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PROCEEDING INTERNATIONAL CONFERENCE

Revitalization of Technical and Vocational
Education to Face Industrial Revolution 4.0

Surabaya, July 11 - 14, 2018



Faculty of Engineering
Universitas Negeri Surabaya
2018

PROCEEDINGS

International Conference

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

**“Revitalization of Technical and Vocational Education to Face
Industrial Revolution 4.0”**

Surabaya, 11-14 July 2018

Speakers:

Prof. Dr. Muhadjir Effendy, MAP.
Minister of Education and Culture, Republic of Indonesia

Michael Freiherr von Ungern – Sternberg
*Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to
Indonesia, ASEAN and Timor-Leste (German)*

Prof. Dr. Wenny Rahayu
*Head of School of Engineering and Mathematical Sciences
La Trobe University Victoria (Australia)*

Prof. Dr. Muchlas Samani, M.Pd.
Rector of Universitas Negeri Surabaya period 2010-2014 (Indonesia)



Faculty of Engineering
Universitas Negeri Surabaya
2018

PROCEEDINGS

International Conference

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

“Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0”

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PREFACE

All praises be to Allah SWT, so that the 2018 International Conference of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** could be held in Surabaya during 11-14 July 2018. APTEKINDO International Conference is conducted biennially in which this year host is Faculty of Engineering, State University of Surabaya. There were sixteen colleges attending this year Conference, most of which were former Institutes of Teacher's Education (LPTK).

This year theme is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*" aimed to respond to the development and acceleration of the industrial revolution 4.0 that has become the most discussed issues in many countries. Industrial revolution connects machines with internet systems. In regard to facing such phenomena, Indonesian government through the Ministry of Industry has launched "Making Indonesia 4.0", of which the program focuses on industries that are driving the development of the industrial revolution 4.0 such as food and beverages, electronics, automotive, textiles and chemicals. To achieve better results of the program actualization, vocational education helps to prepare compatible and competitive workers for the areas of the aforementioned industries. Henceforth, numbers of Conferences, conventions, and meetings among Indonesian practitioners in FPTK / FT-JPTK need to be held to initiate ideas in strengthening the role of LPTK within industrial revolution 4.0 era.

The Conference's proceedings contain 121 research papers and ideas that are relevant to the following nine sub-themes: *Technical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competencies Certification.*

Finally, all the committees send their gratitude to the participating speakers and all parties who support the run of the Conference. They also apologize for any inconvenience and wish a better undertaking event next year.

WELCOMING SPEECH RECTOR UNESA

Conference and Convention

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (Aptekindo) 2018

Rich Palace Hotel Surabaya, 11-14 Juli 2018

Assalammu'alaikum Warahmatullahi Wabarakatuh.

Respectable Head of Universities, members of APTEKINDO

Distinguished Keynote speakers

Honorable authors, and fellow participants of APTEKINDO Conference and Convention 2018

Alhamdulillah, first of all, let us express our gratitude to Allah SWT because of his grace and blessings, we are able to attend this international Conference and convention of the Indonesia Association of Technology and Vocational Education or ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** held in Surabaya, 11-14 July 2018.

This international and national Conference is conducted biennially as a routine agenda held by Association of Technology and Vocational Education or *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*, which consists of 16 different universities throughout Indonesia. We would like to thank for the opportunity given to Universitas Negeri Surabaya for hosting this year event.

In the raise of industrial revolution, Conferences, gatherings, and sharing of knowledge play an important meaning in supporting the acceleration of innovative science and technology. Therefore, this Conference's theme is ***"Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0"***. This is an interesting and challenging topic not only for academic researchers but also for stakeholders and industry owners.

Ladies and gentlemen,

Since 2011, the industrial sector has been integrated with the online system known as industrial revolution 4.0. The first industrial revolution was marked by the use of steam engines to replace human and animal power. The second stage of the revolution was marked by the utilization of electrical power and the concept of mass production. Furthermore, the application of automation technology brought the industrial revolution to its third stage. Tremendous revolution happened when information and communication technology was introduced and fully utilized in industrial area, of which the condition brought the world in the fourth stage of the industrial revolution. The utilization of this technology changed not only the production process, but also across the industrial chains that result in a new digital-based business model which can achieve higher efficiency and better quality in industrial products. The consequences of this revolution are the increase of production efficiency as well as changes in the employment prerequisite. There is an increasing demand for new manpower, whilst the machines are replacing the role of workers. This condition leads to the importance of a new and more advanced method of preparing human resources that are ready to compete in the industrial revolution.

Ladies and gentlemen, in regard to prepare Indonesian human resource in facing the era of media convergence, there are at least two aspects that need our attention, namely the quality of human resources in accordance with the requirement of the digital-based industry and the equal distribution of qualified human resources especially in suburban and urban areas. Both aspects could be meant as a challenge and an opportunity for the higher education especially technology and vocational education to innovate and harmonize curriculum that connects with the industry. Thus, this Conferences becomes a perfect momentum for technology and vocational education to join and strengthen steps in preparing graduates that are ready to compete in the industrial revolution 4.0. Therefore, by starting with **“Bismillahirrahmanirrahim” The Conference and Convention of Association of Technology and Vocational Education or APTEKINDO 2018, is officially started”**

Ladies and gentlemen, we would like to thank the keynote speakers who are willing to attend and share knowledge in today’s Conference:

1. Prof. Dr. Muhadjir Effendy, MAP. Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern–Sternberg, ***Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.***
3. Prof. Dr. Wenny Rahayu, *La Trobe University Victoria (Australia)*
4. Prof. Dr. Muchlas Samani, M.Pd., *Rector Universitas Negeri Surabaya (2010-2014).*

We also would like to thank the authors and all participants of the convention who have participated and contributed to sharing the knowledge and ideas. Hopefully, what we share and get here today can give benefits and contribute to improve a competitive atmosphere in Indonesia, Aamiin YRA.

Surabaya, July 2018
Universitas Negeri Surabaya
Rektor,

Prof. Dr. Warsono, M.S.

WELCOME SPEECH BY THE DEAN OF FACULTY OF ENGINEERING
at the International Conference and National Convention of
Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018
Rich Palace Hotel, 12 July 2018

Assalamu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya
Respectable the Head of Universities as the members of APTEKINDO
Distinguished Keynote Speakers
Honorable authors and Participants

Alhamdulillahirobbil alamiin. Thanks God. First of all, let us express our gratitude to Allah SWT because of his grace and blessings we are able to attend the 9th International Conference and convention of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** and the 19th workshop of the Technology and Vocational Education for FPTK/FT/FTK-JPTK in Indonesia. It is an honor for us, the Faculty of Engineering, Universitas Negeri Surabaya, to host this year Conference and convention.

On behalf of *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*, we would like to welcome keynote speakers, authors, delegates and participants from technology and vocational education to the city of heroes, Surabaya.

Today, we meet in Surabaya to attend a biennial agenda named APTEKINDO International Conference and Convention and National Workshop of the FPTK/FT/FTK-JPTK. Following the mandate from the 2016 APTEKINDO Convention in Medan, this year's Conference is held in Surabaya hosted by the Faculty of Engineering, Universitas Negeri Surabaya.

Ladies and Gentlemen, the theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". The theme is chosen due to the fact that we have to quickly respond and act accordingly to the effects of the industrial revolution on vocational education. Well-programmed and structured efforts should be undertaken to ensure if technology and vocational education can produce globally competitive graduates especially for industrial revolution era.

Numbers of important topics for technology and vocational education are discussed in this Conference. The topics include Technical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competence Certification.

Today's Conference has several outcomes. The accepted articles will be submitted for proceeding publication indexed by Atlantic Press. Meanwhile, the rejected articles by Atlantic Press will be published in the International Proceedings with International Standard Book Number (ISBN). Moreover, the articles written in Bahasa Indonesia will be published in the National Proceedings with ISBN.

Ladies and Gentleman, this meeting must be meaningful as a venue to communicate among researchers, academics, and members of FPTK / FT / FTK-JPTK from different universities as well as from related industries. By this regular Conference and convention, we can make a strong communication network and create innovative breakthrough and substantial blueprint of different aspects such as institutional quality, field study, and curriculum. We hope that this forum plays an important role in developing technology and vocational education to face the industrial revolution 4.0.

Finally, we would like to thank the organizing committee led by Mr.Tri Wrahatnolo, M.Pd., M.T., who gave an extraordinary support. Moreover, we would like to express our appreciation and gratitude to the members of steering committee from various regions in Indonesia, delegates, SC and OC members, sponsors, as well as personal or institutional support that make this event well-organized. I apologize if there are shortcomings from my part.

Good luck with the Conference of Indonesian Association of Technology and Vocational Education, APTEKINDO 2018, and wish the best improvement for technology and vocational education in Indonesia. Thank you.

Wassalammu'alaikum Warahmatullahi Wabarakatuh

CHAIRMAN'S SPEECH

**at the International Conference and National Convention of
*Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018***

Rich Palace Hotel, 11-14 July 2018

Assalammu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya,
Respectable the Head of Universities, members of Aptekindo, Keynote speakers, Authors, and fellow participants of Aptekindo Conference and convention 2018.

Alhamdulillah, no words could represent the feelings but the gratitude of the presence of Allah SWT, for His blessings, so that we can attend APTEKINDO Conference with the theme "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*".

In this pleased occasion, we would like to welcome all keynote speakers, authors, and participants of the Conference to this city of heroes, the city of heroic histories, Surabaya. We would like also to welcome to APTEKINDO 2018 Conference and convention held at the Rich Palace Hotel Surabaya, 11-14 July 2018.

The theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". This theme is chosen to respond to the development and acceleration of industrial revolution 4.0 that has been impactful in various countries. This industrial revolution has connected the utilization of machines to an internet system. To face such phenomena, Indonesian government through the Ministry of Industry has launched a program called "Making Indonesia 4.0". Currently, the government is focusing on industries that support the development of the industrial revolution such as food and beverage, electronics industry, automotive, textile and clothing, and chemical industries.

In addition, vocational education plays an important role in preparing competent and competitive human resources. That is, Faculty of Technical and Vocational Education or *Fakultas Pendidikan Teknik dan Kejuruan (FPTK)* in Indonesia aims to compile excellent ideas and vision, which later could be shared through Conferences, conventions or meetings, and also be useful to encounter industrial revolution 4.0.

Today's Conference will present competent keynote speakers in the field of technology and vocational education, who are:

1. Prof. Dr. Muhadjir Effendy, MAP. Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern-Sternberg, Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.
2. Prof. Dr. Wenny Rahayu, La Trobe University Victoria (Australia)
3. Prof. Dr. Muchlas Samani, M.Pd., Rector of Universitas Negeri Surabaya (2010-2014).

In addition, I would like to point out that there are 602 participants from 17 different universities participating in today's Conference involving:

1. Universitas Palangka Raya
2. Universitas Gorontalo
3. Universitas Islam Negeri Ar Raniry Aceh
4. Universitas Negeri Solo
5. Universitas Negeri Manado
6. Universitas Pendidikan Ganesha
7. Universitas Nusa Cendana
8. Universitas Malang
9. Universitas Negeri Jakarta
10. Universitas Negeri Padang
11. Universitas Negeri Yogyakarta
12. Universitas Pendidikan Indonesia
13. Universitas Negeri Makassar
14. Universitas Negeri Semarang
15. Universitas Negeri Medan
16. Universitas Negeri Surabaya
17. Universitas PGRI Adi Buana Surabaya

There are 491 articles submitted to this Conferences covering papers and posters. 76 articles were accepted to Atlantic Press, 156 articles published in international proceedings with ISBN, dan 129 articles published in the national proceedings with ISBN. All articles will be available for an online access through the Atlantis Press official website and through APTEKINDO 2018 website.

Today's Conference is actually held with the helps and good cooperation of various parties. Therefore, we would like to express our gratitude to the Minister of Research, Technology and Higher Education, Rector of Universitas Negeri Surabaya, keynote speakers, participants, sponsors, and other stakeholders for the supports. We also send our highest appreciation to the committees who have worked hard to succeed this Conference.

At last, we hope that all participants get benefits and knowledge that can contribute to reinforce vocational education and technology in facing the industrial revolution 4.0. WELCOME TO APTEKINDO CONFERENCE AND CONVENTION 2018, Thank you.

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5 Development of Web-based Information System for Women Empowerment Research Center in Universitas Negeri Makassar

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Abstract—This study aims to: (1) produce a web-based information for women empowerment research center in Universitas Negeri Makassar and (2) to know the user's response to web-based information system. The method used is the research and development model of ADDIE. Data collection techniques used observation, questionnaires, and interviews. Data were analyzed by descriptive technique. The result of the research shows that (a) web based information system has been produced through five steps: need analysis, information system design, information system development, information system implementation, and information system evaluation. Furthermore, the web-based information system shows that this system is feasible and easy to use. The system allows all members to access information about the women empowerment research. The other benefit of system that the member may update the personal data. Based on the results of this study that the university specifically for research center should optimize this information system. This effort directly will increase the institution performance.

Keywords—*Information system; web-based; information*

I. INTRODUCTION

Web-based information systems have an essential role in the performance of an institution[1]. Women Empowerment Research Center as the information center for women's empowerment research for lecturers of Universitas Negeri Makassar (UNM). The number of lecturers as many as 854 people spread across six campuses makes it more difficult to access information. This is increasingly heavy due to the intensity of the information is solid. The alternative proposed at the university is the use of information systems.

Information systems provide many advantages, from simple tasks such as service processes at the operational level too complicated tasks such as making essential and competitive decisions at the organizational level. With the development of technology and the use of the website today, an institution is fundamental to use it to support the

effectiveness and efficiency of information dissemination and administrative management. Information Systems that can be accessed widely by using technology or commonly called an online information system or web-based. The system is a set of interrelated or integrated elements intended to achieve a goal. Information as data has been processed in such a way as to increase the knowledge of someone using the data [2], [3]

The information system consists of components called the building blocks, including: (1) Block input. Is an input representing data that goes into the information system; (2) Block model. It consists of a combination of procedures, logic, and mathematical models that will manipulate the input data and data stored in the database in a certain way to produce the desired output; (3) Output block. It is quality information and useful documentation for all users of the system; (4) Technology block. It is the part used to receive inputs, run modules, store and access data, hook and send outputs, and help control the system as a whole; (5) Database block. Is a collection of data that are interconnected with one another, which is stored on the computer hardware and software used to manipulate it; and (6) Block of control. [4]

Many acts as the efforts to prevent the things that can damage the system, and overcome the damage in case of errors. Furthermore, the quality of information is also influenced by the value of information. The value of information relates to the decision, if no decision then the information becomes unnecessary. Within the scope of the information system, the value of information has several characteristics, including: (1) true or false, this may relate to reality or not; (2) new, information should not be late and should be fresh for the recipient; (3) additional information may update or provide new additions to existing information; (4) Corrective, information may be a correction of false or false information beforehand; and (5) confirmation, information can meperteras existing information to improve perceptions of recipients of the truth of the information. [5], [6]

System Design is a description of the planning, and sketching of the arrangement of constituent elements and into a series of intact and can be utilized according to purpose. The design is made according to user requirements. Designing is an alternative to solving problems where the design is used to organize everything for the framework. Preparation of data structures begins with the formulation of problems and analysis of problems that become sasarsn system. The tools used to simplify the system design are: (1) Data Flow Diagram (DFD) or Data Flow Diagram, and (2) Entity Relationship Diagram (ERD).

Web-based information systems are considered appropriate for Women Empowerment Research Center because members or lecturers are able to access information via the internet. Information systems that not only contain text, but also contain pictures, sounds or movies. World Wide Web or better known as the word web is the most prominent icon in the internet world. The initial concept of the web is the use of hypertext or documents in the form of electronics that are interconnected in a particular way. Web programming as a computer application that can give users access to exchange information.

II. METHOD

Development model used Research and Development with ADDIE model that consist of five stages: Analysis, Design, Development, Implementation, and Evaluaion (ADDIE). The object of this research is Web-based Information System Research Center for Women Empowerment Research Institute of Universitas Negeri Makassar. The subject is the objective of a web-based Information System trials of potential users (Chair, secretary, and members) of research center.

The instrument for data collection is an interview guide to find out the information system needs consisting of several questions; the observation sheet is used to determine the success of the functions of each item in the information system of its form of checklist; and questionnaires are used to find out the user's response about the developed system, the form being a statement whose answer is Yes or No.

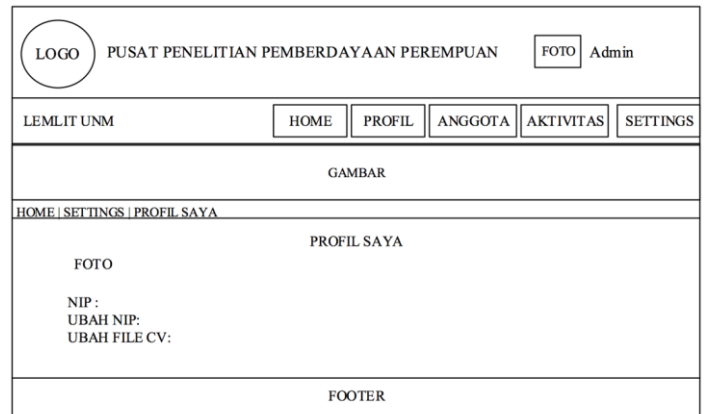
Data were analyzed using descriptive statistics and testing of input and output systems generated by the information system. The test method is the ISO 9126 Standard Feasibility Test, taking into account the four aspects of ISO 9126, which are aspects of functionality, usability, reliability, and portability characteristics.

III. RESULTS AND DISCUSSION

This research has resulted in Web-based Information System that can be implemented at Women's Empowerment Research Center. This system uses the programming language PHP (Hypertext Preprocessor), HTML (Hyper Text Markup Language), CSS (Cascading Style Sheet), and JavaScript as data storage media. Phase needs analysis produces a picture of the needs of the development of information systems as a medium of communication and dissemination of information for all lecturers at the State University of Makassar.

The main page design (Figure 1) contains a navigation menu: Web Identity, Home, Profile, Member, Activity, and Login. Profile design results contain photos and admin data (figure 2)

The system development stage includes a test of validity and practicality. Test the prevalence through consultation with three information systems experts. After the system is declared valid and considered feasible implemented, the user performs a test of practicality. Usage can access the system through



<http://p3p.lemlit.unm.ac.id/>.

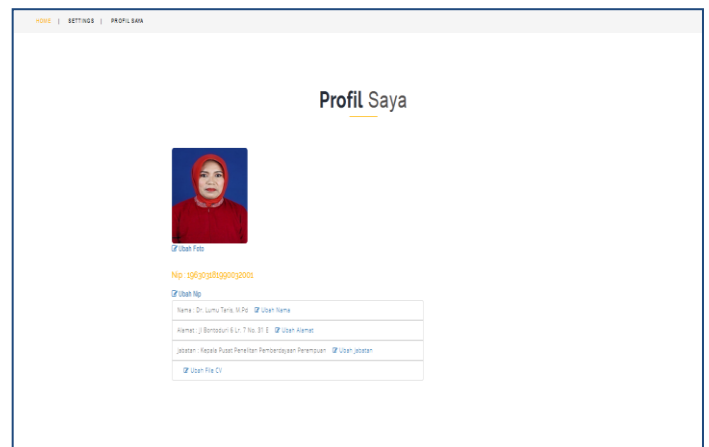


Fig. 1. The main page design of the web

Fig. 2. Main Menu: Views of Menu Management and Members (Initial Design Results)

The result of this information system is tested using software testing based on ISO 9126 with four characteristics namely functionality, reliability, portability, and usability. Each character is tested by its instrument, either in the form of a questionnaire or a web testing tool. The test results as follows:

A. Functionality Test

Testing the characteristics of functionality using the method of black box testing testers judge based on the

3 instrument in the form of test cases. The functionality testing instrument contains 43 questions that describe the sub-characteristics of suitability and accuracy that have been validated by two experts. For sub-characteristics of security using web software testing tools, while sub-characteristics of interoperability testing software combined with portability testing because it has the same character. Questionnaires that have been filled by each validator give YES answer to all questions. The second validator then states that each test-case is done to get results by its function. Analysis of functionality test using a descriptive statistical analysis technique.

Based on the results of the data analyst, the results of functionality test obtained 100% success. The value is converted, and the result of system feasibility percentage from the functionally private side (sub characteristic and accuracy) and has the interpretation of Very Worthy.

Test security on sub-characteristics security using Sucuri Site Check web testing tool that works to check the security of website from malware. The test results can be seen in Table 1.

TABEL 1. SECURITY TEST RESULTS

Security	Level of Risk
Malware	Low Risk
Website Blacklisting	Low Risk
Injected SPAM	Low Risk
Defacement	Low Risk
Website Firewall	Medium Risk

Based on the data above test results that for the endurance of the website against malware, blacklisting websites, injected SPAM, and defacements have a low risk so no need to repair. While on the firewall website is found to have a medium risk, this is because this kind of protection can only be provided with the help of third parties, not from the website system itself.

A good information system has the opportunity to develop its capacity and functionality [7].

B. Reliability Test

Reliability test in information systems is done by stress testing methods to determine the robustness of software by testing it beyond the average usage limits. Stress testing can be tested by using a web testing tool called WebServer Stress Tool which consists of three kinds of tests, namely click test, time test, and ramp test. The reliability test results from the three tests show in table 2

TABEL 2. RELIABILITY TESTING

Testing	Error Percentage of URL	Success Percentage of URL
Click Test	2,01%	97,99%
Time Test	2,43%	97,57%

Ramp Test	1,11%	98,89%
	Average	98,15%

C. Portability Testing

Portability test is an information system check that has been designed using a browser on the desktop and mobile Operating System. This test is done by using online web testing ie, browserstack.com. The test results of this system as follows.

TABEL 3. VARIABEL PORTABILITY TESTING

No	Operating System	Type	Browser	Result
1	Windows 10	Desktop	Mozilla Firefox 59	Not found Error
2	Windows 7	Desktop	Google Chrome 63	Not found Error
3	Mac Lion	Desktop	Firefox 44.0	Not found Error
4	Android	Mobile	Internet Explorer, Google Chrome	Not found Error

D. Usability Testing

The design of information systems require responses from users. This is because the system was developed to meet the needs of users. Thus important usability testing is performed to see the evaluation of the users. For usability testing, a questionnaire was used to find out the user responses related to the information system containing 19 questions about computer software. The questionnaire was distributed to respondents with a total of 20 respondents. The data of usability test results were analyzed by descriptive statistics, which are as follows.

TABEL 3. USABILITY CHARACTERISTICS

Respondent	Score Total	Expected Score	Category
1	2	3	4
1	91	100	Very good
2	89	100	Very good
3	90	100	Very good
4	89	100	Very good
5	88	100	Very good
6	74	100	Very good
7	90	100	Very good
8	90	100	Very good
9	89	100	Very good
10	88	100	Very good
11	89	100	Very good

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