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Application of Traditional Method and Smart Wearable Devices in Monitoring Physical Fitness: A Comparative Study

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Abstract: This study utilized the Quasi -experimental research design by setting two groups of students -respondents. Thirty students applied the traditional way of getting their physical fitness status while the thirty experimental group utilized the smart wearable devises in monitoring their physical fitness status. The physical activity was Brisk Walking around the Track and Field Oval for one and a half hours everyday for six weeks. Respondents for the experimental group were selected based on the availability of the smart wearable devises that they used when they conducted the brisk walking activity for the duration set by the researcher. They are students of Yongzhou Vocational and Technical College for school year 2023-2024.The duration of the experiment were done for six weeks from August - September 2023. The data were recorded using the researcher –made physical fitness monitoring form for each respondent. The findings of the study were: (1) The level of the physical fitness of both the control group and experimental group before the brisk walking activity when utilizing the traditional method are both on normal levels.(2)The level of the physical fitness of both the control, group who utilized the traditional method and the experimental group when utilizing the smart wearable devices after the brisk walking activity are both on normal levels too.(3)It was evident also that utilizing smart wearable device could help the students record their physical fitness components faster, easier and more accurate.(4) There is a significant difference in the results of the physical fitness components of the experimental group when they utilized the traditional method and the smart wearable devices. The later shows better results. Based from the findings of the study, the following conclusions were drawn:(1)It can be inferred that both the traditional method and the smart wearable devices can be of great help in monitoring and recording the physical fitness status of the students. (2)It can be inferred that any of the two method can give accurate results but if students have the capacity to buy smart wearable devices, these can be a better choice for getting the physical fitness status because of the faster and easier retrieval of the results as

compared to the traditional method.(3)Traditional method of getting the physical fitness information of the students can still be utilized especially if the students do not have the capacity to buy smart wearable devices.(4) Brisk walking activity can greatly help improve the physical fitness status of the students.(5) Further, it can be concluded that utilizing smart wearable devices could help the students and individuals record and monitor their physical fitness status faster, easier and more accurate.

1. Introduction

With the tremendous progress made by mobile Internet and smart wearable devices in China, smart wearable devices have gradually become a new growth point for electronic consumption. In 2015, smart wearable devices reached a market size of 11.27 billion yuan. In 2016, their market value reached 17.94 billion yuan, a year-on-year increase of 59.18%. In addition, the sales volume of smart wearable smart devices in China in 2015 was about 42.5 million units, and the sales volume reached 78 million units in 2016, an increase of 83.53% year-on-year. At the same time, the rapid development of smart wearable sports products has also driven the economic and cultural growth of the sports industry to a certain extent. Wearable technologies, known mostly just as "wearables," are electronic devices that are physically worn by individuals in order to track, analyze and transmit personal data. These smart devices can track biometric data from heart rate to sleep patterns, and are also becoming popular consumer technologies in the gaming and fashion industries. Daley S., Urwin, M.(2022). It is in this premise that the researcher aimed at exploring the possibility of utilizing smart wearable devices in monitoring the physical fitness components information of the college students. The findings could help the students to be more mindful of their fitness and health status.[1]

Nowadays, college students' participation in physical fitness is a hot topic of current research. Scholars conduct investigations from the perspectives of the current situation and motivation of students' sports, analyze the reasons for the lack of physical fitness of college students, and put forward targeted countermeasures. Some scholars have verified college students through tracking experiments. The effect of long-term fitness on body and skills. The advantages of smart wearable devices are that they are convenient for users to carry, have keen sensitivity, can monitor body movement, and are widely used in the field of fitness. As an emerging sports equipment, smart wearable devices play a significant role in meeting individual needs. College students can obtain timely exercise status information through smart wearable devices, and use mobile terminals to analyze data to formulate fitness plans that meet their needs. The unique sports and fitness functions of smart wearable devices cater to the needs of college students.[2]

This research aimed to identify the level of physical fitness components information of college students with the aid of both traditional method and the smart wearable devices. The physical fitness components that were monitored were their resting heart rate, exercise heart rate and maximum heart rate as they conducted aerobics exercises like brisk walking. The students recorded their total number of steps during the durations of one hour and thirty minutes by doing the brisk walking. The body mass index was also monitored. The researcher found interest in conducting a study which utilized both the traditional way and applying technology app like the smart wearable devices in getting the heart rate and body mass index when conducting the brisk walking activity. According to the survey of relevant literature, there are few studies in this area. Therefore, the researcher believed that this research will increase the knowledge system in this field. The

researcher's goal is to recommend technology –based tools that can help track and monitor the physical fitness components information of the students which could help adjust their exercise program as well as observing a healthier lifestyle guided by the results of their body mass index. Being an advocate of a healthy lifestyle, the researcher was compelled to conduct this study for the benefit of the students, and individuals regardless of sex and age. He had a premise that both the traditional method and the smart wearable devices could help in monitoring the heart rates, number of steps in brisk walking and the body mass index but using the smart wearable devices could help make the gathering of results of these physical fitness components information faster and easier. [3-4]

2. Statement of the Problem

This research aimed to explore the utilization of both the traditional method and smart wearable devices in monitoring the level of physical fitness components information of the college students at Yongzhou Vocational and Technical College and University. They conducted Brisk walking activity around the Track and Field Oval of the university daily for the duration of six weeks and spending one hour and thirty minutes.[5]

Specifically, it aimed to answer the following questions:

1. What is the result of the control group's level of physical fitness component information before the intervention (utilizing the traditional method) in terms of:

1.1 Resting heart rate
1.2 Exercise Heart Rate
1.3 Maximum heart rate
1.4 Total number of steps /1.5 hours/day
1.5 Body Mass Index

2. What is the result of the experimental group's level of physical fitness component information before the intervention (utilizing traditional method) in terms of:

2.1Resting heart rate
2.2Exercise Heart Rate
2.3Maximum heart rate
2.4Total number of steps /1.5 hours/day
2.5Body Mass Index

3. Is there a significant difference on the control group's level of physical fitness component information (utilizing the traditional method) and experimental group's level of physical fitness information (utilizing the traditional method) before the intervention in terms of the aforementioned variables.

4. What is the result of the control group's level of physical fitness component information after the intervention (utilizing the traditional method) in terms of:

4.1Resting heart rate
4.2Exercise Heart Rate
4.3Maximum heart rate
4.4Total number of steps /1.5 hours/day
4.5Body Mass Index

5. What is the result of the experimental group's level of physical fitness component information after the intervention (utilizing the smart wearable device) in terms of:

5.1Resting heart rate
5.2Exercise Heart Rate
5.3Maximum heart rate

5.4Total number of steps /1.5 hours/day

5.5Body Mass Index

6. Is there a significant difference on the control group's level of the physical fitness component information (utilizing the traditional method) and experimental group's level of physical fitness information (utilizing the smart wearable devices) after the intervention in terms of the aforementioned variables.

7. Is there a significant difference on the experimental group's level of physical fitness information in terms of the aforementioned variables before (utilizing the traditional method) and after (utilizing smart wearable devices) the intervention?

8. Based on the results of the study, what innovative educational tool can be proposed to improve the monitoring of students' physical fitness component information ?

3. Guiding Framework

This chapter presents the theoretical and conceptual framework to fully understand the research done and lastly the definition of terms for better comprehension of the study.

3.1 Healthy China 2023 Plan and Sports Apps

With the issuance of the "Healthy China 2030 Plan" and the advent of the era of nationwide fitness, the development of sports has reached unprecedented prosperity. Heathy China 2030 is a government effort to ensure that Chinese population advocate the concept of "health for all, and all for health" (Tan et al., 2019). The strategies of the plan include popularizing healthy lifestyle. Doing physical activities is one aspect of a healthy life style, and China's mobile communication industry has recognized an opportunity in here to widen its business. Knowing that the penetration rate of smartphones has reached an unprecedented high and social networking applications carried by smartphones are continuously altering people's social lifestyles, the mobile communication industry in China introduced sports and fitness applications (APP). These apps are supposed to augment the traditional ways of exercising and staying fit which are no longer sufficient to meet the new demands of the masses for health and fitness.[6]

The emergence of this software has changed the way people exercise. People can use sports and fitness apps to record their workout data and share their exercise information (Zhang et al., 2022). Sports apps that integrate with the internet have become important tools for competitive sports and nationwide fitness. According to data from the Speed Institute for Q1 2019, the download statistics for fitness apps in China are as follows: "Keep" leads with over one hundred million downloads, followed closely by "Xiaomi Sports" with 16.48 million and "Gudong Sports" with 15.8 million downloads, while "Yuedong Circle" ranks fourth with 13.14 million downloads (Meng, 2021). University students are the primary users of mobile internet networks spending an average of five hours daily (Li et al., 2020). They are also users of sports and fitness apps because they wanted affordable intervention for their health conditions (Zhang et al., 2022). They are passionate about sports and are strong supporters of our country's sports industry. With the development and progress of the times, the fitness requirements of university students have also increased. The traditional sports development model is no longer suitable for university students. Sports apps are a special type of software that incorporates emerging science and technology. They have been designed to cater to the diverse sports needs of university students. These apps not only provide scientific workout plans and methods but also help ignite users' passion for exercise to some extent. However, Chinese university students receive traditional physical education and health courses for an extended period, which may lead to a loss of enthusiasm for traditional sports. To change this situation, universities are gradually incorporating sports apps into physical education to boost

students' interest in sports and improve their physical fitness.[7-8]

Since Google first released the smart glasses prototype in 2012, the understanding of smart wearable devices have been different from all walks of life, because smart wearable devices have a wide range of applications, whether it is entertainment, sports fitness, medical management and others. Have the penetration of smart wearable devices. The integration of electronic technology into spare parts that can be worn directly on the body is widely used as a wearable technology, and the application of this technology to monitor the physiological indicators of human movement during exercise is called smart wearable sports technology. Wearable device was also considered as a kind of clothing or wearing accessories that integrates computers and advanced electronic technology.[9]

3.2 Classification of Smart Wearable Sports Equipment

Wearable sports devices also have different categories according to their different characteristics, which are divided into different categories from application fields, wearing parts, and product types.

①Classification of application areas

According to the current product functions on the market, wearable devices can be divided into two categories: one is sports health or health promotion, Apple Watch, Google Glass, Samsung gear, etc. with simple step counting, heart rate monitoring, and sleep monitoring Fashionable wearable devices that promote health functions such as calorie calculations, and other types of medical and health products, such as wearable vision and hearing enhancers, non-invasive diabetes monitoring, Intel Parkinson's syndrome monitoring, prevention of sudden heart attacks and strokes Functional wearable devices, etc.

Wearable devices are roughly divided into four categories: infotainment, sports and fitness, safety, and medical management according to the degree of close correlation between wearable devices and public life.

According to the classification of application fields, it can be seen that wearable sports equipment is widely used in sports fitness and medical health according to its application fields, and the functions that focus on the use of different application fields are also different. The use of wearable devices during exercise pays more attention to the monitoring of human physiological functions during exercise, such as heart rate during exercise, calorie consumption, exercise distance, and exercise trajectory.[10]

②Classification according to the wearing part

According to the wearing position of wearable devices on the market, it is divided into head-mounted devices, wristband-type devices, and body-worn devices. The wearable equipment is further subdivided into torso wearables, lower limb wearables and other two categories. According to the classification of the wearing part, it can be seen that the common wearing forms of wearable sports equipment on the market are wristband and body wear. It is easy to be "invisible" during exercise, and can detect various physical indicators of the user without feeling. And information channels, and provide timely feedback. In addition to these two forms, smart phones are widely used. Many mobile phones have added functions such as sensors during the development process to achieve the purpose of detecting human physiological indicators by smart phones. As a portable device, smart phones can also measure human movement during exercise. The function of physiological indicators.

The application of smart wearable technology in the field of sports and health did not appear as a sporting product at the beginning. However, as the detection of human physiological data by smart wearable devices matures, it has gradually been widely used in sports and fitness. Engaging in sports activities and fitness provides basic material conditions.[11]

3.3 Conceptual Framework

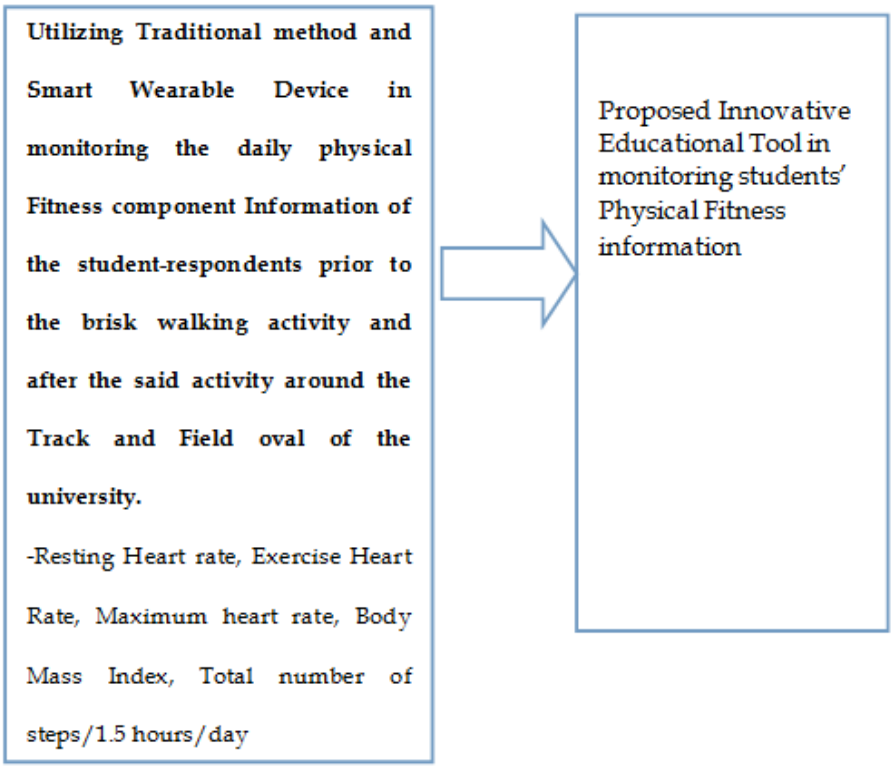

Figure 1: Research Paradigm

As shown is shown in Figure 1 above, The researcher aimed to determine whether the utilization of the traditional method and smart wearable devices are effective educational tools in monitoring the physical fitness information of the sixty college students who served as the respondents of this study. They conducted the brisk walking activity everyday for six weeks around the track and field oval of the university for 1.5 hours. The expected output of this study will be the adoption of smart wearable devices as an educational tool to help monitor the physical fitness information of the students.

4. Methodology

This chapter discusses the methods and procedures used to collect the necessary data to evaluate the use of smart wearable devices in physical exercise by college students. The elements described in this chapter include research design, sample and sampling techniques, research tools, data collection procedures, and statistical processing of data to achieve research purposes.

4.1 Research Design

This research utilized the quasi-experimental research design. An experimental research design is typically focused on the relationship between two variables: the independent variable and the dependent variable. The researcher conducted this study to the sixty sample respondents who participated in the brisk walking activity for six weeks. The data gathered were encoded in using the researcher-made fitness monitoring form. The results of the experiment compared to determine

whether there is a significant difference between the results of the physical fitness component information of the selected student-respondents who joined the brisk walking activity when they recorded their daily resting heart rate, exercise heart rate, maximum heart rate, number of steps and body mass index utilizing the traditional method and the smart wearable device.[12]

4.2 Research Locale

The researcher selected Yongzhou Vocational and Technical College as the research locale. It is located in Hunan Province with a long history. Yongzhou Vocational and Technical College has more than 20,000 students and has a good campus culture and background. The school is committed to cultivating high-quality, high-skilled, specialized and applied talents for local economic and social development. It is a national exemplary higher vocational college, which is representative in Hunan Province.

Yongzhou Vocational and Technical College is a full-time public national model higher vocational college approved by the Hunan Provincial People's Government and registered with the Ministry of Education in July 2000. The college covers a total area of 1.959 million square meters and a total construction area of 469,700 square meters. The school now has 1,024 faculty and staff, including 70 with senior professional titles and 265 with associate senior professional titles. Among the full-time teachers, the proportion of “double qualified” teachers is 82%. It has 12 secondary colleges and teaching departments, offers 39 higher vocational majors, and recruits students from 27 provinces and municipalities across the country, with more than 20,000 students enrolled.[13]

4.3 Respondents of the Study and Sampling Technique

Respondents of the study were selected using purposive sampling, sixty student-respondents(30 for the control group and 30 for the experimental group) joined in the brisk walking activity. They are officially enrolled in Yongzhou Vocational and Technical College. They are officially enrolled in their physical education course in the university; and those who belong to the experimental group must have experience using smart wearable device in helping them monitor their present physical fitness components particularly their resting heart rate, exercise heart rate, maximum heart rate, number of brisk walking steps and the body mass index.[14]

4.4 Research Instrument

The researcher prepared a monitoring form to record the daily physical fitness component information of the two groups of student-respondents while doing the brisk walking exercise activity for six weeks. The daily brisk walking activity was done for 1.5 hours per day after their class hours.

The data that were collected in monitoring their resting heart rate, exercise heart rate, maximum heart rate and steps covered during the brisk walking exercise program for one hour and thirty minutes, and their Body Mass Index. The data that were collected were analyzed and recorded. The intended output of this study was a proposed Innovative Educational Tool to improve the monitoring of students’ physical fitness information.[15]

4.5 Data Gathering Procedure

4.5.1 Prior to the experiment

A letter of request was given to the head of the university seeking permission to conduct the said

study. Upon approval, he sought the help of his friend in organizing the two groups of student-respondents. He prepared a physical fitness monitoring form to record the daily information of the student-respondents.

He conducted a one- time brisk walking activity for the two groups of respondents to get the data about their physical fitness information prior to the actual brisk walking activity for six weeks. The data collected were recorded using the traditional method and also as part of the pre-testing activity.

4.5.2 During the experiment

The researcher gathered the student-respondents and oriented them of the nature of the activity. He handed to them the information form for them to record their daily physical fitness information for six weeks. He gave a thorough instruction on how to conduct the brisk walking activity, observing propose attire too and recording their present physical fitness components particularly their resting heart rate, exercise heart rate, maximum heart rate, number of brisk walking steps and the body mass index.

4.5.3 After the experiment

The researcher gathered all the data for the past six weeks and requested the expertise of a statistician to compute the data with the correct statistical treatment of data.

He assured the two groups of respondents that the data that were gathered will be used only for his study, and the identity of the respondents will be kept confidential.

Thorough interpretations of the findings will be presented to come up with conclusions, recommendations and proposed output of the study.[16]

Its who could decide on their own.

5. Summary Of Findings, Conclusions And Recommendations

5.1 In the Light of the Results of the Study, the Following Summary of Findings Can be Drawn

1. The level of the physical fitness component information of both the control group and experimental group before the brisk walking activity when utilizing the traditional method are both on normal levels.
2. The level of the physical fitness component information of both the control, group who utilized the traditional method and the experimental group when utilizing the smart wearable devices after the brisk walking activity are both on normal levels too.
3. The level of the physical fitness component information of both the control, group who utilized the traditional method and the experimental group after the brisk walking activity when utilizing the smart wearable devices are both on normal levels too. But it can be seen also that utilizing smart wearable device could help the students record their physical fitness components easier and more accurate.
4. The level of the physical fitness components information do not show differences for both the control group and the experimental group before and after the brisk walking activity.
5. There is a significant difference in the results of the physical fitness components of the experimental group when they utilized the traditional method and the smart wearable devices. The later shows better results.

5.2 Conclusions

1. It can be inferred that both the traditional method and the smart wearable devices can be of great help in monitoring and recording the physical fitness information of the students.
2. It can be inferred that any of the two method can give accurate results but given the opportunity and capacity to buy smart wearable devices, smart wearable devices can be a better choice for getting the physical fitness information because of the fast results of data as well as the level of accuracy is higher as compared to the traditional method.
3. Traditional method of getting the physical fitness information of the students can still be utilized especially if the students do not have the capacity to buy smart wearable devices.
4. Brisk walking activity can improve the physical fitness status of the students
5. Further, it can be concluded that utilizing smart wearable devices could help the students and individuals record and monitor their physical fitness component information faster, easier and more accurate.

5.3 Recommendation

1. The smart wearable devices can be recommended for utilization if the students have the capacity to buy them because of it is easier to use and the data can be easier to get.
2. The traditional method can still be use by students who have no budget to buy smart wearable devices especially those students who live and study in places were smart wearable devices are not their priority.
3. It is recommended to adopt brisk walking exercise as a form of aerobics exercise to improve the physical fitness status of the individuals particularly the overall fitness of the heart, lungs and maintaining the ideal body weight.

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If any, should be placed before the references section without numbering.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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