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Multimedia Software's Effects on High School Physical Education Students' Fitness Patterns

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Abstract

The purpose of this study was to examine the effects of high school physical education students interacting with a multimedia software program designed to provide nutritional and physical activity guidance. The year-long multimedia intervention did not affect physical activity or nutritional patterns of students significantly.

Physical education is beginning to gain support at the national and state levels. Senator Ted Stevens (R-AK) recently introduced the Physical Education for Progress Act (PEP) authorizing 400 million dollars over a five-year period for grants to local education agencies for physical education programs. Near the beginning of the previous decade, the federal government supported the document, Healthy People 2000 (U.S. Department of Health and Human Services, 1990; 1996), which stressed achieving objectives related to improving school physical education and the fitness status of Americans (McKenzie & Sallis, 1996).

Although the Surgeon General's Report (U.S. Department of Health and Human Services, 1996) underscores the decline in the amount of physical activity in which young people engage as well as the increase in obesity levels, experts agree that school physical education is still the most ideal place in which young people may engage in appropriate amounts and levels of physical activity (McKenzie & Sallis, 1996; Strand, Scantling, & Johnson, 1997; Simons-Morton, et al., 1987; Verabioff, 1988). However, physical educators must ensure that instruction is appropriate and objectives-driven and students are engaged in physical activity as much as possible—both inside and outside of class.

Too often students in physical education class are not provided enough appropriate opportunities to engage in fitness-related activities nor are activities intense enough for students to benefit cardiovacularly (Li & Dunham, 1993; McKenzie & Sallis, 1996; Strand, Scantling, & Johnson, 1997; Simons-Morton, et al., 1987). In order for young people to engage in the recommended amounts of moderate-to-vigorous physical activity each week, it may be necessary to change how physical education is taught and to encourage students to get more involved in physical activity outside of physical education class. With the latest governmental support, it should be possible for physical educators to find ways to improve fitness levels and physical activity patterns of our youth.

One such approach may involve using technology. Technology continues to improve in terms of user-friendliness and graphics have been improved with the increase in video capabilities in multimedia software programs (Haggerty, 1997; Silverman, 1997). These programs and video-based graphics may be attractive enough to increase the use of the programs. With that in mind, a multimedia computer program might be able to affect students' physical activity levels and fitness levels due to the attractiveness of the graphics-enhanced software program (For an example of such a graphics-enhanced program, see McKethan & Everhart, 1997). Even with better technology available, its effectiveness in the classroom or gymnasium has not been clearly proven. Some

studies have produced less than favorable results in term of computers' effects on student outcomes (Deer, Wright, & Solomon, 1985; Kerns, 1989; Labonty, 1985; McKethan, Everhart, Sanders, & Stubblefield, in press McKethan, Everhart, & Stubblefield, 2000; Morrell, 1992; Ruef & Layne, 1990; Skinsley & Brodie, 1990), while others have found positive results in reading (McCreary & McGinnis, 1989), business education (Din, 1996), and in other areas including bowling performance of physical education students (Steffen & Hansen, 1987). No research concludes at this point that computers assist achievement positively across the board in all contexts.

However, what if physical education teachers used computer technology as a supplement to instruction? Multimedia Workout (Smith, 1996) is a CD-Rom with video capability, showing videos of exercises for appropriate development of a variety of muscle groups when selected. It includes nutritional information, exercise information (with video), personal improvement information and graphs, and much more. If students in a high school physical education program used this CD-Rom as a station assignment, would such use affect how much time students spent in physical activity? One high school program participated in a study designed to determine if station-work with a multimedia software program and supervision would affect physical activity patterns and mile run scores of students.

Methods

For an entire school year, high school students (n = 78) enrolled in their first physical education class (optional elective classes were available in subsequent years) at their school were randomly divided into one of two treatment groups. The teachers taught within a traditional multi-activity model based curriculum (Siedentop, 1991). The first treatment group (multimedia) consisted of students who interacted four times during the year with a multimedia software program designed to provide nutritional information and record personal workout and nutritional patterns for each subject (n=39). A trained physical education professional supervised each student's software interaction each time. The second treatment group (traditional) did not interact with the multimedia software (n=39). All subjects participated in physical education activities with their regular instructors and no lessons were modified for the purpose of this study. To summarize the process, both groups participated in their normal physical education class for the year, but the multimedia group interacted with a multimedia software package under supervision four times during the year.

Testing

Prior to the multimedia interaction sessions, all subjects completed pre-tests of the half, mile run, push-ups, sit-ups, and a questionnaire on physical activity engagement (see Figure 1) to extract information on students' physical activity patterns and their participation reasons (Ross & Jackson, 1990). Subjects repeated the process (fitness tests and questionnaire) again at the end of the school year.

Multimedia Intervention

The process of the interaction was simple and time-efficient. Most students spent an average of 10 minutes recording personal information during each of the four interactions with the research assistant. Information was put into the software program related to physical activity participation and eating habits. When a student decided what exercises to include in a workout, exercises could then be selected based on the specific body area targeted for emphasis. If a student was unsure of the recommended exercise, the software enabled the viewer to see a short video of the exercise. If the student recorded eating out at a fast-food restaurant but was unsure of the total calories of the food, the software enabled the viewer to see almost every major fast-food chains' menus and the nutritional information with it. The supervisor would ask questions of each student to facilitate

the interaction and to find out what physical activity students engaged in outside of class as well as their eating habits. After completing each session, the students would rejoin the respective physical education classes.

Hypothesis

The teachers and the investigators believed that by keeping track of physical activity and eating patterns with a multimedia software package, the physical education students will increase their participation in physical activities and improve eating habits. By doing so, it was also hypothesized that the fitness scores would improve as well.

Results

Results indicated that the second treatment groups (traditional) scores were generally better in terms of improved physical activity patterns (see means in Table 1). That is, more of those who did not participate in the computer intervention reported an increase in physical activity by the end of the year than did the students who interacted with the computer software program. A multivariate analysis of variance (MANOVA) with repeated measures found that none of the differences were statistically significant between the two groups.

One interaction which almost generated significant results was that of group by gender and sports, $F(1,1) = 3.874$; $p<.054$. Often times in the literature, non-significant differences are reported if the p-values are extremely close to the significant level (alpha level).

Although significant differences were not found between groups without interactions within groups, significant differences were found on several variables for all subjects combined as one group. Those significant results were found when analyzing the following variables:(a) present level of physical activity; (b) sit-ups; and (c) push-ups.

Discussion

Research on technology in physical education has produced no solid evidence in the literature to support or question the use of technology's role in affecting student outcomes in physical education (Deer, Wright, & Solomon, 1985; Kerns, 1989; Labonty, 1985; McKethan, Everhart, Sanders, & Stubblefield, in press, McKethan, Everhart, & Stubblefield, 2000; Morrell, 1992; Ruef & Layne, 1990; Skinsley & Brodie, 1990). This is one of the first studies which looked at contemporary computer technology's effects on secondary students' outcomes in physical education. Although the primary investigator hypothesized that the computer intervention would produce more improved outcomes in the experimental group, the results of the control group's interaction within gender, and sport participation provides teacher educators with evidence suggesting such a conclusion to be false. It may be that computer technology in the form of multimedia personal interventions spread out over four consultations during an academic year may not be a better method for getting students to participate more in physical activity and to improve fitness-related scores. However, if the intervention were modified to include more personal time with the computer program or to analyze personal information differently, results may differ from the present study's findings.

This appears to be consistent with two studies by McKethan and his colleagues (McKethan, Everhart, Sanders, & Stubblefield, in press; McKethan, Everhart, & Stubblefield, 2000) findings in relation to comparing multimedia use with traditional lecture methods in producing cognitive student outcomes in physical education. Although the subjects in those studies were from different backgrounds (elementary education majors in one study and physical education majors in the other), the subjects in those two studies learned motor skill components and cue descriptors better with the lecture approach than

with the multimedia computer-based approach. With McKethan and colleagues' work in support of the present study's results, it appears that a reason must exist for students in physical education class to achieve higher standards with more traditional methods than with innovative, technological approaches.

Another interaction which did not quite produce a statistically significant difference, but was borderline was that of the group by gender by sports participation. That is, females in the control group who participated in sports regularly indicated that their physical activity participation had increased.

Because significant differences were revealed for all subjects for the differences between pre-test and post-test scores for reported physical activity levels, sit-ups, and push-ups, a validation for the physical education program as a whole may exist. Basically, physical education students who participated as subjects in the study improved significantly from the beginning of the school year to the end based upon the amount of physical activity engagement and the number of sit ups and push ups they could do. Not only is this a validation of the existence of physical education in one school's curriculum, but it also may have made it difficult for the intervention to produce significant differences between groups because all of the students were improving on the variables.

In summary, results suggest that a multimedia computer-based intervention had little effect on physical education students' physical activity levels or fitness-related scores. These differences were not seen between the two groups as a whole, but only when the groups were further subdivided into gender, and those who participated in sports regularly. The results of this study suggest that a technological intervention produced no positive results. However, this failure may be due to the duration and quality of the intervention as opposed to the technology itself. If more interaction times were available for the students it may have generated different results. If the students had more actual hands-on work with the computer without an research assistant looking over their shoulders, it may have generated different results. All of this is speculation, but it appears that a different intervention organization would be the next step to take. Perhaps these same results would be supported with more time interaction time with the computer program, but it is also possible that a second study would generate contradictory findings to the present study.

REFERENCES

Deer, R., Wright, K., & Solomon, A. (1995). A comparison of student performance following instruction by computer assisted instruction versus traditional lecture method for an undergraduate athletic training program. *KAHPERD Journal, 31 (1)*, 18-20.

Din, F.S. (1996). Computer-assisted instruction, students' off-task behavior and their achievement. *Education and Treatment of Children, 19*, 170-182.

Haggerty, T. (1997). Influence of information technologies on kinesiology and physical education. *Quest, 49*, 254-269.

Kerns, M. (1989). The effectiveness of computer-assisted instruction in teaching tennis rules and strategies. *Journal of Teaching in Physical Education, 8*, 170-176.

LaBonty, D. (1989). Computer-assisted homework in accounting: Effects on student achievement and attitude. *Delta Pi Epsilon Journal, 31 (1)*, 47-55.

Li, X.J., & Dunham, P. (1993). Fitness load and exercise time in secondary physical education classes. *Journal of Teaching in Physical Education, 12*, 180-187.

McCreary, IL, & McGinnis, *G.* (1989). *The Effects of Computer-Assisted Instruction on Reading Achievement for College Freshmen.*(Report No. CS009791). (ERIC Document Reproduction Service No. ED 311 402)

McKenzie, T., & Sallis, J. (1996). Physical activity, fitness, and health-related physical education. In (S. Silverman and C. Ennis, eds.) *Student Learning in Physical Education: Applying Research to Enhance Instruction.* Champaign, IL: Human Kinetics.

McKethan, R., & Everhart, B. (1997). *Using Multimedia Technology to Teach Learning Cues of a Video-Executed Motor Skill to Physical Education Teacher Education (PETE) Preservice Teachers.* Presentation at the NASPE national conference on technology in physical education in Muncie, IN, August 1, 1997.

McKethan, R., Everhart, B., Sanders, R., & Stubblefield, E. (in press). The effects of using a multimedia computer on physical education majors learning motor skill components and cue descriptors. *The Physical Educator.*

McKethan, R., Everhart, B., & Stubblefield, E. (2000). The effects of using a multimedia computer on elementary education majors learning motor skill components and cue descriptors. *The Physical Educator,* 57, 58-65.

Morrell, P. (1992). The effects of computer assisted instruction on student achievement in high school biology. *School Science and Mathematics, 92,* 177-181.

Ross, R., & Jackson, A.S. (1990). *Exercise Concepts, Calculations, and Computer Applications.* Carmel, CA: Benchmark Press.

Ruef, S., & Layne, T. (1990). A study of the effects of computer-assisted instruction in the social studies. *Social Studies, 81,* 73-76.

Siedentop, D. (1991). *Developing Teaching Skills in Physical Education.* Mountain View, CA: Mayfield. Publishing.

Silverman, S. (1997). Technology and physical education: Present, possibilities, and potential problems. *Quest, 49,* 306-314.

Simons-Morton, B.G., O'Hara, N., Simons-Morton, D. , & Parcel, G., (1987). Children and fitness: A public health perspective. *Research Quarterly for Exercise and Sport, 58,* 295-302.

Skinsley, M., & Brodie, D. (1990). A study of the effectiveness of computer assisted learning in physical education. *Research Supplement* (Physical Education Association of Great Britain and Ireland), *7(1)* 14-16.

Smith, J. (1996). *Multimedia Workout.* Champaign, IL. Human Kinetics.

Steffen, J., & Hansen, G. (1987). Effect of computer-assisted instruction on development of cognitive and psychomotor learning in bowling. *Journal of Teaching in Physical Education. 6,* 183-191.

Strand, B., Scantling, E., & Johnson, M. (1997). *Fitness Education: Teaching Concepts-Based Fitness in the Schools.* Boston: Allyn & Bacon.

United States Department of Health and Human Services (1990). *Healthy People 2000: National Health Promotion and Disease Prevention Objectives.* Washington, D.C.: Centers for Disease Control and Prevention.

United States Department of Health and Human Services (1996) Physical Activity and Health: *A Report of the Surgeon General.* Atlanta, GA: Centers for Disease Control and Prevention.

Verabioff L. (1988). Fitness behavior during physical education class. *Canadian Association for Health. Physical Education, Recreation, and Dance, 54* 31-36.

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Figure 1. Survey questions subjects completed for the questionnaire related to physical activity engagement.

Survey for Physical Activity Engagement

Circle ONE value (0-7) which best represents your general activity level for the previous month

- **Circle one of these if you did not participate regularly in programmed recreation, sport, or heavy physical activity**

0 Avoided walking or exertion (as an example, always use elevator, drive whenever possible instead of walking, biking, or rollerblading)

1 Walked for pleasure, routinely used stairs, occasionally exercised sufficiently to cause heavy breathing or perspiration

- **Circle one of these if you participated regularly in recreation or work requiring modest physical activity such as golf, horseback riding, calisthenics, gymnastics, table tennis, bowling, weight lifting, or yard work**

2 Engaged in these10 to 60 minutes per week

3 Engaged in these over one hour per week

- **Circle one of these if you participated regularly in heavy physical exercise such as running or jogging, swimming, cycling, rowing, skipping rope, running in place or engaging in vigorous aerobic activity type exercise such as tennis, basketball or handball**

4 Ran less than 1 mile per week or spent less than 30 minutes per week in comparable physical activity

5 Ran 1 to 5 miles per week or spent 30-60 minutes per week in comparable physical activity

6 Ran 5 to 10 miles per week or spent 1 to 3 hours per week in comparable physical activity

7 Ran over 10 miles per week or spent over 3 hours per week in comparable physical activity

Table 1

Means and standard deviations of Pre-test and Post-test Scores of High School Physical Education Students' Self-Reporting of Physical Activity Patterns.

Groups	Month's Pattern					Present Level			
	Pre		Post			Pre		Post	
	Means	S.D.	Means	S.D.		Means	S.D.	Means	S.D.
Treatment 1 (traditional)	5.10	2.22	5.33	1.79		5.28	3.65	4.44	.82
Females	4.2	2.5	4.4	1.8		4.92	2.39	4.32	.89
Males	6.0	1.3	6.3	1.2		5.63	4.58	4.55	.76
Treatment 2 (multimedia)	4.59	1.85	4.82	1.72		7.42	5.9	4.41	1.14 *
Females	4.88	1.8	5.2	.96		9.32	5.83	4.48	.71
Males	4.86	2.0	4.1	1.6	*	5.84	5.53	3.57	1.50

* statistically significant at alpha level of <.05