Analysing a Gap between Students' Expectations and Perceptions: The Case of Blended Learning

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Abstract. The adoption of blended learning at university levels is pervasive. This learning approach is deemed to be more effective compared to face-to-face or online learning. To prove the claim, this study aimed to investigate a gap that may be existed between students' expectations and perceptions of blended learning implementation at the Science Department in a university in Surabaya, Indonesia. A questionnaire and semi-structured interviews were utilized to gather relevant information from 79 preservice science teachers who have experienced blended learning in science subjects. The gaps between expectations and perceptions were measured using Cohen's effect size. Overall, the effect size of students' expectations and perceptions of the blended learning implementation exceeded 0.5 and is categorized as large. The aspects with large effect size values included the number of interactions between students and teachers. These findings indicated that the implementations of blended learning in science subjects were not run well. Implications of this study are discussed.

Keywords: Expectations and perceptions, Blended Learning, Science subjects, Preservice teachers.

1 Introduction

A growing interest in adopting blended learning at the university level has been identified [1-3]. Between 2012 and 2017, 40 review papers about blended learning in higher education have been published [4]. A systematic review conducted by Ashraf et al. [5], furthermore, reported a rapid increase in the number of publications focused on the implementation of blended learning from 2012 until 2020. Similarly, the implementation of blended learning in Indonesia is pervasive. Setiawan et al. [6] found that the effect size of 36 studies conducted in Indonesia from 2012 to 2021 on blended learning varies. However, most research on blended learning in Indonesia confirmed the effectiveness of this learning approach [6-10].

The effectiveness of blended learning as a content delivery method is supported by several reasons. Firstly, by combining online and face-to-face experiences [11, 12], blended learning enables students to get benefit from technology-enhanced learning and natural student-student and teacher-student interactions [13]. Secondly, the integration of technology in blended learning, such as the use of a Learning Management System (LMS), increases learning flexibility [11]. Thus, students can learn materials anytime and anywhere according to their pace [1, 14]. Lastly, a blended learning environment also enhances students' collaboration inside and outside the classrooms [11, 15] resulting in better learning achievements [1, 16].

In addition to students' achievement, several studies proved the positive impacts of blended learning on skills and attitudes [5]. For example, Yustina et al. [17] reported that the combination of blended learning and project-based learning improved preservice biology teachers' creative thinking ability compared to a conventional method. Students' critical thinking skills were also improved when blended learning was combined with the STEM approach [10]. Besides, the effectiveness of blended learning on students' science process skills [18-20] and digital literacy [11, 21] have been identified. Furthermore, students' attitude toward science [22, 23], self-efficacy, and motivation [5] improved when blended learning was implemented.

Despite the aforementioned advantages, the challenges of blended learning implementation were also reported by several studies. A systematic literature review conducted by Boelens et al. [24], for example, identified four key problems in designing blended learning. Those problems included increasing learning flexibility, facilitating the learning process, promoting interactions, and supporting motivation. In addition, the challenges in using technology and promoting self-regulation were recognized in the adoption of blended learning [2, 5]. The lack of ICT infrastructure and teachers' pedagogical knowledge were also other barriers to blended learning [5, 11, 25].

Furthermore, studies on students' perception of blended learning showed varying results [13]. A study conducted by Yilmaz et al. [26] reported positive

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responses from preservice teachers on blended learning leading to an increase in their self-efficacy toward science teaching. However, the author raised a concern about online collaboration. Positive impacts of a blended learning environment on learning experience and engagement were also captured from perceptions of undergraduates in Vietnam [13] and South Africa [27]. In contrast, students from three higher institutions in Indonesia [28] and a university in China [29] argued that the online session of blended learning was problematic. The correlation between perception and achievement in a blended learning environment has been explored. Most of the studies indicated positive results [30, 31], but contrary findings were also recorded [32]. Thus, students' perceptions need to take into consideration when designing blended learning [26].

Although students' opinion is essential for effective teaching and learning, research on perceptions of blended learning in the context of teacher education in Indonesia is minimal. The existing studies in Indonesia about preservice teachers' perception of blended learning were conducted in the context of English Education [33, 34] and Mathematics Education [35], but there is no research in the Science Education context. As mentioned by Vo et al. [1], soft and hard disciplines require different strategies for effective blended learning. Furthermore, none of them investigated the gap between students' expectations and perceptions of the aspects of blended learning. Therefore, the purpose of the current research was to identify gaps that may exist between preservice science teachers' expectations and perceptions of blended learning implementations. Results of such investigation could be utilized for designing effective blended learning.

2 Research Methods

A case study was adopted in this research involving 79 preservice teachers from the Undergraduate Program of Science Education at a university in Surabaya, Indonesia. Those students had experienced the implementation of blended learning in many courses, such as Plant Anatomy and Physiology, Fluid, and Learning Theory. When this study was conducted, those participants were second-year students from three classes consisting of 75 female and four male students.

This study collected quantitative and qualitative data to gain insights into students' expectations and perceptions of blended learning implementation in the targeted study program. The quantitative information was collected using a survey that was adapted from the questionnaire developed by Bouilheres et al. [13]. The survey contained a total of 37 items consisting of five questions about identity, two questions asking about experiences of blended learning, 14 statements about expectations, 14 statements inquired about perceptions, and two open-ended questions asking comments and suggestions for improving blended learning. Each statement about expectations and perceptions of blended learning was followed by a four-point scale ranging from strongly disagree (score 1) to strongly agree (score 4). Those statements are available in Table 1. The survey was administered to students at the end of the semester using a Google Form. While semi-structured interviews were adopted in this study to gain an understanding of the reasons why students responded to the survey. These interviews were conducted one week after the survey administration and involved 12 students. Those students were selected because of their low total survey scores.

Descriptive statistics including means, standard deviations, mean differences, and Cohen's d (effect size) were calculated for analyzing the students' expectations and perceptions collected from the survey. The effect size values, then, were interpreted using the following classification. The value ranging from 0.0 to 0.2 was categorized as low, more than 0.2 to 0.5 as a medium, and above 0.5 as large [36]. These conventions apply in the same way for both positive and negative values of effect size. While the qualitative data in the form of open-ended responses for the survey and interview results were analyzed by categorizing the similar responses under the survey aspects which have an effect size of more than -0.8 [37].

3 Results and Discussion

The results of this study are in the form of quantitative and qualitative data. Both are presented separately in this section for easy reading.

3.1 Quantitative Data

This study used a survey to collect information about students' expectations and perceptions about the implementation of Blended Learning. Descriptive statistics for the survey results are presented in Table 1.

Table 1 shows that on average students had high expectations of the Blended Learning implementation with mean scores ranging from 3.39 to 3.65. However, students' perceptions of Blended Learning, overall, were lower than their expectations. The minimum mean score of students' perception is 2.89, whereas the highest mean score is 3.37 which is lower than the minimum score of their expectations. The negative values of mean differences also indicate that students' perceptions are lower than their expectations of Blended Learning implementations. The aspects which have a high gap between expectations and perceptions are students' activity in posing questions in face-to-face mode (-0.57) and the quantity of teacher-student interactions (-0.52)

Concerning Cohen's measure of effect size, the values of 14 statements ranged from -0.629 to -0.901. Those values are categorized as large effect sizes [36]. It means the gap between expectation and perception is big [36]. Aspects with effect size values more than 0.8 include the activity of posing questions (-0.893), the integration of online and traditional learning (-0.87), student-student interactions (-0.838), the quantity of teacher-student interactions (-0.901), and the quality of teacher-student interactions (-0.841).

Table 1. Descriptive statistics for the questionnaire ($N = 79$)

Expectation/Perception Statement	M_P	M_E	$M_P - M_E$	SD_P	SD_E	ES
Online learning activities make me more prepared for face-to-face learning.	2.91	3.39	-0.48	0.70	0.63	-0.722
Available online materials help me understand the topic being studied.	3.10	3.47	-0.37	0.55	0.62	-0.631
Understanding online materials makes it easier for me to understand the topics discussed when face to face.	3.03	3.44	-0.42	0.64	0.61	-0.665
I feel more confident joining face-to-face lectures with the prior knowledge I have through online learning.	3.01	3.43	-0.42	0.67	0.57	-0.672
Online learning helps me to be actively involved in face-to-face learning.	2.96	3.44	-0.48	0.65	0.59	-0.773
With an initial understanding through online learning, I am more likely to actively ask questions in class.	2.89	3.46	-0.57	0.70	0.57	-0.893
My online learning experience integrates well with face-to-face learning.	3.06	3.51	-0.44	0.49	0.53	-0.87
Online learning materials give me the opportunity to apply or practice what I learn during face-to-face learning.	3.08	3.48	-0.41	0.59	0.50	-0.737
The online materials provided allow me to study whenever, wherever I can.	3.37	3.65	-0.28	0.54	0.48	-0.547
The online materials provided allow me to learn at my own pace.	3.28	3.61	-0.33	0.53	0.52	-0.629
With this Blended Learning approach, I interact more with other students inside and outside face-to-face lectures.	3.19	3.65	-0.46	0.58	0.51	-0.838
With this Blended Learning approach, the quality of my interactions inside and outside face-to-face lectures with other students is much better.	3.27	3.59	-0.33	0.55	0.49	-0.63
With this Blended Learning approach, I interact more with my lecturers inside and outside face-to-face lectures.	3.00	3.52	-0.52	0.64	0.50	-0.901
With this Blended Learning approach, the quality of my interactions with my lecturers inside and outside the face-to-face learning room is much better.	3.06	3.53	-0.47	0.58	0.53	-0.841

3.2 Qualitative Data

Qualitative information is also collected in this study using semi-structured interviews with students. The qualitative data are used to gain insights and understand why there were discrepancies between students' expectations and perceptions of blended learning implementation. Therefore, this section is divided based on the similarities of the interviewees' responses.

3.2.1 Preferred Learning Mode

Most of the respondents preferred blended learning compared to fully online learning or face-to-face mode. The preservice science teachers argued that blended learning is effective for learning science subjects. When asked to elaborate on their preference for blended learning, three respondents explained:

1. S1: I prefer blended learning because when I study independently, I can study alone or in groups. If there is a material that I do not understand, I can ask questions [what I do not understand] during offline meetings with lecturers.
2. S2: blended learning, because from what I experienced, for example [for the course] Fluid, before face-to-face [meetings] materials were provided in *Vinesa*, then for practical works [were conducted] on campus [using] offline [mode]. It is easier to understand after studying the materials.
3. S3: blended learning is better because you can get material from online first. Then when face-to-face [meeting] it is clear for the material to be discussed.

However, few respondents perceived that full online learning is the best. The practicality and financial issues were the main reasons mentioned by the respondents, one of them said:

4. S4: Full online, if time is tight, you can still attend the lesson [just open a laptop or hand phone]. If you meet face-to-face, you have to prepare for campus beforehand. If it is fully online, you do not need to spend money on boarding.

3.2.2 Activity of Posing Questions

Posing questions during discussion indicate students' learning engagement. The effect size of students' activity of posing questions in the questionnaire is categorized as large (see Table 1). Most of the respondents elaborated on this aspect by focusing on personal characteristics, such as shyness and lack of confidence. This fact is shown in the following responses.

5. S2: I am a shy person. In online learning, it is not seen directly [so I dare to argue]. If offline, I am still shy to express my opinion.

6. S4: Paranoid of offline lectures. [I am] still afraid to meet face-to-face because of online habits. Fear of being appointed offline. Because sometimes I like to blank out when I meet a lot of people, I'm embarrassed.

7. S5: [I felt] inferior so I am less active. Sometimes, the questions I want to ask have been asked by other friends.

The statement of Respondent S4 informs that online learning during the Pandemic COVID-19 situation has an impact on students' behavior. This fact needs to take into account by teachers during the transition periods from online to offline modes of learning.

3.2.3 Learning Resources

Learning resources are important for implementing blended learning which combines online and offline modes. Some respondents revealed their difficulties when interacting with learning resources, as explained in the following quotes.

1. S10: sometimes lecturers send material suddenly, then the next day we have to work on and complete assignments.
2. S11: there is a lecturer who gives material in English so I find it difficult. There are also material files that are too large so they have to be compressed first and then translated. But there are some materials that fail when compressed.
3. S12: mostly [resources are]…For example, the lecturer gives a lot of material but it turns out that only a few are discussed….. Sometimes the practicum is not in accordance with the material taught by the lecturer.

From the respondent's explanation (S12), it is apparent that the teacher discusses the materials that have been provided in online learning. Thus, the offline sessions were used to reteach the materials rather than doing problem-solving or group discussion activities.

3.2.4 Teacher-Student Interactions

One of the advantages of blended learning compared to full online mode is the presence of natural teacher-student interactions. Table 1 shows that the effect size value of teacher-student interaction aspects is large (more than -0.8). The following four students' responses on these aspects indicate that the relationship between teachers and students needs to be improved.

1. S1: Sometimes there are lecturers who are slow to respond...[we are] calling using WA. There have been direct interactions, the interactions are good…we discussed the schedule, and you can go offline or online too.
2. S6: I feel ashamed. A bit afraid of some lecturers.
3. S8: I am afraid to chat with the lecturers.

4 Discussion

The collected quantitative and qualitative data in this study confirm that preservice science teachers perceived the effectiveness of blended learning. The finding supports the evidence recorded in the previous research [13, 26, 27]. As mentioned by respondents (see Quotes 1-3), blended learning supports independent learning. The use of LMS (e.g., *Vinesa*) in blended learning enables students to manage by themselves the learning period depending on their learning style, thus, increasing flexibility [1, 11, 14]. Furthermore, the respondents recognized the presence of natural interactions in blended learning as an essential aspect of their learning. A face-to-face meeting is important for stimulating social interactions among students and between teachers and students [24].

Although teacher-student interactions are crucial, data from the survey in this study revealed a large gap between students' expectations and perceptions about this aspect. This fact was also supported by students' interview responses, as shown in Quotations 11-13. The challenge of social interactions in blended learning is also observed in several investigations [13, 24]. Building a quality teacher-student relationship will give a positive learning experience [13] leading to high student engagement [38].

Learning engagement was identified as a challenge in blended learning [2, 13]. Students' active participation in discussions during the teaching and learning process reflects their learning engagement [38, 39]. The survey results of this study show that there was a large gap between students' expectations and perceptions related to the activity of posing questions during learning processes which are supported by respondents' explanations during interview sessions (see Quotations 5-7). Students' personalities and lack of confidence were recognized as the main reason for their low participation. Similar findings were also recorded in several studies [2, 24, 38]. Building social interaction [2], using an appropriate instructional model [38], and supportive learning environments [40] can be solutions to this problem.

A supported learning environment is crucial for effective blended learning [13, 24]. Due to the integration of physical and online modes in blended learning, students' interaction with online components including resources needs to take into account when implementing this learning approach [13]. The quantitative data collected in this study informed a large gap between students' expectations and perceptions of the integration of online and offline experiences. The most mentioned reason for this fact is related to the online resources (see Quotes 8-10). A similar problem is also mentioned in the study conducted by Setyaningsih [28]. The accessibility to learning resources affects students' learning engagement [38]. However, the respondents' explanation revealed that students still relied on a teacher as a center of information. It indicates that blended learning is not implemented correctly [11, 25, 28]

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