Dissecting Contributions: Experiences in Elementary and Middle School Physical Education

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Objectives of the Study

School age learners like physical education because the experiences provide much enjoyment. Most of them, however, do not think physical education experiences are valuable in terms of gaining useful knowledge and skills (Goodlad, 1984). In the standard-based curriculum reform, a number of standards have been developed to enhance positive experiences for learning, such as the standards developed by National Association of Sport and Physical Education (2004) in the United States. At local levels, the states have been creating curricula and assessment tools to help learners accomplish the goals defined in the standards (e.g., Rink & Mitchell, 2003).

The current study is part of this effort. It is designed to assess, over a three-year period, the overall effect of a physical education curriculum developed to help elementary (grade 3-5) and middle (grade 6-8) school learners acquire and sustain knowledge, skill, and values of physical activity. The current study is reporting the baseline year findings, which focuses on the effects of the conventional curriculum on outcomes that are expected of physical education.

The conceptual framework for the study draws upon rich literature on learner experience in physical education (e.g., Graham, 1995), connection between curriculum design and learner motivation (e.g., Chen & Darst, 2001; Chen & Ennis, 2004), outcome expectations including movement competence, fitness knowledge (Rink & Williams, 2003), active lifestyle (Rink & Williams, 2003; Tappe & Burgeson, 2004), and providing physically active lessons as health benefit (Centers for Disease Control and Prevention, 1997). A thorough review of the literature led to variable categories of (a) learner reported motivational experiences, (b) movement competence as physical skills needed for physically active living, (c) knowledge about physical fitness and physically active living principles, (d) learner reported after-school behavior patterns, and (e) in-class physical activity amount and caloric expenditure.

The purpose of the current analysis is to delineate the extent to which the conventional physical education curriculum, which encompassed a broad spectrum of content foci from fitness routine to sport skill development, contributed to the intended outcome of providing health benefits and developing physically active behaviors. The significance of the analysis lies in the possibility to clarify experiential contributions to learning outcomes. Thus, future curricula may be designed to enhance the experiences that contribute to achieving the standards.

Method

The participating schools were 15 elementary and 15 middle schools from a large public school system of the United States that serve ~140,000 K-12 students with socially, culturally, and economically diverse backgrounds in about 200 schools. The 30 schools were randomly selected with stratifications on students’ socio-economic background and school size to ensure the sample represents the student population in the district, and possibly those in large school districts across the U.S. From each school, a class from each grade (3rd, 4th, and 5th in elementary, 6th, 7th, and 8th in middle schools) was randomly selected as the participation unit. A total of 2,159 students from 52 elementary and 42 middle school intact classes were selected. Useful data were from 827 elementary and 1,039 middle school students who had parental permission for the study. The response rate was 86%.

The variables were (a) motivation experience profile including students’ expectancy for success, perceived values in the content (attainment, intrinsic, utility values) ( Eccles & Wigfield, 1995), and cognitive and emotional experiential responses to the content (novelty, challenge, exploration intention, attention demand, and instant enjoyment) (Chen, Darst, & Pangrazi, 1999). The profile was measured using modified Expectancy-Value Questionnaire (Eccles & Wigfield, 1995) and Situational Interest Scale (Chen et al., 1999). (b) Movement competence was measured using two standardized skill tests that focus on footwork and throwing/striking skills. (c) Cognitive knowledge about fitness and physical activity principles was measured using a standardized knowledge test. (d) After-school behavior was measured using a modified Three-Day Physical Activity Survey (Bouchard, Tremblay, LeBlanc, Lorit, Savard, & Theriault, 1983), which asks students to log in their activities in 15-min. segments from 3:00 p.m. to 10:00 p.m. on the previous day. (e) In-class caloric expenditure was measured using RT-3 accelerometers in two randomly chosen lessons. The data were reduced and aggregated as required by the instruments used. Preliminary statistical analyses were conducted to examine the assumptions for statistical analyses. Hierarchical multiple regression analyses were performed to address the purposes of the study. Given the nested cluster nature of the data, class means were used in the data analyses.

Results

Collectively, students provided a very positive experiential profile for the physical education. For example, they considered physical education important (M ~ 4.0 on a 5-point scale), enjoyable (M ~ 4.0 on a 5-point scale), moderately
challenging (M ~ 2.4 on a 4-point scale), but not enough novelty (M ~ 1.8-2.8 on a 4-point scale). Elementary school students gave higher score to the task values than their middle school counterparts (p<.05), while middle school students reported higher attention demands, challenge, and novelty (p<.05). The students could only answer approximately 40% - 50% questions correctly.

Correlation analyses revealed a complex web of relationships between experiences and outcomes. The most noticeable includes a weak but significant negative relationship between fitness knowledge and movement competence for both elementary (r = -.29, p<.05) and middle (r = -.32, p<.05) school students. It seems that skillful students possess less knowledge about fitness and physical activity principles. Another is that BMI only correlated with in-class calorie expenditures in elementary school students (r = .36, p<.01).

The hierarchical regression analyses were conducted to identify the extent to which in-class experiences contributed to the learning outcomes. In the analyses, the in-class calorie expenditure and after-school physical activity were designated as the dependent variables, while knowledge, movement competence, and the motivation experiential variables were used as contributing variables.

In-class calorie expenditure. On average, the elementary school students spent 94 kcal per lesson (45 minutes), or 2.13 kcal per lesson minute (SD = .95). The middle school students burnt about 161 kcal per lesson, or 3.31 kcal per lesson minute (SD = .95). For elementary school students, the in-class calorie expenditure was negatively predicted by their expectancy beliefs (R² = .312, β = -.521). This is a shocking discovery because expectancy belief is a strong motivation variable, often observed to have strong positive relationship with student motivation. We considered two possibilities. One, it is likely that students who perceived themselves successful in physical education actually put forth less physical effort in the learning process, resulting in less calorie expenditure. The other is that students who perceived themselves successful defined success as listening to the teacher, following directions, being obedient in class, rather than practicing hard and putting forth physical effort. Students with higher level of skills seemed to be able to spend more calories in physical education classes (R² = .065, β = .256). For middle school students, calorie expenditure was predicted by task challenge (R² = .258, β = .846) and attention demand (R² = .075, β = -.435).

After-school physical activity. For elementary school students, none of variables associated with physical education was found predictive of their after-school sport participation time. For middle school students the only predictor was the push up score that negatively predicted after school sport participation time (R² = .15, β = -.388). For elementary school students, challenge positively (R² = .135, β = .485) and exploration opportunities negatively (R² = .086, β = -.878) predicted their after-school fitness activity time. None of the variables predicted middle school students' after-school fitness activity time. For other types of physical activity during after school hours, none of the variables predicted elementary school students' participation, while only push up scores negatively (R² = .120, β = -.339) predicted middle school students’ participation.

Conclusion
The results suggest that the students’ experience variables contributed differently to in-class physical activity levels. Positive contributors include movement competence for elementary school students and task challenges for middle school students. Shockingly, for elementary school students, their expectancy belief for success is found negatively associated with in-class calorie expenditure. Future studies are needed to empirically examine the two speculated reasons. The results also revealed that not much experienced by students in physical education contributed to after-school physical activity behavior. The lack of connection between physical education to after-school physical activity challenges the notion that the conventional physical education is effective in changing students' physical activity behavior. The results seem to have identified certain areas where curriculum intervention could focus on to enhance the outcomes. For example, developing skills in elementary school students and challenging middle school students could help them become more physically active in physical education classes. The results indicate a need to identify effective curriculum approaches that will enhance the possibility to accomplish this goal.

References


