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# Students' Perspectives on the Design and Implementation of a Blended Learning in Practicum

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**Abstract.** This research aimed to investigate the implementation of blended learning (BL), which was designed in a group of pre-service chemistry teachers at higher education institutions. Blended learning was implemented by holding face-to-face lectures combined with online lectures using the Schoology Learning Management System (LMS). Meanwhile, the research employed a qualitative approach. The purpose of this study was to discover learning experiences and perceptions of students who have applied BL in practical learning. The results showed that students found new experiences during blended learning. Based on experience, students felt independence, flexibility, and ease in working on problems. Furthermore, students' perceptions showed a comfortable feeling because learning process was flexible, structured, active, and up-to-date. Given the advantages of BL, pre-service chemistry teachers expressed their interest in applying BL to the learning process when they have become teachers. However, there were some shortcomings of BL, namely slow internet connection and Schoology LMS that often logged the students out on its own during test. However, students liked the flexibility of classes conducted by video call via WhatsApp application. In further research, it is necessary to redesign the learning process, so that the communication between lecturers and students will be balanced during face-to-face learning and online learning and the learning process will be more effective.

**Keywords:** Student, Perspectives, Blended learning, practicum

## 1. Introduction

There are two types of chemistry learning on campus, namely theoretical and practical learnings. Both types of learning have different characteristics. Practical learning, for students, require more energy than theoretical learning. This is because in practical learning, students must carry out practicum activities as well as complete the lab work report. Both theoretical lectures and practicum are generally conducted face-to-face. The current era, where the development of technology is increasingly fast, requires educators to also follow the development of technology. One of the developments is online-based learning, and this is a great opportunity in chemistry learning to improve.

Most learning is conducted face-to-face, but the times are demanding to go online learning. Research showed that there were several advantages of online learning for students, including flexibility[3] [14].



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However, for educators, the change from face-to-face learning to online learning also requires considerable effort. The change to online learning requires a complex process when it will be applied to the class with face-to-face strategies [20]. Based on research results, online learning was more interesting than face-to-face learning [5] [12]. The advantages of online learning have the opportunity to be disseminated to educators. However, it does not mean that online learning is the best when it is compared to face-to-face learning. Therefore, a combination of online learning and face-to-face learning, which is then called blended learning (BL), was born where both approaches complement each other's disadvantages [13]. Blended learning will simplify time, place, situation obstacles, but still maintain the interactions between teachers and students to remain of high quality [10].

There are several characteristics of blended learning [7]. They were:

- 1) Students have two modes of interaction both with teachers and classmates, so that their community is also wider. They can choose the right ICT for their interaction.
- 2) Teachers are required to be dynamic in using ICT and professional in teaching in the classroom.
- 3) Students are trained to develop empathy, decision making, patience, communication, self-management, and critical thinking.
- 4) Blended learning focuses on student-centered learning.

In addition to the characteristics, according to [13], there are some things that must be prepared by those who will develop blended learning, namely:

- 1) Teachers who are trained to provide blended learning
- 2) Teachers who must have scientific skills, such as observation and problem solving skills. These skills greatly support the blended learning process.
- 3) The availability of computer facilities, internet, and video chatting. Students must also have private internet access.
- 4) Learning must be agreed upon by the parents of students, because later they will also be involved in the learning process
- 5) Good assessment instruments

With these various advantages, blended learning can implemented in class. However, there has been no implementation of blended learning in practicum learning. Therefore, it is necessary to have preliminary research on the application of blended learning in practicum. The research needs to be done because lecturers as instructors sometimes have difficulty to manage time. For example, lecturers sometimes have other duty that cannot be left behind, but at the same time, they have to deliver a lecture. Therefore, it is necessary to apply blended learning in practicum activities without reducing the essence of practical learning. This research was conducted to answer the following questions:

- 1) What learning experience do students gain after attending the organic chemistry practicum that applied the blended learning approach?
- 2) What is the students' perception of organic chemistry practicum that applied the blended learning approach?

## 2. Methods

### 2.1 The Course

This research was a qualitative research and aimed to investigate opinions and experiences. The research design was in line with case studies according to [22], who defined case studies as a thorough exploration of certain research studies in real life from various perspectives. Case study research can determine a particular context and this context can be examined in terms of how its parts are configured [4]. The research data were obtained from 1) interviews with course coordinators, 2) students' reflections, and 3) interviews with students. Blended learning in organic chemistry practicum was attended by 15 chemistry education students (1 male and 14 female) in the 2018/2019 school year. All students have never used blended learning before, but have used online learning with a different learning management system (LMS).

In this research, blended learning employed Schoology LMS and was supported by the WhatsApp (WA) application. Blended learning activities at practicum were held once a week (08.00-11.30) for 7 weeks by providing different material. Each practicum session consisted of face-to-face learning complemented by the use of Schoology LMS. In addition, two sessions were held via video calls on WhatsApp and discussions were also held in WhatsApp group. The display of Schoology online class can be seen in Figure 1.

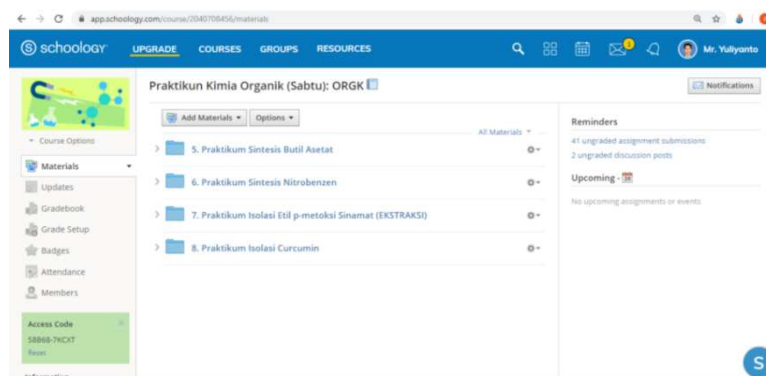


Figure 1. Online Classes at LMS Schoology

Students in this learning process experienced new challenges in the form of a combination of online learning and face-to-face learning, which they had never experienced before. In practicum activities in the previous year, they were accustomed to paper-based pretest before practicum, whereas in blended learning, they took online pretest, and if they did not meet the passing grade (65 out of 100), then they would retake the test until the grade met the requirements. Thus, this research was to find out students' responses to blended learning. Figure 2 is a video call activity between students and lecturers during learning activities in organic chemistry practicum.



Figure 2. Video Call via WhatsApp

## 2.2 Research Tools

Practical learning used Learning Management System (LMS). It is a software application that automates the administration, tracking, and reporting of training or learning events [8]. Learning management system, based on research, can improve the quality of teaching and teaching experience [6] [18]. Many positive effects are obtained from the use of LMS, so that LMS can be used in various universities [1]. The LMS that was used in organic chemistry practicum in this research was Schoology (<https://www.schoology.com/>). The version used was a free version, but the features were sufficient to facilitate learning activities. All students registered and then they would get an access code so they could take online classes.

## 2.3 Technical Strategies

The practicum process was conducted in 7 face-to-face (F2F) classes and online classes using Schoology LMS. At the first meeting, all students were given a briefing on the use of Schoology and rules in the practicum. Some rules that were delivered to students were that students could take part in practicum if they passed the pretest (by getting a grade that exceeded the passing grade 65 of the maximum grade of 100). If students did not pass the passing grade, then they must study and retake the test until they passed the grade. In addition, practicum reports must be uploaded to Schoology LMS with a maximum time limit of one week after the practicum. At each face-to-face session, there were two types of classes, namely face-to-face class and online class. Face to face (F2F) learning was a learning that was conducted to provide an explanation directly. In addition, F2F was conducted to facilitate the submission of assignments and practicum reports and online tests. The learning process was supported by the group and video call features in WhatsApp application. WhatsApp group was used for discussion and coordination of practicum activities. Meanwhile, video call was used for long distance meetings if the lecturer was unable to attend the class and could not teach face to face (F2F).

**Table 1.** Practical Learning Design with Blended Learning Approach

Practicum Materials	Meeting	Class
Introduction to practicum	1	F2F
Synthesis of Butyl Acetate	2	F2F+Online test (Pretest-Posttest)+ WA Group
Synthesis of Nitrobenzene	3	F2F+Online test (Pretest-Posttest)+ WA Group
Extraction of ethyl p-methoxycinnamate	4	F2F+Online test (Pretest-Posttest)+ WA Group
Hydrolysis of ethyl p-methoxycinnamate	5	F2F+Online test (Pretest-Posttest)+ WA Group+Video call
Isolation of Curcumin	6	F2F+Online test (Pretest-Posttest)+ WA Group+ Video call
Tests	7	F2F+Online test (Pretest-Posttest)

## 2.4 Instructional Strategies

Lecturers could proceed with their previous practicum learning strategies, such as pre-practicum exams, preparation of practicum reports, assignments, and posttests. In this learning, learning strategies were developed by adding facilities of online class, class discussion groups, and interactions with video calls via WhatsApp. Practicum using face-to-face and online approaches was expected to add students' insights and experiences in learning. The variation was expected to facilitate and increase the interest and effectiveness of learning as well. This was supported by students' willingness to use their mobile devices for academic activities [16]. In addition, the strategy that was still retained was the learning partnership. In practicum activities, students were divided into 3 groups. Each group

consisted of 5 students. Members in each group could help each other during the practicum process. This learning design was specifically intended to help students who showed a different speed in understanding during the learning process, so that peer learning would facilitate them in understanding. In practicum activities, students could also discuss with other students of other groups about the results of practicum. In this regard, students were facilitated by WhatsApp group. Thus, all forms of technical issues during the practicum could be discussed in the WhatsApp group. In general, the differences between previous organic chemistry practicum and organic chemistry practicum with blended learning approach can be seen in Table 2.

**Table 2.** Comparison of Previous Practicum and Practicum using Blended Learning Approach

Previous Practicum	Practicum using Blended Learning Approach
<ul style="list-style-type: none"> <li>▪ Students attended practicum</li> <li>▪ Written test (pretest-posttest)</li> <li>▪ Written practicum report</li> <li>▪ Grade points from practicum were reported face to face</li> </ul>	<ul style="list-style-type: none"> <li>▪ Students attended practicum</li> <li>▪ Online test (pretest-posttest)</li> <li>▪ Pretest had a passing grade and could be retaken</li> <li>▪ Practicum report was submitted online</li> <li>▪ Facility of WhatsApp (WA) group for discussion</li> <li>▪ Facility of video call</li> <li>▪ Grade points from pretest-posttest during practicum were displayed online</li> </ul>

### 2.5 Instrument and Data Analysis

This research is a qualitative research. The focus of this research was to identify students' perceptions and experiences from the implementation of organic chemistry practicum using a blended learning approach. The following are some of the instruments used in this study.

#### 2.5.1 Lesson Observation

Lecturers as instructors in the learning process, together with practicum assistants, carried out practicum activities in 1 to 7 meetings. The lecturers along with the practicum assistants observed things that happened during the practicum. The results of practicum observation were discussed by lecturers and practicum assistants.

#### 2.5.2 Reflection

Reflections were carried out by lecturers and students. Students did a written reflection in a journal at the end of each meeting. Lecturers also reflected on the learning process at each meeting. The reflection by the lecturer was conducted every time the meeting was related to the preparation of practicum, apperception, practicum implementation, and evaluation. Meanwhile, students reflected learning from their experiences and perceptions. With reflection, some shortcomings would be found and could be used to improve learning process. Reflection results were also supported by observations in the laboratory.

### 3. Results

#### 3.1 Learning Experience

Blended learning experiences were grouped into three parts, namely participation, interaction, and technology [23].

##### Participation

##### Flexibility

Students liked the flexibility of blended learning. This was because flexibility increases their chances of being able to learn anytime, anywhere by using anything. Following are the results of student reflections on flexibility.

*“Ya lebih fleksibel, karena dapat diambil kesimpulan pembelajaran tidak harus selalu tatap muka melainkan dapat menggunakan cara online yang lebih efisien waktu.”*

“Yes, it is more flexible. It can be concluded that learning does not have to always be face-to-face, but rather [learning] can use online methods that are more time efficient.”

*“Menurut saya lebih fleksibel, karena efisien waktu, kertas, tidak menghambat pembelajaran walaupun dosen tidak mendampingi karena masih bisa Video Call.”*

“In my opinion, it is more flexible, time efficient and saves paper, and does not hamper learning, although the lecturer is not present in class because [learning] can still be done via video call.”

*“Ya, karena dengan pembelajaran blended learning komunikasiantara dosen dan mahasiswa lebih mudah. Pre-test dan posttest maupun pengumpulan laporan sudah terjadwal dan sistematis.”*

“Yes, because with blended learning, communication between lecturers and students is easier. Pretest and posttest as well as report submission have been scheduled and systematic.”

*“Menyenangkan dan membuat pembelajaran lebih fleksibel, karena mahasiswa dilatih mandiri saat pembelajaran, menggunakan video call, dan mahasiswa dapat berani mencoba hal baru dengan prosedur biasa dan mengikuti alur.”*

“It is fun and makes learning more flexible. Students are trained to be independent during learning process by using video calls and students dare to try new things with ordinary procedures and follow the flow.”

##### Partnership

Blended learning did not hamper the existing communication facilities. This was because of the increasing number of communication facilities, namely discussion forums at Schoology. In addition, discussion facilities were also available in the WhatsApp group. Of course, during lectures, the togetherness in face-to-face learning was maintained. Students could still do group work and help each other in their groups. If there were big problems in groups, then the problems could be discussed in the WhatsApp group.

*“Tidak, karena pembelajaran blended learning sangat intensif, yang mana setiap menggunakan handpone. Saya lebih suka dengan blended learning. Saya lebih suka menyukai pembelajaran yang seperti ini, karena pegangan anak milenial saat ini adalah handphone. Hal itu juga dapat megurangi intensitas penggunaan handphon pada hal-hal yang tidak bermanfaat”*

“No, because blended learning is very intensive and the learning process requires the use of mobile phone. I prefer blended learning. I prefer learning like this, because what is often played with by

the millennials today is mobile phone. It also can reduce the intensity of the use of mobile phones on things that are not useful.”

#### *Interaction*

##### a) Comfort

Students felt comfortable during practicum that used blended learning approach. In addition, based on observations in the laboratory, students looked more enthusiastic and serious. Students also looked enthusiastic and serious when they made video calls with lecturers who were on out-of-town job assignments. Here are some of the results of student reflections that showed their comfort.

*“Ya, karena pada pembelajaran blended learning ini saya merasa lebih terbuka pemikirannya dan berdiskusi dengan teman-teman tentang hal-hal yang membingungkan dalam proses praktikum.”*

“Yes, because in this blended learning, I feel more open-minded and can discuss with friends about things that are confusing in the practicum process.”

*“Ya sangat nyaman, karena saya tidak terpaku dengan model pembelajaran yang biasa-biasa saja.”*

“Yes, it is very convenient, because I am not fixated on mediocre learning models.”

*“Nyaman, selama fasilitas teknologi mendukung (wifi lancar).”*

“It is convenient, as long as there is supporting technology facilities (fast Wi-Fi).”

##### b) Challenges

Changes in face-to-face learning that are used to being conducted in college will face some problems when it is replaced by a combination of face-to-face learning and online learning. Based on observation and reflection, a number of conditions were found to be a challenge for students who were taking practical learning with a blended learning approach. There were some students who were not accustomed to using Schoology LMS or activities that require the use of technology. Finally, they felt inconvenient. In addition, there were other obstacles that greatly affected the learning process, namely unstable internet network. One solution chosen by students was to use a private hotspot facility. Following are the results of reflections that supported the challenges of students in participating in blended learning.

*“Tantangan, saya dituntut untuk disiplin dalam proses praktikum dan mengumpulkan laporan praktikum.”*

“The challenge is that I am required to be disciplined in the practicum process and in submitting lab reports.”

*“Akses internet (Wi-Fi) tidak lancar sehingga Schoology menjadi eror. Kadang Schoology keluar sendiri sehingga nilai pretest menjadi kurang bagus dan harus mengulang sehingga membutuhkan banyak waktu.”*

“Internet access (Wi-Fi) is not fast so there is an error in accessing Schoology. Sometimes, the Schoology LMS logs the students out on its own so the pretest grades [of the students] are not so good. Pretests have to be retaken and it requires a lot of time.”

*“Untuk kesulitan, hanya terhambat pada akses internet karena dalam pembelajaran blended learning lebih banyak menggunakan teknologi”*

“Difficulties only lie in internet access because in blended learning, the use of technology is dominant.”

#### *Technology*

Blended learning activities using Schoology LMS did not encounter technological problems both on WhatsApp and Schooogy. Some Schoology features used in learning can be seen in Table 3. In



addition, the use of video calls via WhatsApp can be said to be well implemented. However, sometimes video calls were constrained by signal interference. Figure 3 below is a photo of video call activities via WhatsApp.



**Figure 3.** Interaction at a meeting using video call via WhatsApp

**Table 3.** Features of Schoology LMS

Feature	Being Utilized	Not Being Utilized
Online quizzes	✓	
Online assignment submission	✓	
Specially developed audio-visuals		✓
Links to existing audio-visual material	✓	
In-person lectures		✓
Recorded lecture only		✓
Online exercises		✓
Content based discussion forums	✓	
Online access to feedback of assessments	✓	
Externally provided modules		✓

### 3.2 Perception

In this regard, perception was the difference in perception of learning in a traditional class by face-to-face learning only and learning that used a combination of face-to-face and online learnings. In addition, perception was also about students' attitudes in dealing with blended learning in class.

#### Perceived differences

##### a) Flexibility

Students said that blended learning made the classroom more flexible, compared to traditional classes. In blended learning, students felt something unusual, one of which was the use of video calls via WhatsApp.

*“Ada, blended learning lebih modern sehingga disukai mahasiswa masa kini.”*

“There is [a difference]. Blended learning is more modern so it is favored by today’s students.”

The existence of a flexible class, either with the teacher in the classroom or the teacher teaching remotely, made the class still workable.

*“Ada perbedaan, pembelajaran jaenis ini lebih fleksibel dan terstruktur.”*

“There is a difference. This type of learning is more flexible and structured.”

Moreover, blended learning classes gave students practicality in submitting practicum reports. Practicum reports must be submitted online on Schoology class. If the submission was too late, there would be a note from the teacher.

*“Perbedaannya mungkin pada pengetahuan teknologi yang didapat pada mahasiswa kelas blended learning dan lebih dapat mengatur waktu.”*

“The difference may be in the technological knowledge gained by blended learning class students and [students] can manage time better.”

#### b) Equality

The quality of face-to-face learning and blended learning, in general, has significant differences. Following is the response of student who have participated in blended learning.

*“Ada, menurut saya pembelajaran di kelas kurang leluasa dan lebih asyik maina HP atau bercerita, namun pembelajaran blended learning lebih asyik, efisien dan kita fokus pada apa yang dikerjakan karena HP focus untuk pembelajaran online”*

“There is [a difference]. In my opinion, learning in the classroom is less flexible and makes students more engrossed in playing with their mobile phones or chitchatting, but blended learning is more fun and efficient and we can focus on our work because mobile phones are used for online learning.”

### 3.3 Attitudes

Students responded positively to practical learning activities with a blended learning approach. As many as 93% of students said they were comfortable and wanted further practicum activities to be carried out in the same way. However, there were 7% of students who were still experiencing some difficulties so that the practicum activities were still not comfortable for them and they did not recommend blended learning approach. Following are students' responses when they were asked if they would like to apply similar learning later on.

*“Iya, karena pembelajaran seperti ini sangat berharga dan sangat asyik untuk generasi selanjutnya.”*

“Yes, I will, because this learning is very valuable and very fun for the next generation.”

*“Ya, karena pembelajaran ini sangat fleksibel dan memudahkan mahasiswa dan dosen.”*

“Yes, I will, because this learning is very flexible and makes it easy for students and lecturers.”

## 4. Discussion

### 4.1 Benefit

Blended learning has several types of quality. The quality of learning using a blended learning approach has several indicators [2]:

- 1) Teacher is experienced in designing and developing BL.
- 2) Teacher has several types of face-to-face teaching experience in class.
- 3) Teacher has human resource to integrate technology.
- 4) Teacher/educator has experience in integrating technology.
- 5) Teacher feels confident in integrating technology.
- 6) Institutions support the development of blended learning.

Several types of blended learning approaches and their quality are presented in Figure 4.

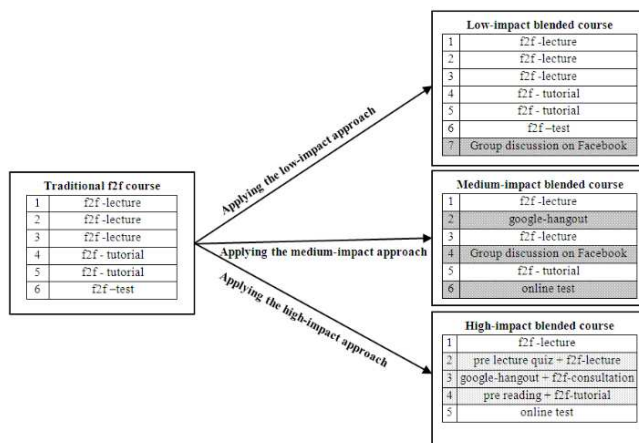


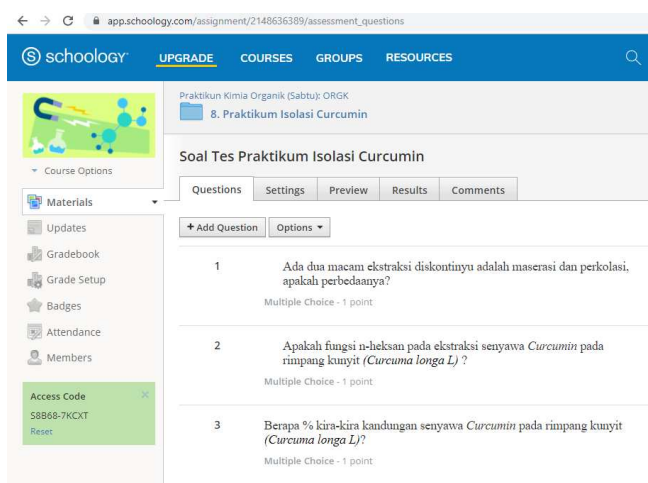
Figure 4. Three approaches to blended learning [2]

In this research, blended learning had been applied in a practicum for the first time, but lecturers actually had been using Schoology LMS for 2 years and applying it in several subjects. So, the lecturers already had experience in applying blended learning. However, the LMS used was the free version, so there were still some features that were limited by the software developer.

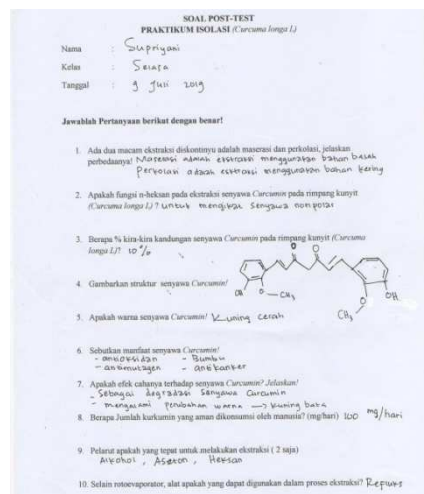
For lecturers, the benefits of using the blended learning approach in practicum learning are:

- 1) Expediting the pretest before practicum
- 2) Assignments and practical reports are centralized in Schoology LMS, so it can save space. Furthermore, assignments and reports can be corrected anywhere.
- 3) Lecturers can still carry out learning remotely.
- 4) Students can study lecture material anywhere and anytime.

With these advantages, practical learning can be further developed. Figure 5 is the display of pretests in the Schoology class and F2F class.



5a. Pretest in Schoology class

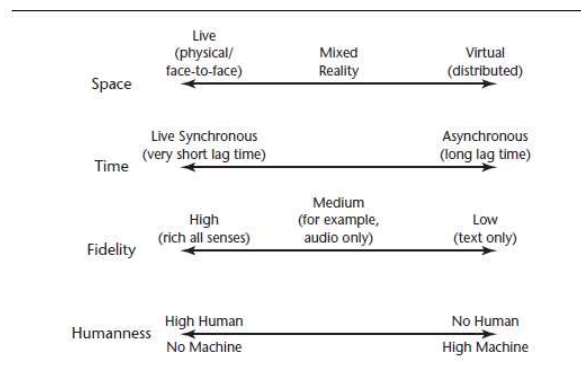


5b. Pretest in F2F class

Figure 5. Schoology Test Questions and Paper-based Test Questions

#### 4.2 Interaction

Blended learning is an initiation of two advantages of face-to-face learning and online learning. In full, an overall comparison of the dimensions of interaction in F2F and BL learnings is presented in Figure 6.



**Figure 6.** Dimensions of interaction in F2F and BL learnings

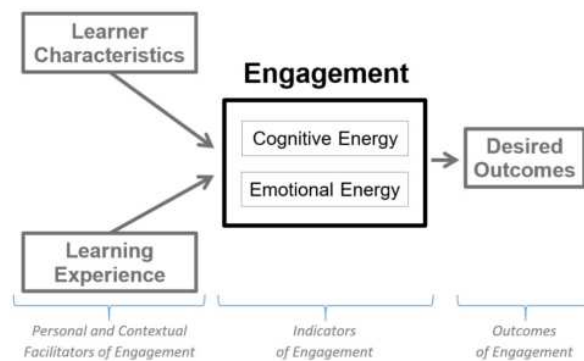
An interesting interaction on practicum with the BL approach was interaction by face-to-face and online. Face-to-face learning was a means of maintaining interaction between lecturers and students. Some learning problems that occurred during online learning could be conveyed during face-to-face learning. However, it did not limit time and space. Difficulties in face-to-face learning could also be conveyed anytime and anywhere with the help of LMS and WhatsApp group. Thus, interactions between lecturers and students were not constrained. Discussion activities on WhatsApp group are presented in Figure 7.



**Figure 7.** Interaction of students and lecturers in the WhatsApp group

#### 4.3 Student Engagement and Redesign of Instructional Activities

There were several things that made students interested in blended learning. The findings showed that learning design and student perceptions had a greater influence on student involvement than the individual characteristics of students did. Meanwhile, students' multitasking ability had a significant negative influence on student involvement in learning using the BL approach. On the other hand, students' perceptions about the importance of learning activities had a strong positive influence on cognitive and emotional involvement [15]. In the meantime, the learning strategy was not significant enough to improve students' performance in learning and learning motivation was even stronger [21].



**Figure 8.** Relationship between facilitators, indicators of engagement, and learning outcomes [9]

Student involvement in learning has several aspects, namely attitude involvement, cognitive involvement, and emotional involvement [11]. Student cognitive involvement in learning is indicated by several aspects, namely attention, effort and perseverance, time needed to complete assignments, use of cognitive and metacognitive strategies, absorption, and curiosity, while emotional involvement is indicated by, inter alia, interests, happiness, self-confidence, and the absence of boredom, frustration, and anxiety [9]. Although blended learning has several advantages and makes it easier to learn, it does not rule out the possibility that students will have no interest in participating in BL learning. The results of observations at the beginning of the lecture indicated that there were still many students who had difficulty in registering at LMS. One difficulty was difficulty regarding email. This was the ability of multitasking that might not be owned by most students. In addition, during the pretest, students were often hampered by slow internet connection, which were caused by slow Wi-Fi. Some of these difficulties made students less interested in blended learning. Internet signal was the main key to a smooth practical learning with the BL approach. To obtain high-speed internet connection, every student used a private hotspot. Furthermore, another fact that showed that students were less interested in blended learning was that in LMS, there was no online discussion feature at all times, so if there was an online assignment, students often overlooked. This was realized by the lecturer, because the LMS schoology used was the free version. Therefore, the discussion was carried out using the WhatsApp group, so that the interaction and discussion could go well.

#### 4.4 Balanced Attention to Students in F2F and Online Classes

In practicum learning using the BL approach, students could all attend F2F classes and online classes. Incidentally, there were no students participating in remote learning. Thus, the intensity of F2F and online learnings was balanced and this did not cause disparities in students. In F2F learning, lecturers, during lectures, acted as instructors in the pretest, practicum, and posttest processes. Whereas in the online learning session, the lecturer acted as an instructor as well as technician of Schoology LMS. One of the difficulties in using Schoology LMS was that the LMS often logged the students out on its own, so lecturers as technicians must always be ready to fix this. Communication in F2F learning and online learning at LMS Schoology still showed gaps. This was because there were no facilities that supported real-time communication. Therefore, the WhatsApp group was used instead.

#### 4.5 Audio

Communication using video call via WhtasApps (WA) sometimes had problems, causing the delivery of instructions during the practicum to be interrupted. At the same time, there were three groups that used video calls so that the noise around them disturbed during the video call. The solution was that all groups activated the silent mode when the lecturer gave a briefing, and deactivated the silent mode when they were about to ask questions. During the practicum process, each group always showed their

activities via a video call. The practicum duration of 3 hours was enough to make their mobile phones overheating. The display when students and lecturers made video calls via WhatsApp is presented in Figure 9.



**Figure 9.** Video call via WA (in silent mode)

#### 4.6 Limitations and Future Study

According to [17], to address various shortcomings of the blended learning approach, further investigation is needed by conducting: 1) structured investigation of the learning management system (LMS); 2) interview with a blended learning coordinator; 3) large-scale survey of students. In addition, if researchers are in doubt, there is a need for further studies on the effectiveness of blended hearing [16].

#### 5. Conclusion

The results showed that students found new experiences in blended learning. Based on their experience, they obtained independence and flexibility, which made them work on problems easily. Meanwhile, students' perceptions showed comfortable feelings because learning was flexible, structured, active, and up-to-date. Given the advantages of BL, pre-service teachers expressed their interest in applying blended learning to the learning process in the future when they have become teachers. However, there were some shortcomings found, namely slow internet connection and Schoology LMS that often logged the students out on its own during test.

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