Article

Development of E-Learning on Abundance of Elements Based on Self Direct Guided Inquiry Learning in Senior High School

Arizona Zamri[1*], Siska Candra Ningsih[2], Sri Herlina[3], Shirley[4]

[1]Magister Programme of Educational Chemistry, Postgraduate, Universitas Negeri Padang, Jl. Prof. Dr. Hamka, Air Tawar Bar., Kec. Padang Utara, Kota Padang, Sumatera Barat 25171, Indonesia

[2]Mathematic Departement, Universitas PGRI Yogyakarta, Jl. PGRI I No. 117, Sonosewu, Bantul, Yogyakarta

[3]Islamic Religious Education, Faculty of Tarbiyah and Teacher Training, Universitas Imam Bonjol Padang, Jl. Prof. Mahmud Yunus Lubuak Lintah, Padang

[4]Faculty of Education, University of Southern Queensland, Australia

*ana.zamri82@gmail.com

Abstract— This study meant to describe how to e-learning that base on guided inquiry can improve self-direct of student in senior high school to learn about abundance of elements. Abundance of elements is one of core material in senior high school, but this material difficult to understand for the students. It cause of its material need some understanding and analyzing to differentiate one element to the others. The research and development of learning module by using 4D models. The phase Define, Design, Develop and Disseminate. To know the quality of the module we use validation and practicality test. The validated by four validator and for practicality by ten students of SMAN 5 Payakumbuh. From that test we get result for content validity is 0.85 and 0.83 in structure. The practicality test result is 0.80. From that result we can get conclusion that e-learning developed is valid and practical.

Keywords— **E-learning, self-direct, guided inquiry, abundance of elements**

I. INTRODUCTION

Learning activities should improve student's activities. Every students must think actively and critical. All the students must can show the real act to prove their knowledge and skill. The needed skill in 21th century is real skill soft skill and hard skill [1-2]. It's only can get by actively and critical activities. The students must improve their skill by them self. It can get by Self Direct Learning.

Self-Direct Learning is an important component for adult learning theory [3]. Garrison, 1997 said that Self Direct Learning (SDL) known as independent activities to improve self-skills and knowledge. According to Morris, 2019, self-direct learning is personality process that can useful to constructivism as theory of education. The student must responsible to their self to get information and knowledge, and how to use it in their life. In another side, considers self-direct learning "as an approach where learners are motivated to assume personal responsibility and collaborative control of the cognitive and contextual processes in constructing and collaborative control of the cognitive and contextual processes in

constructing and confirming meaningful and worthwhile learning outcomes [4]. When we doing the online learning, the teachers must be prepare the module such as video, and others, and they must try to open it to see if there is something to modify.

During that learning activities, it's most important for the students to use online module. Media can make the abstract concepts become more clearly and easy to understand. Teachers must facilitating that process with media. With media, we can take the chemistry concept to the smallest level that calls microscopic of the abundance of elements. It's including the characteristic and reaction of each elements [5-6].

The ideal learning is student centered learning, almost activities doing by students. That learning need the controlled and guided by the teacher to find the essential information. The learning that suitable with that, is guided inquiry learning [7-8].

Inquiry learning especially guide inquiry is one of scientific learning that focuses to the student to learn about skill and knowledge. In guided inquiry students can found the concept by them self, by doing personal activities according the guided that provided in e-learning. With this activities teachers doing student centered already. So the student get the best think that can they get. The knowledge transferred more that 100% percent, because the student not only use their teacher ability but also from other resource [9-10].

Now a days, learning much support by computer application, almost in every subjects. There are so many application that can use to make electronic module, such as Moodle application to make an e-learning.

An e-learning that consist of guided inquiry assumed can help the student to prove their self-direct optimally. This way suitable with suggestion from government to reduce the contact along the pandemic. The teacher must create the learning that only need less contact but effective and efficient. In an e-learning that use guided inquiry can answer this condition.

II.   METHODE
The kind of this research is research and development. It known by 4-D models [11-13].
The main stage are:
- Define: looking for the problems that happened in SMA N 5 Payakumbuh before to create the suitable module
- Design: the teacher must make planning how to teach as a scenario of learning activities
- Develop: start to writing modules, test it, and make some revision if needed, and if it's final, we will produce the final product that developed.
- Disseminate: we must do the test of validation and practical of that modules.

Define stage have some analysis, they are: front-end, learner, task, and concept analysis, and specifying instructional objectives.

The research was conduct at SMAN 5 Payakumbuh. The research population consist of two classes of third year student in academic 2021/2022.

The validity of e-learning is get from questionnaire of validity of content and constructs by validators and students responses. To knowing it's valid or not we use the Aiken's V formula. According to Aiken theory, an e-learning is said to be valid in terms of content and constructs if the average test result of validity is more than 0.80 [14-15].

Practicality questionnaire are get from 10 student of third year class in SMA N 5 Payakumbuh. Based on Kunandar, an e-learning is said to be practice if the average test result of practicality between 0.70 – 1.00 [16].

III.   RESULT AND DISCUSSION
The final result of this research is an e-learning content on abundance of elements for the senior high school third year. The result of validity test are 0.85 and 0.83. It's mean we get a valid e-learning, in other hand value of practicality test is 0.80, it's mean that the practicality of the e-learning suitable with scale that we want.

3.1   Define Stage
3.1.1   Analysis of Front to End

Pandemic situation, make time in school less than before. The teacher must prepare the facilities to support the student to study at home. We must make less interaction between the student and others. It's according to the Indonesia Ministry of Education decision.

According it's condition teach material with e-learning that used guided inquiry learning very useful to help students to learn and find the information by them self, especially in material abundance of elements [17-19].

3.1.2   Learner Analysis

In the result of questionnaire that given to several student at SMA N 5 Payakumbuh, the learning of that school not use e-learning yet, so interested to learn materials with e-learning. Guided inquiry learning is suitable as a second choice in learned activities, specifically in abundance of elements.

3.1.3   Task Analysis

The e-learning is create using application that name is canva to design covers and labels, power point, Microsoft and video to explain the material and Moodle as house of e-learning will be utilized by student in learning activities [20-21] .

3.1.4   Concept Analysis

This analysis to determine the concept of abundance of chemistry elements and its application in daily life. The concepts contained of characteristic, reaction, and utility of each elements [22-25].

3.1.5   Specifying Instructional Objectives

Learning objectives are determined from competency achievement indicators based on basic competencies listed in curriculum 2013 revision 2018. The purpose of learning on abundance of elements materials is formulated into through the learning activities of self-direct approach and guided inquiry by doing step by step that doing in e-learning to get the information. The learner must investigation and process the information, according the guided from the e-learning, by reading the material and doing the activities. Every activities can improved the students self-direct and get all the information that their needed [26-28].

3.2 Design Stage

To start the e-learning we must click the https://elearning.zainulteam.id/link. First, we must have an account, as we see in figure 1.

Figure 1. Login to e-learning zainulteam.id

Guided inquiry can included in introduction, learning resources, and learning activities and will end with evaluation.

Figure 2. Home on e-learning

In beginning, the teacher give the introduction about the materials. Its first interaction between the teacher and the student on e-learning. In this step, student must read all the information about the materials, how to learned, what the target, and how the students can get that target.
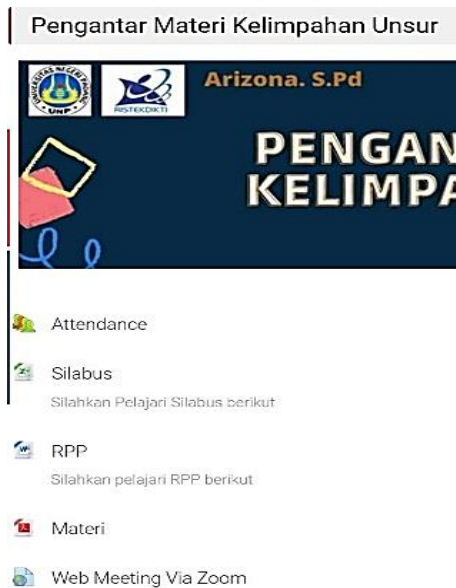
Figure 3. Material Introductory

Learning resources are step that students can find more complete information of materials, such as PPT slides, videos, work sheet and source book. The work sheet can guided the student to get the main information of that materials. The work sheet created with the great design, perhaps the student happy when learned. They will get the meaning of the step of the learning.

Figure 4. Larning Resource

Learning activities is the activities of the student in the learning process. In this steps teacher can see the understanding of the students from the result of their activities that they submit as an exercises. In this activities student can explore every part that can learn. Learning activities on abundance of elements materials example, discussion forums, chat discussion rooms, resume task, discussion result, and evaluation questions.

Figure 5 Learning Activities

3.3   Develop Stage
3.3.1   Validation
According to validity test, the e-learning said valid if the result of the test suitable with the validity scale. Validation done by 3 experts. The validity of the content consist of guiding and information component, content / materials in e-learning and evaluation. The validity of the construct consist of guidance and information, program performance and systematics, esthetics and design principles. The result of the validity is shown in figure 6 and 7.
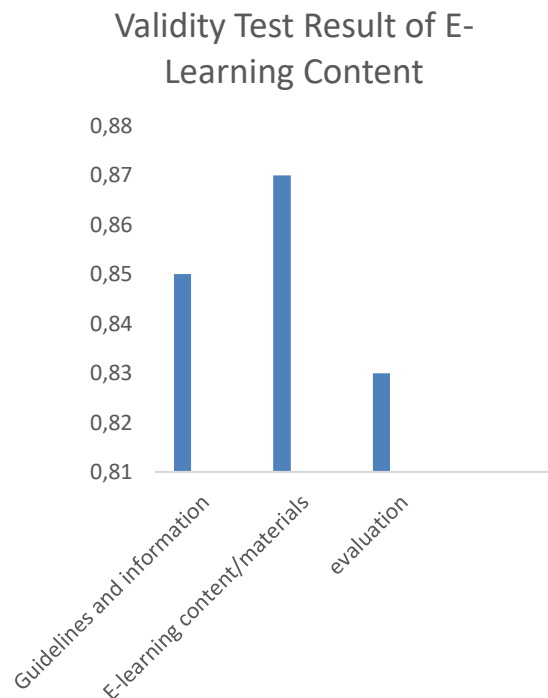
Validity Test Result of E-Learning Content

Figure 6. Graph of validity test result of e-learning content
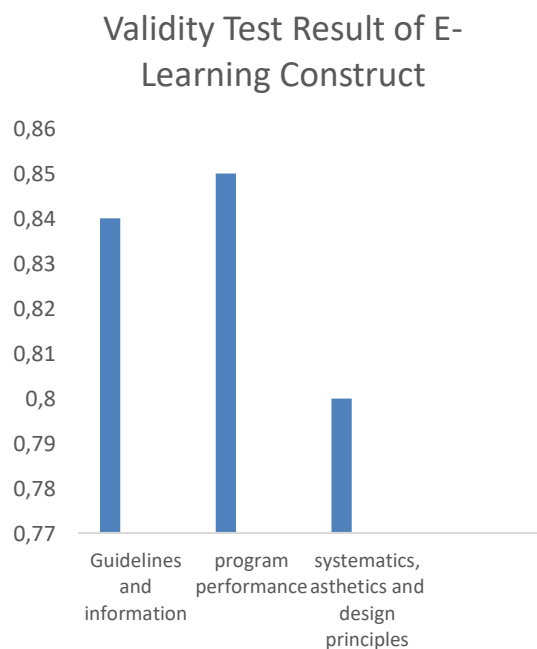
Validity Test Result of E-Learning Construct

Figure 7. Graph of validity test result of e-learning construct

Based on the result of validity test, of the e-learning on abundance of elements learning materials, the e-learning develop is valid. The validity result of the guidelines and information is 0.85, its mean the guidelines and information is easy to understand and its category is valid. The result of e-learning content/material is 0.87, it's according with validity scale. The meaning is the material of e-learning clear and easy to learned, so material of this e-learning is valid. The evaluation steps is valid too. The validity test result is 0.83, its mean the evaluation can evaluated the subjects that discussed before [29-31].

The resume of validity result for construct shown that e-learning is valid. The result of guidelines and information component is 0.84, its mean the guidance can guided the students to open the e-learning. The value of program performance is 0.85, its mean the performance of that e-learning can interesting the students to learned it. The value of systematics, aesthetics and design principles is 0.80, it's mean, this e-learning was construct with good way. With this condition perhaps the e-learning can help students to get the main information for their learning and get the optimal outcomes [32-33].

3.3.2 Practicality

Based on the student responses by questionnaire to e-learning on the material of abundance of elements, an average value is 0.80. It was obtained with practicality category, it means the student have an interest and concern in learning using e-learning. This show that e-learning developed is in accordance with the function of e-learning as an independent teaching material, so that students can take advantage of the module for self-study without depending on the presence of the teacher [34-36].

The learning outcomes, activities, and motivation of students in learning using e-learning prove that e-learning content suitable for use in chemical learning in high school. The project base learning stage in e-learning can also lead critical thinking students.

Table 3. Practicality Test Result

No	Question	Practicality Value
1	Guided Inquiry e-learning is easy to apply.	0.83
2	The direction very easy to knowing	0.85
3	It can used any time we need	0.88
4	The application that used can makes learning time efficient	0.80
5	e-learning makes learning time effective	0.84
6	e-learning helps improve memory	0.85
7	It can make student want to study more and more	0.80
8	e-learning can make it easier to learn independently	0.83
9	e-learning can increase student's learning motivation	0.83
10	This e-learning can improve the students self-direct.	0.80

IV. CONCLUSION

Content of e-learning in abundance of elements materials based on self-direct guided inquiry in Senior High School can developed and has content and construct validity level of 0,85 and 0,83 respectively with valid categories. Practicality for students obtaining a score of 0, 80 in category faily practical. So, e-learning that learning is content guided inquiry learning on abundance of elements material, approach in class XII senior high school is produce valid and practical for use in the learning process.

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