

ORIGINAL ARTICLE



The Effect of Multimedia Teaching Intervention on Physical Education Curriculum on University Students' Sports Attitudes and Sports Behaviors

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ABSTRACT

Background. World Health Organization pointed out in 2019 that insufficient physical activity has become the fourth major risk factor affecting global mortality. **Objectives.** This research explores the influence of multi-media teaching intervention in the physical education curriculum on college students' sports attitudes and behavior. **Methods.** The subjects of weight training and Yogalates courses (94 people in weight training class 2 and 94 people in Yogalates class 2) were divided into experimental and control groups. Both groups were taught in person for 18 weeks. The experimental group participated in multi-media audio-visual teaching for 6 weeks, once a week, for 30 minutes. The control group did not implement multi-media audio-visual teaching. Before and after the teaching experiment, 188 questionnaires were issued with the sports attitude and sports behavior scales, and 184 (97.8%) were effectively returned in the pre-test; 180 (95.7%) were effectively returned in the post-test. After the questionnaire was collected, it was analyzed by descriptive statistics, cross-analysis, and an independent sample t-test. **Results.** The study found that after multi-media teaching is involved in physical education courses, students' sports attitudes and behaviors are significantly higher than in traditional teaching, and the number of students participating in sports after class has increased significantly. **Conclusion.** Multi-media teaching intervention in physical education courses can effectively improve students' attitudes towards sports, change their actual participation in sports, and enable students to develop the habit of continuing to participate in sports after class.

KEYWORDS: *Cross Analysis, Multimedia, Yogalates, Weight Training.*

INTRODUCTION

Research background. World Health Organization pointed out in 2019 that insufficient physical activity has become the fourth major risk factor affecting global mortality. 6% of the annual mortality rate is related to insufficient physical activity, and more than 2 million deaths can be

attributed to static life. Sports administration of Taiwan's Ministry of Education announced in 2019 that only 33% of the population regularly exercises, indicating that Taiwanese people are not active in sports participation. With times change, and the internet's development, the

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aspects of education and learning have been diversified; traditional physical education is generally conducted through teacher dictation, demonstration, practical exercises, one-to-one guidance, teacher-student interaction, homework discussion, and evaluation. To develop teaching strategies to enable students to learn effectively, the first step should be to use multi-media audio-visual teaching materials' interactive and individual characteristics, provide a new learning environment, and become an essential tool for teaching (1). Therefore, in addition to teacher demonstrations, physical education courses should consider integrating multi-media audio-visual teaching materials into teaching and changing the teaching methods and styles of the original courses. Using multi-media to stimulate vision stimulates students' interest in class so that students can continue learning and improving their sports knowledge after class. Teaching videos are in various forms and are rich in topics. They are easily accessible textbooks and are highly practical. You can also choose videos for teaching according to different topics (2).

University physical education courses play an essential role in developing lifelong exercise habits. The teaching innovation and flipping of university physical education teachers can promote a sports atmosphere and even change students' sports attitudes and behaviors. In the physical education course, being able to master the correct technical movements is the key to successful learning. If beginners cannot master the correct technical movements, this situation usually requires continuous teacher guidance and reminders. If students have poor comprehension or lack coordination, they will fail to achieve good results and sometimes be injured due to incorrect actions. In addition, there is limited classroom time, and many students, teachers, and students may not be satisfied with the teaching and learning process. Sports-related courses are roughly divided into two types of courses, outdoor and indoor. In particular, indoor courses involve professional classrooms and venue size. The restrictions on the number of students are relatively strict. Integrating multimedia-assisted teaching materials into the curriculum in the limited classroom space to improve teaching quality and sports atmosphere is vital, and it is also a topic that educators should face and solve. It is an innovative approach to applying multi-media videos to teaching physical education

courses and increasing students' sports attitudes. To enhance sports attitudes, one must think about behaviors that express and form attitudes based on direct experience, previous experience, or closely related to oneself (3). Sports attitude is the psychological factor of behavior. When you have a stable idea about something, it also affects personal behavior and activities. To produce good sports behavior, an excellent positive attitude is required to maintain personal sports thoughts and behaviors (4, 5). A good sports attitude will positively affect sports behavior (6).

Teaching videos can become diverse and rich. The teaching needs to fast-forward, rewind or pause, which is very convenient. Multi-media teaching videos can attract students' attention more than the teaching method teachers use to convey knowledge. The curriculum enables meaningful learning, invisibly cultivates interest in learning, diversifies learning channels, improves practical ability and teaching effectiveness, and is more conducive to achieving teaching goals (7). Scholars' research also pointed out that watching sports influencer videos can effectively improve sports attitudes and behaviors. In the process of watching sports celebrity videos, to get a closer understanding of sports knowledge, inducing oneself to try and experience it personally will affect the actual behavior of participating in sports (8). This year coincides with COVID-19; physical education courses also face the dilemma of implementing remote online teaching. Teachers have become internet celebrities, and multi-media teaching courses seem to be an unstoppable trend in this wave of epidemics.

Above all, this research hopes to use teachers' self-portrait multi-media videos to teach and encourage students to watch physical education videos after class for self-directed learning, to improve their sports attitudes, change their sports behavior, and achieve the goal of developing regular exercise habits. It also serves as a reference for future communication and teaching improvement of physical education teachers.

Research purpose. The purpose of this research is summarized as follows:

Discuss the influence of multi-media audio-visual teaching intervention in physical education courses on university students' sports attitudes and behavior.

Discuss when multi-media audio-visual teaching is involved in sports courses; different

gender students have differences in sports attitudes and behaviors.

MATERIALS AND METHODS

Object and Scope. The objects of this research are students from the Chaoyang University of Technology who took a pre-test in September 2019. A total of 188 questionnaires were sent out (2 classes in weight training courses; 94 people in total, two classes in Yoga Tis courses; 94 people in total), and a total of 184 valid questionnaires were returned. A post-test was conducted in January 2020. A total of 188 questionnaires were sent out, and 180 valid questionnaires were returned.

The selection and allocation methods of the control group and the experimental group in this study are: the author Lin Ching-Te taught two weight training courses this semester, and the author Lee Ting-I taught two Yoga Tis courses this semester. Randomly selected one course each as the control group and the experimental group.

Implementation mode: The teaching courses in this study are all taught face-to-face. In the 18-week course, the experimental group chose 6 weeks to watch the teaching videos shot and recorded by the instructors, with explanations and practical operations. The control group did not join watching teaching videos and only implemented teachers' explanations and students' practical operations.

Research tools. This research collects and refers to relevant research literature, analyses, and considers research needs, using questionnaires as research tools. The pre-test questionnaire was sent by the teacher in person and filled out by the students in the semester's first week. The teacher sent the post-test questionnaire in person and filled it out by the students in the semester's last week. The scale is compiled concerning relevant research and divided into three parts:

1) Basic information: Collect the subject's personal background information, including gender, age, and college.

2) Sports attitude scale: we reference (9-11) research scale and use three dimensions: cognition, emotion, and behavior, to measure sports attitude.

This scale uses the Likert five-point scale to score. From strongly disagree, disagree, normal, agree, and strongly agree, scores of 1, 2, 3, 4, and 5 are given, respectively. The higher the score of the subjects, the higher their feelings towards sports attitudes. After factor analysis and reliability analysis, the cumulative explanatory variance is 68.45%; Cronbach's α value is .75, showing that this scale has acceptable reliability and validity.

3) Sports behavior scale: We reference (11-13) research scales and use the retrospective memory method in the past three months to measure.

The measurement items include:

1. Sports frequency: refers to the number of times doing sport per week. From 1 to 5, which number represents doing sports times per week.

2. Sports duration: refers to the average time spent on sport, not including rest and interruption. The number 1 represents 1-30 minutes each time, and the number 5 represents 121 minutes or more each time.

3. the intensity of Each sport: refers to the degree of conscious physical fatigue after each sport. The number "1" means very relaxed, and the number "5" means very tired.

RESULTS

1. The influence of multi-media teaching intervention on the physical education curriculum on university students' sports attitude and behavior.

1) Sports Attitude

Homogeneity test: In order to understand whether there are significant differences between the two groups of students before the experiment, resulting in a deviation of the results, the pre-test scores of each group are used to test the difference of the testiest by the homogeneity test of variance, Table 1 shows that the control group (traditional teaching) and the experimental group (interventional multi-media teaching) test results of the homogeneity of sports attitudes in the previous test, showing that the scores of the previous test did not reach the significant level $t = .41$, which means that the two groups of students received the previous teaching experiment. There is no difference in sports attitude.

Table 1. Homogeneity Test of Sports Attitudes between the Experimental Group and the Control Group (Pretest)

Sports attitude	Average	Standard deviation	t value	P value
Control Group (Traditional teaching)	4.63	0.25	0.41	0.69
Experimental group (Interventional multi-media teaching)	4.65	0.26		

* $p < 0.05$

Difference test. Multi-media videos involved in the physical education curriculum's sports attitude post-test differences use independent sample t-tests to understand the post-test differences between the control group (traditional teaching) and the experimental group (interventional multi-media teaching) in the cognition, behavior, and emotional factors of sports attitude. It is found from [Table 2](#) that the post-test results of sports attitude of the two groups, $p < .05$, t value = 6.31, and the F test reached a significant level. From the average, it is known that the post-test scores of exercise attitude of the experimental group (interventional multi-media teaching) ($M=4.82$) were significantly higher than those of the control group (traditional teaching) ($M=4.60$), which means that the attitude toward student's sports after intervention in multi-media teaching is higher than that of traditional teaching.

The post-test results in the sports attitude subscale were cognition $p < .05$, t value = 4.70, behavior $p < .05$, t value = 4.56, emotion $p < .05$, t value = 4.44, both reached the significant level of 0.05.

From the average, we know that the cognition post-test score of the experimental group (interventional multi-media teaching) ($M=4.86$) was significantly higher than that of the control group (traditional teaching) ($M=4.70$). It means that the student's sports concepts and cognitive performance after intervention in multi-media teaching are higher than in traditional teaching.

From the average, we know that the behavior post-test score of the experimental group (interventional multi-media teaching) ($M=4.80$) was significantly higher than that of the control group (traditional teaching) ($M=4.59$). It means that the student's performance in sports participation after intervention in multi-media teaching is higher than in traditional teaching.

From the average, we know that the emotional post-test score of the experimental group (interventional multi-media teaching) ($M=4.81$) was significantly higher than that of the control group (traditional teaching) ($M=4.52$). It means that students can meet sports needs and enjoy sports after intervention in multi-media teaching, and their performance is significantly higher than in traditional teaching.

Table 2. Multimedia Video Intervention Physical Education Curriculum and Sports Attitude t-Test Summary Table (Post-Test)

	Number of people	Average	Standard deviation	t value	P value
Sports attitude				6.31*	0.00
Traditional	90	4.60	0.28		
Multimedia	90	4.82	0.17		
Cognition				4.70*	0.00
Traditional	90	4.70	0.26		
Multimedia	90	4.86	0.17		
Behavior				4.56*	0.00
Traditional	90	4.59	0.38		
Multimedia	90	4.80	0.25		
Emotion				4.44*	0.00
Traditional	90	4.52	0.55		
Multimedia	90	4.81	0.28		

* $p < .05$

Table 3. Homogeneity Test of Sports Behavior between Experimental Group and Control Group (Pretest)

Group	Sports behavior, No. (%)		Total number of people	Chi-square value	P value
	Yes	No			
Traditional teaching	46 (50)	46 (50)	92	.02	.88
Involved in multimedia teaching	47 (51)	45 (49)	92		
Total number of people	93 (50.5)	91 (49.5)	184		

* $p < .05$

2) Sports Behavior

Homogeneity test. In order to understand whether there are significant differences between the two groups of students before the experiment, resulting in a deviation of the results, the pre-test

scores of each group are used to cross-analyze the differences of test subjects.

From [Table 3](#), it is found that the control group (traditional teaching) and the experimental group (interventional multi-media teaching) test results

of the homogeneity of sports behavior in the previous test show that the p-value of .88 did not reach a significant level. It means there was no difference in the sports behavior of the two groups of students before the teaching experiment.

Cross analysis. The difference in the post-test of the sports behavior of the multi-media video intervention in the physical education curriculum is to understand whether the two groups of students have significant differences after the experiment. According to the results of the post-test of each group, the difference between the

testiest is tested by the chi-square test; from Table 4, it is found that the control group (traditional teaching) and the experimental group (interventional multi-media teaching) after the sports behavior test results, $p < .05$ reached a significant level. It means that there are differences in the sports behaviors of the two groups of students after the experiment; among them, the proportion of actual participation in sports behavior after the intervention of multi-media teaching is significantly higher than that of traditional teaching.

Table 4. Summary Table of Cross-Analysis of Multimedia Video Intervention in Physical Education Curriculum and Sports Behavior (Post-Test)

	Sports behavior, No. (%)		Total number of people	Chi-square value	P value
	Yes	No			
Groups				6.032*	.014
Traditional teaching	73 (81.1)	17 (18.9)	90		
Involved in multi-media teaching	84 (93.3)	6 (6.7)	90		
Total number of people	157 (87.2)	23 (12.8)	180		

* $p < .05$

Table 5. Multimedia Video Intervention Physical Education Curriculum and Sports Attitude t Test Summary Table (Post-Test)

	Number of people	Average	Standard deviation	t value	P value
Cognition				-.91	.36
Male	16	4.89	.16		
Female	74	4.85	.18		
Behavior				-1.45	.15
Male	16	4.89	.21		
Female	74	4.79	.26		
Emotion				-.91	.37
Male	16	4.75	.34		
Female	74	4.82	.27		

* $p < .05$

Table 6. Summary Table of Cross-Analysis of the Sports Behavior of Different Genders in the Multimedia Video Intervention Physical Education Curriculum (Post-Test)

	Sports behavior, No. (%)		Chi-square value	p value
	Yes	No		
Male	16 (100)	0 (0)	.23	.58
Female	68 (92)	6 (8)		
Total number of people	84 (93)	6 (7)		

* $p < .05$

2. Multi-media audio-visual teaching is involved in the physical education curriculum for the differences in sports attitudes and behaviors of students of different genders.

1) Sports Attitude. The results of the post-test analysis of the differences in the sports attitude of different genders in the multi-media video intervention in physical education courses are shown in Table 5. From the t-test summary table of students of different genders in sports attitudes, it can be found that the p-values of the three factors of sports attitude are not at a significant

level. It means that students' cognition, behavior, and emotional performance will not have a gender difference.

2) Sports Behavior. The results of the analysis of the post-test differences in sports behavior of different genders in the multi-media video intervention physical education curriculum are shown in Table 6. The cross-analysis summary table of sports behavior of different gender students shows that the p-value does not reach a significant level. It means that the performance of students' sports behavior will not

have a difference on the gender after intervening in the physical education curriculum through multi-media supplementary teaching materials.

DISCUSSION

Through the intervention of multi-media teaching in physical education courses, it is known that both the control and experimental groups can effectively improve the student's sports attitude and behavior, indicating that the two teaching methods have the same effect. Among them, the performance of the interventional multi-media teaching group is higher than that of the traditional teaching group. The results of this research are similar to (14). The researcher found in the experiment teaching process that teaching content can effectively attract students' interest in learning through multimedia-assisted teaching presentation and produce emotional communication to promote the development and upward improvement of students' psychological needs. According to the research results, it is concluded that the teaching content of indoor sports courses through multimedia-assisted teaching helps improve students' sports attitudes and behavior. This research result is the same as (15).

The result of this study found that there is no significant difference in the impact of sports attitudes on different genders after the intervention teaching experiment. It means that the performance of students' sports attitudes will not differ due to different genders. This result differs from most scholars (10, 11, 16). It may be because weight training and yoga are indoor sports courses that can be done by oneself. Most indoor physical education courses are done by individuals alone, and the feeling of a lack of team competition will not cause physical collisions. Therefore, it is inferred that the intervention of multi-media teaching in indoor physical education courses can shorten the gender differences after sports. It further shows that both males and females can enjoy the fun of sports while engaging in indoor sports and meet the needs of the sport.

There is no significant difference in the impact of sports behavior on different genders after using multi-media teaching to intervene in the physical education curriculum, which means that the performance of students' sports behavior will not be different because of gender. This result differs from most scholars' results (17, 18). According to the research results, multi-media teaching applied

to indoor physical education courses can improve students' sports performance without being restricted by gender. Even students who are less interested in sports have begun to change their sports habits. The performance of the students' sports behaviors is only raised to the low-medium threshold. Although most students' exercise habits after class have changed, the intensity and progress of the exercise have not yet reached the 333 principle standard set by the Taiwan Ministry of Education, which is a pity. Yes, increasing the time for multimedia-assisted teaching materials to intervene in physical education courses should help improve sports performance.

The development of computer technology has brought more convenience to people. Many subject courses have used the characteristics and advantages of computer multi-media to develop teaching materials and strategies more suitable for teacher teaching and student learning (19). Multimedia-assisted teaching is a new teaching method and learning method that meets the needs. Teaching needs to break through the predicament. Therefore, how to transfer the teaching connotation through multi-media in the traditional teaching model. Create high-quality teaching situations in sports-related education, and design practical, effective, safe, rich, and diverse teaching materials. To improve students' sports attitudes and behaviors and achieve regular exercise habits, we must continue working hard as physical education workers.

This research observes that students may affect their learning outcomes due to their sports attitude and performance in the learning process. The findings of this study are similar to those (20, 21), indicating that the higher the student's sense of self-efficacy, the better their actual sports performance. In recent years, the exploration of the psychological variables of student self-efficacy has gradually received attention after the emergence of student-based research topics. Therefore, in the future, we should further explore the effectiveness of students' learning after multi-media intervention in traditional physical education so that technology can be used to gain more significance in physical education.

CONCLUSION

After multi-media teaching is involved in physical education courses, it can effectively establish students' correct sports concepts and encourage them to continue participating in sports courses, improving sports attitudes and behavior.

In the process of doing sports, it can meet the physical and psychological needs and achieve the pressure relief effect simultaneously, and the interventional multi-media teaching is significantly higher than the traditional teaching. After multi-media teaching is involved in physical education courses, the actual number of participants in sports has increased significantly, and the intervention of multi-media teaching is significantly higher than traditional teaching, which indicates that it has a positive impact. After multi-media teaching is involved in physical education courses, students' psychological feelings and participation in sports will not be limited by different genders.

Multi-media teaching intervention in physical education courses has become a novel teaching and learning mode. However, whether the indoor and outdoor physical education classes are diverse and whether they all have a positive impact remains to be discussed later. We suggested that the research on the experimental teaching of university physical education courses should be explored in a single course. Due to the diverse attributes of physical education courses, the effects and demands of the sport are still slightly different to achieve more objective research results.

This study found that multi-media intervention in traditional physical education is feasible. The rich and diverse multimedia-assisted teaching

content can help improve learners' sports attitudes and behavior while providing a novel learning model. However, to ensure that students' learning is not interrupted due to the severe epidemic of the special infectious pneumonia (COVID-19), most students change their class mode and switch to online learning.

APPLICABLE REMARKS

- We suggest building more multi-media teaching materials for indoor sports courses to improve female willingness to participate in sports.
- It is recommended to increase the content of multi-media teaching materials and teaching time, guide students to invest in more learning opportunities, increase the proficiency of sports skills, and help improve students' sports performance.
- It is recommended to expand the age group of the research object, whether different ages will cause different learning results.
- It is recommended that indoor sports courses should be planned for complete distance teaching materials, synchronized or non-synchronized teaching mode, in order to break through the innovative thinking teaching mode of physical education in the epidemic test in the future and to cultivate student's independent learning ability after class through multimedia-assisted teaching.

REFERENCES

1. Keller JM. Motivational design and multi-media: Beyond the novelty effect. *Strategic Hum Res Develop Rev.* 1997;1(1):188-203.
2. Li JR. The Promotion of Teaching Effectiveness: The Exploration and Strategies of Using Videos. *J Techno Hum Res Edu.* 2015;4(1):1=13.
3. Tsai YY, Hsu CH. A survey of nursing junior college student's attitudes toward physical education. *J Nat Cheng Kung Uni Physic Edu Res.* 2006;39(1):57-66.
4. Yang H, Ni Y, Shih C. The effect of sports movies on audience experience and exercise attitude-a case study of university students in the Taipei area. *J Taiwan Soc Sport Manag.* 2013;13(2):111-134.
5. Guo J, Liu X. College Students' Consciousness of Participation in Leisure Activities Behavior Related Research. *Int J e-Educ e-Bus e-Manag e-Learn.* 2016;6(3):186-192. doi: 10.17706/ijeeee.2016.6.3.186-192
6. Yang CC, J. YJ, Ching-Te L, Wu P. Effect of Sports Lottery Consumers on Sports Attitude and Behavior. *Utopía y Praxis Latinoamericana.* 2020;25(10):297-304.
7. Papastergiou M, Gerodimos V. Can learning of basketball be enhanced through a web-based multi-media course? An experimental study. *Educ Inform Technol.* 2012;18(3):459-478. doi: 10.1007/s10639-012-9186-z
8. Yang C-C, Sia WY, Tseng Y-C, Chiu J-C. Gamification of Learning in Tourism Industry. Proceedings of the 2018 2nd International Conference on Education and E-Learning 2018. p. 191-195.
9. Chen JC. A Study of physical education course satisfaction and leisure sports attitude on leisure sports participation-Tamkang university as an example. *J Sport Recreat Management.* 2018;18(1):1-20.

10. Myung W-S, Yang C-H. Relationship among Motivation, Recognition and Attitude of Leisure of College Students. *Indian J Sci Technol.* 2016;**9**(44). doi: 10.17485/ijst/2016/v9i44/105100
11. Yang C-C, Tseng Y-C, Lin C-T, Chang Y-N. The Research on The Influence of Sports Internet Celebrity's Online videos and Articles for Youths Sports Attitude and Sports Behavior. Proceedings of the 2018 2nd International Conference on Education and E-Learning2018. p. 187-190.
12. Fox KR. Physical self-perceptions and exercise involvement. Arizona, USA: Arizona State University; 2018.
13. Hsu C, Tseng Y. Exercise Behavior among College Students in Taiwan. *J sport Res.* 2016;**25**(22):1-18.
14. Qu H, Cheng P. Application of Multimedia Education Technology in English Teaching. Proceedings of the 2016 2nd International Conference on Economics, Management Engineering and Education Technology (ICEMEET 2016)2017.
15. Wang C-M, Sung H-T. Online Cooking Learning during COVID-19: Relationship between YouTube Self-efficacy, Learning Interest, Attitude and Satisfaction. *J Nat Taichung Uni Sci Technol.* 2020;**7**(2):171-188.
16. Gau LS. Socialization process of adolescent's sport attitudes and behavior. . *TAMSUI OXFORD J Sport Know.* 2011;**8**(1):36-50.
17. Feng CK, Wu CM, Lin CH, Chang BW. Health belief of obesity and weight control behavior among college students in Taichung city. *J Sport, Leisure Hosp Res.* 2016;**11**(2):108-123.
18. Theadom A, Reid D, Hardaker N, Lough J, Hume PA. Concussion knowledge, attitudes and behaviour in equestrian athletes. *J Sci Med Sport.* 2020;**23**(11):1055-1061. doi: 10.1016/j.jsams.2020.05.008 pmid: 32471785
19. Lu CH, Shih KT, Chen CH, Ho KL. A comparative study of multi-media assisted instruction and traditional instruction on college students' learning motivation in table tennis class. *Tpec Press.* 2006;**14**(2):48-59.
20. Lin Y JH. Changes of self-efficacy in motor learning process. *Q Chine Physical Education.* 2016;**30**(1):25-30.
21. Moritz SE, Feltz DL, Fahrbach KR, Mack DE. The relation of self-efficacy measures to sport performance: a meta-analytic review. *Res Q Exerc Sport.* 2000;**71**(3):280-294. doi: 10.1080/02701367.2000.10608908 pmid: 10999265