The Effectiveness of Web Centric Course for Redox Material in Chemistry Learning

Tri Joko Raharjo[1], Imam Shofwan[2], Harianingsih[3], Didik Widiyono[4], Wijianto[5]

{trijokoraharjo@mail.unnes.ac.id[1], ishofwan@mail.unnes.ac.id[2], harianingsih@mail.unnes.ac.id[3], didikotomotive@gmail.com[4], wijianto369@gmail.com[5]}

Departement of Non Formal Education, Universitas Negeri Semarang, Indonesia[1,2,4,5]
Departement of Chemichal Engineering, Universitas Negeri Semarang, Indonesia[3]

Abstract. The web-centric course is technology as digital visualization methods that it can be as interactive and fun learning. Packet C students feel difficult in learning chemistry especially redox material because the learning uses conventional methods. This research's aim to analyze packet C learning using digital visualization. The object was 20 students of packet C on PKBM An Naafii. The technique of collecting data uses questionnaire assessment-based rating scale. The web product was evaluated and validated by a chemistry expert and multimedia expert. The result of the research that web-centric course validation of feasibility rate value were 89.3% from multimedia expert or very high, chemistry expert obtained feasibility rate value was 88.7% or very high. The level of eligibility on 80.82% or very high. Besides, 90% and 100% of learning activities is completeness. So, the web-centric course learning for packet C is declared feasible.

Keywords: learning, packet C student, web-centric course

1. Introduction

The web is an internet popular service application which collection of documents that are connected to a particular network and data stored on the server. The document of web commonly abbreviated as HTML or Hypertext Markup Language. In addition to documents, the web also provides facilities in the form of photos, videos, graphics and even animations [1]. Learning with the web is usually referred to as e-learning [4]. The web according to Bullen, namely the use of computer networks or delivery learning[5]. According to Conrad and Training links the web is learning that is integrated with the internet[3]. Boulton defines the web as an electronic means based on information technology[2]. Current technology enables a web revolution that provides a positive function for its users [6]. The pattern of learning by using Communication Technology today is very easy to access because internet networks are available with various sources. One of the non-formal education programs is Packet C. Students in Packet C need fun and easy to use cognitive, affective and skill development methods.

Packet C has been using conventional learning patterns with the teacher centre method. For this reason, research is conducted on the development of web use, which is only a normal web-centric course. The research focused on the redox material that exists in chemistry learning[7]. The web-centric course which will be applied to Packet C, according to the results of Singh's research where the web-centric course is a learning method by combining two

ISET 2019, June 29, Semarang, Indonesia

DOI 10.4108/eai.29-6-2019.2290465

methods, namely online learning without a direct face-to-face meeting. In addition to learning material, for consultation, assignment and practice questions are submitted via the web[9]. As for the exam, it is conducted by meeting directly [11] The hope is with the web-centric course method, redox chemistry learning is more effective, fun and more flexible time [8]. Several preliminary studies on the use of the web as learning material have been carried out by several researchers, among others, conducted by Yulianti, Alfred and Hope, Hartini and Evaline Siregar, Davidson and Karel Remussen, and all the conclusion that the web is effective learning.

According to Condi and Livingston that learning using a web-centric course applied in education can improve student learning achievement[4]. The Asep's study integrating face-to-face learning online can improve individual learning and provide feedback. Web development as a learning media with novelty web-centric courses in redox chemistry material must use the system rules of approach and design learning principles. The system of the approach will later provide a framework or guidance for web designers in designing the material given to students. The effectiveness of learning is oriented to the success of students' achievements, how students can easily understand and learn the redox material provided[1].

2. Method

The research object was 20 packet C students at PKBM (learning centre) an Naafii Purwodadi, Central Java, Indonesia. The Research and development model used modification between Sugiyono development model and D. Carey development model. The flow of this research is looking for potential and problem in chemistry learning at packet Can Naafii, collecting data about chemistry learning, developing of the web, web validation with multimedia expert and chemistry expert, web revisions, web trials, second web revisions, second web trials, checking the web completeness, product integration. The research design is shown in Figure 1.

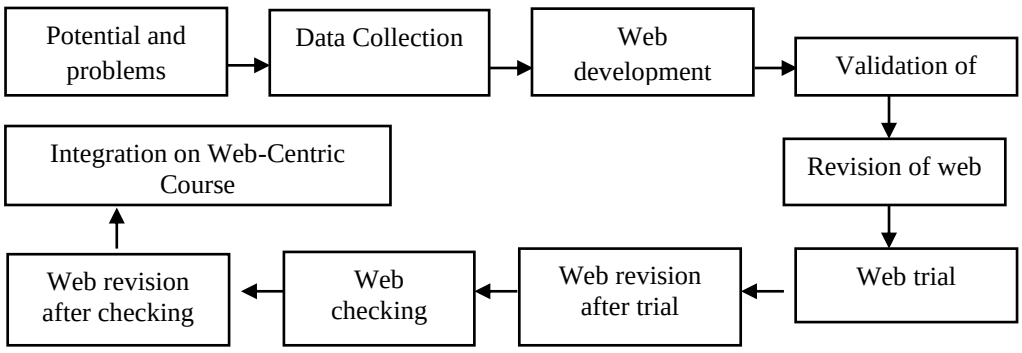

Figure 1. Research design

Figure 1 shown the web-centric course created must be validated and revised with multimedia expert and chemistry expert to improve the contents. Then the web-centric course was tried by the student. The instruments used were the validation questionnaire assessment of numerical rating scale. Instrument assessment is shown in table 1.

Table 1. Instrument Assessment of Web Centric Course

Instrument	Variable	Indicator	Validator
Questioner on rating scale	Content Quality	a) Compliance with the curriculum b) Compliance with the guidelines for preparing the material c) Suitability evaluation d) Conformity with students e) Conformity with facilities and infrastructure	Chemistry expert
Questioner on rating scale	Web Quality	a) Self-instructional b) Self-contained, c) Stand alone d) Adaptive e) User-friendly f) Organizing the content of material on the web, g) Attraction, h) The shape and size of letters, i) Empty spaces (spaces), tables and images	Multimedia expert
Questioner on the rating scale	Instructional Quality	a) web exploration b) Use of the web	Student
Score	Mastery Learning	a) Individual b) Group	Tutor
	Attitude	a) Enthusiasm b) Compliance	Tutor

Analysis of material learning about redocks uses the formula modifications are the following: (1) individually Analysis which students of packet C are considered to have completed learning if they can reach the minimum completeness criteria or KKM value > 75.00. (2) Group Analysis which uses categorization of learning outcomes as follows:

90-100	very good	A
80-89	good	B
75-79	enough	C
60-74	less	D
< 60	very less	E

3. Result and Discussion

The result of the research about validation web-centric course from multimedia expert and chemistry expert is shown in table 3 and table 4.

Table 3. Redox Web-Centric Course Validation by Multimedia Experts

No	Rating Indicator	Point of rating	Rating Value		Percentage (%)
			Validator I	Validator II	
1	*Contains*	1,2,3,4	20	18	95
2	*Instructional*	5,6,7,8	20	18	95
3	*Stand alone*	9,10	10	8	90
4	Adaptive	11,12	10	9	95
5	*User-friendly*	13,14,15	15	12	90
6	Web Organization	16, 17	8	7	75
7	Attractiveness	18, 19, 20, 21	18	18	90
8	The shape and Size	22,23	10	6	90
9	Space, table, images	24, 25, 26	15	10	83.3
Individual Score			128	106	
Feasibility Level Code			L	L	
Group Score			234	89.3	
Feasibility Level Code			L		

Based on variables score of multimedia expert validation represented in table 3, the following analysis is obtained 95% of instructional or very high value, eligibility of contains in 95% or very high, 90% of standalone value shows very high feasibility, 90% of adaptive value, 90% of user friendly, 75% of web organizing, 90% of attractiveness, 90% of shape and font size. Percentage of group score 89.3% indicates that web-centric course has a very high level of feasibility.

Table 4. Redox Web-Centric Course Validation by Chemistry Expert

No	Rating Indicator	rating point	Rating Value		Percentage (%)
			Validator 1	Validator 2	
1	Compatibility with Curriculum	1,2,3,4,5	23	22	90
2	Compliance with the material preparation reference	6,7,8,9,10	24	22	92
3	Evaluation Schedule	11,12	9	8	85
4	Suitability of Student	13, 14	9	8	85
5	Compliance with Facilities and equipment	15	4	4	80
Individual Score			69	64	
Feasibility Level Code			L	L	
Group Score			133	88,7	
Feasibility Level Code			L		

Based on the score of the variables on the validation of the material by chemistry expert represented in Table 4, analysis was obtained as follows: Percentage of 'web compatibility with curriculum' on 90%, indicating very high feasibility, percentage of web compliance with material preparation reference on 92%, indicating very high feasibility on 85% evaluation of evaluation schedule, this shows very high feasibility, percentage of web suitability of students on 85%,this shows very high feasibility, percentage of web compliance with facilities and equipment on 80%,this shows very high eligibility, Score on 88.7% for group, indicating that material of web-centric course feasibility is very high.

The recommendation given by the multimedia expert and chemistry expert for the development of a web-centric course in this study is that learning using the web must have the following characteristics: (1) Interactivity, namely the availability of synchronization pathways for direct communication via the web such as forms for chatting, mailing lists or books guest. (2) Independence, according to the multimedia expert, there must be flexibility in providing time, place, tutors, and teaching materials so that what happens is the student learning centre. (3) Accessibility, where learning resources are easily accessed through the web, and this differentiates them from conventional models which can only access learning resources by buying books or copying teaching materials from other literature. (4) Enrichment enrich contains web-centric courses by displaying video, streaming, simulation and animation.

The product trial aims to measure the quality of instructional digital books to four randomly selected students through questionnaire data. The product trial results are shown in Table 5.

Table 5. The Web-Centric Course Trial Result for Individually

No	Rating Indicator	Rating Point	Rating Value				Percentage (%)
			Student A	Student B	Student C	Student D	
1	Web Exploration	2, 5, 6, 7, 8, 9	30	24	29	30	94,2
2	The Use of Web	1, 3, 4, 10	20	16	20	20	95
Individual Score			50	40	40	50	94.6
Feasibility Level Code			L	TL	L	L	
Group Score			189				94.5%
Feasibility Level Code			L				

Based on the score of the variables in the web-centric course trial represented through Table 5, the following analysis was obtained: Percentage of web exploration on 94.2%, indicating very high feasibility, 95% percentage of 'web usefulness for students', indicating very high, percentage group score 94.5% shows that web eligibility is very high. The usage test aims to measure the instructional quality of media to students in the class (classical) through questionnaire questionnaires and attitude assessment. The results of the trial questionnaire are shown in Table 6.

Table 6. The Web-Centric Course Trial Result for Group

No	Rating Indicator	Rating Point	Rating Value		
			Σ Score	Percentage (%)	Feasibility
1	Web Exploration	2, 5, 6, 7, 8, 9	842	80.190	High
2	The use of web	1, 3, 4, 10	574	82.714	High
Total Number			1416	81.2	High

Based on the score of the variables in the product trial represented through Table 6, the following analysis is obtained: Percentage of web exploration on 80.190% shows high feasibility, percentage of 'usefulness for students' 82.714% shows high feasibility, percentage group score 81.2 % shows that web eligibility is high.Learning completeness shows the success of the media in guiding students towards achieving learning competencies. This can be seen in Table 7.

Table 7. The Result of Student Learning Completeness

Value	Student's Test			
	1	2	3	4
The ratio from the total student can completeness with a total of student	11/20	14/20	18/20	20/20
Percentage (%)	55	70	90	100
Mean	75	80	76	78
Median	81	83	77	82
Modus	82	84	73	80

Based on the recapitulation of student learning outcomes shown in Table 7, the following analysis was obtained: The percentage of group learning completeness (classical) in learning activities was 55%, 70%, 90%, and 100% respectively indicating that four learning activities (100%) have achieved the completeness of group learning (classical), the average learning activities are 75, 80, 76, 78 respectively, indicating that all learning activities exceed the expected minimum criteria, the average of all learning activities is 77, indicating that in general student learning outcomes are included in enough categories.

4. Conclusion

Research to find out the effectiveness of using a web-centric course results in a recommendation that this learning method can be applied and increase the effectiveness of learning for packet C or non-formal education. Students feel that the web-centric course for redox subjects increases their interest in learning and achievement. In this study, web-centric course analysis was carried out by multimedia experts and the redox material on the web was the result of validation by chemical material experts for improving the media. The use of a web-centric course is very suitable for the pattern of non-formal education. The use of a web-centric course as a learning model, contains the material delivered by the tutor does not only refer to the source of the existing handbook, even tutors are allowed to develop beyond the existing curriculum. Because the curriculum as a standard of achievement is adjusted to the average ability of packet C students. Whereas if the student's ability is above average, then through the web-centric course the tutor is given freedom in developing the material. In developing redox material, tutors can enrich the competence of packet C students by accessing certain sites, tutors can also share teaching material files in the form of documents, videos, simulations, and animations.

Acknowledgement. Our thanks to LP2M Universitas Negeri Semarang for funding this research, so this research produces a product in the form of a web-centric course that is useful for non-formal education.

References

[1] Asep, Herman, S. *Step of Web Design Theory and Practice.* Penerbit: Andi. Yogyakarta. (2009)

[2] Boulton, H. Managing E-learning: What are The Real Implications for Schools. *Electronic Journal E-Learning*. Vol. 6(1): 44-45. (2018).

[3] Counrad, K., and Traininglinks. *Instructional Design for Web Best Training*. Amherst: HRD Press.(2010).

[4] Wendhie, Prayitno. Blended Learning dalam Pembelajaran pada Pendidikan Dasar dan Menengah. *Jurnal Pendidikan*, Vol. 5(2): 36-39. (2015).

[5] Bullen, M. (2011). E-learning and The Internalization Education. *Malaysian Journal of Educational Technology*, 1(1): 37-46.

[6] Cassidy, S. and Eachus, P. Developing Computer User Self Efficacy. *Journal of Education Computing Research*,Vol. 26(2): 133-153. (2016).

[7] Cooper, P.A. Paradigm Shifts in Designing Instruction. *Educational Technology Journal*, Vol. 33(5): 12-19.(2013)

[8] Murphy, K.L. and Cifuentes, L. Using Web Tools, Collaborating and Learning Online. *Distance Education Journal*, Vol. 22(2): 285-305.(2011)

[9] Rourke, L., Anderson, T., Archer, W., and Garrison, D.R. Assessing in Text-based Computer Conferences. *Journal of Distance Education*, Vol. 14(3): 51-70. (2011).

[10] Singh, H. Building Effective E-Learning Programs. *Educational Technology Journal*, Vol. 43(2): 51-54. (2013).

[11] Khalifah, M. Inovasi Model Pembelajaran Bidang Kimia. *Jurnal Lentera Pendidikan*, Vol. 12(2): 29-34. (2009).