Developing a Virtual Nature Laboratory of Faculty Social Science (LAV-FIS) to Assists Field-Based Learning during Pandemic: A Need Analysis Review

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Abstract—The Covid-19 outbreak has affected several aspects of field-based learning. The best way to ensure the survival and safety of everyone involved in field-based learning is to adapt and integrate technology. In response to this problem, numerous innovations in learning technology that lead to the virtualization of the learning environment have begun to emerge. However, the various application products developed have fallen short of the expectations of students. As a result, in order to design the optimal virtual application for use in field-based learning, a needs analysis must be done. This study offers an understanding of student needs for virtual field-based learning applications. An online survey of 140 active university students was carried out to do so. The results showed that students require applications with sophisticated features that resemble the real world for the implementation of online field-based learning. They expect the incorporation of online meeting features, 360 Virtual Reality Panorama, access to learning videos, augmented reality, learning materials, chatbox, and multimedia into the software that will be developed.

Keywords—LAV-FIS, field-based learning, virtual, learning, Covid-19

1 Introduction

The ongoing Covid-19 pandemic is threatening many aspects of life, including education. These difficulties are addressed by modifying the educational system, which employs technology as a platform In the United Kingdom, for example, health information technology (HIT) has been integrated into the health learning system [1]. In Pakistan, the Flipped Class Room (FCR) is utilized to supports both synchronous and asynchronous online learning [2]. Meanwhile, during this pandemic, e-learning is widely employed as a platform for learning at all levels of education [3]–[6]. Not only technologies specifically designed for education, even social media is also used to support the teaching and learning process during this pandemic. Whatsapp, for instance, is one of the social media that are widely used for the learning process in Indonesia [7]. In this setting, the Indonesian government implemented a learn-at-home strategy.

Various kinds of online learning applications are used to assist the implementation of distance learning, for example Google Classroom [8], Moodle [9]–[12], MOOCs [13], [14], SPADA Brightspace [15] and others. However, these technologies are intended more for theoretical learning. When in normal circumstances, learning activities are not limited to theory but also field-based. Field-based learning, on the other hand, is almost impossible to accomplish due to government mobility restrictions [16] which impede the execution of field trips. This circumstance undoubtedly requires the development of alternate solutions to the problem, as the endpoint of the epidemic cannot be foreseen with confidence.

Although health risks must be taken into account, proper education during a pandemic must also be pursued. Learning must continue, as must the curriculum, which includes field-based learning. Incorporating technology into the classroom is, without a doubt, the best answer at this time. The development of learning technology innovation is currently leaning toward online virtual platforms. Several prior studies have attempted to address the challenge of field-based learning during a pandemic in a variety of ways, including Jiang et al. [17] who used smart learning, flipped learning, and interdisciplinary education to overcome field-based learning issues. Additionally, Larsen et al. [18] also recommend using the notion of Hybrid Environments for field-based learning, where virtual field trips are the best alternative. However, every new idea has its own set of advantages and disadvantages. This weakness could be in the incomplete features of the apps. In this context, it is necessary to design a field-based learning application based on an analysis of student needs. Unfortunately, there are very few studies on needs analysis, especially in the field of field-based learning. In turn, this condition raises questions about virtual learning applications that will be developed, such as: how do students feel if field-based learning is eliminated? What kind of field-based learning are they expecting? What kind of field-based learning platform do they think will be available online? What kind of field-based learning applications do students expect if it's done online? What are the characteristics that students expect to see in a field-based learning program that is conducted entirely online? Therefore, we believe that having the proper answers to these concerns is critical before designing a virtual application that supports field-based learning during this epidemic.

2 Literature review

2.1 The urgency of developing virtual applications in field-based learning

The use of technology in the field of learning is currently growing rapidly due to the ongoing Covid-19 pandemic. Progress in mobile learning education research is also moving at an incredible rate [19]. In this new situation, leaders in schools have a very important role to set an example in mastering digital technology [20]. Since there are basic challenges that still need to be addressed by many parties, such as instructors' abilities to use technology for learning [21]. Other than that, the government also need to pay particular attention to the psychological effects of the pandemic [22].

A number of initiatives have been undertaken by the Indonesian government to keep the learning process alive is the implementation of online learning [23]–[25]. It may

solve some problems, but not all, since there are lecture activities in universities that require students to go out into the field (field study) to test their knowledge empirically. Due to the outbreak, the college administration was obliged to postpone this session [26]. Meanwhile, several universities made steps to ensure the application of learning, which included field lectures that were conducted both offline and online under specific conditions, as well as online field lectures [27]. However, this still provides a different learning experience when it comes to putting lectures into action in the field, which is especially beneficial for students of social sciences. Examples include geography, which allows students to gain hands-on experience exploring physical geography when implemented in the field [28], [29], history, which involves studying historical heritage sites scattered throughout various regions [30], social studies [31], culture [32], and community economics [33]. These potentials must be preserved and utilized in lecture activities. However, due to the outbreaks, field-based learning has become more risky, and virtual laboratories may be one answer to this problem.

When it comes to virtual laboratories, significant advancements are now being made in the domains of natural science and engineering. Several researchers [34]–[36] have developed virtual laboratories for Physics learning, which allow students to experiment with the rules of physics and learn more about them. Furthermore, virtual laboratories are used as learning media in the fields of chemistry [37]–[39], Biology [40], [41], as well as courses related to Engineering [42], [43]. Virtual laboratories for social research, on the other hand, are still few. Based on earlier study, the developed application is still in the form of web-based information management [44], [45] and it is also in the form of a virtual tour application for field trip activities [46]–[48].

2.2   Theoretical framework

This study supports Larsen et al. [18] contention that the paradigm of field-based learning can be transformed into an online hybrid form. This is a learning adaption to a specific situation. Larsen believes that the onset of a pandemic, for example, is an opportunity for new inventions rather than the end of field-based learning. Based on this logic, the researchers translated the natural environment into a virtual environment to facilitate learning processes. To make the virtual space as lifelike as possible, a virtual tour with a 360-degree panorama capability was implemented. This virtual tour is supplied with various information in accordance with the curriculum to enable student independent study activity. Students can obtain material in the form of multimedia that resembles a learning environment in the field and enjoy activity that allow them to assess how far they have learned after taking this virtual tour. This aspect of evaluation is in the form of a quiz that students must complete.

3   Method

3.1   Research design

The objective of this study is to find the right formula for an online platform that students can use as a replacement for field-based lectures during the pandemic.

Therefore, this study used a survey as data gathering method to explore student's preferences. This research used Krosnick's [49] survey research approach with some adjustments to fit the objectives of the study.

3.2 Participants

Researchers distributed research instruments to 140 students at the Faculty of Social Science Universitas Negeri Malang, who frequently performed field lectures. These respondents included 107 female and 33 male students from a variety of majors (see Table 1). The students were classified according to their year of enrollment into college, as follows: 2016 (0.71%), 2017 (5%), 2018 (63.57%), 2019 (25%), and 2020 (25%) (5.72%).

Table 1. Respondent's distribution

Departement/Study Program	n
Social Studies Education Study Program	62
Department of History	49
Department of Geography	20
Department of Sociology	8
Department of Law and Citizenship	1

3.3 Data collection

The information for this study was obtained from 140 students who completed an electronic survey. The data gathered included: 1) student opinions if field-based learning is abolished during the pandemic; 2) the preferred form of field-based learning during the pandemic; 3) an online field-based learning platform needed by students during a pandemic; 4) applications that students want when field-based learning is carried out online; and 5) features that students want in applications for online field-based learning.

3.4 Data analysis

Once downloaded, the data on our Google Form is tabulated for each item. To analyze the research data, we used descriptive statistical data analysis techniques to reveal its meaning [50].

4   Findings

4.1   Student opinions if field-based learning is abolished during pandemic

Table 2. Student's perception

No	Elimination of Field Based Learning	Total	Reason
1	Agree	41.42%	86.20% health reasons
			10.34% did not give a reason
			1.72% ineffective
			1.72% adaptation to other learning methods
2	Disagree	57.14%	61.25% interfere with competency achievement
			20% did not give a reason reason
			7.5% of learning methods can be adapted according to conditions
			6.25% learning atmosphere is not conducive
			1.25 can't interact with fellow students
			1.25 can't enjoy entertainment
			1.25 interferes with physical health
			1.25 interferes with mental health
3	No Answer	1.42%	did not give a reason reason

Based on the data in Table 2, it can be concluded that 57.14% of students do not agree if field studies during the pandemic are abolished. They are afraid that it will interfere with the achievement of student competencies. On the other hand, a significant number of students (41.42%) agree that field studies should be omitted due to the health risks.

4.2   The desired form of field-based learning during the pandemic

Based on these findings (see Figure 1), it can be inferred that, notwithstanding pandemic conditions, 75% (105 people) of students choose offline field-based learning, whereas 20% (28 people) prefer to do it online. Other findings indicated that among the 20% (28 students) who chose online, 14 people (50%) suggested using VR Apps (Virtual Reality Apps), 8 people (29%) suggested using other applications, and two persons (7%) suggested using DC Apps (data collector Apps); OM Apps (online meeting); and LS Apps) (live streaming Apps).
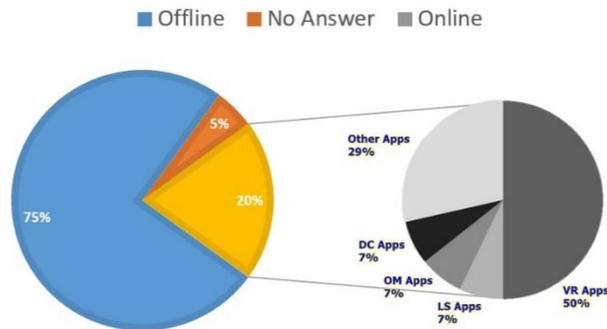
Fig. 1. FBL need analysis

4.3 Field-based learning platform preferred by the students during the pandemic
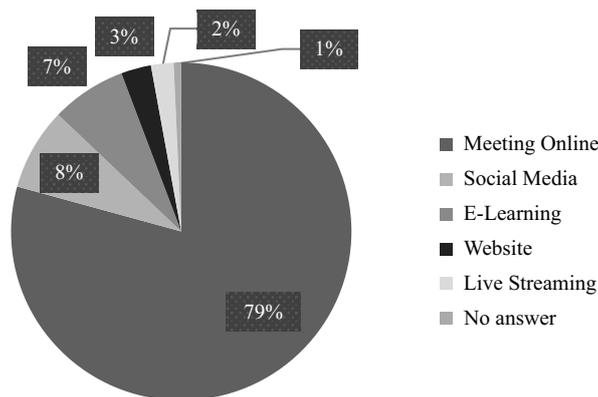

Fig. 2. The need analysis of online FBL

According to the data collected (see Figure 2), the most popular field lecture platform among students if it is conducted online is online meetings (79%), with live streaming being the least popular platform choice (amounted only 3%).

4.4 The desired online application for field-based learning study by students

Student preference for the 360 VR Panoramic a learning medium that may assist them in conducting online field-based learning is demonstrated very clearly in Figure 3. Meanwhile, other applications that were also chosen by students were multimedia apps (32%), video conferencing (27%), and live streaming (22%).
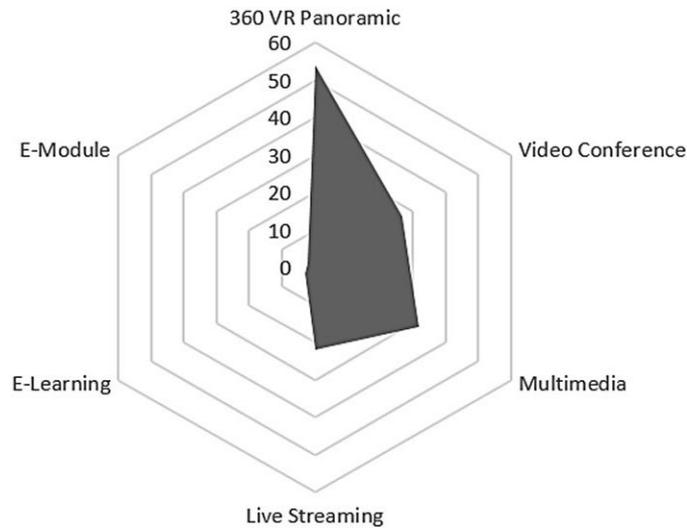
Fig. 3. The tendency of online FBL application that students required

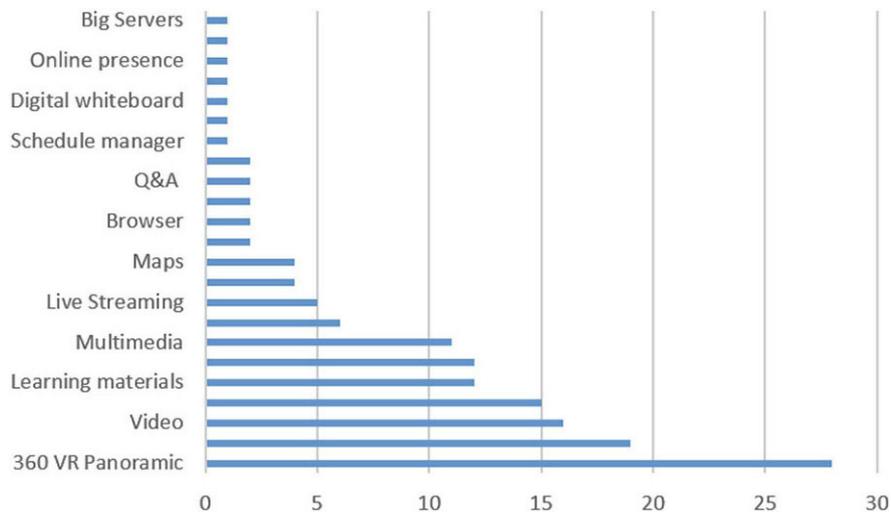### 4.5 The desired features of online field-based learning application by students

Fig. 4. Online FBL features required

Each application should have features that are not only attractive but also help the learning process. Likewise, what students expect from applications that will be developed for online field lecture activities. Figure 4 demonstrates that the 360 VR

Panoramic feature (28) is frequently referenced by students, indicating that it should be included in the developed program, along with online meeting capabilities (19), video connections (16), and Augmented Reality (15).

5 Discussion

According to the statistics, the majority of students still want field lectures to take place throughout the pandemic. Field lectures are still expected to be held offline rather than online, according to them. They objected to the field lectures being eliminated since they are afraid of not acquiring the expected competency. This finding is backed up by prior research, which found that students still prefer face-to-face instruction [51]–[55]. This could be related to the difficulties that must be overcome when putting online learning into practice. Online learning, for example, has technological infrastructure restrictions [56], [57]. In addition to technological barriers, there are also individual (student learning styles, physical and mental health), domestic (financial difficulties), institutional (administrative, curriculum, school resources, and educator skills), and community (lockdown restrictions, infrastructure challenges, and socio-political issues) barriers [58]. Bozkurt et al. [59] study finds that students do not get adequate support psychologically, socially and academically. This may be related to the perception of parents regarding the implementation of online learning during the pandemic. Dong et al. [60] reported that parents generally have negative opinions about the value and benefits of online learning. They tend to refuse for reasons related to the lack of online learning, student discipline, lack of time, and professional knowledge of students. Referring to the framework of field-based education, Larsen et al. [18] claimed in their article that "the field has not ended," but is undergoing adaption to online and hybrid environments. In fact, long before this pandemic appeared, students were already familiar with various virtual applications, the internet, handheld devices, social media and others [61]. These technologies help students to learn about things in the field more easily and lead them to the cyborg generation [62], [63].

This study find that students want online meetings that are integrated with the 360-degree panoramic application, multimedia, Augmented Reality (AR), learning materials, and chat boxes. This crisis certainly gave rise to new innovations in the field of learning [64]–[66]. Learning in this time of crisis makes us more in touch with technology [65], [67]–[69]. Features that are useful in learning are also increasingly diverse, for example online meetings [70]–[72]. Learning management system [8], [73], [74], multimedia [75], [76] and features for learning evaluation [77]–[80]. Existing technological developments are increasingly sophisticated with the incorporation of the real world into virtual elements such as in Virtual reality (VR) [81]–[84] Augmented Reality (AR) [85]–[87]. And the newest, Mix reality (MR) feature [88], [89] take it one step further by enabling online learning experience that feels closer to the actual world. But more than visual experiences, the developed program also requires interactive capabilities where users can leave comments, bookmarks, and annotations, all of which can help to increase student learning qualities [90], [91]. Although it has been able to meet the needs of teaching and learning, technology is frequently thought to be inadequate to enable lecturers' supervision of students' integrity. Occasionally,

questions emerge as to whether students are genuinely enrolled in distance courses that are delivered through an LMS. However, with the feature to detect student attendance in the LMS, however, there is no need to be concerned [92]. The Neural Turing Machine function can also be used to detect student interest in learning [93]. All those things strengthen the notion that engaging and complex features are critical to the long-term success of online learning. As a result, the more comprehensive and helpful the features provided by an application, the more likely it is to aid learning during this crisis. Its development path is fairly obvious, towards future education [94], [95].

6   Conclusion

Due to a lack of studies that analyze the demands of the product to be developed, this research contributes to the initial study of development research. This study provides a fundamental viewpoint that learning practitioners should consider when developing various learning technology developments, particularly in virtual-based field-based learning. The results of the study indicate that there is an openness to paradigm shifts in field-based learning which begins to integrate technology in it. However, when field-based learning is translated to an online format, it is important to consider the application/platform that will be used as a learning tool. Applications/platforms that are developed need to pay attention to the completeness and sophistication of the features offered. In this context, students need applications that have features such as Virtual Reality Panorama 360o, video, Augmented Reality, learning materials, chat boxes, and multimedia. This research is limited to application development in the context of learning only. However, we believe that future researchers can further refine these findings so that they can be used as a basis for them for the future. We recommend the next researcher create a more current needs analysis model that may be applied in a variety of fields.

7   Acknowledgment

8   References

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