describe an entire concept that is interrelated [12], which is also observed as an attempt to solidify a as an analogy and representation of the variables contained in it. However, this concept is described

by Robbins, as an actual abstraction, a simplified representation of some real-world phenomena. Furthermore, the definition is expressed by Miarso, as a representation of a process, in the form of graphics or narration, showing the principal elements and structures. Hence, it is possible to interpret the narrative model into graphic form, or vice versa [13].

The prototype is a set of sequential procedures, designed to carry out learning realized by graphs, diagrams or narratives, by illustrating the principal elements and their form. Furthermore, this is a developmental research, concerning several theoretical studies on standard advancement procedures and also, the results of identification and analysis of needs. However, Learning strategies are still conceptual, whose implementation requires a variety of specific methods, which means that the strategy is “a plan for operational achievement of something,” while the method is “a way to accomplish it.” Hence, learning methods can be interpreted as a way, used to implement set plans, through real and practical activities to obtain learning goals, some of which, include: (1) lectures (2) demonstrations (3) discussion (4) simulation (5) laboratories (6) field experience (7) brainstorming (8) debates, (9) symposiums, etc. [14, 15].

**2.2. The Mentoring System Assistance**

The system is more likely to achieve success where institutional culture has moved towards the appreciation of educational rights, inclusive of students, which are far from the past withdrawal models for development assistance. Hence, education support, which is an integral part of the program, specific in handling identified needs, is most probably taken and valued by students [16]. The Mentoring System is further included in any activity, outside the specified ‘content’ of the college program, which therefore contributes to the attendance, retention, learning, and achievement of students [17]. In some cases, this becomes an addition or an integral part of the program. However, the Mentoring scheme must involve colleges in meeting

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**Table I.** 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 and 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 counseling the	Effectiveness of learning support for students from underrepresented groups is 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 summaries of counseling services

all education desires, identified through the initial assessment process and also from an ongoing review of student progress.

The Mentoring System is further determined by the current range and practice, where each project college defines its definitions and limitations and also shapes its thinking, based on its history and expertise. Furthermore, they individually have to develop a strategy in response to the combined or adverse effects of national initiatives, institutional culture, and local needs.

Guiding structures are trained and instructed to circulate the class during think-pair-share activities, encouraging groups to engage in discussions with units of students. Furthermore, they are assigned to train reasoning abilities during the conversation because this exercise is very useful in this aspect [18]. The more learned training systems are further tasked with facilitating collaborative education in the discussion section, by moving through classrooms, engaging with group discussions, and elevating participants' reasoning.

### 3. METHODOLOGY/MATERIALS

#### 3.1. Research Approach This Study

Research and Development (R and D) approach was used in this study, to produce certain products, and further test their effectiveness [19], which involves steps to create new products or improve existing ones. However, products obtained through R and D are expected to increase the productivity in the education field, such as numerous graduates, qualified, and relevant to the workforce needs, specific curricula for certain educational needs, teaching methods, learning media, textbooks, modules, evaluation systems, competency test models, etc. Seels and Richey define development research as a systematic study of designers, who program advancements and its evaluation

in the learning process and also defines products that must meet the criteria of practicality validity, and effectiveness.

This research refers to the steps taken by Borg and Gall which were later modified into preliminary studies, divided into field and literature lessons, system analysis, design, development, testing, verification and validation, as well as revisions and reviews on system testing, and results analysis [20].

#### 3.2. Characteristics of the Model Developed

The objectives of this research involved all ICT students, who took the test of Informatics Certification. However, it also discusses methods to build a mentoring system, in an attempt to carry out the testing process for lecturers and students, using internet as an instructional media. Furthermore, the system created is a place of interaction between prospective examinees (including students, lecturers, and others, willing to take the Certification Test) with questions and test subjects, issued by various Professional Associations involved in the system, which can be tested at anytime and anywhere, using Ubiquitous learning.

For prospective participants who choose to study the test eye to be taken first, this can be conducted by accessing the lecture materials openly (online), and also enriched with the capability of a trial/simulation work on the problem questions that are tested. When conducting a test, answer the question, the participants see the results, therefore learning what has not been answered correctly. However, once the partaker is considered capable of answering the question, they opt for a certification test, by accessing the prepared and regulated site. Furthermore, the assessment is conducted with a Proctor or supervisor, who is a test technician in the field, in order for the exam to be monitored, further minimizing fraudulence while providing answers.

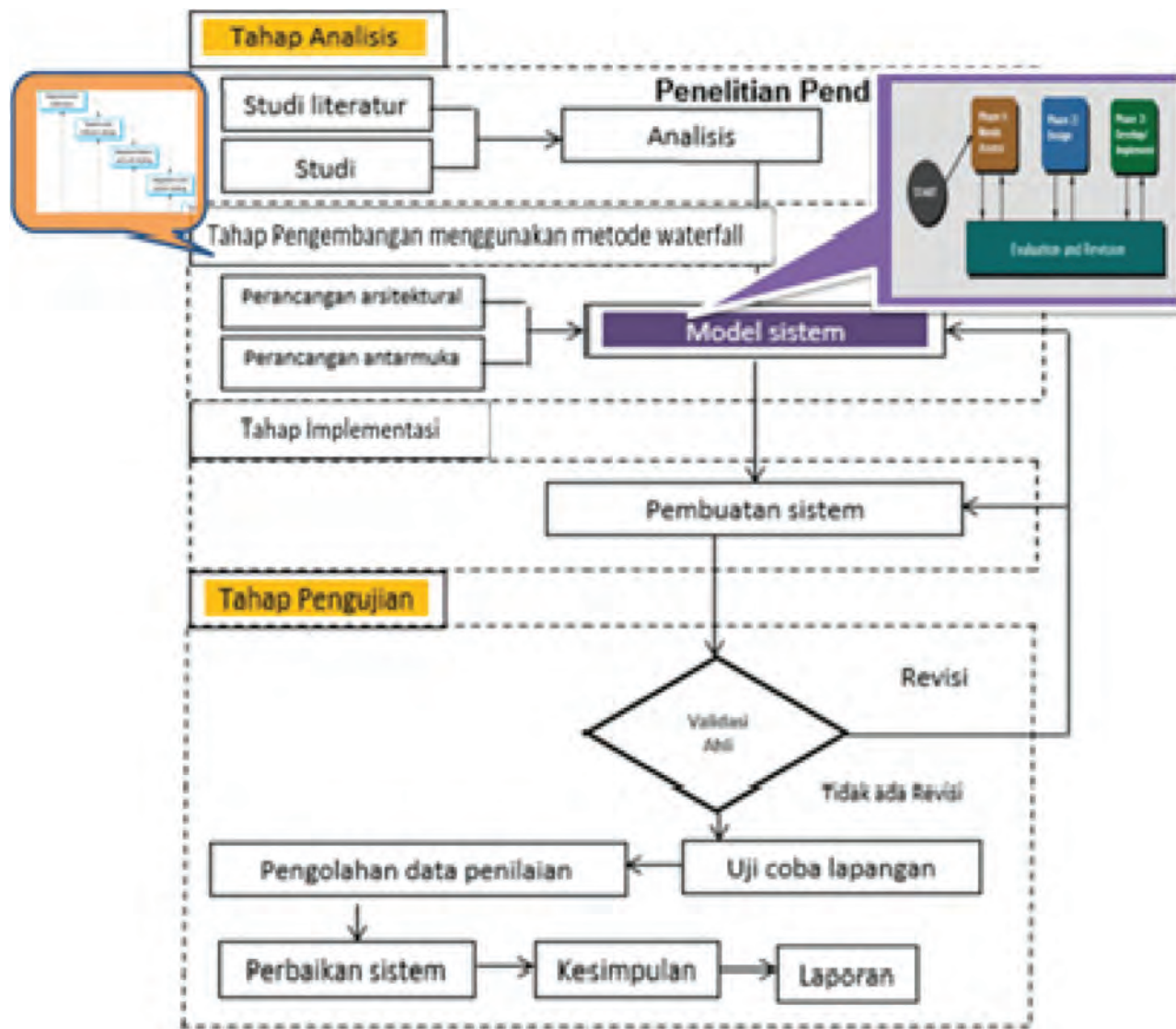


Fig. 3. Research steps.

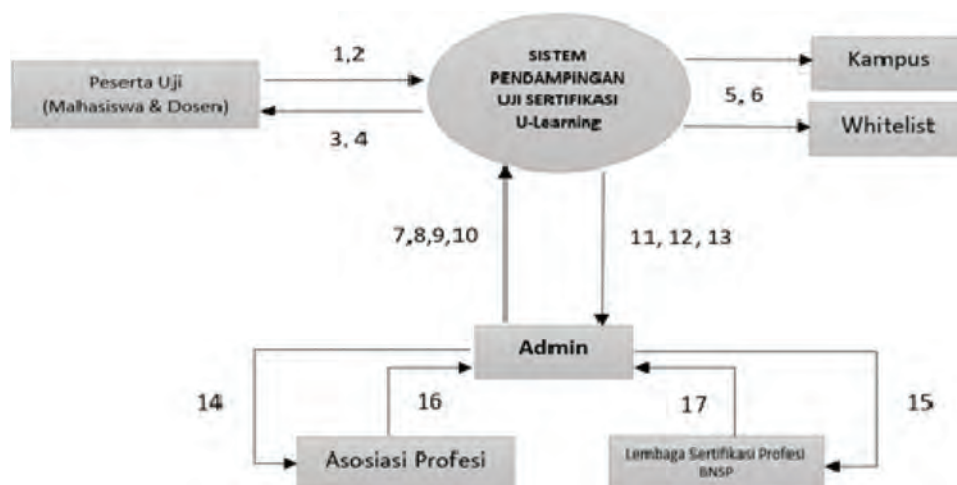


Fig. 4. Context diagram development assistance system.

Graduates are declared with the predicate determined by the Professional and Industry Association. At this point, the participant gets the certification result by first paying the administrative fee to print the document. Furthermore, this system also provides all the results recorded, according to the requirements, including, Name of the test taker, the College, and department, the course taken, the results as a whole. The participant's data can also be given directly to universities on request, to be used for filling information in university accreditation forms. System development in this study can be described as follows.

Description:

- 1: Participants get Login and enter into system.
- 2: Study modules and Exam Materials and Implement Certification Test.
- 3: Provide User ID.
- 4: Provide Certification Test Result.
- 5: Provide Test Results to University.
- 6: Publish Test Results to Web.
- 7-10: Online System Input, Mobile Application Input, Question Input, Test Eye Input.

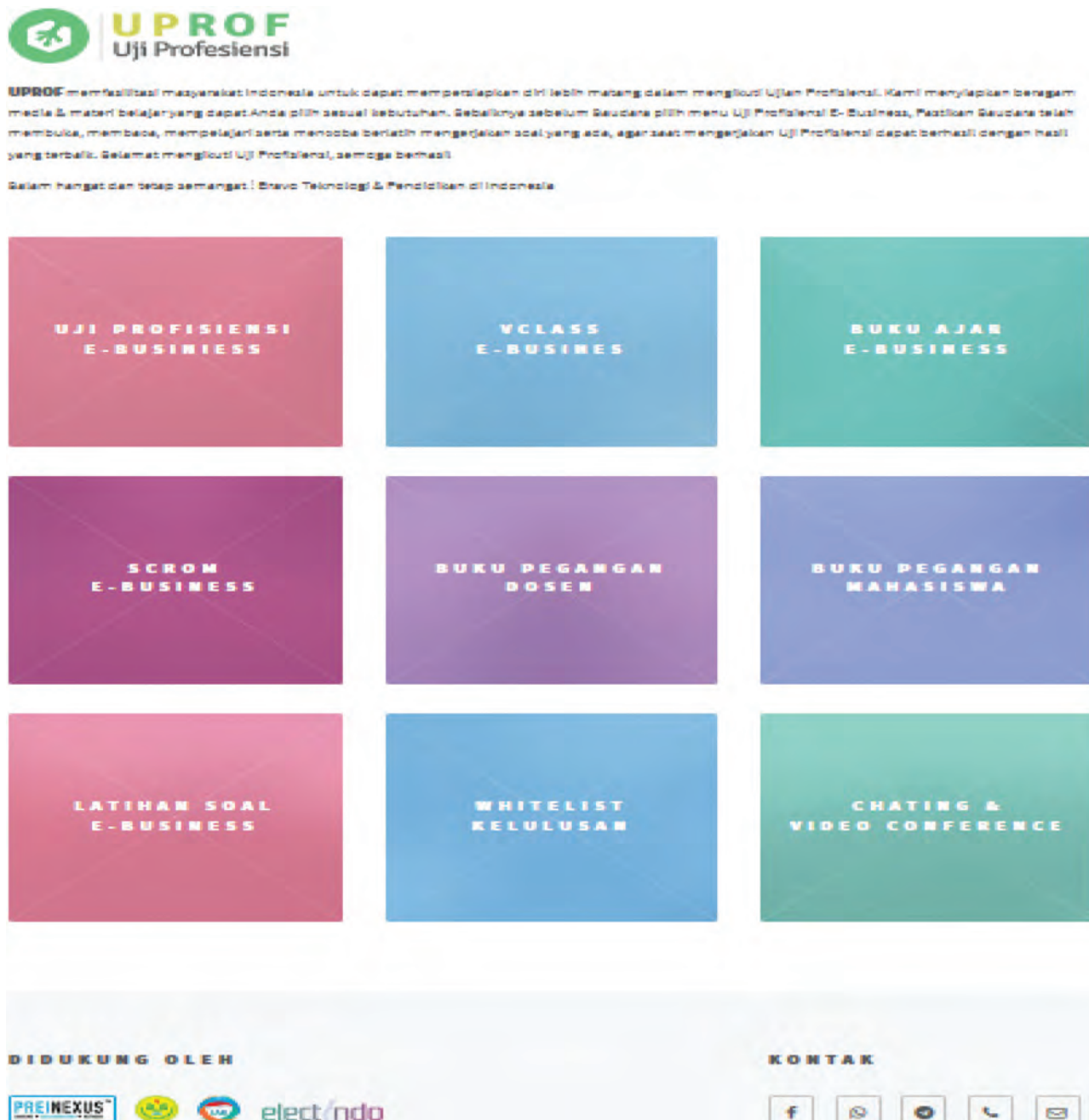


Fig. 5. Proficiency test (uprof).

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11–13: Update Test Participant Data , Update Questions, Update Test Results U-Learning.

14, 15: Provide Test and Administrative Report.

16, 17: Provide Update Test Eye Questions.

#### 4. RESULTS AND FINDINGS

Results from Physical Models for Developing Assistance System Proficiency Test for Ubiquitous Learning, based on Information Competency is seen in the form of advancement in Informatics Endorsement Test Support Application for e-spark material, which are Web and Mobile-based, integrated with other systems. Furthermore, this relates to structures in professional associations that provide and issue values and certificates, which are recorded in the proficiency testing information system on the web.

In this system, everything organized for prospective participants to directly work on their assessment. Hence, in cases of unpreparedness, learning independently is promoted and also exercises on proficiency test questions can be carried out, as seen in Figure 5.

Description of the Proficiency Test System, which consists of several systems, among others;

1. Proficiency Test: All participants first write their name, majors, university and city names in order to log in and take approximately 30 questions. However, professional associations face some problems when each participant gets a different matter at a time, which is predetermined after completing test because the system automatically assesses and the results are obtained, based on levels set by the body by the SKKNI, or other standard organizations that exist in the Industrial field.

2. The VCLASS menu is an online study material, applied using Blended/Hybrid Learning methods for universities that desire it utilize material-based models Learning Management System (LMS).

3. Textbooks are another form of independent learning, where participants study reference books, used to increase knowledge in the field of informatics. However, various kinds are presented, through soft files or e-books to be downloaded by participants in preparation.

4. SCORM is an education media in multimedia packages, which adapt to Open Sources, especially the Moodle platform. Furthermore, this is also as a way to deliver the teaching materials through the combination of media, including text, voice, video, movies, slide shows, etc., to be displayed online and offline.

5. Lecturer and Student Handbook is another mentoring process that facilitates independent learning. However, the composition of these two books refers to how a textbook is for lecturers and how students carry out existing learning commands, intended to improve success in proficiency tests.

6. The exercises in this application are based on how participants are asked to practice on mock test questions

to accustom them to the central assessment. Hence, they know the pattern to answer problems provided by the association of informatics proficiency certification.

7. Whitelist is the information provided by the Proficiency Test system, for participants from universities and department, who obtain the value from working on the questions. Furthermore, this data is accessed on the Association's website, organized in the form of reports, obtained from the Test system and Certificates are also issued by the Organizing body. However, the examination structure in this study is made in an open system, where anyone is welcome to take the test after getting a unique code from each coordinating university.

8. Forum Chat and Video Conference is a synchronous virtual media, intended to communicate about matters of Proficiency assessment. Furthermore, this technique is carried out on schedule, predetermined after students send a direct message to the system owner, using the WhatsApp Android/iPhone based (WA) application. Furthermore, video conferencing activity is conducted using the Zoom application, which can also be downloaded in the play store and register is not compulsory.

#### 5. CONCLUSION

Conclusions and Suggestions, based on the data obtained in this study, are as follows:

##### 5.1. Conclusions

The establishment of a digital learning platform, based on national and international standard certification programs, professionally attributed to competency standards, provided by the industry and associations. However, this is carried out to bridge the gap between the industry and university physical learning models. Furthermore, this is conducted to obtain evidence, based on empirical data about the results from the Assistance System for Ubiquitous Learning-based Informatics Certification Tests. Hence posing an impact on elevating the competence of student and lecturers in Higher Education informatics and computer, Indonesia.

##### 5.2. Suggestions

Some measures to be considered for further research are as follows;

Business Processes should be developed in order to obtain results in the form of finance, which could be used to improve the system.

Cooperation in the associations is better in the structure because this enhances collaboration between the academic, business and government

Utilization of Tests for Proficiency as a Certificate of Companion Diploma must be socialized. Hence, enhancing the utility of the system in the future, and further attributing development in the acquired properties of universities

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