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Research Paper

Investigating the impact of a blended learning approach to teach herbal extract production

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ABSTRACT

Herbal extract production ("Galenika") is a course for the bachelor of pharmacy program majoring in herbal medicine at the Universitas Gadjah Mada. This study aimed to develop a blended learning approach to teach the class and to evaluate the effectiveness of the method on students academic performance.

The course combined classical lectures, laboratory works, and field study. Fourteen lecture sessions were developed with the flipped classroom method and simulated cases. Grades and course learning outcomes (CLOs) achievement profile of student enrolled were assessed, and student perceptions regarding the application of blended learning were evaluated using a questionnaire and focus group discussion.

All students passed the course, of which 94% was satisfactory, and the mean was 3.28 (max. 4.00). The mean of CLO achievement was 71.7% (range 65.1–86.9%). Students were satisfied with course implementation, with the mean score was 3.45 (Max. 4.00, range of 3.38–3.50) and 3.05 (Max 4.00, range of 2.94–3.10).

Key words: blended learning, pharmacy, herbal extract production, course learning outcome, student's perception

1. Introduction

Blended learning is the latest education program combining online digital media with traditional face-to-face methods. It facilitates students to gain self-driven study of which the lecturers design a suitable learning environment involving more attractive learning materials. As described by Halili et al. (2015), blended learning elaborates internet technology to facilitate learners.

Integrating technology to classroom activities such as lectures, homework, quiz and assignment can be provided by a Learning Management Systems (LMS) (Fu, 2013). Technology may facilitate more intensive communication between fellow learners, as well as between learners and teachers outside the classroom (Fisher, 2009); supporting the implementation of the student-centred learning method. Moreover, students will be encouraged to learn actively and independently with less dependent on the teacher role as a major source of knowledge (Gebre et al., 2014).

Herbal extract production is a fast-growing subject in pharmaceutical sciences especially in the "back to nature" era. It covers topics on chemical contents of various herbal sources and techniques for herbal extract production and analysis. The herbal extract contains highly complex chemicals of which the composition may vary according to the techniques used in the production. Digital resources provide enormous sources of information which can be accessed by students with lecturers' guidance. On the other hand, students need sufficient laboratory works to enhance their practical skills. Previously, the course was offered as a didactic course in the classroom and practicum. Less student active participation was observed. Blended learning in herbal extract production course is expected to endorse students' achievement by improving student-teacher interaction in the classroom as well as out of the classroom with the help of Internet technology. Therefore, objectives of this study were to implement the blended learning methods and to evaluate the effectiveness of the technique as part of outcome-based education framework.

2. Methodology

2.1. Study design and population

Herbal extract production is a compulsory course for the 4th year pharmacy students majoring in herbal medicine at the Universitas Gadjah Mada (UGM). Sixteen students enrolled as time taker during the academic session of 2017/2018. This study was an observational study of which

all students enrolled were included in this study with no different treatment applied.

2.2. Course material development and implementation

A predefined course syllabus has been developed by the teaching team based on comprehensive literature review and expert panel discussion. Three-credit course was formulated, consisting of 2 credits didactic lectures and one credit laboratory works. The Course Learning Objectives (CLOs) are defined as follows. After completing the course, students are capable of: (1) applying herbal extraction methods for herbal medicine formulation; (2) selecting optimized solvents for herbal extraction methods; (3) implementing essential oils extraction methods; (4) implementing pharmaceutical science and technology in herbal quality assurance; and (5) performing the critical appraisal for scientific articles related to herbal extracts production and quality assurance.

Blended learning method was designed as follows: Model of learning used was station rotation model (Figure 1).

Courses were given in the form of didactic combination with online methods. Collaborative learning was used as an approach for achieving interactive environment. Three videos for learning materials were prepared as two videos on laboratory scale extract production, (extract purification technique; extract standardization); and one video on industrial-scale production (obtained from a collaborating industry.

Laboratory works were prepared in the form of a group project assignment. Each group was given specific herbal samples as raw materials to produce herbal extracts by using different methods and solvents. They were required to recommend the most optimal laboratory-scale production, which was presented as a group presentation and in a video format. For a preliminary assessment, the students were required to explain the guideline and discuss the field study.

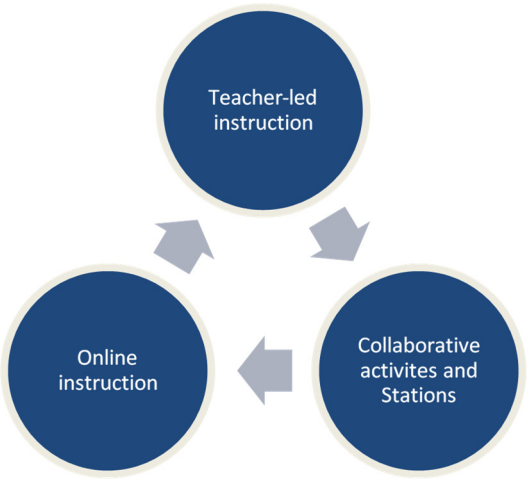

Figure 1. Station rotation model of blended learning in Herbal Extract Production Course (Adapted and modified from https://www.blendedlearning.org/models/)

The online method employed flipped four sessions of lectures and skills lab using Zoom® and Webex®. Besides, seven sessions of flipped course were added, consisted of PowerPoint presentation, video and selected journals. eLisa (e-Learning system for Academic Community, https://elisa.ugm.ac.id/) and EDOM ("Evaluasi Dosen Oleh Mahasiswa", an online survey of Student evaluation on lecturers performance of respective course) were used for evaluating blended learning method. Online discussion, individual and group assignment, quiz, submitting and grading of practicum reports were also performed.

2.3. Assessment methods

Assessments include both summative and formative evaluation. The final grade was composed of 67.5%, and 32.5% of the total grade for lecture and laboratory works respectively. Summative assessment constituted of online quiz (2.5%); group assignment (12.5%); Mid-term exam (27.5%); and final exam (25%) for lecture, while assessment for practice skills was pretest (5%); laboratory activity (2.5); reports and group presentation (10%); 8-station Objective Structured Pharmaceutical Evaluation (OSPE. 15%). Student's grades and CLOs achievements were used to evaluate the effectiveness of blended learning method. Each CLOs contributed to the overall performance as follows 32.75% (CLO 1), 13.75% (CLO 2), 16.25% (CLO 3), 24.75% (CLO 4), and 12.5% (CLO 5).

Student satisfaction regarding the implementation of blended learning methods was assessed using eLisa and EDOM platform, with 4-scale Likert scale, asking about the course materials adequacy, online methods attractiveness, assignment relevancy, discussion session, and the platform easiness to use. A 12-item questionnaire asking about wide-range of learning method, lecturer performance, assignment and student comprehension from EDOM was also delivered to the students. Focus Group Discussion was conducted before the final exam to have more in-depth insight into the student's perceptions of the blended learning method used.

3. Results and Discussion

The implementation of the blended learning method in Herbal Extract Production Course intended to provide broader and more comprehensive insight to 4th pharmacy students. The objectives of the blended learning method were to facilitate students' self-directed learning, to encourage life-long learning for students, and to expand opportunities for lecturer-student interaction.

To evaluate the effectiveness of the blended learning method, we assessed the students' performance using students' final grade distribution (Figure 2) and CLO achievements (Figure 3). The study program has set B/C as the minimum requirement to be considered as successful (satisfactory). Based on the preset target, about 94% of students were successful with the average grade as 3.28

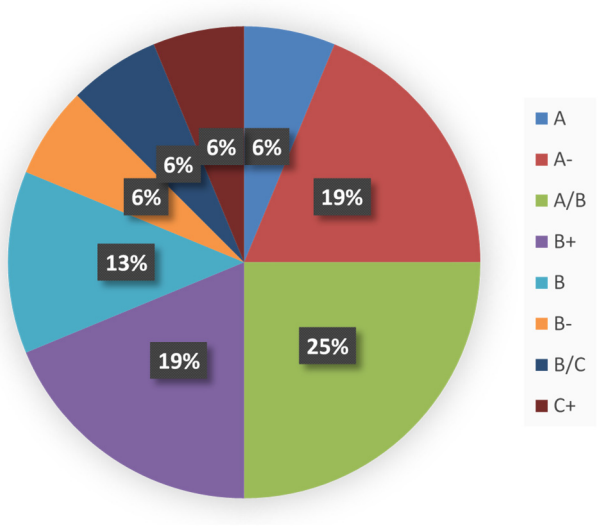

Figure 2. Student final grades distribution on Herbal Extract Production course.

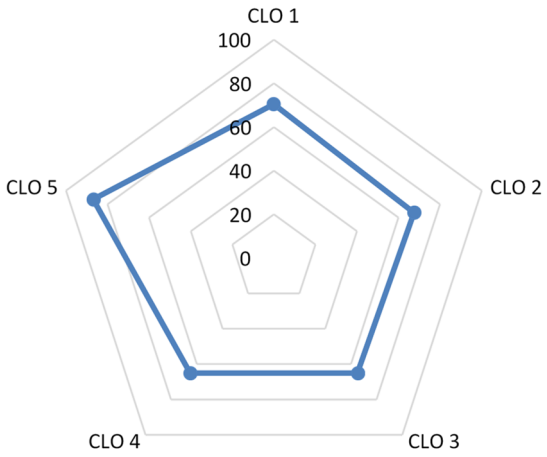

Figure 3. Course Learning Objectives (CLOs) achievements on Herbal Extract Production course.

(out of 4.00). By comparing the average of students' achievements during the last five years, the year 2015 to 2018, with mean grade 3.51; 3.81; 3.46; and 3.28 respectively, we found that the lowest score occurred in the student year of 2018. Average of CLOs achievement was 71.7% (range 65.1–86.9%). A different approach in the evaluation of students' accomplishments makes the conventional vs blended learning method cannot be directly compared in this study.

Regarding the CLOs profile based on types of assessment, the CLO 5 was obtained solely from the assignment (Figure 4), of which the CLO description is to perform a critical appraisal for scientific articles related to herbal extracts production and quality assurance. Method of delivery of the lecture targeting on CLO 5 was a collaborative learning approach performed as a flipped classroom. All other CLOs achievements were evaluated through a various summative assessment which covers individual and group assessments. Collaborative, as well as a cooperative learning method, were used together with the teacher-centred. Collaborative and cooperative learning is known to nurture students' soft-skills experiences in term of teamwork building, communication skills etc. The group project is also supporting the students' social skills which will be benefiting their overall performances.

In this course lecture, we used various learning methods as well as assessments. Formative assignments were conducted to be as diagnostic tools for the lecturers and self-reflection for the students' achievement. In this course, the formative tasks were observed through quiz as well as discussion in class and via online. Various type of assessments beside the midterm and final exam may also serve as diagnostic tools for each student's achievements. eLisa as LMS used in this course was proven to be very useful in assisting the team teaching for managing the various type

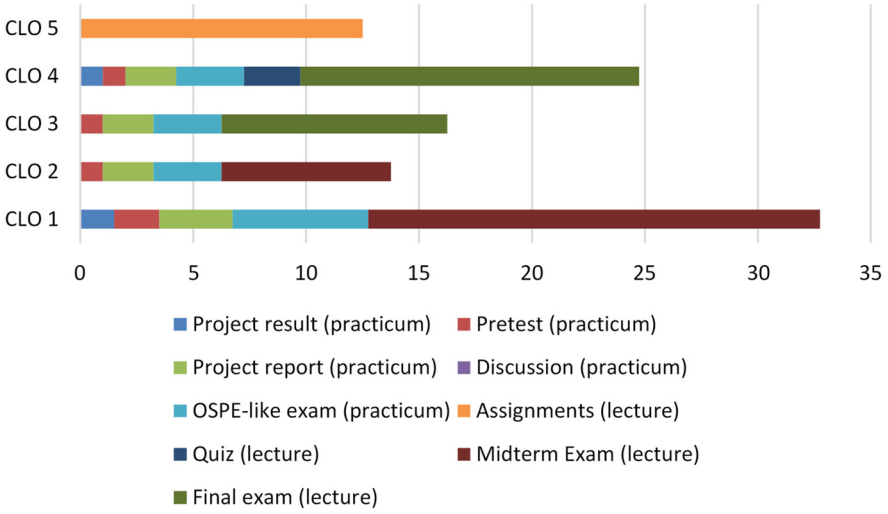

Figure 4. Course Learning Objectives (CLOs) profile based on assessments types.

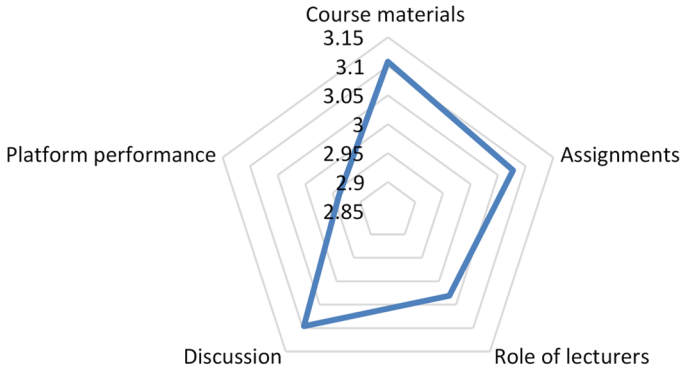

Figure 5. Student's perception of e-learning variables (n = 16; response: 81.25%; scoring: 1–4).

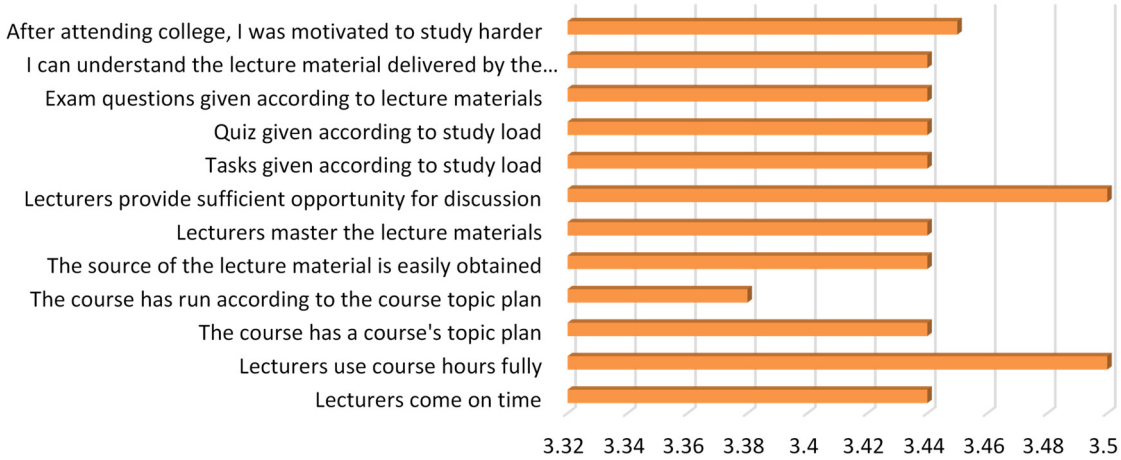

Figure 6. Student's perception towards the general learning environment (n = 16; response: 100%; scoring: 1–4).

of assessments in term of the assessment execution as well in grading.

Practicum was assessed based on group and individual assessment. Pretest, discussion and OSPE evaluation as the final exam for practicum was individually based (25% contribution for the final grade). In comparison, results and reports were group-based (7.5% contribution for the final grade). E-learning method used for the practicum beside for managing the individual reports was also used for sharing materials in the form of the practicum guideline book, as well as the video from industry used in the site visit.

Evaluation derived from a self-administered questionnaire collected by eLisa administrator described student engagement on the e-learning environment (Figure 5) and students' responses to the global learning environment (Figure 6). Scores of the student satisfaction from EDOM was 3.45 (max. 4.00, range: 3.38–3.50) while from eLisa was 3.05 (max 4.00, range of 2.94–3.10).

It is a highlight that platform performance was considered as the weakest score (2.93). At the same time, course materials contribute to the highest, which may influence the students' engagement in the e-learning process (3.11). The role of course materials on students' engagements was confirmed by the student's perception of the general learning process of the course (3.45) (Figure 6). The lowest score was the implementation of the course plan (3.38). This finding was correlated with the result is in the course flexibility of various learning methods of delivery by the lecturers.

Regarding the role of lecturers, the mean score was 3.03. This finding was confirmed by the students' feedback on the general learning environment of which the students considered that the lecturers provide opportunities for discussion and the course time allocated was used adequate (3.50). These scores contribute the highest on the student's perception.

Students' feedbacks were divided into positive, negative reflection and overall comments on the blended learning method (Table 1). The feedbacks showed that Learning Management System performance was less satisfactory. Students' enthusiasm for the blended learning method to support self-directed learning were positive (Table 1). Students recommended solution to the limited facilities reflected their positive engagement to the learning process. As explained by Sun et al. (2008) the face-to-face learning

Table 1. Students' feedbacks on the blended learning methods.

No	Positive reflection
1	Flipped classroom method: gives more opportunity to do a prior study on lecture materials presented in the form of written or video files
2	Students have more opportunity to watch course videos for clarity
3	Face-to-face lectures are conducted using material discussion methods which have been studied previously, so it's not boring
4	Students are motivated to ask questions or comments because it is obligatory
	Negative reflection
1	E-learning platform performances: eLisa is less user friendly; there is no notification for incoming messages and not easy to upload images/files; uncomfortable discussion because the comments are orderedbased on the incoming messages
2	Learning video: the sound is not clearand needs improvement in presenting content to be more attractive; video is too big, so it's difficult to download
3	Students feel uncomfortable for online discussions with lecturer because it is written (afraid of mistakes)
	Overall comments on the learning process
Most students still consider face to face is required for engagement	
Course videos should be more varied; an animation is suggested to be more attractive	
The material title should be more attractive, data size and video duration will influence a student's interest in downloading particular material	
Students suggest using social media for communication which cause less burden to the students	

model supports physical and emotional teacher-student interaction, student reflection from this study was also consider that face to face interaction between students peer group is also essential.

Blended learning provides opportunities and challenges that were not yet fully anticipated. Blended learning, because of its flexibility, allows us to maximize many positive education functions (Dziuban et al., 2018). However, the new techniques need to be supported by more advanced supported facilities to provide more attractive materials to increase student engagement to the course. These results are encouraging because the method offers potential for improving the teaching and learning process in a higher education environment to become more responsive to millennial student's lifestyles and needs (Dziuban et al., 2018). The students' positive perceptions on the course new methods of delivery confirms the issue. Zainuddin (2015) suggests that teachers should consider students' learning style. It is recommended to create more flexibility in designing learning process and environment, considering that student profile in individual or population profile, in ways of receiving and processing the information and the pattern may be varied (Zainuddin and Keumala, 2018).

However, our study is subject to limitations. The number of students involved in the subject was still low. Inadequacy of duration, of course, as well as limited laboratory equipment facilities, caused consequences of not all students can be exposed to work skills in the laboratory. We anticipated the problem with flipped session made by the lecturer team and by other groups that can be used as references by students.

4. Conclusion

The implementation of blended learning in the Herbal Extract Production course provides a positive impact on students' achievement. This new teaching-learning approach offers a potential effect on nurturing self-directed learning for students and expanding opportunities for lecturer-student interaction. Nonetheless, the blended learning method needs to be developed further in the form of course materials and type of online discussion, and further study should involve more number of students.

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References

Dziuban C, Graham CR, Moskal PD, Norberg A and Sicilia N. Blended learning: the new normal and emerging technologies. Int J Educ Technol High Educ. 2018; 15(3): 1–16.

Fisher D. The use of instructional time in the typical high school classroom. Educ Forum. 2009; 73(2): 168–176.

Fu JS. ICT in Education: A Critical Literature Review and Its Implications. IJEDICT. 2013; 9(1): 112–125.

Gebre E, Saroyan A and Bracewell R. Students' engagement in technology-rich classrooms and its relationship to professors' conceptions of effective teaching. Br J Educ Technol. 2014; 45(1): 83–96.

Halili SH, Razak RA and Zainuddin Z. Exploring the use of 'Wiggio' to support online collaborative learning for adult learners. In Economics, Social Sciences and Information Management: Proceedings of the 2015 International Congress on Economics, Social Sciences and Information Management (ICESSIM 2015), 28–29 March 2015, Bali, Indonesia (p. 15). CRC Press.

Sun PC, Tsai RJ, Finger G, Chen YY and Yeh D. What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. Comput Educ. 2008; 50(4): 1183–1202.

Zainuddin Z. Exploring the Potential of Blended Learning and Learning Management Systems (LMS) for Higher Education in Aceh. Englisia. 2015; 2(2): 70–85.

Zainuddin Z and Keumala CM. Blended Learning Method Within Indonesian Higher Education Institutions. JPH. 2018; 6(2): 69–77.