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DESIGNING WEBSITE E-LEARNING BASED ON INTEGRATION OF TECHNOLOGY ENHANCE LEARNING AND HUMAN COMPUTER INTERACTION

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Designing Website E-Learning Based on Integration of Technology Enhance Learning and Human Computer Interaction (Conference Paper)

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Abstract

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Proof of integration between Technology Enhanced Learning and Human-Computer Interaction requires a significant evaluation, Collaboration method was developed in the form of an e-learning website. The evaluation is done with WebQual 4.0 and modeled in several variables. Based on the evaluation obtained e-learning website sasmoko.com can be said enough quality significantly at $\alpha < 0.05$ and the most decisive improvement of e-learning website sasmoko.com is on the usability. © 2018 IEEE.

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References (14)

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-
- 1 Udjaja, Y., Guizot, V.S., Chandra, N.
Gamification for elementary mathematics learning in Indonesia ([Open Access](#))

(2018) *International Journal of Electrical and Computer Engineering*, Part II 8 (5), pp. 3859-3865. Cited 4 times.
<http://www.iaescore.com/journals/index.php/IJECE/article/view/10415/9574>
doi: 10.11591/ijece.v8i5.pp3859-3865

View at Publisher
-
- 2 Altbach, P.
Higher education and the WTO: Globalization run amok
(2015) *Int. High. Educ.*, (23), pp. 2-4. Cited 71 times.
-
- 3 Knight, J.
Updating the definition of internationalization
(2015) *Int. High. Educ.*, (33), pp. 2-3. Cited 230 times.
-
- 4 Bellamy, E.
Interactive web browser learning tool
(2018) *Defensive Publication Series*
-
- 5 Gunawan, F.E., Maryanto, A., Udjaja, Y., Candra, S., Soewito, B.
Improvement of E-learning quality by means of a recommendation system

(2016) *Proceedings - 11th 2016 International Conference on Knowledge, Information and Creativity Support Systems, KICSS 2016*, art. no. 7951421. Cited 3 times.
ISBN: 978-150905130-4
doi: 10.1109/KICSS.2016.7951421

View at Publisher
-
- 6 Kirkwood, A., Price, L.
Technology-enhanced learning and teaching in higher education: What is 'enhanced' and how do we know?
? A critical literature review
(2016) *Learn. Media Technol.*, 9884 (MAY), pp. 1-44.
-
- 7 Benaida, M., Namoun, A.
An exploratory study of the factors affecting the perceived usability of algerian educational websites
(2018) *TOJET Turkish Online J. Educ. Technol.*, 17 (2), pp. 1-12.
-
- 8 Anuar, S.M.S., Azmi, N.F.M., Maarop, N., Samy, G.N., Yaacob, S., Ten, D.W.H.
Preliminary review of model-view-presenter (MVP) and usability design for the development of postgraduate web portal
(2017) *Open Int. J. Informatics*, 5 (1), pp. 1-11.
-

□ 9 Fonseca, D., Kompen, R.T., Labrador, E., Villegas, E.
Technology-enhanced learning: Good educational practices
(2018) *Global Implications of Emerging Technology Trends, IGI Global*, pp. 93-114.

□ 10 Grudin, J.
From tool to partner: The evolution of human-computer interaction
(2017) *Synth. Lect. Human-Centered Interact.*, 10 (1), pp. i-183. Cited 8 times.

□ 11 Sundar, S.S., Bellur, S., Oh, J., Jia, H., Kim, H.-S.
Theoretical Importance of Contingency in Human-Computer Interaction: Effects of Message Interactivity on User Engagement

(2016) *Communication Research*, 43 (5), pp. 595-625. Cited 29 times.
<http://www.sagepub.com>
doi: 10.1177/0093650214534962

View at Publisher

□ 12 Lazar, J., Feng, J.H., Hochheiser, H.
Research Methods in Human-Computer Interaction

(2017) *Research Methods in Human-Computer Interaction*, pp. 1-560. Cited 52 times.
<http://www.sciencedirect.com/science/book/>
ISBN: 978-012805390-4; 978-012809343-6

□ 13 Kristiadi, D.P., Udjaja, Y., Supangat, B., Prameswara, R.Y., Warnars, H.L.H.S., Heryadi, Y., Kusakunniran, W.
The effect of UI, UX and GX on video games

(2018) *2017 IEEE International Conference on Cybernetics and Computational Intelligence, CyberneticsCOM 2017 - Proceedings*, 2017-November, pp. 158-163. Cited 3 times.
ISBN: 978-153860783-1
doi: 10.1109/CYBERNETICSCOM.2017.8311702

View at Publisher

□ 14 Barnes, S.J., Vidgen, R.
Measuring web site quality improvements: A case study of the forum on strategic management knowledge exchange

(2003) *Industrial Management and Data Systems*, 103 (5-6), pp. 297-309. Cited 134 times.
<http://www.emeraldinsight.com/info/journals/imds/imds.jsp>
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Abstract—Proof of integration between Technology Enhanced Learning and Human-Computer Interaction requires a significant evaluation, Collaboration method was developed in the form of an e-learning website. The evaluation is done with WebQual 4.0 and modeled in several variables. Based on the evaluation obtained e-learning website sasmoko.com can be said enough quality significantly at $\alpha < 0.05$ and the most decisive improvement of e-learning website sasmoko.com is on the usability.

Keywords—Website, E-Learning, Sasmoko.com, TEL, HCI, WebQual 4.0.

I. INTRODUCTION

The indirect effects of education include improving the economy of a society, which ultimately affects the country's economy [1]. One that supports education, especially higher education that affects technology is [2]. The technology itself is continuously developed and has a significant impact on improving the teaching and learning process that is characterized by aspects of globalization [3]. On the other hand, everyone has different learning styles and may also have learning difficulties that require more effort to improve his ability [4]. Many approaches to learning include multisensory approaches and repetition of learning indirectly into techniques for providing technology enhanced learning (TEL).

TEL is a dynamic concept and the most widely implemented education world because TEL is designed to improve one's learning aspect [5], [6]. Many types of platforms are used to provide TEL services, ranging from without using the internet or using the internet. Given the current development of the internet, TEL services are more considered to use the website in order to support educational optimization [7].

In general, the website aims to attract many users so that the quality of the website will impact on user satisfaction in utilizing the website [7]. Therefore, the functionality of the website against the target users is needed. Such functionality is within the area of human-computer interaction (HCI) and requires the psychological aspects of a person.

Based on these things then designed a website e-learning Sasmoko.com based on the integration of TEL and HCI. This website is designed according to the course curriculum. To prove the functionality and quality of the website, the test is done by students in Indonesia as many as 30 people.

II. RESEARCH METHOD

A. Website Pattern Design

Website pattern design has several types, including Forms and Controls, Model-View-Controller (MVC), Model-View-ViewModel (MVVM) and Model-View-Presenter (MVP). The types of patterns are analyzed in table 1 [8].

TABLE I. STRENGTH AND LIMITATION IN WEBSITE PATTERN DESIGN

Website Pattern Design	Strength	Limitation
Forms and Control	How easy maintenance is	If it has many interfaces and complex logic this pattern cannot be done.
MVC	Patterns commonly used by programmers and clear assignment of tasks if within an organization	Difficulty in doing unit testing, because the display is used in conjunction with different functionality.
MVVM	Can solve problems in view and can-do unit testing	Too many combinations between view and model, some development engines are not free and sometimes not compatible with a server.
MVP	Able to do unit testing and there is a full control system from presenter on view and model	Difficulty in maintaining the code, because if the user has multiple interfaces, causing synchronization of the logic becomes complicated.

Based on table 1, MVP is the selection of appropriate development patterns to create a website, as there is a full control system from presenters to view and model, so testing is easier and the solution can be reused for frequent recurring problems.

B. Technology Enhance learning (TEL)

There are 3 areas that must be understood to make TEL [9]:

- Social: Social activities are very helpful in improving the quality of students. The culture of cooperation will increase the active involvement of learners and encourage the participation of other learners.
- Technological: The technology created does not have to focus on specific services, but it is preferred for the learning function and its application in the long run, where the technology has the option to increase students' confidence in managing and solving problems or difficulties.
- Methodological: Creativity that enables learners to explore technologies provided with a "learn to learn" approach to improving self-study skills, as well as preparing for learning new tools and transitions between technologies if the old technology is out of use.

C. Human Computer Interaction (HCI)

HCI has been around for half a century. Until now, there are still many people who do research to increase the attractiveness of the technology that made using the concept of HCI. Researching the history of HCI alone is not enough, as it is currently required to uncover patterns and challenges of the user's need for technology to evolve dynamically [10]. HCI research often involves many participants with the

psychological aspect as the most dominant aspect [11], [12]. These aspects are [13]:

- User interface (UI) is anything that is designed as an information giver that interacts with the user.
- User experience (UX) is the art of planning or designing applications related to user satisfaction.

D. WebQual 4.0

The quality of the website is based on the quality function deployment (QFD), which serves to identify the opinions of users at each stage of development or implementation of a product or service [14]. The quality determination of each product or service varies, to determine the quality of the website used WebQual. WebQual is usability, information quality, service interaction and overall website quality.

III. RESULTS AND ANALYSIS

There are 34 items used to measure Quality of E-learning Website Sasmoko.com. The indicator can be seen in table 2. The trial of e-learning website quality instrument sasmoko.com is aimed at 30 users (students) with criteria 0.361. Of the 32 items planned, after an Orthogonal Iteration calculation 3 times, yielded "valid instrument" as the final instrument with only 23 items. The results are as in table 2.

TABLE II. QUALITY INSTRUMENT CALIBRATION OD E-LEARNING WEBSITE SASMOKO.COM WITH THO ORTHOGONAL ITERATION APPROXIMATION OF $R_{CRITERION} 0.361$

No.	Indicator	Item planned	Iteration Orthogonal 1	Iteration Orthogonal 2	Iteration Orthogonal 3 (Final Instrument)	
			Drop	Valid	Drop	Valid
1.	Information quality	1, 2, 3, 4, 5, 6, 7, 8	1, 3, 6	2, 4, 5, 7, 8	-	2, 4, 5, 7, 8
2.	Service Interaction Quality	9, 10, 11, 12, 13, 14, 15	9, 12	10, 11, 13, 14, 15	-	10, 11, 13, 14, 15
3.	Usability	16, 17, 18, 19, 20, 21, 22, 23	17, 19	16, 18, 20, 21, 22, 23	-	16, 18, 20, 21, 22, 23
4.	Usefulness Content	24, 25, 26, 27	27	24, 25, 26	-	24, 25, 26
5.	Adequacy Information	28, 29, 30, 31, 32	28, 32	29, 30, 31	29	30, 31
6.	Accessibility	33, 34	-	33, 34	-	33, 34

TABLE III. SUMMARY OF THE TREND OF QUALITY VARIABLES OF E-LEARNING WEBSITE SASMOKO.COM

Variable	Categories	95% Confidence Interval for Mean		Website E-Learning Sasmoko.com
		Lower Bound	Upper Bound	
Quality of Website E-Learning Sasmoko.com (Y)	<ul style="list-style-type: none"> • Less quality • Quite qualified • Qualified 	93,5005	95,3630	Quite qualified significantly on $\alpha < 0,05$
Information Quality (X_1)	<ul style="list-style-type: none"> • Less quality • Quite qualified • Qualified 	20,3456	20,9760	Quite qualified significantly on $\alpha < 0,05$
Service Interaction Quality (X_2)	<ul style="list-style-type: none"> • Less quality • Quite qualified • Qualified 	20,0610	20,7231	Quite useful significantly on $\alpha < 0,05$
Usability (X_3)	<ul style="list-style-type: none"> • Less useful • Quite useful • Useful 	23,7338	24,6010	Quite useful significantly on $\alpha < 0,05$
Usefulness Content (X_4)	<ul style="list-style-type: none"> • Less useful • Quite useful • Useful 	12,2314	12,6409	Quite useful significantly on $\alpha < 0,05$
Adequacy Information (X_5)	<ul style="list-style-type: none"> • Information is very poor • Sufficient information • Information is very good 	8,2893	8,5653	The information is significantly on $\alpha < 0,05$
Accessibility (X_6)	<ul style="list-style-type: none"> • Less access • Access is sufficient • Access is good 	8,2079	8,4882	Access is quite significant on $\alpha < 0,05$

TABLE IV. RESULTS OF THE CALCULATIONS INDIVIDUALLY INFLUENCE THE EXOGENUS VARIABLES (X_1 THROUGH X_6) AGAINST ENDOGENOUS VARIABLES (Y)

Analysis	Simbol	$X_1 \rightarrow Y$	$X_2 \rightarrow Y$	$X_3 \rightarrow Y$	$X_4 \rightarrow Y$	$X_5 \rightarrow Y$	$X_6 \rightarrow Y$
X relationship with Y in sample	r_{yn}	0,577	0,741	0,752	0,599	0,146	0,252
Variance determination	r_{yn}^2	0,329	0,547	0,564	0,366	0,017	0,059
The relative contribution of X in forming Y	r_{yn}^2 (%)	32,9	54,7	56,4	36,6	1,7	5,9
X relationship with Y in population	t	10,585	16,543	17,133	11,225	2,207	3,9
Significance value	Sig.	0,000	0,000	0,000	0,000	0,028	0,000
The effect of X on Y in the sample	Y	1,703 X_1	2,084 X_2	1,616 X_3	2,725 X_4	0,982 X_5	1,672 X_6
The effect of X on Y in the population	F_{Reg}	112,049	273,678	293,534	125,998	4,871	15,209
Significance value	Sig	0,000	0,000	0,000	0,000	0,028	0,000
The greatest pure relationship	$r_{yn.m}^2$	0,634	0,650	0,762	0,442	0,097	0,109
A relatively pure donation of X with Y	$r_{yn.m}^2$ (%)	$r_{y1.3}^2 = 63,4$	$r_{y2.3}^2 = 65,0$	$r_{y3.1}^2 = 76,2,0$	$r_{y4.2}^2 = 44,2$	$r_{y5.2}^2 = 9,7$	$r_{y6.2}^2 = 10,9$

Based on the valid instrument, the reliability index produced through the Cronbach Alpha formula is 0.927 (see table 4). In proving each variable, set each with 3 (three) categories that result in the following table. Based on these results, it can be concluded that the e-learning website sasmoko.com quite qualified significantly at $\alpha < 0,05$ (see table 3).

Individual influence analysis of information Quality (X_1), Service Interaction Quality (X_2), Usability (X_3), Usefulness Content (X_4), Adequacy Information (X_5), and Accessibility (X_6) to endogenous variables ie Quality of E-Learning Website Sasmoko.Com (Y) can be seen summarized in Table 4.

TABLE V. DESCRIPTIONS OF ENDOGENUS VARIABLE AND EXOGENUS VARIABLES

	Variable	Description
Endogenous Variable	Y	Quality Variables E-Learning Website Sasmoko.com
	X_1	Information Quality
	X_2	Service Interaction Quality
Exogenous Variables	X_3	Usability
	X_4	Usefulness Content
	X_5	Adequacy information
	X_6	Accessibility

The results of the analysis found that Usability (X_3) is the most powerful indicator to determine the quality improvement of e-learning website sasmoko.com (Y). If usability (X_3) is improved through one program, then the quality will increase 1,616 times from the current website condition. Graphically can be seen in figure 1

IV. DISCUSSIONS AND CONCLUSIONS

The results showed that usability is the most decisive indicator of the quality improvement of e-learning sasmoko.com website. Usability is one of the factors that can show how far e-learning can be utilized by users easily, easy to learn so that users feel comfortable in operating the e-learning. Usability also refers to the level of user satisfaction. Therefore, it is very important for e-learning application developers to be able to pay attention to usability factors so e-learning can provide optimal impact for users.

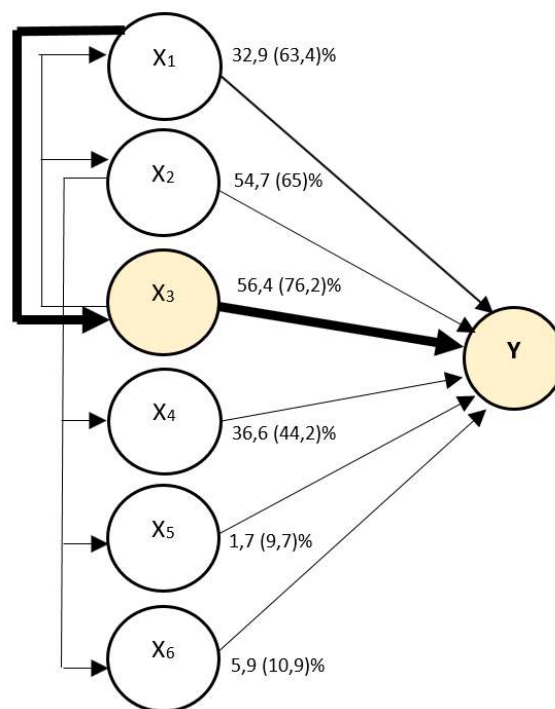


Fig. 1. The Indicators That Determine The Quality Improvement of E-Learning Website Sasmoko.com

REFERENCES

- [1] Y. Udjaja, V. S. Guizot, and N. Chandra, "Gamification for Elementary Mathematics Learning in Indonesia," *Int. J. Electr. Comput. Eng.*, vol. 8, no. 6, 2018.
- [2] P. Altbach, "Higher Education and the WTO: Globalization Run Amok," *Int. High. Educ.*, no. 23, pp. 2–4, 2015.
- [3] J. Knight, "Updating the Definition of Internationalization," *Int. High. Educ.*, no. 33, pp. 2–3, 2015.
- [4] E. Bellamy, "Interactive web browser learning tool," in *Defensive Publication Series*, 2018.
- [5] Gunawan, Fergyanto E., et al. "Improvement of E-learning quality by means of a recommendation system." *Knowledge, Information and Creativity Support Systems (KICSS)*, 2016 11th International Conference on. IEEE, 2016.
- [6] A. Kirkwood and L. Price, "Technology-enhanced learning and teaching in higher education: what is 'enhanced' and how do we know? A critical literature review," *Learn. Media Technol.*, vol. 9884, no. May, pp. 1–44, 2016.

- [7] M. Benaïda and A. Namoun, "An Exploratory Study of the Factors Affecting the Perceived Usability of Algerian Educational Websites," *TOJET Turkish Online J. Educ. Technol.*, vol. 17, no. 2, pp. 1–12, 2018.
- [8] S. M. S. Anuar, N. F. M. Azmi, N. Maarop, G. N. Samy, S. Yaacob, and . D. W. H. Ten, "Preliminary Review of Model-View-Presenter (MVP) and Usability Design for the Development of Postgraduate Web Portal," *Open Int. J. Informatics*, vol. 5, no. 1, pp. 1–11, 2017.
- [9] D. Fonseca, R. T. Kompen, E. Labrador, and E. Villegas, "Technology-Enhanced Learning: Good Educational Practices," in *Global Implications of Emerging Technology Trends*, IGI Global, 2018, pp. 93–114.
- [10] J. Grudin, "From tool to partner: The evolution of human-computer interaction," *Synth. Lect. Human-Centered Interact.*, vol. 10, no. 1, p. i–183, 2017.
- [11] S. S. Sundar, S. Bellur, J. Oh, H. Jia, and H.-S. Kim, "Theoretical importance of contingency in human-computer interaction: effects of message interactivity on user engagement," *Communic. Res.*, vol. 43, no. 5, pp. 595–625, 2016.
- [12] J. Lazar, J. H. Feng, and H. Hochheiser, *Research methods in human-computer interaction*. Morgan Kaufmann, 2017.
- [13] D. P. Kristiadi et al., "The effect of UI, UX and GX on video games," in *Cybernetics and Computational Intelligence (CyberneticsCom)*, 2017 IEEE International Conference on, 2017, pp. 158–163.
- [14] S. J. Barnes and R. Vidgen, "Measuring web site quality improvements: A case study of the forum on strategic management knowledge exchange," *Ind. Manag. Data Syst.*, vol. 103, no. 5–6, pp. 297–309, 2003.