Chapter 8
Teaching Physical Fitness and Exercise Using Computer-Assisted Instruction:
A School-Based Public Health Intervention

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ABSTRACT

Empirical evidence has demonstrated the benefits of physical activity in preventing chronic diseases and premature death. Unfortunately, there is a global trend of insufficient physical activity, which was aggravated by the recent global pandemic. Although physical education is often used to promote physical activity, the transition to online education made it difficult to teach fitness and exercise from a distance due to several limiting factors. This chapter aims to respond to these challenges by implementing a school-based public health intervention using a computer-assisted instruction (CAI) tool called VD-CAI. Through an experimental approach, it was found that VD-CAI as an instructional technology shows a performance advantage compared to other pedagogies. Specifically, students who used VD-CAI in their physical education courses received higher scores and exhibited a more positive attitude. This chapter contributes to the growing scientific evidence of the effectiveness of school-based health education programs as well as the expanding literature on CAI and physical education.

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INTRODUCTION

Physical activity refers to any bodily movement generated by skeletal muscles that necessitate energy expenditure. Evidence regarding the health benefits related to regular physical activity is well established. Being physically active assists in preventing chronic diseases (e.g., osteoporosis, obesity, hypertension, cancer, diabetes, and cardiovascular disease) and premature death (Miller et al., 2016; Reiner et al., 2013; Warburton et al., 2006). The vital role of physical activity in human health led to the establishment of various guidelines (e.g., Piercy et al., 2018; World Health Organization, 2020). The common denominator between these guidelines is the assertion that physical activities are fundamental to obtaining the minimum requirements to achieve better health outcomes and physical fitness. They also recommend types and amounts of physical activity to improve a variety of health outcomes for multiple population groups. For instance, aerobic exercise should have a daily frequency (^{3} 60 minutes per day), at a mostly moderate-to-vigorous intensity, and should include vigorous-intensity activities at least three days a week (aerobic activities such as running, walking outdoors, swimming, dancing, and cycling). Muscle strengthening should be done at least three days a week (as part of the daily 60 minutes of exercise), which can be activities without a specific organization (climbing trees, playing on playground structures, and others) or structured programs (lifting weights, working with rubber bands and bands, and others). Bone strengthening should also be worked on at least three days a week and should involve activities such as running, jumping rope, playing sports, and training force. Despite these guidelines and the many health benefits of physical activities, there are still many people who do not engage in adequate physical activity (Guthold et al., 2020). Within the scope of this chapter, emphasis will be placed on school-based interventions to improve physical fitness and exercise practiced by students in schools. According to Kljajević et al. (2022), schools are an ideal setting for implementing interventions that promote sufficient physical activity. Rather than the traditional pedagogies, we aim to investigate what role computer-assisted instruction (CAI) plays in the teaching and implementation of these activities.

MAIN FOCUS OF THE CHAPTER

Empirical evidence has demonstrated the benefits of physical activity and cardiorespiratory fitness (Miller et al., 2016; Reiner et al., 2013; Warburton et al., 2006). Accordingly, there is irrefutable proof that regular physical activity assists in preventing chronic diseases (e.g., osteoporosis, obesity, hypertension, cancer, diabetes, and cardiovascular disease) and premature death. According to the guidelines set by the World Health Organization (2020), adults (18-64 years) should undertake at least 150–300 minutes of moderate-intensity or at least 75–150 minutes of vigorous-intensity physical activity throughout the week. At the very least, this recommendation emphasizes the requirement of limiting the amount of time being sedentary and replacing it with physical activity of any intensity. Unfortunately, there is a global trend of insufficient physical activity (Guthold et al., 2020), which was aggravated by the recent pandemic (Kaur et al., 2020; Puccinelli et al., 2021). Physical education is often used as an auxiliary skill course or exercise training to promote physical activity (Demetriou & Höner, 2012; Trudeau & Shephard, 2008; Wallhead & Buckworth, 2004). However, the transition to online education made it difficult to teach fitness and exercise from a distance due to several limiting factors (Centeio et al., 2021). Thus, this chapter aims to respond to these challenges by implementing a school-based public health intervention using a CAI-based tool named "VD-CAI". Specifically designed for teaching physical fitness and

exercise, this tool is an extended version of nutrition systems called Plan-Cook-Eat (Garcia, 2019) and Virtual Dietitian (Garcia et al., 2020).

LITERATURE REVIEW

School-Based Health Intervention

Schools are an ideal setting for the implementation of interventions that promote sufficient physical activity (Kljajević et al., 2022). The considerable time that students spend at school should create opportunities to engage them in physical fitness and exercise. Beyond their physical education classes, students can participate in extracurricular sports and have access to training camps, games, school gyms, and playgrounds. According to Garcia (2022a), extracurricular activities play an important role in the educational process. Research has also shown that well-structured school physical education programs have a significant impact on young people's physical activity levels (Jacob et al., 2021). Teachers may emphasize the health benefits of physical activity and support efforts to implement programs, practices, and policies in their educational institutions to facilitate increased physical activity and better health outcomes. Thus, their role is essential in providing the foundations for students to perform physical activity for pleasure and not out of obligation. Instructional educational technologies should also be applied to enhance the adoption of physical activity. Studies have recommended that computer-based training strategies help greatly in this regard, which enhances opportunities to improve the quality of public health and increase students' academic achievement (Lawdis et al., 2017).

Computer-Assisted Instruction

In physical education, CAI is among the most important instructional technologies that can assist students in improving their physical performance. The advantage of this type of educational software is the availability of visual teaching aids in addition to the self-paced skills activities (Teng & Cai, 2021). Specifically, it can offer structured exercise guides or 360-degree views of the physical movements (Lee et al., 2021). In this case, Cheng (2021) recommended that the materials should be as close to the actual situation as possible. Through interactive activities, CAI can also improve student performance in physical education courses. For instance, Liu (2021) conducted a series of virtual experiments to offer suggestions for enhancing physical education among college students. After using CAI in the subject, students who struggle to understand the fundamentals of sports movement exhibited a noticeable improvement. Moreover, the CAI's approach to teaching physical education is more adaptable than conventional approaches. These results suggest that CAI can dramatically increase students' enthusiasm and develop a more positive attitude for sports and their physical activity in general.

Physical Education and Physical Activity

Structured exercise programs are essential for students to acquire new patterns and progress in learning. They need new stimuli and tasks that foster the exponential acquisition of skills, which will broaden their motor range and help them succeed in any challenge they face. Thus, to counteract the trends of a sedentary lifestyle, it is vital to promote healthy lifestyle habits from an early age that can likewise

reduce harmful health behaviors (Kljajević et al., 2022; Miller et al., 2016; Qin et al., 2021). Students can benefit from the practice of physical activity both in the present (promoting harmonious and healthy development) and in the future (showing the long-term effects that exercise has on health). Unfortunately, the disparities between students' opinions and experiences in conventional and online physical education and health-related courses persist. This gap was especially pronounced during the COVID-19 pandemic (Garcia, 2022b), which not only lowered the physical activity among students (Kaur et al., 2020; Puccinelli et al., 2021) but also made it difficult to teach physical education courses (Centeio et al., 2021; González-Calvo et al., 2021). This deficiency is likewise highlighted in physiotherapy-related studies (Tomé & Coelho, 2023). Williams et al. (2020) confirmed that students who took the course online take more advantage in developing and carrying out a personal fitness regimen. Moreover, students reported that they had improved in terms of their fitness levels. The fact that they could receive credit for engaging in sports and physical fitness activities in their local communities was popular with the students. Garcia (2022a) found a similar effect in other extracurricular activities. Consequently, improving students' physical fitness and developing their awareness of the importance of physical education is one of the important objectives of CAI.

METHODOLOGY

Research Design

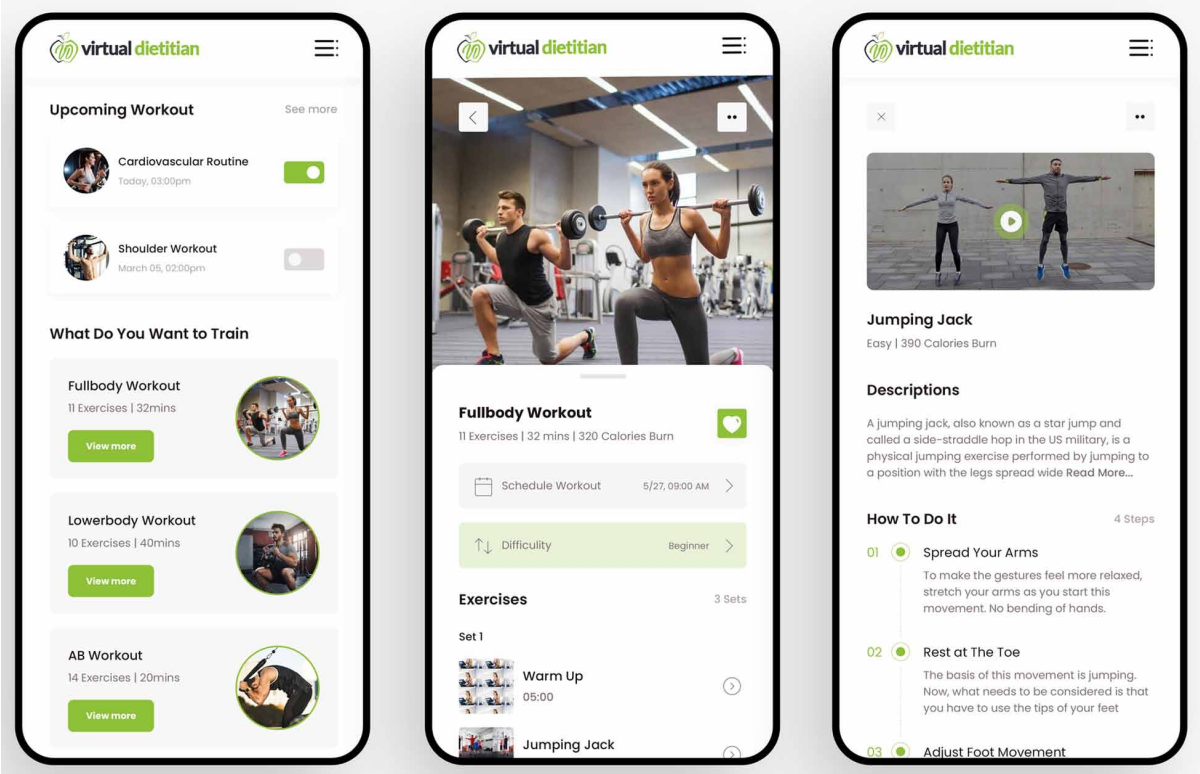
In this study, we adopted an experimental approach to examine the effect of VD-CAI as an intervention tool in teaching physical fitness and exercise. According to Taber (2019), experimenting is a common process in educational research for evaluating new teaching approaches, curricula, or learning resources. This research method has three types: pre-experimental, quasi-experimental, and true experimental. Although true experimental designs (e.g., randomized controlled trials) are the gold standard, we selected a quasi-experimental approach because of the expected small sample size and the constraints brought by university policies (e.g., randomization at an individual level). Garcia (2021) used the same research methodology and found it to be sufficient in examining the effectiveness of a new teaching strategy. We also followed the pretest-posttest nonequivalent group design where assessment measures are given to groups of participants both before and after the treatment. In our case, we have three groups (two experimental and one control) where our innovation (VD-CAI) is compared to the enhanced treatment (DLP) and standard treatment (traditional instruction). This setup conforms with the highest level of experimental research (Taber, 2019). We conducted this study following the ethical principles of the University and the Declaration of Helsinki.

Setting and Sample

We carried out this research in one private university during the 2021-2022 academic year. This educational institution offers physical education courses that focus on physical fitness fundamentals including basic movement patterns and familiarity with preparatory exercises. Advanced courses cover fundamental relationships between physical fitness and a healthy lifestyle through selected workout routines. For this research project, we recruited three sections with 50 students each ($n = 150$) to participate in the experiment. Each group was randomly designated either as the experimental (EXP_{DLP} or EXP_{CON}) or the

control group (*CON*). All sections used the same syllabus, online modules, and instructional activities throughout the semester. They were also under the supervision of the same course instructor. Before the experiment, we tested the homogeneity of the groups and found no significant difference ($p > .05$). Majority of students were male ($n = 79$, 52.67%), 18-25 years old ($n = 134$, 89.33%), living with a family ($n = 116$, 77.33%) with upper-middle class ($n = 97$, 64.67%), and engaged in light physical activity ($n = 71$, 47.33%).

Figure 1. Application Dashboard, Workout Program, and Workout Description.



Interventions and Instruments

Our experimental groups received a supplemental tool either in the form of DLP or VD-CAI. First, DLP is a print-based online education course originally intended for students who do not have the technological capacity to continue their online study during the COVID-19 pandemic (Bihu, 2022; Lin & Yeh, 2022; M. S & Siddiqui, 2022). The conception of this strategy was a direct response to the socioeconomic inequalities especially faced by underprivileged students (Garcia, 2022b). According to many studies (e.g., Fung et al., 2022; Ruipérez-Valiente, 2022), implementing an inclusive framework by considering the socioeconomic status of learners is vital in the new normal. Meanwhile, VD-CAI is the extended version of *Virtual Dietitian* – a nutrition knowledge-based system that automatically generates personalized daily meal plans (Garcia et al., 2021b). Following the conception of this research project, we used its core features as a starting point for developing the CAI infrastructure. Rather than simply present-

ing the materials via a computer (i.e., the typical CAI), VD-CAI utilizes the inbuilt forward chaining algorithm used by its predecessor in filtering recipes and foods. We reprogrammed this algorithm to determine the most appropriate workout routines as an additional feature to simply listing all exercises. Figure 1 shows the interface for the user dashboard, workout program, and workout description. For our evaluation, we developed our instrument using the "International Physical Activity Questionnaire" (Craig et al., 2003) and the attitudes toward physical activity questionnaire (von Seelen et al., 2018) for self-reported physical activity and attitude, respectively. The assessments used for measuring learning achievement were based on the examinations created by the instructors.

Data Collection and Analysis

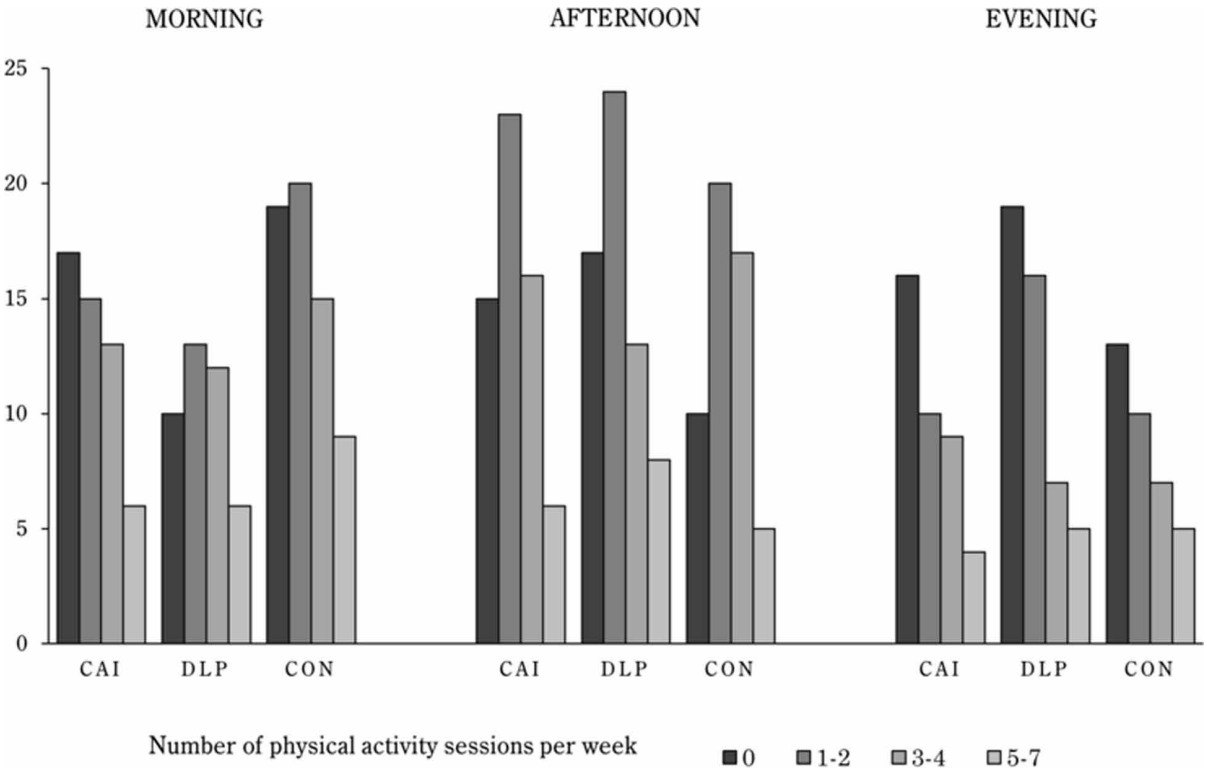
During the first meeting of the semester, we distributed the pre-test questionnaire containing a demographic section, self-reported physical activity, and attitude toward physical education exercises. Excluding the demographic section, we distributed the same questionnaire after the experiment for comparison. With consent and approval, we also collected the assessment scores for the five pre-identified topics: (1) Dynamic Warmups, (2) Push/Pull Exercises, (3) Plyometrics Workout, (4) Strength Training, and (5) Cardio Routines. We analyzed the collected data using IBM SPSS Statistics 22.0. We used descriptive statistics to report the demographic information, the level of self-reported physical activity, and other variables in the dataset. For the attitude variable, we used Wilcoxon Signed-Rank Test to determine whether there was a significant difference before and after the experiment. We also used Analysis of Covariance (ANCOVA) to compare post-test with pre-test scores as a confounding variable. Finally, we used one-way Multivariate Analysis of Variance (MANOVA) to examine whether there was a significant difference in learning achievement based on the treatment they received.

EXPERIMENTAL RESULTS

Level of Self-Reported Physical Activity

On average, students self-reported an estimated 65.74 (SD = 32.21) minutes of daily physical activity. Using ANOVA, we found no significant difference in the level of physical activity between EXP_{DLP} (71.34±35.52), EXP_{CAI} (68.63±30.19), and CON (57.24±25.41). This result implies that all students have a similar level of daily physical activity. Students also noted being physically active in the afternoon (n = 67, 44.67%), with two to three weekly sessions (n = 58, 38.67%) of vigorous activities of at least 15 minutes (see Figure 1). For physical activities requiring low (n = 59, 39.33%) and moderate (n = 41, 27.33%) effort, students reported engaging four to five times a week for at least 20 minutes (i.e., 80 to 100 minutes of low-moderate physical activity). Following the guidelines set by the World Health Organization (2020), these students were insufficiently active because they are not regularly engaged in at least 150 minutes of moderate-intensity physical activity throughout the week. This finding strengthens the urgent necessity for the implementation of a school-based health intervention.

Figure 2. Weekly Frequency of Physical Activity by Time of Day.



Attitude Toward Physical Education Exercises

Before the experimental intervention, students' attitude toward physical education exercises was 3.53±0.43 for EXP_{CAI}, 3.55±0.44 for EXP_{DLP}, and 3.44±0.51 for *CON*. Using ANOVA, we found no significant difference among the three groups ($F = 1.29$, $p > .05$). This finding indicates that all students have equivalent attitudes. In general, 90.67% of students believe that exercising positively affects their well-being. They think it is a nice break from the typical classroom instruction ($n = 101$, 67.33%) and makes school more fun ($n = 98$, 65.33%). However, students think it interrupts their learning ($n = 124$, 82.67%) and it is not meaningful to engage in some physical activity during school hours ($n = 128$, 85.33%). These results explain why students were insufficiently active and not regularly exercising. More importantly, only 32% of students believe they have learned about health. Table 1 presents the ratings of students concerning their attitude toward exercising as part of their physical education course.

Table 1. Students' Attitude Toward Exercising

Questionnaire Items	f	%
Exercising has a positive effect on my social well-being	136	90.67
Exercising helps me concentrate	23	15.33
Exercising makes school more fun	98	65.33
Exercising is a nice break from classroom teaching	101	67.33
Exercising has made me learn more about health	32	21.33
Exercising has made me healthier	53	35.33
Exercising interrupts my learning	124	82.67
Exercising during school is not meaningful	128	85.33
Exercising is not a good idea	145	96.67

After the intervention, we noticed that the attitude for both EXP_{CAI} and EXP_{DLP} increased to 3.81 ± 0.74 and 3.67 ± 0.70, respectively, while CON decreased to 3.22 ± 0.51. Using a Wilcoxon Signed-Rank Test, we found that there was a significant difference between the pre-test and post-test scores of EXP_{CAI} ($p = .043$) but not EXP_{DLP} and *CON*. This result implies that VD-CAI as a supplemental tool can significantly increase students' attitudes toward exercising as part of their physical education course. We also used ANCOVA to compare their post-test ratings with pre-test scores as a confounding variable. As presented in Table 2, the three groups had significant differences in their attitude scores ($F = 3.59$, $p < .05$). Pairwise comparisons showed that students from EXP_{CAI} had significantly higher attitude ratings than those from *CON* and EXP_{DLP}.

Table 2. ANCOVA Results for Self-Efficacy

Group	Mean	Adjusted Mean	SD	*F*	p-value	Pairwise Comparisons
EXP_{CAI}	3.93	3.81	.74	1.14	.41	($EXP_{CAI} > CON$)
EXP_{DLP}	3.69	3.67	.70			($EXP_{DLP} < EXP_{CAI}$)
CON	3.12	3.22	.51			

Learning Achievement

Teachers of the corresponding groups measured students' learning achievement by giving a 50-item assessment test on the five identified topics. These assessments were given via VD-CAI's custom-built knowledge evaluation interface for EXP_{CAI} group and an online learning management system for EXP_{DLP} and *CON* groups. As presented in Table 3, students from the EXP_{CAI} group achieved the highest mean score in all assessments. We used MANOVA and found a statistically significant difference in the learning achievement of all groups based on the given assessment ($F = 8.007$, $p < .000$; Wilk's $\Lambda = 0.455$, partial $\eta^2 = .325$). This finding indicates that the type of intervention significantly influenced student performance in the assessments.

Table 3. MANOVA Results for Learning Achievement

Assessments	CON Mean (SD)	EXP_{CAI} Mean (SD)	EXP_{DLP} Mean (SD)	*F*	p-value	Partial η^2
Dynamic Warmups	31.27 (13.05)	36.83 (5.62)	35.40 (8.08)	6.182	.003	.124
Push/Pull Exercises	28.08 (12.69)	38.87 (5.70)	32.70 (6.81)	10.224	.000	.190
Plyometrics Workout	29.20 (11.16)	39.90 (6.56)	33.63 (7.66)	11.506	.000	.209
Strength Training	31.02 (10.01)	37.90 (4.44)	31.10 (9.56)	7.640	.001	.149
Cardio Routines	25.47 (11.90)	41.02 (8.23)	36.67 (9.60)	19.742	.000	.312

DISCUSSION

This chapter sought to investigate the effectiveness of a school-based public health intervention using an instructional technology called VD-CAI inspired by (Garcia, Revano, et al., 2022). Our study was driven by the recent global trend of insufficient physical activity among students (Guthold et al., 2020), the emerging limitations of teaching physical education online especially during the COVID-19 pandemic (González-Calvo et al., 2021), and the growing instructional technologies in health education (Miranda & Tolentino, 2023; Rao & Mokhtar, 2023; Silva et al., 2023; Tavares et al., 2023). Researchers have established physical education as an auxiliary skill course in promoting physical activity (Demetriou & Höner, 2012; Trudeau & Shephard, 2008; Wallhead & Buckworth, 2004). The installment of our intervention tool aims to support this process, ensuring students could learn fitness and exercise anywhere and anytime. Our study is significant because regular physical activity assists in preventing various chronic diseases (e.g., osteoporosis, obesity, hypertension, cancer, diabetes, and cardiovascular disease) as well as a premature death (Miller et al., 2016; Mishra et al., 2023; Reiner et al., 2013).

Following the guidelines on physical activity and sedentary behavior (World Health Organization, 2020), we found that students are insufficiently active. This finding is consistent with the global trend of inadequate physical activity among school-going adolescents (Guthold et al., 2020). Like in most parts of the world (Kaur et al., 2020; Puccinelli et al., 2021), it was found that overall physical activity and sedentary behaviors among Filipino students have significantly decreased during the COVID-19 pandemic (Cruz et al., 2022). This is unsurprising due to the established restriction guidelines that forced students to stay in their homes and attend online classes (Amaghouss & Zouine, 2022; Khusanov et al., 2022). As our data was collected when students can freely go outside and attend in-person classes, it is apparent that they have not returned to their normal physical activity level. Therefore, policy actions must emerge to encourage physical activity in all its forms, including safe independent mobility and physical education. To be successful, comprehensive strategies will demand coordination between stakeholders, including community groups, sport and recreation providers, and schools (Almeida, 2023; Çalış et al., 2023; Garcia & Yousef, 2022; Howard, 2023; Lobo, 2023; Silva et al., 2023).

According to Kljajević et al. (2022), schools are an ideal environment for the promotion of physical fitness and physical activity. Our intervention contributes to the growing scientific evidence of the effectiveness of school-based health education programs. Jacob et al. (2021) reported that the success of interventions with health education is dependent on how the messages are delivered. In physical education courses, teachers can facilitate different activities and strategies to engage students in any physical activity. For instance, Cheng (2021) used web embedded systems and virtual reality to improve the quality of

teaching and training. Having dominance in the classroom may have partially helped teachers in getting their students started engaging with more physical activities. According to Lü and Hu (2021), teacher authority is a crucial component of students' school-life experiences and overall development. Schools, on the other hand, can establish policies that provide adequate time for organized physical activity. Like in our study, they can initiate school-based physical activity programs that may influence students in exploring different physical activities that may lead to a more physically active lifestyle.

In terms of the pedagogical impact, we found a significant increase in students' attitudes toward physical education exercises after using VD-CAI. This finding confirms prior works on the effectiveness of CAI as an instructional technology for promoting positive student attitudes (e.g., Aliasgari et al., 2010; Teng & Cai, 2021). One possible reason is the authentic learning experiences that students acquire after using technology-enabled instruction, which is supported by Garcia et al. (2023). As demonstrated by existing studies, using technology as a learning tool promotes engagement and facilitates academic success (Cardullo et al., 2018; Garcia, Juanatas, et al., 2022; Mustafa et al., 2022; Schindler et al., 2017). In a systematic review, Crompton et al. (2021) recapitulated the prevalence of learning with technology and emphasized their important role during the pandemic. Another potential factor is the association of shyness with physical activities, especially in front of many people. Page and Zarco (2001) found that shy students participated in vigorous physical activity significantly less often. With VD-CAI providing lessons and exercises that are accessible anywhere and anytime, students can engage in physical activities even in the comfort of their homes. Similarly, Haerens et al. (2007) found that computer-tailored interventions can enhance physical activity behaviors among students. They asserted that personally adapted feedback delivered by these digital tools helped achieve a successful health intervention. Vandelanotte and De Bourdeaudhuij (2003) supported this contention by noting that computer-based tools can provide personally adapted suggestions to change behaviors that are potentially health-threatening and to maintain behaviors that are beneficial for health.

Garcia and Revano (2021) added that students are more willing to learn when they have a positive attitude toward the course. This assertion explains why students who used CAI in their physical education courses achieved the highest mean score in all assessments. Our result is consistent with previous studies that assessed knowledge outcomes, which concluded that CAI is equally effective as in-person teaching methods (Tomesko et al., 2017). When students are provided with computerized educational resources to aid their learning, it reinforces their understanding of the materials and lessons (Cardullo et al., 2018). It also allows them to have some control over their learning process, which is conducive to promoting student engagement. With the evident association of student engagement to various academic outcomes (Schindler et al., 2017), our study offers an important implication for educational policy. Schools should provide students with instructional technologies, especially related to health education (e.g., Barua et al., 2023; Solanki et al., 2023), that could assist in their learning and could be beneficial in many academic aspects. Nevertheless, we acknowledge that it should not replace the face-to-face teaching of physical education, especially since teachers have reservations about virtual physical education courses (González-Calvo et al., 2021). Rather, these technology-based learning approaches should be viewed as supplemental tools for supporting both teachers and students (e.g., Arayata et al., 2022; Cortez et al., 2022; Parel et al., 2022; Valderama et al., 2022).

Our study has some limitations that suggest directions for future research. First, although we reported that the decline in students' physical activity during the pandemic is still apparent after returning to normal life, it is unclear why students are still insufficiently active and have not yet restored their normal physical activity level. Identifying the factors that hinder students from being more physically active may

inform policies and programs that could address this problem. Second, we did not evaluate the effect of our intervention on health outcomes as this research requires longer follow-up periods. We recommended that future research investigate distal outcomes (e.g., health results and behavior change) in addition to proximal outcomes (e.g., attitude and knowledge. Mukamana and Johri (2016) also emphasized this gap in their scoping review of the literature on school-based interventions for health promotion. Finally, we did not account for demographic factors in analyzing the effects of our intervention. In the most recent version of *Virtual Dietitian*, Garcia et al. (2021a) found that participants' profile such as monthly household income, nutritional status, living condition, average daily meals, and current physical activity affects the way they perceive the quality and acceptability of a health application.

CONCLUSION

In this chapter, we reported the results of our school-based public health intervention using VD-CAI as a supplementary tool in teaching physical fitness and exercise. Based on our findings, we can conclude that CAI as an instructional technology demonstrates a performance advantage compared to our standard and enhanced treatments. Students who used VD-CAI in their physical education courses received higher scores and demonstrated a more positive attitude. These findings offer important implications to relevant stakeholders. For educational policymakers, they may consider adding this instructional technology as a supplement to conventional education. A blended format may also be applied where students can benefit from both in-person classes and online learning with CAI. For school leaders, it is apparent that their initiative is needed in equipping their institutions with this type of educational technology. They must be the first adopters that champion the necessary pedagogical transformations in their institutions. For physical education teachers, they may want to employ CAI in their classes to help students achieve better cognitive performance and a more positive attitude. Integrating CAI and the subsequent techniques and approaches in their syllabi is consequently necessary. For students, they should develop their digital literacy to benefit from using CAI and other academic technologies. It is recommended that they maximize supplementary tools and materials to support their learning. Overall, our findings contribute to the literature on physical education, CAI, and school-based health interventions. In a time when health is at the forefront of our minds, schools have an influential role in helping students achieve better physical fitness and health.

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KEY TERMS AND DEFINITIONS

Computer-Assisted Instruction: A form of education in which a computer is used to present instructional material, provide feedback, and facilitate learning as well as deliver interactive lessons, tutorials, simulations, and assessments.

Physical Education: A course taught in school that focuses on the development of physical fitness and the ability to perform and enjoy daily physical activities with ease.

Public Health Intervention: An action taken by public health officials, organizations, and communities to improve the health and well-being of the population.

Physical Activity: It refers to any bodily movement (e.g., walking, running, and swimming) produced by the contraction of skeletal muscle that results in energy expenditure.

Physical Fitness: A set of attributes or characteristics (e.g., muscular strength and endurance) that people have or achieve that relate to the ability to perform physical activity.

Virtual Dietitian: A nutrition knowledge-based system that uses a forward chaining algorithm to general meal plans according to users' profiles and preferences.