RESEARCH ARTICLE

Advanced Science Letters
Vol. 23, 11976–11981, 2017

Building the Design of Blended Learning in Web Lite-Based and Industrial Visits Inorganic Chemical Course

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Blended Learning Designing based on Web Lite Course and Field Study on Inorganic Chemistry course is to increase the effectiveness of the Inorganic Chemistry lecture, which meets the eligibility requirements. Feasibility in terms of media, presentation material and language. The design flow follows the Four-D model that includes defining, design, develop and disseminate. Results of this study are the construction of Web Lite-Form and Field Study Course that combines in-class activities, the use of internet and real learning. It showed from percentage 81% based content and objectives quality, instructional quality and technical quality so the media was valid.

Keywords: Blended Learning Design, Web Lite Course, Field Study, Inorganic Chemistry.

1. INTRODUCTION

Recently, most students have difficulty in learning the basic concepts of chemistry that are largely microscopic.[1,2] The students need to do much analysis and memorizing such a condition can not be observed directly (invisible) as observed by Sirhan.[1,2] The material of Inorganic Chemistry 2 is considered unattractive and difficult to understand because many contain abstract components. The invention of the facts that are expected to emerge from the laboratory experiments is less achieved. Hence, the learning process based on observations tend to run passively. Communication is dominated by lecturers.[2]

Various efforts have been made to improve the activity and results of student learning.[3] Efforts have been made. They are done by applying constant innovating learning strategies that can improve outcomes and learning processes. The result is not satisfying. It is because the course is thought in a very limited time allowed.

Many intentions to improve students' motivation and learning outcomes are more emphasis on the study of literacy (review of literature), never carrying field study-based learning and using VCD media.[2] Other efforts are being made to enhance the students' understanding of concepts, procedures, and the law is using the cooperative model of Think Pair Share type (TPS) aided Student Worksheet.[3]

The using of cooperative model TPS type can increase the activity of students.[3] The advantages of using this model are students are trained to apply the concept for exchanging opinions and thoughts with friends to get an agreement in solving the problem. In addition, the students are more active in learning. While, one of the barriers of the model is very difficult to implement in the classroom if the student's cognitive abilities are low that fewer ideas that come with a limited time, and the number of groups formed much.[2,3]

The obstacle mentioned above is supported by the results of a questionnaire distributed to 2011 academic year chemistry student department, KA and KB classes as many as 47 students. The results of the questionnaire showed that 32% of the students stated that the Inorganic Chemistry 2 is a difficult subject to study because too much material that requires analysis. As many as 42% of the students stated that the Inorganic Chemistry is a boring subject. Because too much material that needs memorizing and 25% stated that the Inorganic Chemistry 2 is a fun course if it is presented using appropriate learning method.

The study aims to solve such problem, the research proposes applying blended learning web lite-based course and industrial visits learning design. It combines online learning (e-learning), conventional (classical learning), and industrial visits. This can be seen more vividly in line with the shift in learning patterns from face-to-face conventional teaching-learning model to a more open maximally utilize information and communication technology as a learning medium.[4,5]

Bishop predicts that the future of education will be flexible, open, and accessible to anyone who needs it regardless factors as gender, age, and previous education experience.[6] While Mason argues that the future of education will be determined by the information network that allows interaction and collaboration, rather than the school building.[6]

According to Smaldiono,[7] web-based learning provides more benefits which can be used at any time, the material is renewed, encouraging interaction between students and lecturers in some

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 1936-6612/2017/23/11976/006 doi:10.1166/asl.2017.10556

way that can combine multiple media such as text, audio, video, graphics, and animation. It allows students to form a learning community, the facilitator can easily check the progress of the students and allow the student-centered learning approach. So it can facilitate many differences that exist on college campuses.[7]

Design blended learning web lite-based course and industrial visits are developed on the assumption that
(a) the media can facilitate the concentration of students using learning resources,
(b) provide features activities that allow students to learn actively,
(c) oriented user groups more broadly,
(d) provides navigation to limit the range of users in finding information.

To be able to meet the function, then the media web lite-based blended learning course has major components include domain models, user models, and adaptation models. While it because it is web-based, then the media blended learning web lite-based course will have the advantage that it does not enjoy unlimited in space a particular class (accessible from anywhere), is not limited to a specific time (can be accessed at any time), and are not limited to particular platform (accessible from any operating systems). In addition, learning materials are faster and easier to update. Similarly, in its distribution to users. Possible to be accessible higher.[8]

The result of depth study of all the data mentioned above will contribute to enabling learning to be more professional to address learning needs in a way that is most effective, efficient, and have a high appeal. Contributions were obtained blended learning based benefits for educational institutions are:
(1) extending the range of learning with the availability of the web;
(2) education cost efficiency with optimal result;
(3) adjusting the various needs of learners by providing information that can be performed by students wherever they are with the availability of the web, textbooks and video lab, and
(4) Learning quality will produce quality graduates are expected to answer the times and globalization.[9, 10]

Web lite course is the use of the internet to support the quality of learning in the classroom. Where the main activity is face to face learning in the classroom. In this study, internet functions to provide enrichment and communication between students and lecturers, fellow students or students with other resource persons.[2] Therefore the role of the faculty in this case required to master the technique of searching information on the internet, guide students search for and find websites that are relevant to learning materials, presenting the material through an attractive web is desirable.[9–11]

In the process of learning, web lite course application can cover all aspects of planning, implementation, and evaluation. A learning plan is basically a plan that projected a picture of some of the activities and actions to be carried out during the learning process. In the implementation, web-based learning is done by applying the model of e-learning, namely:
(1) selective models
(2) sequential model
(3) static station model
(4) laboratory models.[10, 11]

In laboratory models in addition to practical implementation is also supported by industrial visits to obtain the application of theoretical concepts in the industry. Universitas Negeri Surabaya (Unesa) curriculum structure is based on the decision of the Minister of National Education no. 232/U/2000 on Guidelines for Higher Education Curriculum Development and Assessment of Learning Outcomes and the National Curriculum Bachelor Study Program and Decision letter of the Minister of National Education no. 045/U/2002 on Higher Education Core Curriculum. The curriculum structure in Chemistry Department is also part of the curriculum structure Universitas Negeri Surabaya. One of the subjects in the Universitas Negeri Surabaya curriculum structure is the Chemistry Department of Inorganic Chemistry 2. Competency Standards of this course is students have an understanding of abundance, how to obtain elements, compounds, and manufacture of laboratory main group elements. This course includes subject areas of study required for the education department of chemistry and chemical study program. This course is programmed on odd semester for the education department of chemistry second semester for study programs. Chemistry study program presents the subject faster than the education department of chemistry.[12, 13]

One of the goals of learning that is mastered by the student is able to discuss and presents it on public characteristics, manufacturing, usability elements and compounds of the main group. To further enhance the students understanding the concept of inorganic chemical material 2 is necessary to do field study or industrial visits that produce or process the materials are sourced from the main group elements.[14]

Evaluation is the final component in the planning of learning that serves to measure the extent of the learning objectives have been achieved and what actions should be done if the objectives have not been achieved. Through this web-based approach, to know the results of the evaluation can be done variously. In addition, each student can see and follow the instructions on the web page. Students can also access questions, tasks, and or exercises that should be done.[12, 13]

Blended Learning Designing based on Web Lite Course and Field Study on Inorganic Chemistry course is to increase the effectiveness of the Inorganic Chemistry lecture, which meets the eligibility requirements.

2. METHOD

Learning content design development carried out by following the 4-D design models developed by Thiagarajan.[10] This model consists of four phases: definition, designing, development and disseminating. In the first year is limited only to the extent that the definition 3D model, namely: defining, designing, developing.

Stages of Web lite-based Blended Learning design Course and industrial visits follow the design 3-D model can be described as follows:

a. The defining phase

This stage aims to establish and define the terms of learning. Determination of this phase is done by analyzing the goals and limits of the material that will be developed the device. A fundamental step in this phase are:

(1) Front Edge Analysis

The objective analysis raises the front end is the basic problem is needed in Web Lite-Based Blended Learning Design. Some things to consider in the analysis is the front edge: Challenges and future demands that must be faced by students can

be developed from competence which has been obtained after the lecture inorganic chemistry 2.

(2) Students Analysis

This analysis aims to determine the character of the learners are students in accordance with the level of development. These characteristics include age, prior knowledge, the level of cognitive development and psychomotor skills.

(3) Task Analysis

This analysis is used to identify the stages of completion of tasks in accordance with the subject matter of course Inorganic Chemistry 2. For the tasks in this subject matter in addition to the student is given the task in the form of assignments given in class, students are also given practical tasks in the laboratory.

(4) Concept Analysis

Concept analysis aims to identify the main concepts that will be discussed, arrange systematically and detailing concepts relevant. The results of the analysis of this concept are in the form of a concept map of the lecture material Inorganic Chemistry 2 and the types of practicum elected to represent the material being studied.

b. Designing Stage

The aim of this stage is to design Web Lite-Based Blended Learning Course here in after referred draft 1. The steps at this stage is an inventory of the devices needed in presenting lectures tailored to the objectives to be achieved, time allocation, content and technical implementation. At this stage of design, a product to be produced is the preparation of a web lite-based blended learning design course and industrial visits.[10–15]

c. Development Stage

Draft 1 that has been compiled and then analyzed by the expert lecturer to obtain input. Results of the study are used to improve the draft 1. The revised first draft is called draft 2 which were then assessed by expert lecturers and students through a limited test. This assessment is used to determine eligibility for the learning content subjects of Inorganic Chemistry 2.[10–13]

3. RESULTS AND DISCUSSION

Based on the data collection has been done in the Department of Chemistry Universitas Negeri Surabaya to build Blended Web Lite-based Learning Course and industrial visits. In Inorganic Chemistry Course (elements of the main group) with the development of the 3D model, then the data obtained in the form of the review and validation.

3.1. Defining Phase

This stage aims to establish and define the terms of learning. Determination of this phase is done by analyzing the goals and limiting the material that will be developed the device. Key steps in this phase are:

Based on the pre-study that had been done, it is known that the problem in the course of Inorganic two are: 57.1% of students had difficulty in studying inorganic matter 2 because the material is complicated and complex. The reason is based on the experience of students have difficulty understanding the nature of the main group elements. In addition, students are passive in the learning process is also an obstacle of inorganic 2 lecturer in teaching material to students.

Various efforts had been made to improve the activity and results of student learning. Efforts have been made by inorganic clump team that is by constantly innovating learning strategies with the aim of learning to be fun, exciting, is not monotonous, and certainly, can improve learning outcomes as well as fostering creativity and innovation of students or good soft skills. That can be gained through industrial visiting (Field Study) related to the use of elements of the main group for small industry or the interests of other industries, such as visiting PT. PKG, PT. Semen Gresik, PT. Liku Telaga Gresik, etc.

Developments in technology and communications have shifted resources from the correspondence models, The Multi Media Model, The Blended Learning Model, The Flexible Learning Model, and now go on The Virtual/Online/E-Learning Model.[16, 17]

Based on the results of research conducted by TSN Indonesia together with Yahoo, was among teenagers aged between 15 and 19 years of dominating the internet users in Indonesia. Its account is 64%. If the views of his age, teenagers are classified as students in secondary and upper secondary schools they are the younger generation who are expected to act as an agent of change for the Indonesian nation. The Data show that among the current students already feel familiar with the internet. The Data is supported by the results in the chemistry department. In the preliminary study, it is revealed that 52.4% are obtained from questionnaire data is that students often access the Internet for learning materials by accessing Google.com and another website as well as accessing to social networks, such as Facebook and twitter.[14]

The Internet has been provided in the department of Chemistry, but not fully utilized in the learning activities. One of the services provided in the Internet network is the World Wide Web, Also known as the Web. The results of the pre-study Also Showed that most students (81.0%) also frequently access the web "Chemical E-learning Unesa" as a medium of learning for Web "Kimia E-learning Unesa" is to provide more information and can assist them in completing reviews their duties. By looking at this reality, now living how to complete/suggest content–content websites/web "Chemical E-learning Unesa" is popular, more accessible to the younger generation, mainly dealing with the values and educational materials. It is able to invite them to take advantage of healthy Internet. This is a task for the older generation, especially the organizer of education mainly professors who act as educators have a major role in creating educational contents. This is a potential that can be used in support of the faculty and resolve problems encountered in teaching and learning.

Related to the above problems, if we carried out an analysis of inorganic 2 includes label concept, the concept kind, and its relationship with the generic skills of science, it shows that the overall label of chemical concepts belongs to the kind of abstract concept. Because they involve atoms and electrons the which are classified as microscopic particles. Thus, it is necessary to take the effort to make the inorganic material 2 becomes easily understood and studied by college students. The potential that has been known, is expected to solve problems that occur in chemistry learning, especially in the Department of inorganic Chemistry 2 Unesa. It can be by exploiting the potential of the internet in learning through web services by combining offline learning.

3.2. Students Analysis

This analysis aims to determine the character of the learners. They are university students in accordance with the level of development. These characteristics include age, prior knowledge, the level of cognitive development and psychomotor skills. Students are calling for people who are undergoing higher education at a university or college.

According to cognitive development Piaget, students are adults who have completed their growth and ready to receive an important privilege in society along with other adults. Developmental tasks of early adulthood centered on society's expectations and include getting a job, choosing a life partner, accept responsibility as citizens and to join in a social group matches. The ability of adults to master as developmental tasks that physical efficiency, motoric capability, mental ability, and motivation.

Students take inorganic subjects 2 odd semesters 2015/2016 academic year is a student with an average age of 18–19 years. They are in the mature stage, it is the formal operational stage is the last period in Piaget's theory of cognitive development. Characteristics of this stage are to obtain the ability to think abstractly, reason logically, and draw conclusions from the available information.

3.3. Task Analysis

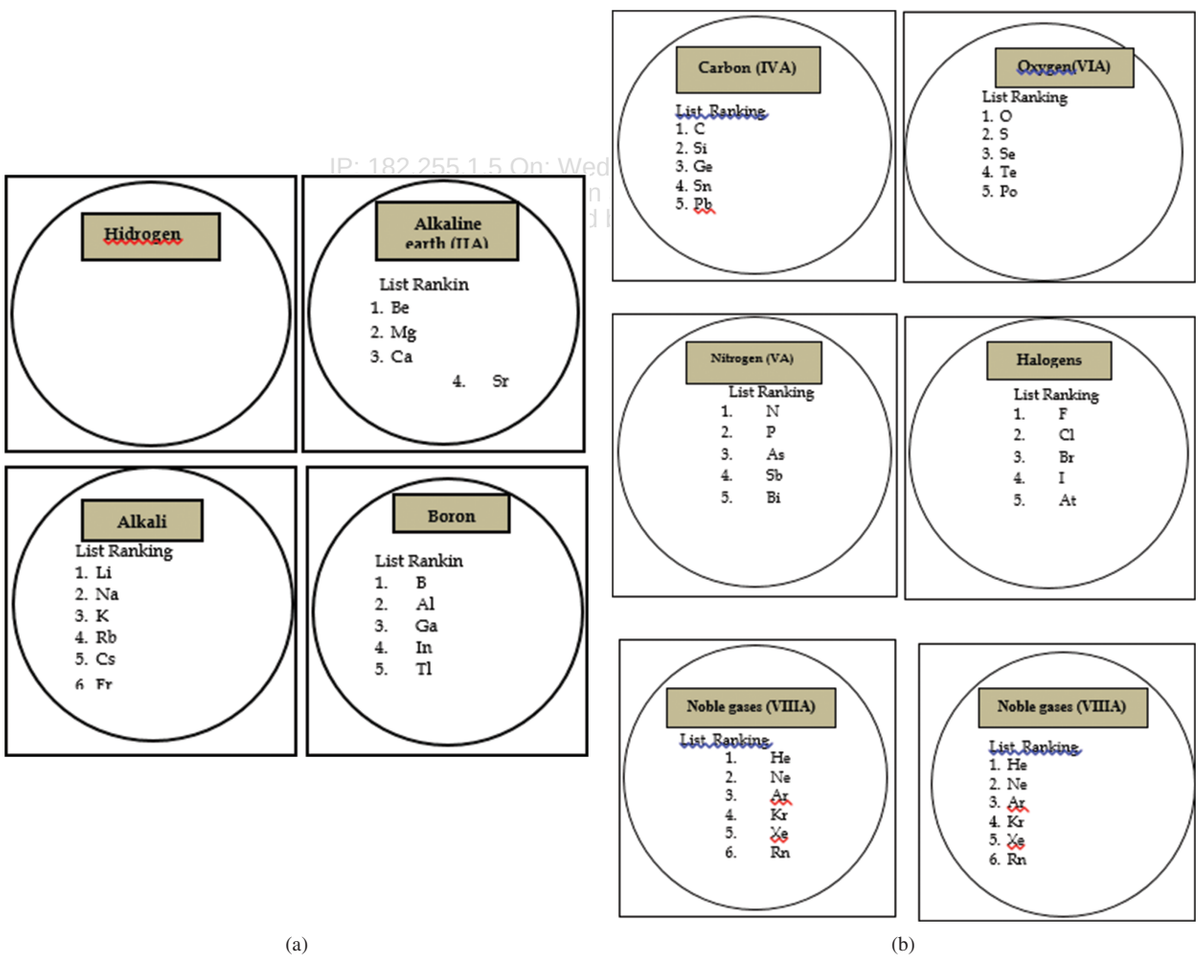
This analysis is used to identify the stages of completion of tasks in accordance with the subject matter of Inorganic Chemistry 2 Course. For the tasks in this subject matter in addition to the student is given the assignment given in class, students are also given practical tasks in laboratory and tasks on-line.

3.4. Concept Analysis

Concept analysis aims to identify the main concepts that will be discussed, prepare systematically and detailing concepts relevantly. The results of the analysis of this concept are in the form of a concept mapping of the lecture material Inorganic Chemistry 2 and the types of practicum elected to represent the material being studied. The results of the analysis of written concept in Figure 1 which are translated into the formulation of indicators.

Based on the analysis of the concept further structured learning indicators as follows:

(1) Describing the scope of inorganic chemistry and the role and status of theory in inorganic chemistry
(2) Mentioning the origin of elements
(3) Discussing on the classification of the elements in the periodic system



(a) (b)

Fig. 1. (a) Inorganic chemistry 2 group H, IA, IIA and IIIA matter fragmentation, (b) inorganic chemistry 2 group IVA, VA, VIA, VIIA and VIIIA matter fragmentation.

(4) Communicating the position of hydrogen in the periodic table
(5) Discussing the properties of physics and chemistry of hydrogen and their compounds
(6) Defining and describing the isotopes of hydrogen, hybrids elements, water and related matters
(7) Mentioning and discussing the sources, extraction, and physical-chemical properties as well as the usefulness of alkali and alkaline earth metals
(8) Presenting the manufacture, properties and usefulness hydroxide, carbonate, cyanide and its salts
(9) Discussing the location of the family boron in the periodic table, physicochemical properties of boron and usability, resources and extraction, manufacture boron compounds, the nature and usefulness, the extraction of aluminum
(10) Discussing how to make aluminum compounds, nature, and usefulness
(11) Communicating about the periodicity properties of the carbon family, forms of the element carbon allotropes, usability elements carbon and carbon compounds
(12) Discussing carbon compounds, carbon and carbides properties of carbon compounds
(13) Presenting the periodicity of the nature of the carbon family, forms of the element carbon allotropes, usability elements carbon and carbon compounds
(14) Discussing and presenting about the general properties of nitrogen, manufacture, and properties of elements families nitrogen, compounds and properties of families nitrogen, allotropes on families nitrogen, usability elements and compounds family of nitrogen, nitrogen compounds, arsenic compounds and antimony as well as the reaction of analytic nitrogen
(15) Discussing the location of the oxygen family in the periodic table, group elements oxygen, oxygen, and sulfur compounds
(16) Presenting where halogens in the periodic table, the separation of the elements of the halogen family, nature and family usability halogen, fluorine compounds, bromine, iodine and pseudohalogen
(17) Discussing the position of the noble gasses in the periodic table, clathrate compounds, manufacture of noble gas, noble gas utility, and bonding in noble gas compound
(18) Describing the position of noble gasses in the periodic table, clathrate compounds, manufacture of noble gas, noble gas utility, and bonding in noble gas compound.

3.5. Designing Stage

The purpose at this stage is to design a prototype of Web Lite-Based Blended Learning Course hereinafter referred draft 1. The steps at this stage is an inventory of the devices needed in doing lectures tailored to the objectives to be achieved, time allocation, content and technical implementation. At this stage of design products to be produced are the design of blended learning courses inorganic 2 lite web-based course and industrial visits.

Preparation of design for learning is one of the topics in the course of inorganic chemistry used is inorganic chemistry 2. If in one semester there are approximately 16 sessions, the meeting at which the meeting to select four to nine with the topic Hydrogen, Alkali, and alkaline soil will be in the e-learning. Which need to be prepared is a learning orientation to be determined using the e-learning. Determination of the overall topic of the topics that will be one semester of the e-learning materials under consideration of material provided and time for implementation of the matter and field study. At the meeting, we consider that students can learn independently, and the material can be in visualized based on concepts that are already described in Figure 1, then it is subsequently made fragmentation pattern every topic like Figure 1.

Based on the fragmentation of the material, it could create a mapping program, that is systems that have been planned are learning design before applying in the classroom. In the course of mapping, the use of learning methods synchronous (being at the same time) and asynchronous (at different times) was combined into one. With this program not only perform conventional learning but can also online.

In the making of this instructional design, teaching materials provided by the teacher can go through online learning and conventional. For online learning, will use a web-based and face-to-face video conferencing for online. Conventional learning is done through face to face in the classroom, but the field study is conducted through industrial visits method.

Learning Mapping is shown in Table I below. In the table explains the basic competence, subject to how the learning process in a conventional classroom, virtual and field learning as a form of blended learning.

Types of e-learning models that will be applied in the course of Inorganic 2 is supplemental. Model selection is based on several considerations such as information technology infrastructure at the Department of Chemistry, Universitas Negeri Surabaya is inadequate and characteristics of students who are not familiar with e-learning based learning/LMS like Moodle.

4. CONCLUSIONS

Based on the results of research and discussion that has been described, it can be concluded that the mapping program based blended learning developed as feasible as the medium of learning in the subject of inorganic in terms of quality of content and objectives, instructional quality and technical quality with a percentage of the average valuation of 81%.

Acknowledgments: The author would like to thank to Universitas Negeri Surabaya (UNESA) and This work was supported in part by Direktor Riset dan Pengabdian pada Masayarakat Kemenristek Dikti Dana DIPA Unesa 2016.

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Received: 20 August 2016. Accepted: 22 May 2017.