Research Article

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Adopting Flipped Learning (FL) for Physical Education Pre-Service Teachers at a Korean University

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Abstract

Since flipped learning (FL) is a popular approach in a worldwide university classroom, expanding the scope with diverse disciplines and student populations is necessary. This study examines Korean pre-service teachers' evaluations and satisfaction with flipped learning for physical education courses. The data was collected in 2022 fall, including the course exit survey (n=103) and focus-group interviews (n=8). The results are as follows. Firstly, FL provides a convenient and adaptable learning environment for PSTs, allowing them to access course materials conveniently. Secondly, the FL format is beneficial for PSTs in developing their self-directed learning skills, as they review course materials before attending face-to-face classes. As a result, PSTs reported feeling more prepared for in-class assignments. Thirdly, PSTs praised the FL instructor as a competent educator who effectively communicated the course content in a well-organized manner. However, PSTs preferred immediate instructor feedback during focus-group discussions during face-to-face or synchronous Zoom lectures. Lastly, various recommendations were discussed for successfully implementing FL in higher education physical education courses.

Keywords: *flipped learning, flipped classroom, pre-service teachers, physical education, higher education, four pillars of flipped learning, self-directed learning*

1. Introduction

Flipped learning can be defined as an instructional approach that reverses the traditional classroom setting by delivering content outside the classroom and using in-class time for active learning activities and the application of knowledge (Bredow et al., 2021; Østerlie, 2018). This approach has gained attention in higher education as a way to enhance student engagement and learning

outcomes. A review of the literature on flipped learning found that this approach has been shown to have several benefits (Hinojo Lucena et al., 2020). For example, students can access course content independently and at their own pace (Bond, 2020; Isidori et al., 2018). In addition, the students can revisit the material as needed, leading to increased motivation and ownership of their learning (Ferriz-Valero et al., 2022). Using technology and multimedia resources also allows for a more personalized learning experience and can increase students' technological competency (Bond, 2020; Isidori et al., 2018).

Previous studies have shown that flipped learning can benefit physical education students in higher education (Li et al., 2021; Lin et al., 2022; Lee et al., 2022). Firstly, FL encourages physical education students to participate in learning actively, engage with course materials, practice skills, and increase performance outside class time. As a result, this FL learning environment can help students retain information and develop physical abilities. Secondly, FL can be tailored to meet the specific needs of each student, allowing them to focus on their individual goals and interests. For example, students can watch pre-recorded videos, read articles, and complete assignments independently before in-class time, and instructors can provide targeted feedback and support. Thirdly, FL can foster greater collaboration and teamwork among students as they develop their physical abilities and achieve common fitness goals. Finally, flipped learning can provide physical education students with a dynamic and engaging learning experience emphasizing active learning, personalization, flexibility, and collaboration (Hinojo Lucena et al., 2020; Isidori et al., 2018).

Since flipped learning is a popular approach worldwide, expanding the scope with diverse disciplines and student populations is necessary (Østerlie, 2018). However, there is limited research to understand how FL can be implemented for physical education students in Korean higher education. Therefore, this study explores Korean university students' evaluations and satisfaction with flipped learning for physical education courses.

2. Literature Review

In higher education, flipped learning allows university students to access course material at their own pace while still having the opportunity to participate in class discussions and hands-on activities (Nerantzi, 2020). FL in higher education often relies on technology, such as learning management systems (LMS), video lecture platforms, and interactive tools, to facilitate content delivery outside the classroom. In addition, this FL approach encourages active learning, where university students engage in hands-on activities and problem-solving exercises in the classroom rather than passively listening to lectures (Østerlie, 2018; Østerlie et al., 2023). FL also provides opportunities for collaborative learning, where university students can work on projects and engage in group discussions and activities (Sargent & Casey, 2020). Overall, the trend in FL in higher education is toward a more flexible, student-centered approach that utilizes technology and prioritizes active collaborative learning experiences (Calderón et al., 2021; Wang et al., 2022).

Previous studies have also shown that FL can lead to improved student engagement and achievement, increased student-teacher interaction, and more efficient use of class time (Calderón et al., 2021; Wang & Chen, 2022). Specifically, Koh et al. (2020) examined pre-service physical education teachers' perceptions of FL in a physical education teacher education program. As a result, FL benefits are summarized as facilitating student-centered learning, promoting self-directed learning, and encouraging real-world application (Calderón et al., 2021). In another study, Wang and Chen (2022) examined the application of FL in public physical education in ordinary colleges and universities. Specifically, this result indicated that students could learn anytime and anywhere, allowing them to continue their education. Also, FL could increase teacher-student interaction and play an important role in the teacher-student teaching relationship. Lastly, autonomous learning through students' personalized learning is better suited to developing students' academic performance during the FL format.

These studies collectively suggest that implementing flipped learning in physical education can

lead to positive outcomes such as increased academic achievement, cognitive engagement, self-efficacy, motivation, and enjoyment. In addition, flipped learning provides opportunities for student-centered, active learning experiences that enhance conceptual understanding and skill development in physical education.

In 2014, the FL network provided a framework of four pillars of FL for effective implementation (Chen et al., 2014; Zhao et al., 2021). Since then, many studies have used this framework to construct effective FL in higher education. The four pillars of FL include 1) a flexible environment, 2) a learning culture, 3) intentional content, and 4) a professional educator. Firstly, FL requires a flexible learning environment that allows physical education students to learn at their own pace, with access to various resources and materials, including pre-recorded instructional videos, interactive activities, and online discussion forums. Secondly, FL encourages a learning culture that values collaboration, active learning, and student engagement. Thus, physical education instructors facilitate in-class discussion and interaction among students, encouraging them to work together to achieve course goals.

Thirdly, FL requires intentional content to engage and challenge physical education students, using various media and resources to reinforce key concepts and skills. Lastly, FL requires a professional educator skilled in using technology and other resources to facilitate student learning. Physical education instructors must be able to create and curate instructional content, facilitate online discussions, and provide personalized feedback and support to students to help them achieve their learning goals. Finally, the instructors must be able to assess student progress and adjust their teaching strategies accordingly. Overall, the four pillars of FL provide a framework for physical education instructors to create a more personalized, engaging, and collaborative learning experience for their students (Wilson, 2020).

3. Methodology

3.1 Research Context

This study collected data sources from a local private university in South Korea. 103 Korean physical education pre-service teachers (PSTs) registered for the FL courses. All prospective physical education teachers (PSTs) must take courses to obtain their teaching certificate. The FL course has three stages: pre-class, in-class, and after-class. Before attending the in-class sessions, university students must watch pre-recorded lectures by FL instructors and pre-view course materials through a learning management system (LMS). During the in-class sessions, physical education PSTs are randomly divided into groups of 3-4 people to participate in collaborative and team-based activities, such as group discussions and presentations. Finally, physical education PSTs must share their reflections on what they have learned in the course LMS after the class.

3.2 Data Collection and Analysis

Data was collected from a South Korean private university for this study. The participants were 103 Korean physical education pre-service teachers (PSTs) who enrolled in the mandatory FL course. The data collection and analysis followed a specific process. Initially, an exit survey was conducted at the end of the 2022 Fall semester to evaluate the satisfaction and opinions of the PSTs toward the FL classes. The survey was adapted and revised from previous studies (Chen et al., 2014; Lee et al., 2022) and consisted of six areas and 35 questions, including personal information, flexible learning environment, learning culture, intentional content, professional educator, and course satisfaction. The quantitative data from this study were analyzed using IBM SPSS Statistics for descriptive statistics. In addition, focus-group interviews were conducted (n=8). All interview participation was voluntary, and there was no monetary compensation. Two groups of focus-group interviews were asked about their FL experiences based on the four pillars of FL. Interview data were analyzed based

on thematic analysis. Table 1 shows the demographic of survey participants.

Table 1. Survey participants

Category		Frequency (N=103)	Percent
Gender	Male	36	35.0
	Female	67	65.0
Grade Level	Freshman	4	3.9
	Sophomore	42	40.8
	Junior	33	32.0
	Senior	24	23.3

4. Results

4.1 Survey results

Table 2 shows the descriptive statistics of the survey result. Guided by four pillars of FL, the survey results are as follows.

Table 2. Survey result

Components	Questions	M	SD
Flexible Environment	1. I can participate in online learning anytime, anywhere.	4.24	.846
	2. Online education provides a flexible learning environment.	4.19	.817
	3. I can pause or re-watch the pre-recorded video whenever I want.	4.50	.765
	4. I was able to learn at my own learning pace.	4.36	.884
	5. During class, the professor provided us with various learning activities.	4.32	.795
Learning Culture	1. I watch the pre-class videos and read textbooks in advance (before class).	4.15	.856
	2. Before class, I prepare the course materials in advance.	4.19	.793
	3. I can freely express my thoughts and opinions during class.	3.85	.912
	4. I started self-directed learning due to FL classes.	3.98	.980
	5. During class, I actively participated in various learning activities.	4.12	.932
Intentional Contents	1. The length of the pre-class video is appropriate.	4.32	.877
	2. The content and structure of the pre-class video are effective for learning.	4.25	.825
	3. The amount of pre-class learning is appropriate.	4.15	1.004
	4. The pre-class video helped me to understand the learning content.	4.20	.809
Professional Educator	1. The professor often encourages or praises us during learning activities.	4.09	.981
	2. The professor answers students' questions appropriately during class.	4.37	.874
	3. The professor helps or encourages us to check if the learning process is appropriate.	4.18	.883
	4. The professor listens carefully to the student's thoughts and opinions.	4.31	.886
	5. The professor helps us to understand the learning content easily.	4.35	.837
	6. The professor's evaluation methods are properly informed.	4.42	.786
	7. The professor provided feedback to individuals or groups of students.	4.46	.764
	8. The professor encouraged us to study deeply.	4.32	.782
Class Satisfaction	1. I like this FL class because I can learn new things.	4.26	.907
	2. I have the confidence to do well in this FL class.	3.99	1.024
	3. I became interested in studying subjects through this FL class.	3.99	.965
	4. This FL class is effective in achieving the learning goals.	4.17	.951
	5. My learning outcome through this FL class is positive.	4.23	.952
	6. Overall, I am satisfied with the FL course.	4.28	.944
	7. I am willing to take another FL course in the future.	4.18	.978

Physical education pre-service teachers evaluated the flexible learning (FL) course positively. They found the pre-class videos helpful as they could re-watch or pause the recorded lectures (score of 4.50±.765). The FL format allowed them to participate in online materials without time or space constraints (score of 4.24±.846). Additionally, FL classes helped them develop self-directed learning skills. They studied the pre-class materials in advance (score of 4.19±.793) and felt more prepared before attending in-class (score of 4.15±.856). They also actively participated in various collaborative activities during the in-class FL course (score of 4.12±.932). The PSTs found the length (score of 4.32±.877) and amount (score of 4.15±1.004) of pre-recorded lecture videos appropriate. They also concluded that the FL content was effective for learning (score of 4.25±.825). The FL instructor was considered a professional educator who provided systematic instruction design with knowledge and instant feedback. The instructor provided instant feedback during in-class activities with individual learners (score of 4.46±.764), explained the contents effectively (score of 4.35±.837), and continuously checked the students' learning status (score of 4.18±.883). Overall, the PSTs were satisfied with the FL course (score of 4.28±.944) and were strongly willing to take it again (score of 4.18±.978).

4.2 Interview Results

The four pillars of flipped learning can also interpret interview data. First, PSTs in physical education majors mentioned that pre-recorded instructional videos in the FL format were effective because the PSTs could enhance their self-directed learning skills. Also, PSTs evaluated that FL offered a flexible learning environment. For example, they could have time to read and prepare the course materials before class. Thus, it helped PSts actively participate in collaborative learning activities during the in-class FL course because they are more prepared to work on team projects and group discussions. Here are some examples from the interview transcripts.

> *We are more prepared to focus on the class if it is in FL format. For example, we did not pre-view the materials in a traditional class, but in FL, we had to watch and read materials in advance. Otherwise, we could not follow the various activities during the class (Focus group interview, SS 1).*

> *The quiz evaluated the pre-class video, so we had to watch it. It could be extra work at first, but we realized we could practice and learn more in FL format (Focus group interview, SS3).*

Third, PSTs mentioned that the pre-recorded lecture video length and amount were appropriate. As a result, they responded that pre-class videos helped them better understand the learning content. Fourth, PSTs satisfied the individual feedback that was conducted during the class. Thus, students' questions can be answered or addressed appropriately. Here is an example based on this theme.

> *FL made us become more self-directed learners. Thanks to the FL format, I am pretty sure we have more responsibility for our learning progress and performance. Self-directed learning is on us, not somebody doing jobs for us (Focus group interview, SS 8).*

However, a few PSTs might not be satisfied with the pre-recorded lecture videos because they wanted immediate feedback from their PE coaches. Here is an example based on this theme.

> *We want to have a pre-class video via synchronous format. If it is in Zoom format, we can ask the instructors for feedback on our performance immediately. In addition, the Zoom group function best provides feedback for pre-lecture materials (Focus group interview, SS5).*

Overall, PSTs were generally satisfied with the FL. Furthermore, they showed a strong willingness to take the FL classes again. Here is an example based on this theme.

Overall, this FL format was good. We think that FL is better than a lecture-oriented class. The lecture format is somewhat boring without using educational technology in the class (Focus group interview, SS7).

5. Discussion

This study investigated the experiences of Korean university students who took FL courses in physical education. The aim was to understand their satisfaction and evaluation of the FL courses. The study showed that physical education PSTs found FL to provide a flexible learning environment. The pre-class learning materials were efficient and helped students participate actively in various collaborative activities during class. The students found that instructional videos in the pre-class materials helped them better understand the learning content. This finding is consistent with previous research on efficient FL classes.

Furthermore, FL allowed students to watch and re-watch lecture videos whenever needed, increasing their satisfaction with the learning experience. The study also revealed that FL could gradually increase university students' self-confidence in understanding the content, enhancing their self-directed learning skills. Previous studies have shown that FL could impact students' learner autonomy and make them more self-confident in learning. Finally, the study found that the students were satisfied with the FL classes and were willing to take them in the future. This result aligns with previous studies showing students' positive perceptions and assessments of FL. The flipped classroom model allows university students to study independently and acquire relevant and specific support while interacting deeply with the learning content and colleagues.

Survey results were consistent with previous studies. However, interview findings showed some challenges in implementing FL for physical education majors. For example, although PSTs liked the FL format, a few students liked receiving instant real-time feedback from course instructors via online lectures. This finding indicated that PSTs could want a synchronous Zoom session if they need instance coaching from the course instructors. Therefore, this interview could differ from previous studies and be interpreted as a specific discipline that needs FL's different approaches and implementation. Thus, it is concluded that FL course instructors must carefully design their FL courses based on specific majors and disciplines. As a result, FL can allow physical education instructors to provide immediate feedback to students during in-person class time, which can help students improve their technique and form and reduce the risk of injury (Chung & Lee, 2018; Ferriz-Valero et al., 2022; Yoshida, 2016).

In summary, regarding the effectiveness of FL implementation for physical education, previous studies have shown that FL can increase student engagement (Koh et al., 2020; Sargent & Casey, 2020; Yoshida, 2016). In addition, by providing physical education students with pre-recorded instructional videos, flipped learning frees up more class time for hands-on, interactive fitness activities, which can increase student engagement and motivation. Finally, although the implementation of FL may have a few challenges, it can be concluded that PSTs showed positive reactions to FL for physical education majors.

6. Conclusion

Since flipped learning is a popular approach in a worldwide university classroom, expanding the scope with diverse disciplines and student populations is necessary. This study examines Korean university students' evaluations and satisfaction with flipped learning for physical education courses. The data was collected in 2022 fall, including the course exit survey and focus-group interviews. The findings are as follows: Firstly, it was discovered that FL provides PSTs with a flexible learning environment, allowing them to pre-view course materials at their convenience. Secondly, the FL format aids PSTs in improving their self-directed learning skills as they pre-view the material before attending the F2F class. As a result, most PSTs feel better prepared to tackle in-class assignments. Thirdly, the FL course instructor was highly evaluated by PSTs as a professional educator who

effectively conveyed the course content intentionally and structured. However, focus-group interviews revealed some limitations of the FL format, as PSTs preferred instant feedback from course instructors via F2F or synchronous Zoom lectures. Lastly, several implications were discussed to implement FL for physical education courses in higher education effectively.

7. Recommendations

Adopting FL in higher education requires careful planning and preparation to ensure its success. Here are some steps to consider when implementing FL in higher education. First, the FL instructor should clearly define the learning objectives for each course and align them with the FL model. This effort of FL instructors will help ensure that the course content and activities are well-suited to the FL approach. Also, FL instructors should choose appropriate technology to support FL, such as a video lecture platform or interactive tools. It is suggested that the technology is user-friendly, accessible, and reliable.

In terms of university support for faculty and students, the institution should support students and faculty throughout the FL implementation process, including training on technology and pedagogical strategies and ongoing professional development opportunities. For instance, higher education should provide an FL workshop, including student feedback, assessment results, and observation of class activities. This FL workshop will help identify improvement areas and ensure that FL continues to meet the needs of students and faculty. By following these steps, higher education institutions can successfully implement FL and create an engaging and effective learning experience for their students.

The success of flipped learning in higher education depends on several factors. First, properly implementing the approach, including a well-designed online learning environment and clear student expectations, is key to success (Goad et al., 2021; Yoshida, 2016). Additionally, course instructors must have adequate training and support to ensure they can effectively facilitate in-class activities and provide timely feedback to students (Gündüz & Akkoyunlu, 2019). Also, students should be trained as active learners who complete tasks before the course (Koh et al., 2020; Yoshida, 2016).

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Appendix: Group-Group Interview Questions

Q1: Can you share your experience or knowledge of flipped learning in the context of physical education majors?

Q2: What in-class activities did you incorporate to reinforce the concepts learned outside the classroom?

Q3: What challenges did you encounter during the flipped learning in physical education?

How did you address those challenges?

Q4: What were your reactions or feedback regarding the flipped learning approach?

Q5: Did you notice any changes in your academic achievement, motivation, or conceptual understanding due to flipped learning?

If so, could you provide some examples?

Q6: How did the flipped learning approach impact your learning in physical education?

Q7: What advice or recommendations would you give other educators or physical education majors interested in implementing flipped learning?