Evaluation on Chemistry Lab at Distance Learning System Universitas Terbuka’s Experience

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Abstract
Chemical Education Study program S1 at Universitas Terbuka (UT) opened since 1986, provides laboratory works to ensure practical competencies of students with degree in chemical education. Accordingly, guidance is developed to manage the lab works which focus on step, materials, and support required for the lab works. While the guidance is developed in UT’s main office, the lab works are conducted in (all 38) UT Regional Centre’s. The UT Regional Centers have responsibility to provide lab schedule for all students registered in courses with lab work via all communication media, namely SMS, email and phone. Before starting the lab works, UT Regional Centers have to explain requirements and procedures of the lab works to the students. UT Regional Centers have also been responsible to recruit and employ qualified instructors based on requirement written in the guidance. After years of implementation, it is necessary to evaluate the effectiveness of the lab works. The study that reported here is aimed at analyzing student’s perceptions of lab works’ quality and constraints. The study was conducted and involved 24 persons from UT Regional Centers, student registered in the first and second semester of 2014 academic year, 8 of 38 UT Regional Centers (because students registered in courses only half of the total Regional Centers). Data were gathered through questioners. Analyzed using mix method qualitative. Qualitative with video conference. Results shows that students had positive perception toward lab work implementation. However, there was a tendency of students to work in groups, not individually as required, due to limited circumstantial situation. In some UT Regional Centers, lab work could only be conducted in place far away from the office that cause difficulty for students to attend. In term of the guidance, students perceived lab works to be good although not entirely helpful.

Keywords: chemistry lab; distance education students; lab management; student’s perception

INTRODUCTION
Universitas Terbuka (UT) is an open university, established in 1984 as the 45th state university to provide opportunity an improve access and participation in university education for in-service teachers working adults and recent high school graduates. Despite the fact that UT has uploaded the web based materials, there is still difficulty of access by students because of the poor quality internet infrastructure in Indonesia.

One solution to this problem is to integrate the ICS program into the printed learning materials of practicum in the form of CD. Quality assurance in practicum the UT has implemented an internal mechanism of quality assurance in distance education coordinated by the Quality Assurance Centre. The UT quality assurance system is a comprehensive effort to
improve the quality of distance education products, processes, services and philosophies continually, and it involves both internal and external assessment. Internal assessment is conducted through internal audit conducted regularly every six months. External assessment is conducted by independent assessment and accrediting agencies through external audit conducted every six months. Since 2006, the UT has implemented the quality management system based on ISO9001:2000 in the area of core business processes, including learning materials distribution services, development of learning materials and examination materials, distance learning services of Regional Offices, and academic administration services.

Fig. 1: UT Official website

In 2008, UT has held 14 ISO 9001:2000 certificates in learning materials distribution services (since 2006), development of learning materials and examination materials (since 2007), distance learning services of 11 Regional Offices (since 2007), and academic administration services (since 2008). Further ISO 9001:2000 certification process is currently taking place in the area of distance learning services of 14 Regional Offices, management of promotion and partnership, plus OHSAS 18001:2007 in occupational health. It is important to note that UT has been awarded the Certificate of Quality and International Accreditation by the International Council for Open and Distance Education (ICDE) Standards Agency (ISA) since 2005. Quality assurance of practicum follows the Procedure for Practicum Supervision (JKOP PP01) issued by the UT Quality Assurance Centre. The purpose of assuring the quality of practicum is to enhance learning effectiveness and ensure that practicum grades can be processes laboratory. Implementation of the practicum Procedure involves various units in Head Office as well as Regional Offices. The Procedure itself has been reviewed and revised for improvement, based on feedback from users, students and results of internal as well as external audits timely and accurately. Practicum involves learning activities conducted through observation, experimentation, testing of concepts, principles, or materials in laboratory and or outside.

CHEMISTRY LAB AT DISTANCE LEARNING SYSTEM
According to Sund and Trowbridge in 1973 working laboratory or lab include 1) planning the experiments and formulate hypotheses, 2) assembling equipment, 3) preparing materials and equipment, 4) examine the phenomena of nature, 5) do against a process, 6) to collect and record data, 7) to modify the equipment,8) do the reading on the gauge, 9) calibration equipment,10) drawing material and graphics ,11) analyzing the data, 12) draw conclusions
from the data, 13) make report Journal experiment, 14) explain the experiments conducted, 15) identify issues for further study, 16) for removing, cleaning, storing, and repairing equipment [1].

The support for implementation are easy for students to choice place a for practicum. This same researched have three time. The problem that the student during the practicum are practicum service from UPBJJ or regional center. UPBJJ cannot hand learn tools and materials in the laboratory. The laboratory can be used for implementation practicum and UT can give a recommendation letter before start to practicum and place practicum. UPBJJ more active to give service. Module need for update and suitable with tools and material. Methodology qualitative and quantitative (24 person’s students).

**Fig. 2:** Science practicum process

Qualitative with observes, interview and video conference (students, coordinator practicum at UPBJJ, Instructor lab., examiner report) UPBJJ: Padang, Jakarta, Bogor, Serang, Kupang, Surabaya, Jember, dan Bandung.

**Fig. 3:** Video conference

Problem was that their schools were about 60 miles from each other. Their schools were connected with a fiber-optic network that permitted full-motion video signals to be sent between the schools. The network also carried a high-speed Internet connection that allowed easy access to the World Wide Web. The modules included live television instruction presented by one of the teachers. The students cooperate across schools. Finally, they decided that the chemistry projects should be authentic and deal with local, real-world issues [2].

**RESULTS AND DISCUSSION**

Strategy of practicum Conducting science practicum in distance education involves three components, namely Study Program, Regional Office (UPBJJ) and Partner Universities as described in the following chart. All the above observations indicate that modern educational technologies can really play an impotent role in imparting Chemistry education to the B.Sc. students. In fact, those students who are employed preferred having a web based counseling
instead of face-to-face or video tele conferencing. Further using computer simulations difficult concepts of chemistry could be explained. The computer-simulated experiments could be used in place of demonstration. This will not necessarily impart skills but definitely would be able to give an exposure of the technique and method used. The results of the present study suggest that virtual laboratories are at least as effective as real laboratories in terms of acquainting students with experiment process [3].

Fig. 4: Registration students, information implementation & students have modules

After registration students reported to Regional Centre/ UPBJJ 92% and then UPBJJ prepare for the implementation of the common perception chemistry lab with email, SMS, phone 88%. The Students get information before implementation 96% and students did not difficulties to find in location the place for practicum. In generally most of students have modules 96% but there are some students do not have any module.

Fig. 5: Instructors, instructor guidance, Pokjar manage implementation

The selected instructors from UPBJJ are very appropriate with their field of study 83% so that they are able to guide the implementation of the practicum 87% and 79%. Instructors guidance are not entirely performed by the instructors but more initiated by student only 88%. Study group or Pokjar manage implementation of this lab helped UPBJJ also help find an instructor 67% and 75%.

Fig. 6: >60% of the topics modules the students said 100%, studied and work in group, The student not looking for instructors

The module was selected by the instructors and more than 60% of the topics can be carried out in the laboratory students have studied or read the module before the implementing the practicum 96%, most of the students work in group 96% and students are not looking for instructors 83%.
67% of student did their practicum outside their schools but some students practicum at their schools because tools and instruments lab not enough 37% but no answer 42%. Hofstein and Naaman in 2007 says that laboratory activities have long had a distinctive and central role in the science curriculum and science educators have suggested that many benefits accrue from engaging students in the science laboratory activities [4]. Duffy & Jonassen in 1991; and Aydogdu in 2003 that according to the literature, the laboratory approach is regarded as an indispensable element of chemistry education, and students subjected to constructivist learning theory-based laboratory instruction exhibit higher achievement scores, deeper attention, and more frequent participation in chemistry course [5,6].

In general, the practical was assisted by their report the supervise instructor 92% and 88%. 58% of the students did not make the originality statement of their report with stamp. Student know that the report submitted to UPBJJ 79%.

The consumables are enough for practical implementation chemical 70% agree but 30% not enough. In terms of additional costs many students stated that there are no additional costs 62%. In the next evaluation the additional cost questions will be elaborated, what are the purpose at these costs for example for tools, material, instructor or study group management fees Facilities and infrastructure were very good 67% but some student did not agree. Distance learning class the students were required to meet in lab every Saturday and were give weekly exams the class was a true distance learning course where everything was done at the student’s home. Distance learning class chemistry practicum generally in Indonesia on Saturday and Sunday because the students worked at another day.

The student 83% knew that their reports are marked assessed at UPBJJ for the analyze qualitative with video conference have attended UPBJJ Bogor, Padang, Kupang, Jakarta, student, report practicum, managerial about practicum. Discus about practicum and the result have been early same about the quantitative about a lot the material in practicum, far from houses student. Almost all students did not know that UT provides dry labs 38% known but only 29% the dry lab are useful to help them before the starting the west lab. When the students asked about the dry lab are useful 33% of them agree 50% not answer.
Analysis of qualitative and quantitative suitable about the topic of the module too many and difficult to implementation in laboratory. Need cooperation with the University with UPBJJ appropriate and make MOU and also improve the information through Pokjar that student received practicum information, UPBJJ more active again. The rule of UT about implementation practicum and decision need to be reviewed again. Characteristics of the domicile of UT students are spread throughout the country, they would trouble if the lab report is printed to be sent through the postal service, especially if must be submitted directly to UPBJJ. Need to find an alternative upload lab reports online and Another constraint felt by most of the students is the marks sometimes received out of schedule [8].

CONCLUSION
The problem that the student during the practicum are practicum service from UPBJJ or regional center UPBJJ cannot handle are tools and materials in the laboratory. Examiner report said in the video conference a lot module, and cannot enough by the time in laboratory. At 2016, module PEKI 4420 will soon the printed was finished socialization, BANC, through online tutorials by chemistry tutor.

REFERENCES