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Effect of Flipped Classroom on Rope Skipping Movement Skill in Rhythm Rope Skipping Action Sport for Grade 4 Students

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Abstract

Background and Aim: The flipped classroom redefines learning by using technology for independent study at home and interactive engagement in class, yielding more effective teaching outcomes. Thus, three research objectives were proposed: 1) To compare the students' rope skipping movement skills in rhythm rope skipping action sport before and after learning through the flipped classroom. 2) To compare the students' rope skipping movement skills in rhythm rope skipping action sport after learning through the flipped classroom with the criteria set at 60 percent. 3) To assess the student's satisfaction toward learning through flipped classroom design.

Materials and Methods: The sample was 20 students in grade 4 of the No.3 Primary School in Zhoukou City, Henan Province (1 class) in the year of study 2023 which was derived from cluster random sampling method. The experimental design was a group pretest-posttest design. The research instruments were: (1) a lesson plan (2) a rope skipping movement skills evaluation form and (3) a questionnaire for students' satisfaction. The data were analyzed by using mean, standard deviation, and t-test.

Results: The results found that 1) the students' rope skipping movement skills after learning through flipped classrooms were higher than before at a statistically significant level of .05. 2) The students' rope skipping movement skills after learning through flipped classrooms were higher than the determined criterion of 60% at a .05 statistical significance level. 3）The students' satisfaction after learning through flipped classrooms was at a higher level.

Conclusion: This study demonstrates the positive impact of the flipped classroom approach on students' rope-skipping movement skills. The findings reveal significant improvements in skill levels post-implementation, with students exceeding the set proficiency criterion. Moreover, the heightened satisfaction reported by students underscores the effectiveness of the flipped classroom in enhancing both skill acquisition and overall learning experiences.

Keywords: Flipped Classroom; Rope Skipping Movement Skill; Rhythm Rope Skipping; Student Satisfaction

Introduction

Due to the continuous innovation and rapid synchronous development of information network technology in modern society, as well as the continuous popularization and wide application of information networks, the construction of information basic education is bound to become the inevitable trend of the scientific development of education in China. When the Ministry of Education issued the notice of "Educational Informatization 2.0 Action Plan", it put forward that educational informatization should comprehensively promote the modernization of education, open the era of educational intelligence, and promote the deep integration of information technology and education and teaching (Ministry of education, 2010). With the advent of the 5G era, the reform and development of information education have reached a climax. Therefore, we must pay close attention to the basic principles of modern information technology. In the context of contemporary society, the application of scientific and technological means can save students and teachers a lot of time, expand students 'knowledge,

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improve teachers' teaching efficiency, and help to deepen students' understanding.

With the progress of science and technology, the flipped classroom has been applied in various disciplines. " Flipped classroom " subverts the traditional teaching mode and transforms the" new content " of the traditional classroom into a wonderful and short micro-video. Through the Internet terminal equipment, students can study independently at home, complete communication, discussion, cooperation, and sharing. (Mao, 2013) The teaching mode of flipped classroom mainly refers to the support of multimedia and other technical means, encouraging students to complete the process of self-study independently at home, changing the pattern of teaching the classroom, making it become "teacher one student", "student one teacher", "student one student" three forms of interactive occasions, it covers the process of teachers answering students' doubts and helping students to apply their knowledge reasonably, better teaching effect can be obtained (Zhu, 2021; Liu, 2021).

According to the survey of exercise and health of primary and middle school students in recent years. There are two problems: one is that the current physical quality of students has decreased, Due to the improved living standards, many students consume large quantities of fried foods, Is the proportion of obesity increases (Huang, 2022). In addition, as students' academic pressure increases, Reduced time for extracurricular activities, Less time in daily physical activity, and Lack of a certain amount of physical exercises, Such as endurance, vital capacity, explosive force, and other indicators have decreased; Second, the student's lack of interest in physical exercise, Through the test results of Chinese students' physical health data, it can be seen that many students fail the test results, the training items are also relatively single and boring, lack of certain interest and physical exercise consciousness (Lin et al., 2022). As a method of physical exercise, rhythmic rope skipping can enrich training methods and improve sports quality. In addition, the physical education teaching method also has a certain influence on the learning of students' sports skills and the cultivation of sports interests (Wang, 2021). Jump rope skipping, seemingly ordinary, but can be through the combination of rope, footsteps, and hand movements, transform a variety of patterns and movements, such as left and right foot rotation jump, foot jump, open and closing jump, front cross jump, back cross jump and so on change a variety of rhythmic rope skipping.

Building a flipped classroom based on rhythmic rope skipping is based on the principle of information technology and individualization. The principle of information technology is to apply modern information technology, networks, and multimedia equipment together to teaching (Huang, 2022). Personalized principle in physical education teaching, its main teaching point is action skills, and this key difficulty is the main content that must be actively mastered in physical education teaching. In traditional teaching, teachers tell the knowledge points in front of the platform or students and demonstrate. They use body movements and language sounds to describe the movement points and technical difficulties. Students learn through vision and imitation. In this process, different students have different own understandings, but in the flip mode, students can use the form of video to discuss with each other and seek advice from teachers, effectively realizing the learning goal of practicing anytime and anywhere, and some difficult to master can be watched repeatedly movements.

To improve students' physical quality, interest, and attitude toward physical exercise, Song Yaming and others applied the teaching mode of the flipped classroom to the teaching process of the football program. In terms of learning attitude and emotional experience, the application of the flipped classroom teaching mode was better than the traditional physical education teaching mode, and the comprehensive effect was better. In the teaching process of sports dance, Wang Yi et al. adopted the flipped classroom teaching mode. Through the pre-teaching preparatory stage, the flipped teaching mode in the evil stage better improves the students 'independent innovation skills, improves the students' comprehensive quality, and achieves the teaching purpose. In alignment with the study conducted by Ditchakan (2022), it was discovered that students who underwent basic volleyball skills assessments within a flipped classroom environment exhibited significantly superior performance compared to those in a traditional classroom setup. Moreover, the satisfaction level of students engaged in the flipped classroom approach was reported to be exceptionally high. Furthermore, the application of flipped classroom methodologies within physical education has demonstrated a diverse range of strategies to

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enhance not only students' physical abilities but also their mental, emotional, social, and intellectual dimensions. (Mahakanok, Srisiri & Moungsirithum, 2019; Suddee, 2019; Pinagalang, Chunwanno & Kanjanasorn, 2022)

Based on the sports teaching process how more students like, through the rope skipping movement skill teaching to upgrade the students' sports core literacy, and achieve the goal of strong students' physique, is worth further thinking and research direction, so in the sports teaching into flipped classroom function, try to build the specific operation method of skipping rope, is beneficial to optimize the teaching level and teaching quality, improve the teaching methods. For these reasons mentioned above the researcher is interested in studying, according to the cultivation of students 'physical education interests and the exploration of new teaching mode, in physical education courses, the use of rhythmic rope skipping based on flipped classroom can improve students' physical quality and improve students' interest in physical exercise. This kind of teaching method has certain research significance.

Research Questions

1. How are the rope skipping movement skills in rhythm rope skipping action sport before and after learning through flipped classroom?
2. How are the rope skipping movement skills in rhythm rope skipping action sport after learning through flipped classroom compared with the determined criteria at 60%?
3. How is the student's satisfaction with flipped classrooms after learning through them?

Research Objectives

1. To compare the students' rope skipping movement skills in rhythm rope skipping action sport before and after learning through the flipped classroom.
2. To compare the students' rope skipping movement skills in rhythm rope skipping action sport after learning through the flipped classroom with the criteria set at 60 percent.
3. To assess the student's satisfaction toward learning through flipped classroom design.

Literature Review

Flipped classroom

A flipped classroom or inverted classroom is defined in Lage, Platt & and Treglia (2000) as "events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa". Moreover, Bergmann, Overmyer & Wilie (2012) state that a flipped classroom is an approach that transfers learning responsibility from the teacher to the student. In other words, a flipped classroom is student-centered learning which allows students to prepare themselves for the lesson by watching videos, listening online as well as group discussion and applications during class time. However, a flipped classroom is not about using videos instead of teachers, but it is about how to use class time with students effectively and actively. During class time students achieve supporting activities such as finding the answer to questions together, group working, and problem-solving are recommended.

McCarthy, (2016) mentioned in "Reflections on a Flipped Classroom in First Year Higher Education", that a flipped classroom is also supported by the theory of Bloom's revised taxonomy by Anderson and Krathwohl (2001) that students can practice lower levels of cognition such as remembering and understanding outside the class hour, and more focusing on the higher levels cognitive thinking activities in class because they can refer directly to the instructor for guidance and feedback. Since the out-of-class resources can help students to develop their understanding and remembering level, therefore, in-class time can be more contributed to activities and students' participation in class.

Song (2021) mentioned in the "Flipped classroom application of classical ballet pedagogy courses", in classical dance teaching, teachers according to the educational background and skills learning level of teaching mode, compared with the traditional dance teaching method, flipped classroom learning "before class, class, after class," role swap, outstanding students' learning status, the final results also

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show that both teaching modes are beneficial to students learning, flipped classroom teaching mode is based on online teaching mode exploration, make the teaching mode richer.

Hu, Liu, & Xia (2023) pointed out that flipped classroom basketball elective courses in colleges and universities, in the classroom teaching and information based on combining aims to study the flipped classroom for students' physical quality, basketball basic technology, physical attitude, the influence of cognitive learning, compared to the traditional classroom teaching, find out the advantages and disadvantages of flipped classroom teaching practice. His research takes the learning effect of flipped classroom application to students in college basketball elective courses. The conclusion shows that the implementation of flipped classroom teaching in basketball elective courses has little influence on students' physical quality. Flipped classroom teaching in the implementation of the basketball elective course can improve the students 'internal motivation, and external motivation in addition to the external adjustment, internalization, and identity indicators, of students' internal motivation, improve cognitive learning effect, the traditional classroom can improve students' external motivation, therefore, both should be effectively combined in the teaching process.

Rhythm rope skipping

Skipping rope this sport as a widely can let primary school students participate in the sports by primary and middle school students and large-scale promotion. In many schools, physical exercise can be seen in the figure of skipping, whether in the playground or the schoolyard, whether during physical education time or the break, skipping as a sports activity, and when the students' study and life are more fulfilling.

In addition, in Asia, South America, Africa, Europe, and Oceania 5 continents rope skipping alliance constitutes the international rope skipping alliance, and can be systematically carried out and promoted, in Asia, most European countries residents are rope skipping as a traditional sport, with a high level of sports. These changes show that rope skipping has a broad mass base around the world, especially in Asia and Europe.

Wang and Zhang mentioned (2011) mentioned in the "Research on the Development of rope skipping in China and Abroad", In 2002, the United States included rope skipping as the first choice of fitness sports. In 2008, most schools in the United States planned to include pattern rope skipping in the sports textbooks of primary and secondary schools. rope skipping developed rapidly in the United States. The American Amateur Jump Rope Association has a large scale, a large number of clubs, a large number of participants, holds and carries out all kinds of rope skipping competitions every year, with the characteristics of rich in content, standardized and rigorous organization, and plays a huge role in the process of promoting the development of rope skipping. Canada's slogan and concept of "skipping rope" is widely praised in North America, with the slogan " Jump rope for your heart! "The slogan, to attract more people to participate in the skipping movement, fully shows that the skipping movement in the health promotion of the body has a huge role, but also by the Canadian official and social recognition and attention, and in Canada and even North America widely promoted skipping movement. Skipping rope has a variety of forms, high interest, and low requirements for the field and equipment of sports, in China. It has a history of thousands of years. In China, has established the Chinese rope skipping association, and in primary school students physical monitoring. Mao (2013) mentioned in the “Study on the Influence of Realistic Conditions on the Realization of "Sunshine Sports" Goals in Schools”, he pointed out that 1min rope skipping is listed as a monitoring item. In other foreign countries, with the continuous development of rope skipping this sport has. In the exhibition, there have been a lot of skipping clubs, therefore, skipping is both entertaining and healthy. Physical exercise is deeply loved by people at home and abroad. Skipping rope is not only popular as a fitness training method, but also often used as an auxiliary training method in boxing, wrestling, martial arts, badminton, and tennis.

Rhythmic jumping movement skill level refers to the degree of students' mastery and skill evaluation through the number of ropes skipping rhythmic and rope skipping formation arrangements (Huang, 2022).

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Zhang (2019) mentioned in "Figure rope skipping teaching explores the cultivation of college students' teamwork ability", through the assessment of rope skipping skills, students can feedback on the mastery of rhythmic rope skipping in the past period. In addition, teachers can master the students' physical development and change through the skills test, to better revise the course implementation plan. Students can understand their gaps and shortcomings through the skill assessment of rope skipping, to actively conduct physical exercise.

Rope skipping movement skills

Yang, Wu, Ma, et al. (2018) mentioned in the “Study on the effect of rope skipping options on body composition in college students， they pointed out that the rope skipping training showed that the girls who participated in figure rope skipping had an obvious trend of improvement in the weight, waist-hip ratio and other aspects, indicating that figure rope skipping has good fitness value.

Liu (2021) mentioned in "On the Application of Rope Skipping Movement in Physical Education Teaching", it pointed out that as a relatively physical exercise, skipping can make students feel tired, to exercise the heart, lungs, and musculoskeletal. Skipping rope can improve students 'coordination, endurance, and sensitivity, and help to cultivate students' aggressive attitudes and indomitable will.
The level evaluation of rhythmic rope skipping skills includes quantitative assessment and qualitative assessment. Quantitative assessment is the calculation of students 'movements and time ratio in the rope skipping assessment, through the specific speed of students' rope skipping within the specified time to reflect the students' actual results of time. At the same time, in the process of assessment, students can also guide their skills, and through the assessment results can judge students' tolerance and cardiopulmonary function. Qualitative assessment is the assessment of students 'movement skills in the assessment of rope skipping, according to the difficulty of the rhythm of rope skipping, which can improve students' self-editing ability and teamwork ability to a large extent. Through the assessment of this project, the student's strengths and shortcomings in learning pattern rope skipping can be analyzed (Liu, 2013).

Through studying the literature of the three scholars, I concluded the rope skipping movement skills refers to students’ jumping rope skill including single shake rope skipping (jump straight forward to the forward body, two arms shake the rope forward, jump once both hands forward shake the rope over the head, through the foot, around the body around, that is to complete once) and double shake rope skipping (after the feet jump, the rope passes from the foot twice (around the body for two weeks), and the feet fall on the ground and beat continuously).

Conceptual Framework

In this study, the independent variable was learning management using flipped classrooms and the dependent variable was rope skipping movement skills and student satisfaction. Figure 1 illustrates the conceptual framework of this study.

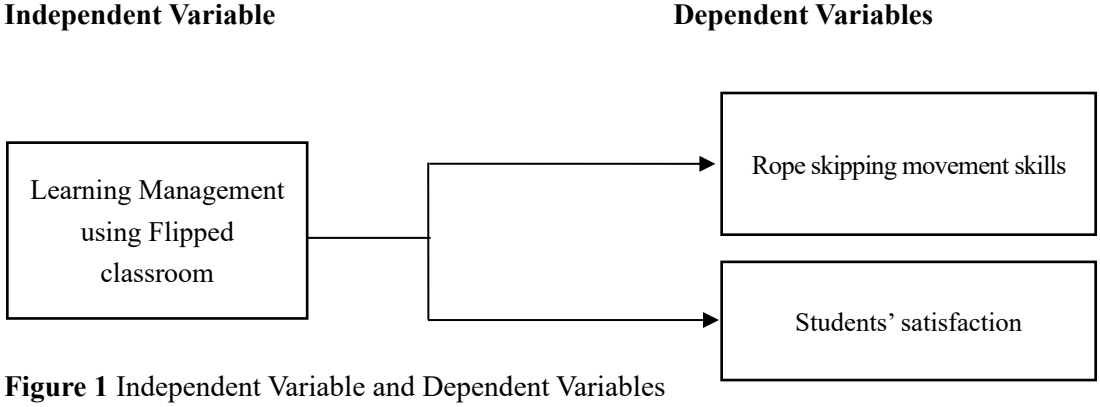

Figure 1 Independent Variable and Dependent Variables

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Methodology

1. Population and samples: The population in this study was 40 students (2 classrooms) in grade 4 students, from the No.3 Primary School in Zhoukou City, Henan Province. The sample of this study was 20 students in grade 4 of the No.3 Primary School in Zhoukou City, Henan Province (1 class) in the year of study 2023 which was derived from cluster random sampling method.

2. Research design: The one-group pretest and posttest design were used as a procedure to investigate the effect of the flipped classroom on rope skipping movement skill in rhythm rope skipping action sport.

3. Research instruments: The research instruments which were used in this study were as follows:

3.1 lesson plan

There are 6 lesson plans, with 6 class hours (55 minutes/section) with rhythmic rope skipping action classes allocated. As shown in Table 1. These 6 lesson plans were utilized to comprehensively cultivate the students' rope-skipping movement skills.

Table 1 Lesson plans

Lesson	Topic	Length
1	open and close jump action	55 minutes/section
2	lunge jump	55 minutes/ section
3	jumping with both feet	55 minutes/ section
4	interval cross single hop	55 minutes/ section
5	Double-foot exchange jump	55 minutes/ section
6	hook jump	55 minutes/ section

The appropriateness data collected from the evaluation form was analyzed by calculating mean scores and assigning the interpretation of the appropriateness level. If the mean scores of the appropriateness evaluated by a group of experts were higher than 3.51, meaning lesson plans were appropriate. The detailed rules mean scores of lesson plan evaluation criteria are all greater than 3.51. Lesson plans can therefore be used. In addition, after obtaining the expert evaluation results, the developed teaching model was revised and improved according to the expert's suggestions.

3.2 Rope skipping movement skills assessment form

The evaluation form is provided to 5 experts for content validity checks and suggestions. The quality of the evaluation form is considered according to the project objective consistency index (IOC) obtained in the performance test evaluation form. If the project objective consistency index (IOC) of each project in the evaluation table is greater than 0.5, it can be used in the evaluation table. the IOC of both the curriculum design test and the paper test were in the range of 0.80-1.00 is greater than 0.60. The result of analyzing the IOC index showed that all test items were appropriate and could be used in the test. The reliability of the test was computed using the formula of Alpha Cronbach should be more than 0.70 (Cronbach, 1951). The Cronbach Alpha coefficient of the reliability of the rope skipping movement skills assessment form is 0.76, which is greater than 0.70. Therefore, the reliability of the rope skipping movement skills meets the requirements.

3.3 Questionnaire for students' satisfaction

The evaluation form was offered to the three experts for the content validity check and suggestions. The quality of the questionnaire was considered from the Index of Item Objective Congruence (IOC) obtained from the evaluation form. In this study: the IOC of both the curriculum design test and the paper test were in the range of 0.80-1.00 is greater than 0.60. The result of analyzing the IOC index showed that all test items were appropriate and could be used in the test. The Cronbach Alpha coefficient of the reliability of the student satisfaction questionnaire is 0.89, which is greater than 0.70. Therefore, the reliability of the student satisfaction questionnaire meets the requirements.

4. Data collection: The procedures of data collection were as follows: The teacher provides flipped classroom orientation for students before learning. The samples were given the pretest by

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measuring rope skipping movement skills assessment form with the constructed instrument. The samples were taught using the flipped classroom method. After finishing the instruction, the samples received the posttest by using the same instrument which was used in the pretest, and a rubric score for the student's skill. The samples were given the students' satisfaction questionnaire.

5. Data analysis: In this study, data were analyzed by using the statistical program according to the research objectives. Compare the students' rope-skipping movement skills before and after learning through flipped classrooms by using a t-test for the dependent sample. Compare the students' rope-skipping movement skills with the determined criteria set at 60% by using a t-test for one sample. Assess the student's satisfaction with flipped classroom mode based on rope skipping by using the arithmetic mean and standard deviation.

Results

1. Compare the students' rope skipping movement skills in rhythm rope skipping action sport before and after learning through the flipped classroom.

The result of comparing the different scores of ropes skipping movement skills before and after learning through flipped classroom teaching. The result is shown as follows in Table 2.

Table 2 Compare the students' rope skipping movement skills in rhythm rope skipping action sport before and after learning through the flipped classroom

Group	Full scores	n	Pre-test scores		Posttest scores		t	*p*
			M	*SD*	*M*	*SD*		
Experimental group	24	20	10.00	0.67	16.80	0.59	28.38*	0.001

$p < 0.05$

As presented in Table 2, the mean score of the pre-test of students' rope skipping movement skill test was 10.00 (*SD*=0.67) and the mean score of the post-test of students' rope skipping movement skill test was 16.80 (*SD*=0.59). The result of Table 2 showed that after implementing the rope skipping course based on flipped classroom teaching in the classroom, the post-test scores of students' rope skipping movement skill were greater than pre-test scores at 0.05 level of statistical significance (t=28.38, p<0.05). When the significance level is 0.05, the value p-value is Sig=0.000< .05, indicating that there was a significant correlation between pre-test scores and post-test scores, which applied to paired sample T-test for dependent samples. The average scores of the study developed increasingly higher than pre-test scores about rope skipping movement skills.

2. Compare the students' rope skipping movement skills in rhythm rope skipping action sport after learning through the flipped classroom with the criteria set at 60 percent.

The result of comparing the different scores of ropes skipping movement skill after learning through flipped classroom teaching with the criteria set at 60 percent, as follow in Table 3.

Table 3: The result of comparing the mean scores of ropes skipping movement skills after learning through flipped classroom teaching with the criteria set at 60 percent

Group	n	Full score	Criteria score	*M*	*SD*	t	*p*
Experimental group	20	24.00	14.40	16.80	0.59	28.376*	0.001

$p < 0.05$

As presented in Table 3, the mean scores of t students' rope skipping movement skills after learning through flipped classroom teaching was 16.80 from possible full marks of 24.00 and the

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standard deviation was 0.59 which was statistically higher than the criterion of 60% at .05 level of statistical significance (t= 28.376, p < 0.05).

3. Assess the student's satisfaction with learning through flipped classroom design, as shown in Table 4.

Table 4: Average score and satisfaction level of students' satisfaction

Question items	M	SD	Satisfaction level
1. In the flipped classroom based on rope skipping, you can learn happily	4.85	0.37	Very high level
2. In the flipped classroom based on rope skipping, you can enjoy the full exercise	4.35	0.59	High level
3. In a flipped classroom based on rope skipping, you can learn while thinking	4.75	0.44	Very high level
4. In the flipped classroom based on rope skipping, the students with high levels and good movement performance can learn the movement skills	4.75	0.44	Very high level
5. In a flipped classroom based on rope skipping, you can have your own learning goals	4.35	0.67	High level
6. In the flipped classroom based on rope skipping, autonomous exercises can be performed during recess and after class	4.45	0.76	High level
7. In flipped classes based on rope skipping, they are often encouraged by their teachers and peers	4.65	0.49	Very high level
8. In the flipped classroom based on rope skipping, their exercise performance is excellent	4.45	0.60	High level
9. In the flipped classroom based on skipping, I have confidence in mastering the technology of skipping	4.60	0.60	Very high level
10. In the flipped class based on rope skipping, the class and group agreement can be followed	4.90	0.31	Very high level
11. In the flipped class based on rope skipping, you can listen to the teacher's explanation carefully	4.60	0.50	Very high level
12. In the flipped classroom based on skipping, there is a desire to learn new skipping techniques	4.55	0.76	Very high level
13. In the flipped classroom based on rope skipping, I feel warm and happy	4.70	0.47	Very high level
14. In the flipped classroom based on rope skipping, I look forward to participating in sports activities	4.80	0.41	Very high level
15. In the flipped class based on rope skipping, I like to learn the relevant information about sports	4.80	0.41	Very high level
Total/Overall	**4.637**	**0.459**	Very high level

As presented in Table 4, in the 15 items of the satisfaction questionnaire, the lowest mean score was 4.35(SD=0.59), and the highest mean score was 4.90 (SD=0.31). The result of this Table showed that the students' satisfaction was very high level (M=4.637, SD=0.459).

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Discussion

This study shows that the flipped classroom teaching method is an effective teaching method to improve students' rope-skipping skills. As a result, as mentioned above, the performance of students' rope skipping skills using the flipped classroom teaching method is better than that before learning. Wang (2016) stated the implementation of flipped classrooms in public physical education teaching in ordinary colleges and universities can help students better master sports technical movements and can have a more positive impact on students' attitudes towards physical exercise. Dai (2021) mentioned that in the learning of "figured rope skipping", students practiced, actively participated, fully mobilized their enthusiasm for learning, and at the same time improved student's self-confidence and cultivated goodwill quality. While strengthening their bodies, students also improved their emotional management and teamwork skills. The micro-class + flipped classroom has played a positive role in improving students' learning interest, overcoming students' fear of difficulties, promoting students' mastery of physical skills, and improving teachers' teaching levels. Consistent with the research of Ditchakan (2022), which found that students' volleyball basic skills assessments using flipped classrooms were significantly higher than in the regular classroom and the flipped classroom students' satisfaction was at the highest level. Suddee (2019) found that student teachers learning through the PE games website based on a flipped classroom approach significantly achieved post-test scores on knowledge, understanding, and competence skills in their teaching classes higher than the pre-test scores at the .05 level and certifying form of using PE games website based on flipped classroom approach to enhance teaching competence. Zhai (2016) stated that in the study of flipped classroom satisfaction, efficient learning strategies are adjusted in the process of flipped classrooms to improve students 'perceived value, fully consider students' learning characteristics, and enhance students' learning autonomy.

Similar to the findings in this research, prior research has consistently highlighted the benefits of the flipped classroom model. It allows instructors to dedicate increased time to physical activity and tailor activities to accommodate diverse student preferences and needs. Comparable investigations into the flipped classroom's impact have yielded favorable results, including heightened content delivery (Mason, Shuman, & Cook, 2013), improved test scores (Park & Park, 2018), heightened class engagement (Mok, 2014), and more immediate feedback (Wilson, 2013). Building upon these positive insights, we strongly advocate for physical education educators to embrace the flipped classroom approach. This instructional strategy facilitates an active and personalized learning environment, aligning with the proven advantages observed in the broader educational context.

Conclusion

The conclusion was as follows:

1. The students' rope-skipping movement skills after learning through a flipped classroom were higher than before at a statistically significant level of .05 and the students' rope-skipping movement skills after learning through a flipped classroom were higher than the determined criterion of 60% at .05 statistical significance level.

2. The students' satisfaction after learning through flipped classrooms was at a higher level (M=4.637, SD=0.344).

Therefore, the study's outcomes strongly support the effectiveness of the flipped classroom teaching method in enhancing students' rope-skipping movement skills. Notably, the post-test scores exhibited a significant and considerable increase, affirming the method's impact. Moreover, students' high satisfaction levels, as indicated by the questionnaire responses, underscore the success of the approach in delivering a rewarding learning experience. These findings collectively emphasize the flipped classroom's value in promoting skill improvement and fostering student engagement within physical education contexts.

In summary, this study illuminates the transformative impact of implementing the flipped classroom teaching model in the context of a rhythmic rope skipping sports course. The findings provide empirical evidence that this approach not only reshapes pedagogical dynamics but also substantively enhances student learning outcomes. By shifting the instructional focus from teacher-centric to student-centered, the flipped classroom method fosters self-directed inquiry, active engagement, and a

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heightened sense of accomplishment. This is particularly evident in the integration of online platforms and video resources, which empower students to engage with learning materials at their own pace and receive immediate support.

The incorporation of preparatory materials before class facilitates anticipatory learning, enabling students to arrive at class sessions well-prepared and ready for informed interactions. This approach also encourages peer collaboration and dynamic discussions during class, thereby promoting a deeper understanding of technical concepts and skills. Post-class consolidation activities further reinforce student learning and skill acquisition. The utilization of online tools for group discussions and self-assessment encourages students to take ownership of their learning journey and engage in reflective practices that foster continuous improvement.

In the broader academic context, this research contributes to the ongoing discourse on pedagogical innovation, underscoring the adaptability of traditional teaching models to the digital age. As educators seek effective strategies to enhance learning outcomes, the flipped classroom approach emerges as a valuable tool for cultivating not only subject-specific skills but also crucial lifelong learning skills. In light of the digital era's influence on education, this study provides insights into how modern teaching methodologies can harness technology to foster active learning, critical thinking, and self-directed education. As educational paradigms continue to evolve, the adoption of innovative teaching approaches holds promise for nurturing well-rounded and empowered learners in the 21st century.

Recommendations

1. Recommendation for implication

1.1 Encourage Flipped Classroom Adoption: Educational institutions should actively encourage and support teachers in adopting the flipped classroom learning process. By internalizing knowledge through practical application in the flipped classroom mode, students' learning outcomes can be significantly enhanced.

1.2 Prioritize Flipped Classroom in Teaching Environments: Emphasize the implementation of the flipped classroom model within the teaching environment, teachers can upload simplified teaching videos to online platforms, assigning pre-class learning tasks that allow students to independently explore course content before formal class sessions. During class time, students can actively contribute their understandings, views, and challenges, fostering interactive discussions with teachers. This learner-centered approach empowers students and redefines the role of students as active participants in their educational journey.

1.3 Promote Flipped Classroom Adoption in All Schools: Advocate for the widespread use of the flipped classroom learning process, with a special focus on rural schools. Where access to educational resources may be limited, holds immense potential for improving teaching quality and broadening students' horizons. Moreover, for students facing family challenges, such as being left behind or lacking parental guidance, the flipped classroom's "guidance, instruction, and cooperative discussion" components become even more vital, fostering profound and lasting impacts on their learning and personal growth.

By embracing and implementing these recommendations, educational institutions can create a dynamic and inclusive learning environment that fosters active student participation, deepens comprehension, and addresses specific challenges faced by diverse communities. The flipped classroom approach stands as a promising pathway to elevate teaching practices and cultivate holistic student development.

2. Recommendation for further research

2.1 To further improve theoretical literacy. The research should not only dig deep into the research results in the fields of learning science, sports training, and school physical education, but also skillfully use advanced technologies such as big data, artificial intelligence, and visualization to analyze the collected teaching data. Future research will focus on integrating the perspectives of multidisciplinary research and the insights of experts in various fields to make the conceptual

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framework more scientific and rigorous.

2.2 The experimental design needs to be further optimized. This study should improve the design of the rope-skipping teaching experiment and extend the experimental period to fully verify the proposed research hypothesis. Improve the measurement method of variables. The design of the rope-skipping teaching experiment should conform to the overall educational environment. Future research will focus on strengthening the scientific and rational demonstration of teaching experiments and improving the quality of rope-skipping experimental design.

2.3 The scope of this experiment needs to be further expanded. Further tests were conducted among different categories of primary schools in different regions of China. Promoting a wider range of testing work, enriching teaching practice experience, and constantly improving the flipped classroom learning process, provides a practical basis for proposing new teaching theories.

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