Flipped Learning as a Solution to Increase Motivation and Academic Achievement: Five Weeks of Mixed Research

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Abstract. In recent years, studies have shown a decrease in students’ motivation and academic achievement in physical education at the university level. This research seeks to address this problem. Specifically, this study aims to investigate the effects of the Flipped Learning model and its potential to increase motivation and academic achievement. This study employed a mixed method. Participants (n=40) were students at the State University of Surabaya (Indonesia). Each participant was placed either in an experimental group that received the flipped learning program (n=20) or a control group whose classes were conducted using traditional methods (n=20). A quantitative research instrument, namely a questionnaire on motivation in physical education classes, was used to measure motivation. Meanwhile, test results were used as indicators to review the progress in student academic achievement. The qualitative research instrument consisted of in-depth interviews lasting 40 minutes. Quantitative data analysis was carried out using IBM SPSS, and qualitative data were subjected to thematic analysis. The findings from this study make several contributions to the current literature. First, the quantitative study showed that flipped learning significantly increased motivation (p<0.05). Second, the study found that flipped learning helped increase students’ academic achievement (p<0.05). These significant benefits were not found in the control group (p>0.05). Meanwhile, the qualitative findings showed that participants had both positive and negative views of the implementation of flipped learning. Thus, it can be concluded that Flipped Learning is an effective way to increase motivation in physical education classes and, in turn, to improve academic achievement.

Keyword: Flipped; Motivation; Academic Achievement; Mixed Method

Aprendizaje invertido como solución para aumentar la motivación y el rendimiento académico: 5 semanas de investigación mixta

Resumen. En la actualidad existe un fenómeno que muestra una disminución en la motivación y el rendimiento académico de los estudiantes en el aprendizaje de la educación física a nivel universitario, y este es un problema de esta investigación. Por lo tanto, este estudio tiene como objetivo investigar el efecto del programa modelo de aprendizaje Flipped como una solución para aumentar la motivación y el rendimiento académico. Este estudio adoptó un método mixto. Los participantes eran estudiantes de la Universidad Estatal de Surabaya (n=40) (Indonesia). Los participantes se dividieron en un grupo experimental que recibió el programa de aprendizaje Flipped (n=20) y un grupo de control que recibió aprendizaje convencional (n=20). Se utilizaron instrumentos de investigación cuantitativa, a saber, un cuestionario sobre la motivación en las clases de educación física, para medir la...
motivación. Además, los resultados de las pruebas de conocimiento se utilizaron como indicadores para revisar el progreso en el rendimiento académico de los estudiantes. Mientras que, el instrumento de investigación cualitativa utilizó entrevistas en profundidad durante 40 minutos. El análisis de datos cuantitativos utilizó IBM SPSS y el análisis temático cualitativo. Los hallazgos de este estudio hacen varias contribuciones a la literatura actual. Primero, el estudio cuantitativo mostró que Flipped Learning tuvo un efecto significativo en el aumento de la motivación (p<0.05), segundo, también se demostró que Flipped Learning tuvo un efecto en el aumento del rendimiento académico de los estudiantes (p<0.05), pero no se encontró ningún efecto significativo encontrado en el grupo control (p>0.05). Mientras tanto, los hallazgos en la investigación cualitativa mostraron que los participantes proporcionaron opiniones positivas y negativas sobre la implementación del aprendizaje invertido. Por lo tanto, se puede concluir que Flipped Learning es una de las soluciones efectivas para realizar educación física para aumentar la motivación, por lo que puede aumentar el rendimiento académico.

**Palabra clave:** volteado; Motivación; Logro académico; Método mixto
Introduction

During the COVID-19 pandemic crisis, it was decided that physical education classes would be held online (Jumareng et al., 2021; Yu & Jee, 2021; Hanif et al., 2021; Jumareng et al., 2022; Chu & Li, 2022). The switch to online learning took place in several countries in the world, including Indonesia, in an attempt to maintain learning activities during lockdowns (Coman, Tiru, Mesesan-Schmitz, Stanciu & Bularca, 2020). One study reported that online learning had a positive impact on physical education learning (D’Agostino et al., 2021), but others found a range of barriers and difficulties in online learning (e.g., poor internet connectivity, minimal technological facilities) (Almahasees et al., 2021; Jumareng et al., 2021; Blain et al., 2022), issues that have contributed to a decline in students' abilities during the current COVID-19 period (Hammerstein et al., 2021). Data suggest that among the consequences of COVID-19 for students have been decreases in motivation and academic achievement (Yuda et al., 2022; Aru et al., 2022).

Motivation is one of the most important aspects of the contemporary physical education learning process (Jang et al., 2021). Motivation can be defined as someone’s desire to follow and achieve a goal (Nekar et al., 2022). Without motivation, student engagement is low throughout the learning process (Botella et al., 2021). Consequently, a lack of motivation leads to difficulties in learning, regardless of the subject matter (Moreno-Murcia & Hernández, 2019). Motivation is also the key to self-discipline, perseverance, and responsibility while studying (Claver et al., 2020; Mata et al., 2021), and it is a parameter of academic success (Steinmayr et al., 2019). Data from a previous study indicated that the problem in physical education was students’ lack of interest and motivation in gaining knowledge or learning new skills (Ruano et al., 2021; Fernandez-Rio et al., 2022). Lockdown measures led to a further decrease in students’ motivation to learn (Jang et al., 2021). The fact that people were not able to do activities outside the home (Dor-Haim et al., 2021; López-Valenciano et al., 2021; Joseph & Schori, 2022) interfered with the kinds of group learning activities that are habitually carried out on a regural basis. In addition, the prolonged lockdown led students to more sedentary behavior such as sitting and lying down, watching TV, and playing games (Rahim et al., 2022).

The crisis associated with the COVID-19 pandemic also led to decreases in students’ academic achievement (Yuda et al., 2022). For example, a study by Woessmann (2020) found that COVID-19 had a significant negative impact on academic achievement at school and at the university level. Academic achievement is a reflection of the knowledge and skills achieved by students after participating in learning (Hagen et al., 2022). If students achieve more academically, then they will have a greater chance to succeed in the future (Moore, 2019). Meanwhile, low academic achievement can lead them fail to graduate from college, and to have difficulties in finding jobs (Tentama & Abdillah, 2019), resulting in lower income (Hammerstein et al., 2021). Many variables have been found to affect students’ motivation and academic achievement at the university level, but one of them is the Flipped Learning model.

Flipped Learning is a model applied at the university level. It is a versatile pedagogical tool designed to encourage active learning (Killian & Woods, 2018; Sargent & Casey, 2020). The Flipped Learning process consists of various steps. In the first phase, students get class material in video format from the lecturer so that they can watch it at home. In the second phase, students present the results of analysis, discussion and group work on the subject matter face to face in class (Campos-Gutiérrez et al., 2021). Flipped Learning can combine online and face-to-face classes (blended learning) (Otero-Saborido et al., 2018; Sargent & Casey, 2020). Several previous studies have documented the effectiveness of Flipped Learning. For example, this approach has been found to help students improve their academic achievement (Custodio & Pintor, 2021) and to develop critical thinking, cooperation, problem solving skills (Thai et al., 2017). Flipped Learning helps change passive students into students who take an active role in their learning process (Hinojo Lucena et al., 2020), but unfortunately research has found that this model is rarely used, and it has received less attention in physical education (Sargent & Casey, 2020).

Recently, the issue of Flipped Learning has been extensively studied internationally using various research methods (Han & Rekenes, 2020; Hinojo et al., 2020; Botella et al., 2021; Soriano-Pascual et al., 2022; Dimarucot, 2022). However, there is no previous research employing a mixed method analysis to investigate the ability of Flipped Learning to increase students’ motivation and academic achievement. This research could shed light on an alternative learning solution for lecturers in physical education and contribute to the development of student motivation and academic achievement during and after the COVID-19 pandemic crisis. Therefore, this study aims to investigate the effect of Flipped Learning on motivation and academic achievement.

Methods

This study consisted of a combination of quantitative and qualitative research, often known as a mixed method. This choice of method was based on previous studies which had proven the effectiveness of solving problems quantitatively and qualitatively (Gani et al., 2022). More specifically, the study uses an explanatory sequential design, with a first stage involving documentary research and quantitative data collection and a second consisting of more research and qualitative data collection. More details about the stages of explanatory sequential design are presented in Figure 1.
Participants

Participants in this study were sports students from the State University of Surabaya (Indonesia). Participants were recruited randomly through email invitations sent to students enrolled in all years of the university degree program. We received 40 responses from students indicating interest in being further involved in this research. The recruitment took place in July 2022. All participants were asked to sign a letter expressing their willingness to become participants in this study. Ethics clearance was granted by the Surabaya State University Committee with the number: E-460/UNESA-7/2022) prior to any data collection. Participants were placed either in the experimental group (n=20), who received treatment in the form of a Flipped Learning model, or in the control group (n=20), who continued with their usual daily learning. The characteristics of the participants are presented in Table 1.

Instruments

The study used the following types of quantitative and qualitative instruments:

Quantitative Instruments

- Questionnaire on Motivation in Physical Education Classes. This study adapted the instrument measuring motivation in physical education classes from a previous study (Ferriz-Valero et al., 2022). This questionnaire has 20 items, which for the purposes of this study were modified to meet the characteristics of university-level students. Some examples of items were (i) Doing physical education using Flipped Learning is more fun, (ii) Flipped Learning motivates me more to learn, (iii) Using Flipped Learning, I can optimally gain knowledge and skills in the field of sports, (iv) Flipped Learning increases my attendance rate. These items are answered on a Likert scale ranging from 1 = “strongly disagree” to 5 = “strongly agree”. This instrument has a Cronbach’s Alpha reliability coefficient of 0.88 and a validity coefficient scale of 0.86 in this study.

- Academic achievement. The instrument used to measure the level of academic achievement was a knowledge test, the score of which was calculated based on total points obtained by students. The average knowledge test results can be considered an indicator of students’ progress in academic achievement (Gustems-Carnicer et al., 2020; Yuda et al., 2022). This instrument has a Cronbach’s Alpha reliability coefficient of 0.81 and a validity coefficient scale of 0.84 in this study.

Qualitative Instruments

In this study, qualitative data were collected using an in-depth interview with participants in the Flipped Learning group. Each interview lasted 40 minutes, and they were conducted in the Bahasa language (Gani et al., 2022). Interviews were only held with participants who had received Flipped Learning, in accordance with the study’s focus and with the application of variables in this study.

Procedure

This study was conducted from August to September 2022 at the State University of Surabaya (Indonesia). The implementation followed the guidelines of the World Medical Association Code of Ethics (Helsinki Declaration for humans), which regulates research with human subjects. Quantitative data collection took place at distinct times. First, on August 1, 2022, all participants were given a pre-test (motivation and academic achievement). The second set of data collection was on August 3, 2022, when the experimental group carried out the Flipped Learning model program, while the control group only carried out their traditional daily lecture activities until the 13th class meeting (August 29, 2022). Then at the 14th meeting (31 August 2022), participants were given a post-test.
all participants carried out a final test activity, completing the instruments measuring motivation and academic achievement.

The Flipped Learning model program was conducted on Mondays, Wednesdays and Fridays at 08.00 am until the end of the session. This study applied the COVID-19 health protocol, namely, all participants and the research team were checked for body temperature and used hand sanitizer. The qualitative research was conducted on September 2, 2022, when the members of the Flipped Learning model group were each interviewed for 40 minutes about their experiences with Flipped Learning. The programs carried out with the two groups are presented in Table 2.

**Table 2. Flipped and conventional learning model programs**

<table>
<thead>
<tr>
<th>Description</th>
<th>Flipped Learning</th>
<th>Conventional Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student-centered</strong></td>
<td>Students analyze assignments in the form of videos via the Edpuzzle Platform at home</td>
<td>Lecturers explain the assignments to students</td>
</tr>
<tr>
<td><strong>Active learning</strong></td>
<td>Students discuss and work together to complete assignments in class</td>
<td>Passive learning</td>
</tr>
<tr>
<td></td>
<td>Students present the results of their assignments in class</td>
<td>Lecturers guide students in completing the assignments</td>
</tr>
<tr>
<td><strong>At home</strong></td>
<td>In the class</td>
<td>The first phase of learning is carried out in the classroom</td>
</tr>
<tr>
<td><strong>In the class</strong></td>
<td>In the first phase, students do their assignments at home online</td>
<td>At home</td>
</tr>
<tr>
<td></td>
<td>The second session is conducted in class face to face</td>
<td>In the second phase, students do their assignments at home</td>
</tr>
</tbody>
</table>

**Table 3. Statistical Descriptive**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>FG (n = 20)</th>
<th>CG (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Motivation</td>
<td>71.60(12.5)</td>
<td>75.10(11.5)</td>
</tr>
<tr>
<td>Academic achievement</td>
<td>67.75(5.73)</td>
<td>79.70(6.29)</td>
</tr>
</tbody>
</table>

Note: FG = Flipped group, CG = Control group, n = Participant, M = Mean, SD = Standard deviation.

**Table 4. Differences in the pre-test and post-test scores for motivation and academic achievement in the FG and CG groups**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>FG (n = 20)</th>
<th>CG (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>Pre-Post</td>
<td>t</td>
<td>p</td>
</tr>
<tr>
<td>Motivation</td>
<td>3.50(1.65)</td>
<td>6.708</td>
</tr>
<tr>
<td>Academic achievement</td>
<td>11.50(3.37)</td>
<td>10.77</td>
</tr>
</tbody>
</table>

Note: FG = Flipped group, CG = Control group, n = Participant, M = Mean, SD = Standard deviation, p = Significance.

**Qualitative analysis**

Data obtained from qualitative research were analyzed thematically qualitatively. The in-depth interviews results were coded and categorized into three themes, and within each theme are two subthemes (Gani et al., 2022):

Theme 1: Ease of Flipped Learning
- Subtheme: Learning media.
- Subtheme: Study time.

Theme 2: Difficulties involved in Flipped Learning
- Subtheme: Technological tools
- Subtheme: Poor internet connection.

Theme 3: Impact
- Subtheme: Impact of Flipped Learning on student motivation.
- Subtheme: Impact of Flipped Learning on student academic achievement.

**Results**

The normality test indicated that data was normally distributed (p>0.05). Descriptive statistical data are presented in Table 3. The results of the paired-samples t-tests indicated that the Flipped group showed a significant positive effect in terms of an increase in the level of motivation and academic achievement (p<0.05), but there was no significant effect in the control group (p>0.05) (Table 4).
Meanwhile, the qualitative research, which was conducted through in-depth interviews with the Flipped Learning group, yielded the following answers:

**Theme 1: Advantages of using Flipped Learning**

Subtheme: Learning media (educational technology)

Learning media (educational technology) can serve as crucial pedagogical tools to support in supporting the implementation of physical education learning during the current COVID-19 pandemic crisis. In this regard, several participants argued that:

In our opinion, Flipped Learning is a method that has advantages in terms of using online educational technology. For example, we used Edpuzzle and other platforms to gain knowledge at home (results of interviews with two male participants).

Flipped Learning was very effective during the pandemic crisis, because we were able to interact, discuss between students and lecturers online (results of interviews with four male participants). Furthermore, some participants argued that:

In Flipped Learning, there were many learning media that could be used, for example Zoom, Edpuzzle, Google Meet and others. All of these media help us to gain knowledge (interview with four female participants).

Utilizing various kinds of educational media in Flipped Learning encouraged us to feel enthusiastic and not bored in attending lectures (results of interviews with four female participants). Three male participants stated:

Yes, it was more fun to learn a lecture material by watching videos on the Edpuzzle platform.

In our opinion, the advantage of Flipped Learning was in the application of media or online platforms, so that we were able to efficiently and effectively carry out learning (interview with four female participants). Three male participants stated:

Study time is an important factor that needs to be considered in carrying out learning in physical education classes. With insufficient time, the material will not be delivered optimally. In this case, the participants revealed their opinion that:

Another advantage of Flipped Learning is we have enough time to study the material. For example, before class we can study at home by analyzing lecture assignments given by lecturers in the form of videos. Then, during class, we also had discussions, worked together to solve assignments and then presented them (interview results with four female participants).

When learning was carried out online at home, we had a long time to study, from 08.00-11.00 am for each session. This was longer than when learning was conducted in class, when we only had from 08.00-09.40 am. With this long study time, we were able to gain a lot of knowledge (results of interviews with three female participants). Some participants also revealed their opinion that:

After an online session at home, we usually continue by searching the internet for the assignments given by the lecturer, so that our study time is endless when we are at home (results of interviews with four female participants).

Flipped Learning provided freedom in utilizing our study time, which meant that we could discuss topics together all day long to analyze the learning assignments given by the lecturer (results of interview with one female participant). That’s right! We spent several hours looking for references on YouTube or other sources on the internet in order to find a solution to complete the assignment (results of interviews with three male participants). Some argued that:

In our opinion, the Flipped Learning provided more learning time than conventional learning, and another advantage was it can be carried out anywhere and anytime (results of interview with five male participants).

Yes! It’s true! Simply by connecting our cellphone to the internet network, we were able to have discussions for hours (results of interviews with two male participants).

**Theme 2: Difficulty using Flipped Learning**

Subtheme: Technological tools

Technology such as computers, cellphones and laptops are important tools in carrying out Flipped Learning, and when students did not have access to all of these technologies, learning outcomes were not achieved optimally (results of interviews with four male participants). Then, some of the participants argued that:

Flipped Learning is very dependent on the use of a technology. For example, lecturers often make videos that are stored in Edpuzzles, and we are required to download the video. This means that if we didn’t have a computer, laptop or sophisticated smartphone, we wouldn’t be able to follow the lessons online (interviews Results with 3 male participants).

I totally agree! Because not all students have high economic status, they don’t all have laptops or sophisticated smartphones (results of interview with one female participant). This is an obstacle or difficulty that often arises in carrying out Flipped Learning, so we often participate with friends who have laptops (results of interviews with four female participants).

Subtheme: Poor internet connection

The next problem that is often encountered in carrying out Flipped Learning was a poor internet connection.
This made it difficult to interact with classmates or lecturers (results of interviews with two female participants). Some argued that:

When we did Flipped Learning in rainy weather conditions, the internet connection often failed. This made it difficult to access the Edpuzzle (results of interviews with four male participants).

The internet network is the key to success in carrying out Flipped Learning at home as well as in supporting the success of lecturers in delivering assignments optimally (results of interviews with four female participants). Some participants argued that:

We really like Flipped Learning! Physical education classes through Flipped Learning make us more motivated to learn (results of interviews with two male participants).

Previously, when we did not use Flipped Learning, we were always less motivated to learn. We often didn’t go to class, but that all changed when we got to know the Flipped class model (results of interviews with three male participants).

Subtheme: Impact of Flipped Learning on student academic achievement

We are very lucky to become familiar with and follow Flipped Learning, because we gained benefits including a gradual increase in our academic achievement (results of interviews with three female participants). That’s right, we can’t believe we got a better score after taking the Flipped class (results of interviews with two female participants). Other participants argued that the experience was:

Amazing! Thanks to Flipped Learning, our academic achievement has improved significantly. I hope physical education classes can continue to apply the Flipped Learning model in a sustainable manner (results of interviews with four male participants).

Of course, our academic achievement increased, because in the Flipped class we were required to study at home online and study in the classroom face-to-face (results of interviews with two male participants). I totally agree, because in conventional learning, I always get low grades, but after taking a class with Flipped Learning, my grades increased (results of interview with one female participant).

Discussion

The aim of this study was to investigate the effects of using the Flipped Learning model on students’ motivation and academic achievement. This was to be accomplished using a mixed method.

The first finding quantitatively shows that Flipped Learning increased students’ learning motivation levels in physical education classes during the COVID-19 pandemic crisis, because the Flipped class had advantages in the context of learning systems that were carried out online (at home) (Romero-Garcia et al., 2019; Romero-Garcia et al., 2021; Bhai & Poustinchian, 2021) and face-to-face (in class) (Parra-Gonzalez et al., 2021). According to previous studies, the main strength of the Flipped class model is the ability to transfer knowledge online with computer technology (Haidov & Bensen, 2021). When students do not understand certain materials during online classes, the subject matter can be repeated in face-to-face classes. Similar evidence was offered by Romila et al. (2021), who observed that if the physical education lecture material was poorly understood by students due to interference from a bad internet network, students could discuss what they had missed in class meetings (Killian & Woods, 2018). The results of this study supported those of previous studies which showed that Flipped Learning tended to increase the motivation of unmotivated students (Campos-Gutiérrez et al., 2021; Botella et al., 2021).

The second finding quantitatively shows that students’ academic achievement increased after taking the Flipped class (Torres-Martín et al., 2022). This is because the Flipped class model promotes learning that requires students to be able to analyze, solve problems, discuss and work together to complete all the assignments given by the lecturer (Marqués-Molias et al., 2019). Previous studies reported that academic achievement in physical education classes increases if the classes involve interactive, active learning (Hwang et al., 2019) and student-centered learning (Fuchs, 2021). According to Custodio and Pintor (2021), Flipped Learning has several strengths that can contribute to academic achievement. For example, there is the fact that learning is conducted in two different ways, namely in online classes (in which students can learn material related to assignments in advance) and face-to-face classes (in which students can interact and discuss the material) (Zhao, 2022). This study results were in line with those of previous studies that found that using a Flipped model in physical education was an effective way to improve student academic achievement (Vaughn et al., 2019; Mischenko et al., 2020; Fang et al., 2022).

Meanwhile, the qualitative findings show that most of the participants expressed a positive opinion about
the learning model (Fuchs, 2021). Some, for example said that the Flipped class model was very efficient (Hew & Lo, 2018) and was and an effective in physical education classes during the pandemic (Ferriz-Valero et al., 2022). However, some participants offered negative opinions, citing, for example, that not all students have sophisticated computers, laptops or smart phones and that poor internet connection had often prevented them from participating in Flipped Learning.

Conclusion
Based on the results and discussion above, it can be concluded that Flipped Learning has proven effective at increasing students’ motivation and academic achievement and that it is a suitable solution for the implementation of physical education during the current COVID-19 pandemic crisis. However, as has been the case in other research, the scope of this study was limited to students from one university in Indonesia, so future research is needed with participants from additional universities in Indonesia. This research contributes to the existing knowledge and advice to stakeholders wishing to apply Flipped Learning in a sustainable and comprehensive manner at all levels of education.

Conflict of interest statement
The authors report no conflicts of interest.

References


