

The Effectiveness and Student Satisfaction on Aerobics Instruction in Flipped Classroom Modality

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Abstract: Flipped classroom, as an innovative teaching model, has been widely applied and validated in various disciplines, but its effectiveness and applicability in professional fields such as aerobics teaching are still uncertain. This study randomly selected 368 college students from Sichuan University for Nationalities in Sichuan Province, China for a survey. Descriptive quantitative research methods were used to describe the effectiveness of flipped classroom implementation in college aerobics teaching and the current situation of student satisfaction. The aim was to provide insights for guiding the improvement of the effectiveness and student satisfaction of flipped classroom implementation in college aerobics teaching, and to understand the influencing factors and implementation conditions that affect these aspects. Specific suggestions have been put forward from a macro perspective to address the existing problems. These strategies contribute to an enriched learning experience, providing comprehensive support for students' aerobic education and overall learning journey.

Keywords: Flipped Classroom; Teaching Effectiveness; Satisfaction.

1. Introduction

With the rapid development of educational technology in the 21st century, traditional teaching methods increasingly faced challenges, prompting educators to seek more modern, effective, and student-centered instructional strategies. Against this backdrop, the flipped classroom model was born. In contrast to traditional teaching, the flipped classroom emphasized the shifting of foundational knowledge acquisition outside the classroom through pre-made videos or other digital materials, with class time primarily reserved for in-depth discussion, practice, and problem-solving.

However, while the flipped classroom model has been extensively applied and validated in many disciplines, its use in aerobics instruction remained relatively uncharted territory. Aerobics, blending artistry with skill as a sporting activity, posed unique demands on teaching methods and strategies. Traditional aerobics teaching might have grappled with limited time, inadequate student practice opportunities, and insufficient interaction. The flipped classroom, a student-centric approach, presented potential solutions to these challenges.

In the modern educational landscape, alongside technological advancements and the advent of the information age, teaching methods and strategies were continuously challenged and innovated. The flipped classroom was regarded as a valuable complement to traditional teaching, emphasizing utilizing technological tools to provide students with a more personalized, in-depth learning experience. However, despite many disciplines benefiting from this approach, its efficacy and applicability in specialized areas, like aerobics instruction, remained unclear.

Aerobics, an intricate physical activity combining art, skill, and movement, had distinct requirements for students' learning environments and instructional strategies. Traditional aerobics instruction often focused on in-class skill guidance and practice, potentially overlooking students' grasp of foundational theoretical knowledge, and limiting opportunities for in-depth discussions, self-exploration, and

peer interaction.

Observing this educational phenomenon, this study aimed to explore the practical effects of the flipped classroom in aerobics instruction. Researchers aspired to understand whether students' learning outcomes and satisfaction improved when they independently studied aerobics theory outside class and engaged more in discussion and practice within the class.

As a university aerobics instructor, the researcher noticed a prominent trend in daily teaching: despite dedicating substantial time to in-class skill guidance and demonstrations, many students still encountered difficulties in practical applications. They seldom had opportunities for in-class exchanges or deep dives into learned knowledge, limiting their learning depth and breadth. Additionally, given that each student's learning pace and needs varied, the traditional "one-size-fits-all" teaching method seemed inadequate.

Upon further observation, the researcher discerned that students were often ill-prepared before class. Their grasp of foundational aerobics knowledge and skills varied greatly, hampering in-class teaching efficacy. This prompted reflection on how to furnish a more interactive, personalized learning environment where students mastered foundational knowledge before class and focused on practice and in-depth discussions during class.

The importance of the study was that it explored the effectiveness of the flipped classroom model and student satisfaction, provided practical experience, and also offered the education field strong evidence of innovative teaching methods, and was expected to provide useful inspiration for future education practices and research directions.

Driven by these observations and reflections, the researcher developed a keen interest in applying the flipped classroom to aerobics instruction. Through this research, the researcher hoped to identify a more efficient aerobics teaching method tailored to student needs, thereby enhancing their learning outcomes and satisfaction.

1.1. Statement of the Problem

This study aims to investigate the effects and student satisfaction levels of implementing the flipped classroom model in aerobics instruction. Specifically, this study will answer the following questions:

1. What is the profile of the respondents in terms of:
 - 1.1. Gender
 - 1.2. Grade
 - 1.3. Major
2. What is the level of effectiveness in using the flipped classroom in aerobics instruction in terms of:
 - 2.1. Cultivation of autonomous learning abilities
 - 2.2. Practice and feedback
 - 2.3. Deep learning and exploration
 - 2.4. Personalized learning
 - 2.5. Learning motivation and participation
3. Is there significant differences in the levels of effects of the flipped classroom in aerobics instruction when considering demographic variables?
4. What is the level of student satisfaction on implementing flipped classroom in aerobics instruction in terms of:
 - 4.1. Appropriateness and clarity of content
 - 4.2. Timeliness of interaction and feedback
 - 4.3. Technical and resource support
 - 4.4. Organization and management of classroom activities
 - 4.5. Learning outcomes and skill enhancement
 - 4.6. Autonomous learning experience
5. Is there significant differences in the levels of student satisfaction concerning the effects of the flipped classroom in aerobics instruction when considering demographic variables?
6. Is there a significant correlation between the effects and satisfaction levels of college students regarding the flipped classroom in aerobics instruction?
7. Based on the findings of the study, what enhancement plan may be proposed to elevate the effects and satisfaction levels of college students in the flipped classroom for aerobics instruction?

1.2. Scope and Delimitation of the Study

This study aimed to evaluate the effectiveness and satisfaction of the flipped classroom application in aerobics instruction, as well as the relationship between the two. This provided necessary references for enhancing the effectiveness and satisfaction of the flipped classroom.

The main focus of this study was on the relationship and current status of the effectiveness and satisfaction of the flipped classroom application in aerobics teaching. Through literature reviews, questionnaire surveys, and statistical analysis over a period of three months, the study explored the relationship between the effectiveness and satisfaction of the flipped classroom application in aerobics instruction.

The research involved 299 university students. Data were collected using survey tools and assessed using indices such as mean values, percentages, independent sample t-tests, and Pearson correlation coefficients. The results of the study provided references for improving the effectiveness and satisfaction of the flipped classroom application in aerobics instruction, offering a basis for understanding the relationship between the two.

1.3. Research Paradigm

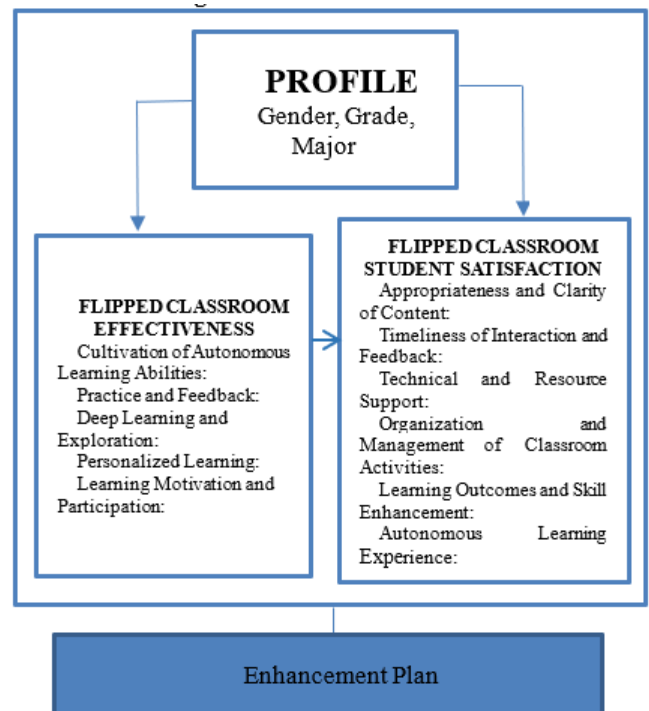


Figure 1. Conceptual Framework

1.4. Hypotheses

Ho1 There are no significant differences in the levels of effects of the flipped classroom in aerobics instruction when considering demographic variables.

Ho2 There are no significant differences in the levels of student satisfaction concerning the effects of the flipped classroom in aerobics instruction when considering demographic variables.

Ho3 There is no significant correlation between the effects and satisfaction levels of college students regarding the flipped classroom in aerobics instruction.

2. METHODOLOGY

2.1. Research Design

This study employed a descriptive quantitative research approach. Specifically, it utilized a descriptive comparative correlational research design, which is deemed appropriate as it pertains to variables describing the effectiveness of flipped classroom implementation in aerobics instruction and student satisfaction. The aim of this study is to evaluate the specific relationship between the effectiveness of flipped classroom implementation in aerobics instruction at universities and student satisfaction, with the assessment results serving as a reference for action planning. A survey method will be used, employing a modified questionnaire as the tool for collecting participant information. The descriptive design is considered the most suitable for this study because, compared to other survey methods, it is the most comprehensive and inclusive tool. In the context of this study, the researchers aim to describe the current status of the effectiveness of flipped classroom implementation in aerobics instruction at universities and student satisfaction. They seek to provide insights into guiding the enhancement of the effectiveness of flipped classroom implementation in aerobics instruction at universities and student satisfaction, while understanding the influencing factors and implementation conditions affecting

these aspects. The study aims to offer guidance and recommendations for improving the current status of flipped classroom implementation in aerobics instruction at Chinese universities and student satisfaction.

2.2. Research Participants

The research will be conducted at Sichuan Minzu College, located in Sichuan Province, China. The study involved 368 college students selected from Sichuan Minzu College in Sichuan Province, China, as participants. The college student participants in this study were enrolled at Sichuan Minzu College in Sichuan Province.

The survey was conducted in the Chinese language environment. After data collection was completed, it was organized and then translated into English.

This study employed a random sampling method to select participants and utilized the Solvang formula to determine the sample size (n). With a total of 4674 college student enrolled, the sample size (n) calculated using the Solvang formula was a minimum of 280 individuals. Consequently, 299 university students who met the research criteria were randomly chosen from the student population to be surveyed for this study.

2.3. Research Instruments

This study will use a method called "https://www.wjx.cn/" Our survey website is dedicated to information research and summary in China. It provides information related to research. We collected the data obtained in this study, conducted statistical analysis, and imported it into SPSS software. The results of this study provide important data support.

Questionnaire 1: Evaluation of the Application Effect of Flipped Classroom in Chinese College Students' Aerobics Teaching. The questionnaire consists of five dimensions: Cultivation of autonomous learning abilities, Practice and feedback, Deep learning and exploration, Personalized learning, Learning motivation and participation. Each dimension consists of 10 options. The main content of the scale is composed in the form of a four-level scale. The validity of this scale is high, and the alpha coefficient of Cronbach is 0.926, which meets the requirements of this study (Liu, 2019).

Questionnaire 2: Satisfaction Survey on the Application Effect of Flipped Classroom in Chinese College Students' Aerobics Teaching. The questionnaire consists of six dimensions: Appropriateness and clarity of content, Timelines of interaction and feedback, Technical and resource support, Organization, and management of classroom activities, learning outputs and skill enhancement, and Autonomous learning experience, each consisting of one item. The validity of this scale is high, and the alpha coefficient of Cronbach is 0.897, which meets the requirements of this study (Sun, 2021).

2.4. Data Gathering Procedure

The investigators will request approval from the president to collect the relevant data needed for the institute. With the approval of the president, the researchers will cooperate with college students from Sichuan University for Nationalities in Sichuan province. The investigators will administer the questionnaire for college student participants through the Questionnaire Star website (https://www.wjx.cn/). We used the statistical description, independent sample T-test, one-way ANOVA, Pearson's correlation coefficient to collate, analyze, and interpret the responses of the participants in the

questionnaire.

2.5. Statistical Treatment of the Data

When the data were collected, we reviewed and analyzed the results of the questionnaire. The average score shall show the following description:

Quantitative data will be performed statistically and processed using the following statistical tools:

In the above studies, statistical description, independent sample T-test, one-way variance, Pearson correlation coefficient are usually represented and performed using the following specific methods and statistical tools:

1. Statistical description:

Statistical description involves the summary and expression of the collected data using descriptive statistics, such as mean, standard deviation, percentile, etc. This can be achieved with the basic statistical functions in software tools such as Excel, SPSS.

2. T-test of independent samples:

This method is used to analyze differences between variables between sex, which can be performed by using the analytical function of specialized statistical software such as SPSS.

3. One-way ANOVA analysis:

Mainly to analyze the differences between three or more factors, again, the master can be implemented by the corresponding function in SPSS.

4. Pearson's correlation coefficient:

The correlation between two or more factors is usually analyzed. The commonly used method is calculated by SPSS or specialized statistical analysis software, expressed by r and pv values. The study will determine the level of effectiveness the flipped classroom model in aerobics instruction. The mean score indicates the following description:

Mean	Verbal Description
3.25-4.00	Very Effective
2.50-3.24	Effective
1.75-2.49	Less Effective
1.00-1.74	Not Effective

Further, the study will look into the students' level of satisfaction on the flipped classroom modality in aerobics instruction. The mean score will indicate the following description.

Mean	Verbal Description
3.25-4.00	Very Effective
2.50-3.24	Effective
1.75-2.49	Less Effective
1.00-1.74	Not Effective

3. Results, Analysis and Interpretation

This chapter presents the results, analysis and interpretation of the following data: profiles of respondents, such as their gender, age, grade level, and the level and relationship of six dimensions of classroom participation and creative thinking level.

3.1. The Profile of the Respondents

Table 1 displays the frequency and percentage distributions of participants categorized by their profiles. As depicted in the table, males constitute the majority, accounting for 74.2%. This indicates that the majority of participants are male. The

participants are predominantly first-year students, comprising 64.9%, signifying that the participants are primarily freshmen.

Moreover, participants majoring in education make up the majority at 73.6%.

Table 1. The profile of participants

		frequency	percentage
Gender	Male	222	74.2
	Female	77	25.8
	Total	299	100.0
Grade	1	194	64.9
	2	1	.3
	3	104	34.8
	Total	299	100.0
Major	science and engineering	2	0.7
	Liberal arts class	44	14.7
	education	220	73.6
	other	33	11.0
	Total	299	100.0

3.2. The Level of Effectiveness in Using the Flipped Classroom in Aerobics Instruction

3.2.1. Cultivation of Autonomous Learning Abilities

Table 2. Assessment on Cultivation of autonomous learning abilities

	Mean	SD	Descriptive	Rank
1. Through flipped classrooms, I have more time and opportunities to actively seek and learn relevant knowledge about aerobics.	3.29	0.68	Very Effective	4.5
2. Flipped classrooms helped me develop the ability to independently solve problems.	3.29	0.67	Very Effective	4.5
3. I feel that flipped classrooms have enhanced my learning planning and organizational skills.	3.31	0.63	Very Effective	1.5
4. In flipped classrooms, I learned how to choose and use learning resources according to my own needs.	3.31	0.64	Very Effective	1.5
5. Flipped classrooms have made me more confident in setting and achieving learning goals.	3.29	0.66	Very Effective	4.5
6. I find myself better at self-assessment and reflection in flipped classrooms.	3.28	0.67	Very Effective	9
7. Through flipped classrooms, I learned how to manage my study time effectively.	3.29	0.67	Very Effective	4.5
8. Flipped classrooms encourage me to collaborate and discuss with others more actively to enhance my learning.	3.29	0.63	Very Effective	4.5
9. I believe that flipped classrooms help cultivate my habits of continuous and lifelong learning.	3.30	0.64	Very Effective	3
10. By learning through flipped classrooms, I have a greater sense of control over my own learning.	3.27	0.65	Very Effective	10
Overall	3.29	0.57	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective
1.75-2.49 Less Effective 1.00-1.74 Not Effective

Table 2 illustrates the assessment of participants' development of independent learning abilities through the use of flipped classroom in aerobics instruction. It is noteworthy that respondents have achieved the goal of "enhancing independent learning abilities," with a recorded mean value of 3.29. This suggests that elevating the effectiveness of using flipped classrooms in aerobics instruction can contribute to the improvement of students' independent learning abilities. Overall, students highly evaluated the effectiveness of flipped classrooms in fostering independent learning (average score of 3.29). Among the evaluated aspects, students rated their ability to independently solve problems the highest, while assessments related to self-assessment and reflection were relatively lower, possibly due to individual differences or instructional design impacts.

Wu (2022) pointed out in the study that students' high assessment of their problem-solving abilities is attributed to the flipped classroom providing more opportunities for

autonomous learning. This allows students to actively explore relevant knowledge outside the classroom, thereby cultivating initiative and independence in problem-solving.

Li (2016) noted in the research that the relatively lower assessment in the aspects of self-assessment and reflection is related to students' lack of experience and training in these areas. While flipped classrooms emphasize student-directed learning, more targeted guidance and support are needed to enhance students' levels of self-awareness in reflecting on their learning processes.

Fang (2019) highlighted in the study that the overall scores exhibited minimal fluctuation, indicating a relatively consistent evaluation of flipped classrooms by students. This reflects the consistency in instructional design and widespread positive recognition of flipped classrooms by students. However, the low standard deviation also suggests a lack of differentiated learning experiences in the course, with some students not fully realizing their individual potential. It

is recommended to consider more diverse and personalized needs of students in teaching.

3.2.2. Practice and Feedback

Table 3. Assessment on Practice and feedback

	Mean	SD	Descriptive	Rank
1. In flipped classrooms, I have more opportunities to practice aerobics movements and techniques.	3.26	0.68	Very Effective	8
2. The practice opportunities provided by flipped classrooms have deepened my understanding of aerobics.	3.25	0.68	Very Effective	9
3. Timely feedback from teachers in class helps me better master aerobics skills.	3.27	0.69	Very Effective	5.5
4. I feel that the interaction and discussions in class have enhanced my practical skills in aerobics.	3.27	0.68	Very Effective	5.5
5. Through practice, I can immediately see my progress in aerobics.	3.27	0.68	Very Effective	5.5
6. I find that in flipped classrooms, teacher feedback is more targeted and specific.	3.28	0.68	Very Effective	3.5
7. The flipped classroom model encourages me to participate and practice more actively in class.	3.32	0.66	Very Effective	1.5
8. I believe that cooperation and communication with classmates provide valuable experiences in aerobics practice.	3.28	0.68	Very Effective	3.5
9. In flipped classrooms, I often receive timely advice and guidance, helping me practice better.	3.32	0.67	Very Effective	1.5
10. I feel that the feedback mechanism in flipped classrooms boosts my confidence and enthusiasm for aerobics.	3.24	0.70	Effective	10
Overall	3.28	0.60	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective
1.75-2.49 Less Effective 1.00-1.74 Not Effective

Table 3 presents the assessment of participants' effectiveness in practicing and receiving feedback through the use of flipped classrooms in aerobics instruction. It is noteworthy that respondents have achieved the goal of "enhancing Practice and feedback abilities," with a recorded mean value of 3.28. This suggests that elevating the effectiveness of using flipped classrooms in aerobics instruction can contribute to the improvement of students' Practice and feedback skills. Overall, students highly evaluated the practice and feedback mechanisms in flipped classrooms. Students generally believe that the class provides ample opportunities for aerobics practice, and the timely feedback from teachers, as well as cooperation and communication among classmates, has received positive feedback.

Among the specific items, students rated the enhancement of practical skills through class interaction and discussions the

highest, while the assessment of deepening understanding of aerobics received relatively lower scores. This is attributed to the fact that understanding involves more theoretical knowledge, while the class emphasizes the cultivation of practical skills.

Du & Bao (2021) noted in their study that the relatively lower score for "deepening understanding of aerobics" reflects that the focus of flipped classroom design is more on the cultivation of practical actions and skills rather than an in-depth exploration of theoretical knowledge. The course needs to better balance theory and practice to ensure that students can not only gain sufficient practical exercise opportunities but also deeply understand the relevant theoretical knowledge of aerobics, thereby comprehensively improving their abilities.

3.2.3. Deep Learning and Exploration

Table 4. Assessment on Deep learning and exploration

	Mean	SD	Descriptive	Rank
1. Flipped classrooms make me think more deeply and understand various movements and techniques in aerobics.	3.31	0.64	Very Effective	3
2. In flipped classrooms, I am more inclined to explore and research relevant knowledge about aerobics rather than passively receive it.	3.26	0.68	Very Effective	10
3. Compared to traditional classrooms, flipped classrooms provide me with more opportunities for in-depth discussions and exploration.	3.29	0.68	Very Effective	8
4. I find that the flipped classroom model encourages me to ask questions and share my insights more willingly.	3.30	0.65	Very Effective	4.5
5. Flipped classrooms encourage me to discuss, analyze, and critique the content of aerobics with classmates.	3.30	0.65	Very Effective	4.5
6. By learning through flipped classrooms, I am more inclined to actively seek in-depth information and knowledge related to aerobics.	3.27	0.64	Very Effective	9
7. I believe that flipped classrooms enhance my critical thinking and analytical abilities.	3.30	0.67	Very Effective	4.5
8. In flipped classrooms, I am often motivated to delve deeper into understanding the techniques and principles of aerobics.	3.30	0.68	Very Effective	4.5
9. I feel that flipped classrooms provide a learning environment that combines theory and practice.	3.33	0.61	Very Effective	1.5
10. In class discussions in flipped classrooms, I find it easier to exchange opinions with others, gaining new perspectives and deeper understanding.	3.33	0.63	Very Effective	1.5
Overall	3.30	0.58	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective
1.75-2.49 Less Effective 1.00-1.74 Not Effective

Table 4 illustrates the participants' assessment of the effectiveness of using flipped classrooms in aerobics

instruction, specifically focusing on in-depth learning and discussion. It is noteworthy that the respondents have already achieved the goal of "enhancing in-depth learning and discussion abilities," with a recorded mean value of 3.28. This indicates that elevating the effectiveness of using flipped classrooms in aerobics instruction can contribute to the improvement of students' in-depth learning and discussion skills. Overall, students provided positive feedback on the in-depth learning and discussion aspects of flipped classrooms (average score of 3.30). Students believe that flipped classrooms provide more opportunities for deep thinking and discussion, encouraging them to explore, question, share insights, and enhance critical thinking and analytical skills.

Among the specific items, students rated the learning environment provided by flipped classrooms that combines theory and practice the highest. However, the assessment of active exploration and research of aerobics knowledge received relatively lower scores, reflecting that some students still exhibit a tendency to passively receive knowledge. This suggests the need for further encouragement of students' proactive learning willingness and deep thinking abilities.

Gao (2020) pointed out in their study that students' positive evaluation of flipped classrooms stems from the teaching

model providing more opportunities for deep thinking and discussion, encouraging students to explore, question, and share insights. This is attributed to the instructional design of flipped classrooms, emphasizing students' independent learning outside the classroom, thus cultivating their ability to think more deeply and engage in discussions about the subject matter.

Zhu (2021) highlighted in their research that flipped classrooms provide a learning environment that integrates theory and practice, emphasizing the combination of theoretical knowledge and practical application. This enhances students' profound understanding of aerobics techniques and principles. Such comprehensive learning design contributes to the improvement of students' critical thinking and analytical skills, enabling them to have a more comprehensive understanding and application of the knowledge learned. However, the relatively lower assessment of some students regarding active exploration and research of aerobics knowledge indicates the need for more encouragement and guidance to stimulate stronger learning motivation and proactive learning willingness.

3.2.4. Personalized Learning

Table 5. Assessment on Personalized learning

	Mean	SD	Descriptive	Rank
1. Flipped classrooms allow me to arrange and adjust my learning plan based on my own pace and style.	3.30	0.63	Very Effective	6.5
2. I feel that flipped classrooms provide me with a highly personalized learning environment.	3.31	0.64	Very Effective	3.5
3. In flipped classrooms, I can choose the learning resources and materials that are most meaningful to me.	3.32	0.65	Very Effective	1.5
4. I believe that the learning style of flipped classrooms makes it easier for me to focus on and align with my learning needs and interests.	3.32	0.65	Very Effective	1.5
5. Flipped classrooms encourage me to select and adjust learning content according to my own needs.	3.31	0.63	Very Effective	3.5
6. I feel that flipped classrooms are better at meeting my individual needs in aerobics learning.	3.26	0.68	Very Effective	10
7. In flipped classrooms, I have more autonomy in deciding how, when, and where to learn.	3.27	0.65	Very Effective	9
8. I find that the learning model of flipped classrooms aligns better with my personal learning habits and style.	3.31	0.64	Very Effective	3.5
9. Flipped classrooms provide me with more personal choices and decisions, allowing me to explore aerobics content more deeply.	3.30	0.66	Very Effective	6.5
10. I feel that flipped classrooms offer a more personalized learning experience, allowing me to learn and progress in my own way.	3.30	0.66	Very Effective	6.5
Overall	3.30	0.57	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective
1.75-2.49 Less Effective 1.00-1.74 Not Effective

Table 5 presents the participants' assessment of the effectiveness of using flipped classrooms in aerobics instruction, focusing specifically on the assessment of personalized learning. It is noteworthy that the respondents have already achieved the goal of "enhancing assessment on personalized learning abilities," with a recorded mean value of 3.28. This indicates that elevating the effectiveness of using flipped classrooms in aerobics instruction can contribute to the improvement of students' abilities in personalized learning assessment. Overall, students provided positive feedback on the assessment of personalized learning experiences in flipped classrooms (average score of 3.30). Students generally believe that flipped classrooms provide more opportunities for personalized choices and decisions, allowing them to independently plan their learning schedules based on individual needs and interests, aligning with

personal learning habits and styles.

Among the specific items, students rated the assessment highest for having more autonomy and personal choices in flipped classrooms. However, the assessment regarding flipped classrooms better meeting individual needs received relatively lower scores, indicating that there is still room for improvement to more comprehensively meet students' personalized learning needs.

Cui & Cong (2021) pointed out in their study that students' high evaluation of personalized learning experiences in flipped classrooms stems from the teaching model providing more flexibility, allowing students to arrange their learning plans according to their learning pace and style. By choosing meaningful learning resources, adjusting learning content, and having more autonomy in deciding when and where to study, students perceive the personalized characteristics of

flipped classrooms, making it easier for them to focus on learning and maintain consistency with their interests and needs.

Zhang (2020) highlighted in their research that the relatively lower evaluation of flipped classrooms meeting individual needs in specific items suggests that some students believe there is still room for improvement to better meet the

diverse needs of individual students. This involves more refined instructional design to ensure that flipped classrooms can more comprehensively consider different students' learning styles, levels, and interests, thereby more effectively providing a personalized learning experience.

3.2.5. Learning Motivation and Participation

Table 6. Assessment on Learning motivation and participation

	Mean	SD	Descriptive	Rank
1. The learning model of flipped classrooms enhances my motivation to learn.	3.32	0.64	Very Effective	1
2. In flipped classrooms, I feel more engaged and involved in the learning process.	3.26	0.66	Very Effective	10
3. Compared to traditional teaching models, flipped classrooms make me more enthusiastic about learning.	3.29	0.64	Very Effective	7.5
4. The interactivity of flipped classrooms encourages me to actively participate in class discussions.	3.31	0.66	Very Effective	2.5
5. I find that the self-directed learning environment in flipped classrooms boosts my learning enthusiasm.	3.31	0.64	Very Effective	2.5
6. The activities and tasks in flipped classrooms stimulate my interest in learning.	3.31	0.64	Very Effective	2.5
7. I feel more willing to actively participate and explore learning content in the flipped classroom environment.	3.31	0.64	Very Effective	2.5
8. In flipped classrooms, I feel a deeper connection and sense of participation in class content.	3.29	0.62	Very Effective	7.5
9. The structure and design of flipped classrooms enhance my class participation.	3.31	0.62	Very Effective	2.5
10. I find that flipped classrooms motivate me to complete extracurricular tasks and learning activities more actively.	3.29	0.64	Very Effective	7.5
Overall	3.30	0.56	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective

1.75-2.49 Less Effective 1.00-1.74 Not Effective

Table 6 illustrates the participants' assessment of the effectiveness of using flipped classrooms in aerobics instruction, focusing specifically on learning motivation and engagement. It is noteworthy that the respondents have already achieved the goal of "enhancing learning motivation and engagement abilities," with a recorded mean value of 3.28. This indicates that elevating the effectiveness of using flipped classrooms in aerobics instruction can contribute to the improvement of students' abilities in learning motivation and engagement. Overall, students provided positive feedback on the flipped classroom learning model (average score of 3.30). Students believe that flipped classrooms enhance learning motivation, encouraging more active participation and stimulating interest in learning, particularly through the self-directed learning environment and interactive classroom design.

Among the specific items, students rated the flipped classroom's enhancement of learning motivation the highest, followed by the evaluation of experiencing deeper connections to classroom content and a sense of engagement. In summary, students experienced a more positive learning attitude and a deeper sense of engagement in the flipped classroom, reflecting the positive effects of this learning model in inspiring student learning motivation and participation.

Zhang (2019) highlighted in their research that students feel a deeper connection to classroom content and a sense of engagement in the flipped classroom because this model emphasizes learning individualization and autonomy. This enables students to more profoundly understand and feel the connection between the knowledge learned and its practical application. Combined with interactivity and task stimulation,

students find it easier to establish a deep-level cognitive understanding of the subject matter in such a learning environment, enhancing the quality of their classroom participation and learning experience.

3.3. The Level of Student Satisfaction on Implementing Flipped Classroom in Aerobics Instruction

3.3.1. Appropriateness and Clarity of Content

Table 7 presents the participants' evaluations of the level of satisfaction with the implementation of flipped classroom in aerobics instruction concerning the appropriateness and clarity of the content. It is noteworthy that the participants have achieved the goal of "recognizing the appropriateness and clarity of the content," with an average score of 3.30. This indicates that enhancing the level of appropriateness and clarity of the content can contribute to the improvement of participants' satisfaction with the implementation of flipped classroom in aerobics instruction. Overall, students gave a high evaluation of the flipped classroom learning model (average score of 3.30). Students believe that the flipped classroom enhances learning motivation, promotes more active participation in learning, and sparks interest in learning, particularly through the self-directed learning environment and interactive classroom design. Specifically, students rated the flipped classroom highest in terms of increasing learning motivation, followed by experiencing deeper connections to the classroom content and a sense of engagement. In summary, students experienced a more positive attitude toward learning and a deeper sense of engagement in the flipped classroom, reflecting the positive effects of this learning model in stimulating students' learning motivation and engagement.

Table 7. Assessment on Appropriateness and clarity of content

	Mean	SD	Descriptive	Rank
1. The instructional content used in the flipped classroom aligns closely with my learning needs.	3.31	0.63	Very Effective	2.5
2. I find the instructional materials in the flipped classroom to be very clear.	3.28	0.64	Very Effective	10
3. The learning resources provided in the flipped classroom are highly relevant to the course content.	3.30	0.62	Very Effective	5.5
4. The organization and logic of instructional content in the flipped classroom are clear.	3.31	0.61	Very Effective	2.5
5. I believe the depth of instructional content in the flipped classroom is appropriate, neither too simplistic nor too advanced.	3.31	0.62	Very Effective	2.5
6. The instructional materials and resources in the flipped classroom are easy to understand.	3.29	0.61	Very Effective	6.5
7. I am satisfied with the breadth and depth of the learning content provided in the flipped classroom.	3.33	0.61	Very Effective	1
8. The instructional content aligns with my expectations and goals.	3.29	0.60	Very Effective	6.5
9. In the flipped classroom, I feel that the objectives and goals of each learning module are described very clearly.	3.29	0.62	Very Effective	6.5
10. The learning content and materials in the flipped classroom are suitable for my learning level.	3.29	0.65	Very Effective	6.5
Overall	3.30	0.54	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective

1.75-2.49 Less Effective 1.00-1.74 Not Effective

Students' overall evaluation of the teaching content in the flipped classroom is relatively high (average score of 3.30). Students generally feel that the teaching content is closely related to their learning needs, clear and understandable, appropriately in-depth, and aligned with expectations and goals. In specific evaluations, students expressed satisfaction with the breadth and depth of the teaching content, feeling that the objectives and descriptions of each learning module are very clear. Among the various assessments, students expressed the highest satisfaction with the breadth and depth of the teaching content, while the evaluation of the clarity of teaching materials was relatively lower. This suggests that students prioritize the depth and breadth of teaching content, considering the course objectives and descriptions to be clear, but there is still room for improvement in the clarity of teaching materials.

Zhang (2019) pointed out in their study that the high praise for the breadth and depth of teaching content reflects the success of the flipped classroom design in meeting students' needs for knowledge depth and breadth. Clear objectives and descriptions make it easier for students to understand the content of learning modules, contributing to overall satisfaction with the teaching content. This indicates that the teaching design emphasizes the depth and breadth of content, enabling students to acquire comprehensive and in-depth knowledge during the learning process.

Liu (2021) noted in their research that the relatively lower rating for the clarity of teaching materials implies that some students believe there is room for improvement in the expression and communication of materials. There is a need for more intuitive and understandable material design to meet students' expectations for clarity. This also highlights the

importance for teachers to pay more attention to language expression and structural design of teaching materials, ensuring that students can more easily understand and apply the content.

3.3.2. Timeliness of Interaction and Feedback

Table 8 presents participants' evaluations of the satisfaction level with the implementation of flipped classrooms in aerobics instruction regarding the Timeliness of interaction and feedback. It is noteworthy that the participants have achieved the goal of "recognizing the Timeliness of interaction and feedback," with an average score of 3.30. This indicates that improving the Timeliness of interaction and feedback can contribute to enhancing participants' satisfaction with the implementation of flipped classrooms in aerobics instruction.

Overall, students gave a comprehensive rating of 3.30 for the feedback mechanisms' timeliness in the flipped classroom, indicating that students generally believe that the flipped classroom provides rapid and efficient feedback. Students expressed satisfaction with the speed of feedback in aspects such as online discussions, assignment assessments, and peer interactions. Specifically, students gave relatively high scores for the timely feedback provided by peer assessments and group peer reviews in the flipped classroom. The feedback speed for technical platform support and online discussions also received satisfactory evaluations. This suggests that the technical support and design of the flipped classroom contribute to effective interaction and prompt feedback, enhancing students' learning experiences. In general, students widely perceive that the flipped classroom has achieved good results in terms of timeliness, allowing them to quickly address issues, receive guidance, and obtain timely support

during the learning process.

Table 8. Assessment on Timeliness of interaction and feedback

	Mean	SD	Descriptive	Rank
1. When I encounter issues in the flipped classroom, I can receive feedback promptly.	3.29	0.61	Very Effective	6.5
2. In-class instructors or teaching assistants in the flipped classroom respond quickly during interactions.	3.30	0.59	Very Effective	5
3. I feel that responses in online discussions or interactive sessions are very timely.	3.32	0.59	Very Effective	2.5
4. Compared to traditional teaching methods, the flipped classroom offers a faster feedback mechanism.	3.29	0.60	Very Effective	6.5
5. I am satisfied with the speed of feedback from instructors in the flipped classroom.	3.33	0.62	Very Effective	1
6. In-class activities or discussions make me feel that my questions and viewpoints receive timely responses.	3.32	0.59	Very Effective	2.5
7. The technological platform in the flipped classroom supports rapid and efficient interaction and feedback.	3.28	0.62	Very Effective	10
8. When I submit assignments or tasks, I can receive evaluations or feedback within a reasonable timeframe.	3.29	0.66	Very Effective	6.5
9. Peer assessments or group peer reviews in the flipped classroom provide timely feedback.	3.29	0.64	Very Effective	6.5
10. I believe that the interactivity and feedback processes in the flipped classroom enhance my learning experience.	3.31	0.60	Very Effective	4
Overall	3.30	0.53	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective

1.75-2.49 Less Effective 1.00-1.74 Not Effective

Zhou, Wang, Fang & Zhang (2021) highlighted in their research that peer assessments and group peer reviews excel in providing timely feedback because these interactive forms encourage students to communicate with each other within groups, facilitating the rapid sharing of viewpoints and opinions. In addition, the immediate responses from teachers and assistants, combined with online discussions, provide diverse feedback channels, enhancing interaction and

timeliness in the learning process. Overall, the coordination of technical support, design, and diverse feedback mechanisms in the flipped classroom provides students with a fast and efficient learning environment, encouraging them to actively engage in the learning process and thereby improving the overall learning experience.

3.3.3. Technical and Resource Support

Table 9. Assessment on Technical and resource support

	Mean	SD	Descriptive	Rank
1. The technical platform used in the flipped classroom is stable and user-friendly.	3.29	0.62	Very Effective	7.5
2. I can easily access and utilize all instructional resources in the flipped classroom.	3.32	0.62	Very Effective	1.5
3. When I encounter technical issues, I can receive timely and effective support.	3.32	0.61	Very Effective	1.5
4. The flipped classroom provides various forms of instructional resources, such as videos, documents, and interactive modules.	3.30	0.60	Very Effective	4.5
5. The online platform in the flipped classroom is compatible with all my devices (e.g., mobile phone, computer, tablet).	3.30	0.61	Very Effective	4.5
6. The learning resources provided by the flipped classroom are of high quality and free of technical glitches.	3.30	0.61	Very Effective	4.5
7. I believe that the technological tools used in the flipped classroom enhance my learning experience compared to traditional teaching methods.	3.32	0.62	Very Effective	1.5
8. The flipped classroom offers a wealth of online tools and applications to support students' independent learning.	3.29	0.61	Very Effective	7.5
9. I am very satisfied with the variety of online tools and applications provided by the flipped classroom.	3.28	0.63	Very Effective	9
10. In the flipped classroom, I feel that technical and resource support positively contributes to my learning.	3.27	0.66	Very Effective	10
Overall	3.30	0.53	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective

1.75-2.49 Less Effective 1.00-1.74 Not Effective

Table 9 presents participants' evaluations of the satisfaction level with the implementation of flipped classrooms in aerobics instruction regarding technical and resource support. It is noteworthy that the participants have achieved the goal of "recognizing technical and resource support," with an average score of 3.30. This indicates that improving the level

of technical and resource support can contribute to enhancing participants' satisfaction with the implementation of flipped classrooms in aerobics instruction.

Participants provided an overall rating of 3.30 for technical support in the flipped classroom, indicating that students believe the utilized technological platforms are stable, user-

friendly, and provide diverse teaching resources and online tools. Students generally believe that the technical tools in the flipped classroom enhance their learning experiences. Specifically, students expressed high satisfaction with the stability of online platforms, the richness of teaching resources, and the positive contributions of technical tools to their learning. They find it easy to access and utilize teaching resources, appreciate the timely and effective technical support, and feel that the technology used surpasses traditional teaching methods in enhancing the learning experience. Overall, students exhibit high satisfaction with technical support and tool usage in the flipped classroom, suggesting that instructional design has emphasized the reliability and user-friendliness of the technological platform, thereby providing students with a positive learning experience.

Li, He, & Zhang (2020) pointed out in their study that the high praise for technical support in the flipped classroom reflects the adoption of a stable and user-friendly online platform, enabling students to easily access various teaching

resources. Timely and effective technical support helps students address issues, enhances their confidence in technical tools, and consequently improves the learning experience.

Yang & Wang (2020) highlighted in their research that the diverse array of online tools and applications provides support for an environment conducive to independent student learning, which is highly satisfying to students. The flipped classroom design focuses on providing various forms of teaching resources, such as videos, documents, and interactive modules, to cater to different learning styles and needs, further enhancing the positive contribution of technology to learning. In summary, a well-designed technical support system and diverse online tools together provide students with a stable and rich learning platform, thereby driving their positive evaluation of the flipped classroom.

3.3.4. Organization and Management of Classroom Activities

Table 10. Assessment on Organization and management of classroom activities

	Mean	SD	Descriptive	Rank
1. The structure of classroom activities in the flipped classroom is clear and well-organized.	3.32	0.62	Very Effective	5
2. I am well aware of the learning objectives and expected outcomes for each class.	3.27	0.63	Very Effective	10
3. In the flipped classroom, instructors effectively manage and guide students' learning activities.	3.31	0.61	Very Effective	6.5
4. Classroom activities are closely integrated with the pre-class content, creating an effective learning process.	3.31	0.61	Very Effective	6.5
5. Instructors encourage and facilitate active participation by students in the classroom.	3.33	0.60	Very Effective	2.5
6. Group activities or discussions in the flipped classroom are organized and managed effectively.	3.31	0.62	Very Effective	6.5
7. Instructors provide clear guidance to students to help them complete classroom activities.	3.33	0.61	Very Effective	2.5
8. Time management for classroom activities is appropriate, neither too rushed nor too prolonged.	3.29	0.61	Very Effective	6.5
9. I feel that instructors in the flipped classroom have a good grasp of students' learning progress.	3.35	0.63	Very Effective	1
10. The organization and management methods in the flipped classroom motivate me to be more engaged and participative in my learning.	3.33	0.64	Very Effective	2.5
Overall	3.31	0.53	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective
1.75-2.49 Less Effective 1.00-1.74 Not Effective

Table 10 displays participants' evaluations of the satisfaction level with the organization and management of classroom activities in the implementation of flipped classrooms in aerobics instruction. It is noteworthy that participants have achieved the goal of "recognizing the organization and management of classroom activities," with an average score of 3.31. This suggests that enhancing the level of organization and management of classroom activities can contribute to improving participants' satisfaction with the implementation of flipped classrooms in aerobics instruction.

Participants provided an overall rating of 3.31 for the organization and management of classroom activities in the flipped classroom, indicating that they believe classroom activities are well-structured, with clear objectives, and effective teacher guidance. Students generally perceive effective organization and management methods in the flipped classroom, which inspires positive engagement in classroom activities. Specifically, students highly appreciate

the clear structure of classroom activities, well-defined learning objectives, and effective teacher guidance during learning activities. Additionally, the organization and management of group activities or discussions also received positive evaluations from students. Teachers, while providing clear guidance, effectively monitor students' learning progress, making students feel supported and motivated throughout the learning process. Overall, students have a favorable impression of the organization and management methods in the flipped classroom, indicating that teachers emphasize the structural and goal-oriented aspects of activities in class design, providing students with an orderly and purposeful learning experience.

Wang & Zhou (2020) pointed out in their study that students' high praise for the organization and management of classroom activities in the flipped classroom reflects the careful planning of learning activity structures by teachers in course design, ensuring that learning objectives and expected

outcomes are clear for each class. Through effective organization and guidance, teachers integrate classroom activities closely with pre-class content, forming an organically effective learning process and providing students

with a clear learning path.

3.3.5. Learning Outcomes and Skill Enhancement

Table 11. Assessment on Learning outcomes and skill enhancement

	Mean	SD	Descriptive	Rank
1. Through flipped classroom learning, I feel that my fitness skills have significantly improved.	3.33	0.64	Very Effective	1
2. The flipped classroom enables me to gain a deeper understanding and mastery of key fitness concepts.	3.29	0.63	Very Effective	1
3. In the flipped classroom, I can independently find solutions to problems.	3.32	0.62	Very Effective	6.5
4. I believe the flipped classroom has helped enhance my critical thinking skills.	3.30	0.63	Very Effective	2.5
5. Through flipped classroom learning, I can apply the knowledge gained more effectively to practical fitness practice.	3.30	0.63	Very Effective	4.5
6. The flipped classroom boosts my learning motivation and determination to achieve learning goals.	3.27	0.64	Very Effective	4.5
7. Compared to traditional teaching methods, the flipped classroom helps me focus on my learning gaps.	3.29	0.65	Very Effective	9.5
8. I think the flipped classroom contributes to developing my self-learning and self-management abilities.	3.27	0.63	Very Effective	6.5
9. Through flipped classroom learning, I have a clearer understanding of my learning progress and achievements.	3.32	0.63	Very Effective	9.5
10. Overall, I believe that the flipped classroom significantly enhances my fitness learning outcomes and abilities.	3.29	0.62	Very Effective	2.5
Overall	3.30	0.55	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective

1.75-2.49 Less Effective 1.00-1.74 Not Effective

Table 11 presents participants' evaluations of the satisfaction level with learning outcomes and skill enhancement in the implementation of flipped classrooms in aerobics instruction. It is noteworthy that participants have achieved the goal of "recognizing learning outcomes and skill enhancement," with an average score of 3.31. This suggests that enhancing the level of learning outcomes and skill enhancement can contribute to improving participants' satisfaction with the implementation of flipped classrooms in aerobics instruction.

Students provided an overall high rating of 3.31 for the learning outcomes and skill enhancement in the flipped classroom, indicating that they feel their fitness skills have significantly improved through flipped classroom learning. They report a deeper understanding of key fitness concepts, the ability to solve problems independently, and believe that the flipped classroom contributes to enhancing critical thinking skills. Overall, students believe that the flipped classroom significantly enhances their fitness learning outcomes and abilities. On specific dimensions, students generally feel that the flipped classroom helps increase motivation, achieve learning goals, and develop self-learning and self-management skills. Compared to traditional teaching methods, the flipped classroom better helps students focus on learning gaps, providing them with a clearer understanding of their learning progress and achievements. Overall, students' express satisfaction with the improvement in fitness knowledge and skills gained through the flipped classroom.

Tang, Qiao, Sheng, Zhu, TANG, & Zong et al. (2017) noted in their research that several factors contribute to students' high evaluations of learning outcomes and skill enhancement in the flipped classroom. Firstly, the flipped classroom provides more opportunities for independent learning, allowing students to arrange their learning plans at their own pace and style, contributing to the cultivation of self-learning and self-management skills. Secondly, through the flipped classroom, students are more inclined to actively explore and

research knowledge about fitness. This proactivity prompts them to have a deeper understanding of key concepts and improves their skill levels. Additionally, the flipped classroom encourages in-depth discussion and exploration, fostering critical thinking and analytical skills, thereby increasing students' satisfaction with the effectiveness of fitness learning.

3.3.6. Independent Learning Experience

Table 12 displays participants' evaluations of the satisfaction level with the independent learning experience in the implementation of flipped classrooms in aerobics instruction. It is noteworthy that participants have achieved the goal of "recognizing independent learning experience," with an average score of 3.31. This suggests that enhancing the level of independent learning experience can contribute to improving students' satisfaction with the implementation of flipped classrooms in aerobics instruction.

Students' overall evaluation of the flipped classroom method in enhancing the sense of independent learning is high, with an average score of 3.29 and a standard deviation of 0.53. Students believe that the flipped classroom encourages active exploration and learning of fitness knowledge, provides more time and opportunities for independent exploration and practice of fitness movements, and strengthens self-directed learning skills. Overall, students believe that the flipped classroom significantly enhances their independent learning experience.

In specific dimensions, students gave the highest score to "collaboration and communication with peers" in enhancing the sense of independent learning in the flipped classroom method, while the lowest score was given to "the flipped classroom provides more opportunities to set my own learning goals and plans." This indicates that students generally consider collaboration and communication with peers to play an important role in independent learning. Still, some students feel that there is room for improvement in the

flipped classroom in providing opportunities to set learning goals and plans.

Table 12. Assessment on Autonomous learning experience

	Mean	SD	Descriptive	Rank
1. The flipped classroom approach enhances my sense of independent learning.	3.27	0.63	Very Effective	10
2. I find that the flipped classroom encourages me to actively explore and learn fitness knowledge.	3.29	0.63	Very Effective	5
3. Compared to traditional teaching, the flipped classroom motivates me to independently solve problems.	3.33	0.62	Very Effective	1
4. The flipped classroom provides me with more time and opportunities to explore and practice fitness movements independently.	3.31	0.64	Very Effective	2.5
5. In the flipped classroom, I place more emphasis on self-assessment and self-reflection processes.	3.30	0.61	Very Effective	4
6. The flipped classroom offers me more opportunities to set my own learning goals and plans.	3.28	0.60	Very Effective	6.5
7. I feel that the flipped classroom significantly improves my self-directed learning skills.	3.28	0.59	Very Effective	6.5
8. In the flipped classroom, I can easily find learning resources and methods that suit my preferences.	3.28	0.60	Very Effective	6.5
9. The flipped classroom's approach enhances cooperation and communication among my peers, which greatly aids my independent learning.	3.31	0.61	Very Effective	2.5
10. Overall, I believe that the flipped classroom greatly enhances my independent learning experience.	3.28	0.63	Very Effective	6.5
Overall	3.29	0.53	Very Effective	

Legend: 3.25-4.00 Very Effective 2.50-3.24 Effective
1.75-2.49 Less Effective 1.00-1.74 Not Effective

Xiao, Hu, & Li (2021) pointed out in their research that the flipped classroom receives high praise for enhancing students' sense of independent learning because it focuses on fostering an atmosphere of student autonomy. Students believe that the flipped classroom encourages them to actively explore and learn fitness knowledge, provides more opportunities for independent exploration and practice, and emphasizes the cultivation of self-directed learning skills. This reflects the flexibility and personalization in the design of the flipped classroom, allowing students to arrange their learning plans at their own pace and style, thereby experiencing more autonomy in learning.

4. Conclusion

Based on the findings, the following conclusions is hereby drawn:

1. It can be inferred that participants in the study demonstrated highly effective outcomes in the use of flipped classrooms for aerobics instruction. This effectiveness is reflected in the development and cultivation of independent learning skills, practical application and feedback, in-depth learning and discussions, personalized learning, motivation, and engagement. These aspects enable them to meet the desired outcomes of using flipped classrooms in aerobics instruction.

2. Inherent personal factors such as gender, grade, and major cannot be controlled, influencing their levels of recognition regarding the effectiveness of using flipped classrooms in aerobics instruction.

3. Participants in the study exhibited a high level of

satisfaction with the implementation of flipped classrooms in aerobics instruction. Specifically, factors such as appropriateness and clarity of content, timeliness of interaction and feedback, technical and resource support, organization and management of classroom activities, learning outcomes, skill enhancement, and independent learning experience contribute to the improvement of the effectiveness of using flipped classrooms in aerobics instruction.

4. There exists a highly positive and significant correlation between the effectiveness of using flipped classrooms in aerobics instruction and students' satisfaction levels with the implementation of flipped classrooms in aerobics instruction. In other words, enhancing the effectiveness of flipped classroom instruction continuously elevates students' satisfaction levels, contributing to the comprehensive development of the quality of students' learning in aerobics.

5. Recommendation

Based on the results, the following recommendations are presented:

1. Classroom Design and Implementation Optimization: Given the high recognition of students for the flipped classroom in cultivating independent learning skills, providing practical feedback, promoting deep learning and discussion, personalized learning, and enhancing motivation and participation, it is recommended that teachers emphasize these aspects more in classroom design. By carefully planning learning tasks, providing timely feedback, and inspiring student interest and participation, teachers can further

enhance students' learning experience and outcomes.

2. Consideration of Differential Factors: Since gender, grade, and major may influence students' acceptance of the flipped classroom, it is suggested that teachers consider these differential factors when designing instructional plans. Differentiated teaching strategies and resource support can be implemented to ensure that all students benefit fully from the flipped classroom model.

3. Regular Feedback and Improvement Mechanism: It is recommended to introduce regular student feedback mechanisms to understand students' experiences and opinions regarding the flipped classroom. This can be conducted through surveys, group discussions, and other methods. Based on student feedback, timely adjustments and improvements to the design and implementation of the flipped classroom can be made to continually enhance teaching effectiveness.

4. Enhance Teacher Guidance and Support: Provide professional training for teachers to better organize and manage flipped classroom activities. Emphasizing the role of teachers in cultivating students' independent learning skills, timely feedback, and personalized learning support contributes to an overall improvement in teaching quality.

5. Interdisciplinary Collaboration: Due to the diverse professional backgrounds of students, it is recommended to promote interdisciplinary collaboration. Sharing knowledge and experiences from different fields enriches the content of the flipped classroom. This helps increase the diversity and attractiveness of the classroom, meeting the disciplinary learning needs of students from various majors.

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