Situational interest in physical education: A function of learning task design

By: Ang Chen and Paul W. Darst

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Abstract:

Situational interest is the appealing effect of unique characteristics students recognize in a learning task during interaction with the task. It occurs when a learning task gives the learner a sense of novelty and challenge, demands high attention and exploration intention, and generates instant enjoyment during the person-task interaction. In this study, a repeated measure research design was used to examine the effects of task design on situational interest and the extent to which the effects were mediated by gender, grade, personal interest, and skill levels. Middle school students (N = 242) evaluated situational interest of four learning tasks with different cognitive and physical demands after having experienced the tasks in their physical education classes. Analyzed data showed that cognitive demand of a learning task played a critical role in generating situational interest. Grade levels, gender, and personal interest mediated the effects of task design on situational interest. But these mediation effects seemed rather limited. Physical skill levels had little influence on the effects of task design on situational interest. The findings seem to suggest that to enhance interestingness of a physical activity task, an option for physical educators may be to increase cognitive demand rather than reduce physical demand.

Keywords: motivation | middle school students

Article:

Motivation is a key factor that influences learning outcomes. There is little doubt that high learning achievement results from high motivation in the student and a learning environment that nurtures high motivation. Conversely, failure in achieving academic goals is usually considered to result from low student motivation and factors that de-motivate students. Motivation, according to Pintrich and Schunk (1996), originates from the Latin verb *movere* (to move) and is defined as something that "gets us going, keeps us moving, and helps us get jobs done" (p. 4). It is an internal process that gives behavior its energy and direction (Reeve, 1996).

Motivation Research in Physical Education

Motivation research in physical education relies heavily on the social-cognitive conceptual framework, particularly on the theoretical underpinnings of student achievement goal orientations (Roberts, 1992). This research has revealed that perceptions of ability, goal orientations (task vs. ego), and the learning climate (mastery vs. performance; Papaioannou, 1995; 1998; Treasure, 1997; Treasure & Roberts, 1994; Vlachopoulos & Biddle, 1997; Walling & Duda, 1995; Xiang & Lee, 1998) account for motivation. It has been concluded that a task-oriented student is more likely to put forth efforts than an ego-- oriented child and that a mastery-centered (task) environment is superior to a performance-centered (ego) environment in motivating students.

Although this research has helped us better understand the importance of promoting student task-goal orientation and mastery-centered environment, their motivational effects on learning specific content are still in question. Recent data (Pintrich, Ryan, & Patrick, 1998) showed that the task-goal orientation and mastery-centered environment seem less effective than task values, specified as interest, utility, and importance, in predicting student motivation and achievement in math, English, and social studies.

In physical education, similar results have been reported in studies in which instructional and achievement variables were measured using means other than student self-report. Berlant and Weiss (1997) reported that variations in college students' attention to, recognition, and recall of correct skill demonstrations were neither associated with nor influenced by achievement goal orientations. Solmon and Boone (1993) found that students' improvement in juggling was not differentiated by their achievement goal orientations. In addition, student goal orientations were not associated with in-class learning behaviors and did not directly contribute to skill achievement.

Theeboom, De Knop, and Weiss (1995) manipulated learning environments to examine the effects on students' intrinsic motivation. They found no differences in all intrinsic motivation measures between children in a mastery-centered environment and children in a performance-centered environment, although those in the mastery-centered environment reported a higher enjoyment level and showed better skill performance. Solmon (1996) also manipulated the learning environment to examine students' in-class learning behavior. Results showed that students in the task-oriented learning environment engaged in difficult task trials more often than their counterparts in the ego-oriented learning environment, while no differences were found in easy task trials. The findings indicate that differentiation of motivated learning behavior depends largely on the characteristics of learning tasks.

It can be stated, then, that although the theoretical framework of goal orientations can be used to interpret learner motivation in a global way, other theoretical frameworks are needed to examine and interpret learner motivation in specific task-engagement settings. This notion is supported by a recent study (Pintrich et al., 1998) in which task values were found to better predict motivation than mastery orientation in task-specific engagement settings in math, English, and social studies. Pintrich et al. (1998) argued that goal orientations, especially mastery orientation, can be used to explain progressive development of motivation, while theories of expectancy value

(Eccles et al., 1983) and interest (Renninger, Hidi, & Krapp, 1992) can be used to interpret motivation in task engagement.

Conception of Situational Interest

Situational interest is defined as the appealing effect of characteristics in an activity or a learning task on individuals (Hidi & Anderson, 1992). It is often referred to as "interestingness" in the literature (Frick, 1992), which has unique positive and instant motivational effects on the learner in the subject areas of mathematics, reading, and history (Renninger et al., 1992).

This definition is adopted in research to contrast the conception of personal or individual interest defined as a person's psychological disposition in preference of an action over others (Krapp, Hidi, & Renninger, 1992). Personal interest is developed over time during a person's constant and consistent interaction with certain activities in a particular environment. Therefore, it is viewed as evolving along with a person's knowledge repertoire and value system (Krapp et. al., 1992). Situational interest, on the other hand, is a person-activity interactive or relational construct. It "flows from a person's relationship with a particular activity" (Reeve, 1996, p. 170) and occurs at the moment of a match between a person and an activity. In school learning, situational interest results from students' recognition of appealing features associated with a specific learning task (Mitchell, 1993).

Interest is associated or covaries with acquired knowledge and skill. Alexdander, Jetton, and Kulikowich (1995) tested a model delineating differentiated influence of situational and individual interest in learning. Their findings suggested that during the knowledge accumulation learning stage, when the learner has limited knowledge, situational interest is the primary factor that motivates the learner by eliciting continuous cognitive effort and energy. In the competency learning stage, individual interest starts to replace situational interest as a major motivator. Although the learner continues to be attracted to situationally interesting features of learning materials, the personal investment in learning helps the learner acknowledge the value of the content. In the proficiency learning stage, the developed values continue to enhance the learner's individual interest in the content. Learning is primarily driven by individual interest. Consequently, Alexander et al. (1995) argued that proficient learners will pursue new knowledge and understanding despite learning materials or tasks that may lack situationally interesting features.

Interest is associated with human development. Todt and Schreiber (1998) observed that situational interest does not differentiate among young children. During adolescence, especially during the ages of 12, 13, and 14 years, the effects of situational interest become progressively differentiated. Although it can be assumed that the differentiation may relate to the level of acquired knowledge and skill, not age or grade per se, age or grade is certainly a variable worth exploring in research on interest (Benton, Corkill, Sharp, Downey, & Khramtsova, 1995).

Gender differences are observed in research on situational interest as well. It is likely that boys and girls perceive situational interest differently (Anderson, Shirey, Wilson, & Fieldings, 1987). An early study (Asher & Markell, 1974) showed that boys were more influenced than girls by situational interest in reading material. Anderson et al. (1987) found that situational interest had

stronger effects on boys' sentence recall performance than girls', although both boys and girls performed better in recalling sentences of interest to them separately than of those with low situational interest. Haussler and Hoffmann's (1998) analyses of longitudinal data of situational interest from middle school physics content revealed similar findings. Factual information dealing with "hard-core" knowledge (p. 286) appealed to 80% of male middle school students, while topics related to social relevance interested approximately 72% of female students.

The Construct of Situational Interest

In research, situational interest is conceptualized as a multidimensional construct. Deci (1992) articulated that situational interest can be reported in seven dimensions by a person when he or she interacts with an activity. Novelty and Challenge are dimensions representing the nature of activity. Deriving from a gap between information known and unknown or information deficiency in a person, novelty has a unique function to elicit and enhance the person's exploratory behavior (Spielberger & Starr, 1994). Challenge, defined as the level of difficulty relative to a person's ability, has unique appealing power to attract a person to engage in an activity (Harter, 1978). Exploration Intention, Desire Arousal, and Time Alteration are mental disposition dimensions that occur in a person when an activity interests him or her. These dimensions represent the effects of stimulation in activities such as puzzles, brain teasers, or "weird" mathematics problems that demand concentrated cognitive energy (Mitchell, 1993). Attention Demand and Sense of Delight represent interactive experience a person obtains when he or she engages in an activity. These seven dimensions are assumed to work together as sources of situational interest to evoke a person's sense of personal relatedness to the activity (Deci, 1992). Based on the sense of relatedness, a person evaluates the "interestingness" in learning activities such as reading (Frick, 1992; Hidi & Baird, 1986; Schraw, Bruning, & Svoboda, 1995).

To validate the construct in physical education, Chen, Darst, and Pangrazi (1999) designed a multistage, multisample validation research involving 674 middle school students. A pair of conceptual analytical tasks and a pair of physical participatory tasks were used to elicit students' contrasting ratings of situational interest. Exploratory and confirmatory factor analyses were applied to split data sets. Five dimensions, instead of seven, were identified in factor analyses solutions: Novelty, Challenge, Attention Demand, Exploration Intention, and Instant Enjoyment. These dimensions were identified when students reported high situational interest as participating in physical activities that interested them. Also, the dimensions were found stable in both exploratory and confirmatory factor analysis solutions. In the same study, the researchers developed and tested the Situational Interest Scale. Results suggest that the data generated using the scale had adequate construct validity and internal consistency (Cronbach α ranging from .63 to .88).

In a second study (Chen, Darst, & Pangrazi, in press), 472 middle school students responded to the Situational Interest Scale after experiencing a low-interest and a high-interest physical activity. Path analyses were performed on the data to verify the sources of situational interest in terms of the theoretical articulation (Deci, 1992). Chen et al. (1998) reported that instant enjoyment was a direct source of situational interest. Novelty and Exploration Intention were likely to be indirect sources, while challenge did not contribute to situational interest. The

researchers suggested that to enhance the motivational effect of "interestingness" physical educators should emphasize instant enjoyment, design relatively novel activities or tasks, provide ample exploration opportunities, and control excessive challenges.

Purpose of the Study

The above review of related literature seems to suggest that if situational interest is considered a motivator in learning (Renninger et at., 1992), then it should be taken into account in learning task design. From a pedagogical perspective, Burke (1995) criticized the fact that motivation research overlooked the link between learning task design and its motivational function. He argued that motivation to learn is more likely to occur *during* student-learning task interaction than it is *before* the interaction. In other words, motivation is inherent in and fundamental to student-content interaction. In this sense, motivation can be defined in general as willingness of a person to engage in an activity (Burke, 1995). To motivate students to learn in schools, educators should assess, select, and design learning tasks that can help elicit the willingness.

Unfortunately, as Burke (1995) observed, motivation and learning task design have been viewed as two separate entities in both research and teaching. Researchers, curriculum designers, and teachers often give attention to one *or* the other, rather than one *and* the other simultaneously. When teaching, teachers design learning tasks with little consideration to the motivational effects of the tasks (Burke, 1995). In physical education, researchers and teachers have approached learning task design and student motivation in a similar, separate way. It can be commonly observed in teaching practice that primary considerations in task design are given to the skill itself (e.g., open vs. closed skills), class management (e.g., time on task), or function of the activity (e.g., health-related fitness or skill acquisition).

This study was designed to examine the effect of learning task design on situational interest. Cognitive and motor (physical) demands are the two fundamental components involved in physical activities. Schmidt (1991) recommended it as a principle in task design to construct learning tasks by manipulating cognitive and physical demands for different learners in various learning conditions. Thus, in this study we intended to examine the extent to which different cognitive and physical demands in learning tasks influenced situational interest. We also examined the extent to which student gender, grade, personal interest, and physical skill levels mediated the influence of task design, given that these variables have been documented as having mediation effects on situational interest (Renninger, 1992), motivation (Walling & Duda, 1995), and learning behavior (Lee, 1997; Solmon, 1996).

The significance of the study lies in an attempt to explore situational interest in physical education. It has been well documented in other content areas that situational interest contributes directly to how much and how well students learn (Renninger et al., 1992; Schraw et al., 1995). Designing motivating learning tasks requires educators to enhance the characteristics that can interest students and attract them to participate in learning. Exploring the effects of cognitive and physical demands, the two crucial components of the movement task design framework (Schmit, 1991), may shed light on identifying the characteristics. The study may assist teachers in determining what to emphasize when designing learning tasks.

Method

A between- and within-participant repeated measure design was used in this study. Situational interest of four basketball learning tasks with various cognitive and physical demands was assessed by having middle school students respond to the Situational Interest Scale (Chen et al., 1999), a paper-pencil instrument, when they were experiencing the tasks. Thus, a set of guidelines (Lee & Solmon, 1992) was closely followed to facilitate accuracy, reliability, and validity of the data.

Lee and Solmon (1992) recommended that the time between an event and participants' reporting of it should be as short as possible. In this study, measurements were taken immediately after the students interacted with each learning task. Lee and Solmon (1992) also recommended that nonreferenced events should be controlled. In other words, measurement will be most accurate and reliable when participants respond to a plausible and typically influential stimulus.

In this study, specific learning tasks were used as the influential stimuli for students to experience physically. Other stimuli remotely related to the research question, although important to learning such as teacher-student and student-student interactions, were controlled as much as possible. In addition to using conventional procedures to facilitate the reliability and validity of the data (e.g., using an internally consistent instrument, examining test-retest reliability), a concurrent coupling of stimulus activities and measurement was used to collect students' responses.

Participants

The participants (N= 242; 51% boys, 49% girls) were seventh (n = 72), eighth (n = 99), and ninth grade (n = 71) students in a junior high school in a major metropolitan area in the southwestern United States. Parental consent and student assent forms were distributed and received prior to data collection. All the participants were informed of the right to withdraw from the study if they wished to do so. The sample did not include students whose parents did not sign or return the consent forms or those who asked for withdrawal. The sample also did not include the students who decided to withdraw from the study.

The school offered daily physical education classes instructed by eight certified physical education teachers. Students in all grades were required to take these classes. The physical education curriculum centered on a variety of sports and fitness activities. Although taught separately, male and female students shared identical access to physical activities and instructional resources. They often shared gymnasium space and fields in same class periods.

Teachers were assigned to teach activities in which they had expertise. Students rotated from teacher to teacher to learn different activities. Class sizes ranged from 20 to 35 students. Students were required to take all the activities offered, but they could choose the order of taking them. Thus, for each new unit, student make-up in a class was different from that in a previous unit. In other words, students were not in intact classes but in naturally formed classes. At the time of the study, the students in the sample were in weight training, flag football, tennis, volleyball, aerobics, and dance units taught by two female and three male teachers.

The students were from families with multicultural and low to middle socioeconomic backgrounds, as generally acknowledged by the school and district officials. Racial characteristics of the students in the sample were: 3% African Americans, 68% European American, 21 % Mexican American, 5% Native American, and 3% from other ethnic backgrounds. The majority (66%) did not participate in any athletics or organized after-school sport programs.

Selection of Stimulus Learning Tasks

Selection of Content. Basketball was chosen as the content area based on the following reasons. First, it is one of the most popular activities offered in secondary physical education curriculum. Students' responses to it are likely to have a profound implication for teaching and learning in physical education. Second, it was documented that students' personal interest may mediate situational interest (Renninger et al., 1992). Thus, student personal interest was used as a controlling variable (covariate) in this study.

To select a content area in which personal interest as a variable could be represented across the participants, a survey was conducted in which participants were asked to rate their personal interest levels on each of the eight physical activities or sports offered in the semester. The results of the survey showed that basketball received the highest mean score from both boys (4.87, $SD = 1.87$) and girls (4.58, $SD = 2.02$), indicating that the mediating effect of personal interest on situational interest would be most likely detected in basketball. In addition, basketball was the only content area in which male and female students' ratings were normally distributed. An analysis of variance showed no significant difference on this measure in terms of gender ($p = .22$) and grade ($p = .23$), indicating that in this sample personal interest in basketball could be considered independent from gender and grade. Therefore, we considered basketball to be the content area in which to examine the mediating effect of personal interest with minimal bias.

Selection of Learning Tasks. Four basketball tasks were selected as stimulus activities. Task 1 was stationary chest-pass, which required two participants to stand about 15 feet apart to pass a basketball back and forth between them using the chest-pass technique. Task 2 was defensive footwork, in which the students were asked to shuffle around the key area in a pattern requiring them to use forward, backward, sideways footwork, and combinations of those movements (see Figure 1 for a description of this task). Task 3 was pass-shoot, a group task requiring students to focus on the movements of two balls and two partners simultaneously when completing dribbling, passing, and shooting tasks (see Figure 2 for a description of this task). Task 4 was skill analysis, for which the participants watched a 5-min video of various basketball skills performed by elite male and female players in various settings, such as Olympic, National Basketball Association, and Women's National Basketball Association games. They used a worksheet to identify various skills used by the players in the games. A sample of the worksheet is presented in Appendix A.

A panel of experienced physical education teachers ($N = 7$; 4 women and 3 men) validated the cognitive and physical demands of the four tasks. All the teachers had a master's degree in

physical education, and three were pursuing a higher degree at the time of this study. Their teaching experiences at the secondary school level ranged from 5 to 12 years.

During validation, a group of skilled middle school students who were not participants of the study performed the tasks. Their performances were video recorded using two cameras. One camera recorded the performance from the ground level to show the details of specific skills required by each task. The other recorded from an elevated angle approximately 20 feet from the floor to show the required basketball and student movements in the tasks. The video were edited into a 3-min movie showing all skills and movement aspects of the tasks.

The teachers viewed the movie individually and ranked each task (1 = highest, 4 = lowest) in terms of its cognitive and physical demands relative to others. Their ranking scores showed that pass-shoot was a high cognitive and high physically demanding task, with the mean ranking scores of 1.57 (*SD* = .78) for cognitive demand and 1.42 (*SD* = .54) for physical demand. Skill identification task was high in cognitive demand (*M* = 1.57, *SD* = .54) but not physical demand (*M* = 4.00, *SD* = .00). The defensive footwork was low in cognitive (*M* = 3.45, *SD* = .53) but high in physical demand (*M* = 1.71, *SD* = .76). The chest-pass task was ranked low in both, (*M* = 3.43, *SD* =.79) for cognitive and (*M* = 3.85, *SD* = .38) for physical demands.

Variables and Measures

Situational Interest. Interest in the four learning tasks was measured using a 24-item Situational Interest Scale (Chen et al., 1999). Novelty, Challenge, Attention Demand, Exploration Intention, Instant Enjoyment dimensions are represented by four items each. Also included are four items for overall situational interest (Total Interest). They are: "This activity is interesting;" "The activity looks fun to me;" "It is fun for me to try this activity;" and "This is an interesting activity for me to do." The 24 items are randomly placed and attached with a five-point Likert-type scale (5 = strongly agree, 1 = strongly disagree) for students to rate the activity in which they participate. Appendix B presents the items as categorized in their dimensions.

Chen et al. (1999) reported that all items possess the capability to distinguish between high- and low-interest activities. The construct validity was established using a factor analytical approach. In both exploratory and confirmatory factor analyses with multiple data sets, the multidimensionality of the dimensional and Total Interest measures has been constantly and consistently observed, Five dimensions were elicited in an exploratory factor analysis, with loading scores ranging from .50 to .90, suggesting the data gathered using the Situational Interest Scale demonstrated acceptable construct validity. The model was further tested using confirmatory factor analyses. Results showed the model fitted well in different data sets.

The five dimensions accounted for 53% of the variance when students responded to conceptual learning tasks (viewing video) and 67% when responding to participatory learning tasks (basketball drills). The internal consistency coefficients (Cronbach's α) are .78, .80, .90, .91,.90, and .95 for Novelty, Challenge, Attention Demand, Exploration Intention, Instant Enjoyment, and Total Interest, respectively. The validity and reliability information suggests that data collected using the Situational Interest Scale are valid and reliable.

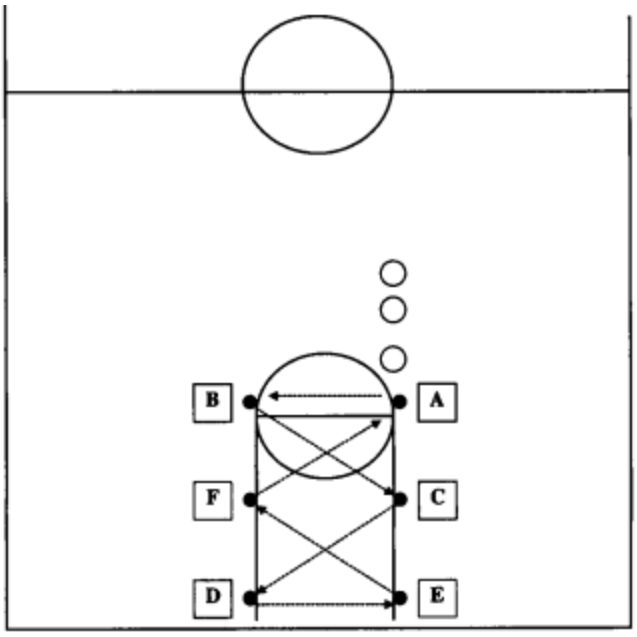

Figure 1. Defensive footwork task: Start from A, shuffle to B, then C, D, E, F, and return to A; at each spot, the student is required to touch the base of the cone with a hand.

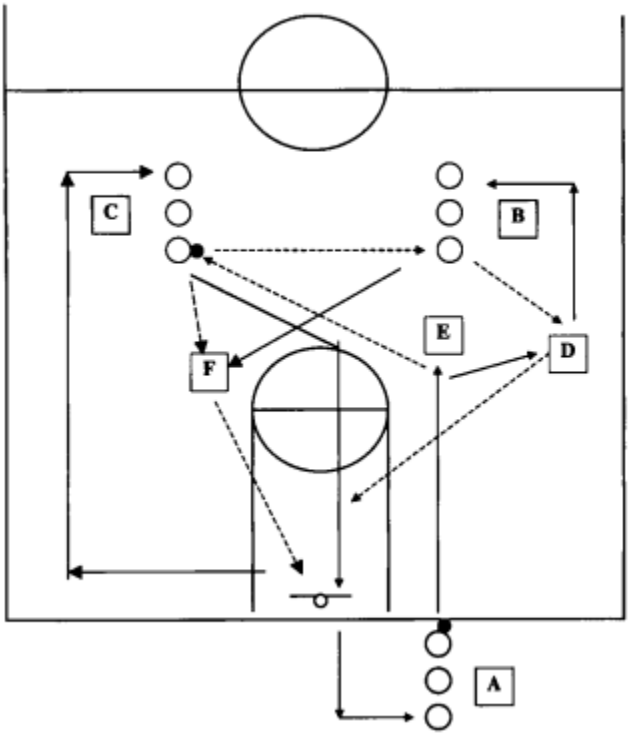

Figure 2. Pass-shoot task: C passes to B, while at the same time A dribbles to E, passes to C, then moves to D; B passes to D then moves to F; C passes to F then starts cutting up to the basket; D passes to C for a lay-up then moves to the end of B; C finishes the lay-up, rebounds, then moves to the end of A; F makes a jump shoot, rebounds, then moves to the end of C.

Personal Interest. Personal interest was assessed in a survey in which the participants evaluated eight physical activities offered in the physical education curriculum for the academic year. They included basketball, flag football, soccer, step aerobics, tennis, track and field, and weight training. The participants rated their level of personal interest in the activities on a seven-point scale, with 7 representing the highest and 1 the lowest personal interest.

Physical Skill. The AAHPERD basketball passing skill test (American Alliance for Health, Physical Education, Recreation and Dance, 1984) was used to assess basketball skill. In the test, the student was required to move (using shuffling footwork) along a 22-foot line and chest-pass the ball into five target boxes at various heights on a wall 8 feet from the line. Two points were awarded for a pass into a box and one for a pass between two boxes. Performance was evaluated based on the total points earned in two 30-s trials. This test was chosen, because it evaluates a basic skill in basketball and can generate valid and reliable data. In addition, it has minimal equipment requirement and can be administered on multiple sites in a gymnasium.

Gender and Grade Information. Demographic information was collected along with the personal interest survey. The participants provided the information in a designated space on the survey. The physical education teachers confirmed the information.

Data Collection

The data were collected in two stages. First, the survey for personal interest and demographic information was conducted in students' natural classes with the assistance of the teachers. The basketball skill test was conducted after the survey. We (including two trained graduate assistants) administered the test on four testing sites simultaneously in the gymnasium. The teachers requested this multiple-site testing approach to minimize interruption of the regular physical education program.

In the second stage, data on situational interest of the learning tasks were collected during a 3-week period in which the participants experienced the four learning tasks and responded to the Situational Interest Scale. Students experienced the stationary chest-pass, defensive footwork, and skill identification on video in the first 2 weeks. All students performed the pass-shoot task, which took longer time to organize, in the third week because of the school's unique weekly short- and long-period alternating schedule.

Situational interest should be measured at the individual level when the individual is interacting with an activity (Hidi & Anderson, 1992). In this field-based study, we adopted the following procedures to minimize interpersonal influences on task experiences and responses to the Situational Interest Scale: (a) We conducted all instructions and data collection; (b) In practices requiring a fixed partnership (chest-pass), we assigned the partners; (c) Classes were mixed in data collection sessions. Students had an equal chance to be assigned to work with students from the same class or other classes.

In the first 2 weeks of data collection, two defensive footwork stations, one chest-pass station, and one video-- viewing station were set up for each data collection session (one natural class period, approximately 45 min). Consistency of instruction among the instructors was

emphasized. For example, after warm-up, we assigned students to stations quickly, followed a fixed instructional structure: explanation or demonstration, checking for understanding, grouping students, starting practice, and providing limited general and positive feedback.

In each data collection session, approximately 45-50 students were evenly divided into three groups for the three tasks. At each station, the students independently completed the Situational Interest Scale immediately after experiencing each task. They then rotated to another station as a group. Each student experienced the defensive footwork twice individually, the chest-pass with an assigned partner, and the skill-identifying task (video) with all other students in the same practice group. In practice, the students were instructed to concentrate on their own part of the practice. They had approximately 5 min of full practice in the chest-pass and defensive footwork and 10 min in the skill identification task. Data on the pass-shoot task were collected in the third week. We used four data collection stations. Similar grouping and instructional procedures were followed, except students did not rotate because they were experiencing the same task at the same time.

Maximum equipment was used so that each student had ample opportunity to experience the learning tasks. The first two data collection sessions were videotaped to verify that our instructions were consistent at different task stations and that students in each station were involved in the task as intended. At the skill-identifying station (video viewing), the skill-identification work sheet were collected and examined to verify that students were attentive to the video and completed the task as instructed.

We, rather than the teachers, organized and instructed the practices and controlled the video display devices to maintain a consistent practice environment for all the participants. We were also responsible for distributing the scales, giving instructions about the procedure, answering questions, and collecting the completed scales. The teachers responsible for the classes were present and helped organize student seating. Each data collection session was conducted similarly in an organized and orderly manner and lasted about 30 min.

When responding to the Situational Interest Scale, the students were instructed to rely on their experiences with the task, work independently, and address all questions to the researchers. The test-retest reliability of the five dimensional and Total Interest measures in this data collection protocol was examined using an independent student sample ($N = 61$) with a 2-week interval. The intraclass correlation coefficients ranged from .97 to .99.

Data Analysis

Data from the personal interest survey, basketball skill test, and Situational Interest Scale were subject to a preliminary data screening for accuracy and descriptive statistical analysis. Because Situational Interest Scale measures a multidimensional construct, the data were also subjected to a series of assumption tests (sphericity and homogeneity of covariance) that are required to precede the multivariate analysis of variance (MANOVA; Stevens, 1992).

A repeated measure MANOVA was conducted with student responses on the Situational Interest Scale as the dependent variables. The measures of Total Interest, Novelty, Challenge, Attention

Demand, Exploration Intention, and Instant Enjoyment dimensions were represented by an aggregated rating score on all four items in each dimension. Therefore, the highest possible score for a dimension used in analysis was 20, and the lowest was 4. Gender and grade were designated as between-participant factors, basketball skill level and personal interest were covariates. The four learning tasks were used as the within-- participant factor. Using this MANOVA model, we were able to analyze the effects of task design across the situational interest dimensions, with mediating effects of personal interest and skill taken into account.

Results

Assumption Tests. Prior to the MANOVA analysis, the assumption of homogeneity of covariance was examined using the Box M test. The calculated Box *M* was 1,510.94 ($F = .58$, $p = .99$), indicating that the assumption was not violated. The assumption that covariates correlate with dependent measures was examined using a multiple regression analysis. Although the covarying relationship of situational interest with personal interest and prior skill level has been supported by the literature (Renninger et al., 1992), it was necessary to examine the relationship in this particular data set to adopt appropriate data analysis approaches. The results shown in Table 1 suggest an overall positive, significant relationship between the situational interest measures and personal interest and skill levels. The assumption of homogeneity of the regression hyperplanes was also examined using a MANOVA on task-personal interest and task-skill level interactions. The calculated *F* values ranged from .66 to 1.14, and *p* value ranged from .07 to .88. The results suggested that the assumption was met at the $p > .05$ level.

Table 1. Correlation coefficients (*r*) of personal interest and skill with situational interest measures on tasks

	M	**SD**	**Skill identification**	**Pass-shoot**	**Footwork**	**Chest-pass**
Personal interest						
Overall	4.71	1.92	.40**	.14*	.10	.07
Male	4.87	1.87	.54**	.34**	.23	.15
Female	4.58	2.02	.41**	.13*	.13	.16
Seventh grade	5.01	1.56	.22	.08	.11	.13
Eighth grade	4.61	1.75	.46**	.20*	-.02	-.03
Ninth grade	4.53	2.13	.46**	.03	.22	.18
Skill performance						
Overall	30.35	8.18	.16*	.19**	.07	-.06
Male	35.76	6.31	.11	.23*	.04	.00
Female	25.99	6.79	.29**	.22**	.27**	.13
Seventh grade	30.65	8.23	.04	.18	.12	-.08
Eighth grade	30.09	8.31	.11	.20*	-.02	-.05
Ninth grade	30.39	8.04	.36**	.19	.20	-.04

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Effects of Between- and Within-Participant Factors. Table 2 reports the means and standard deviations of situational interest measures at the Gender x Grade interactive level. Results of the MANOVA analysis, as reported in Table 3, indicate no gender-grade interaction effects. The main effects from gender and grade, however, were statistically significant. The results showed the effects of task design (within-participant factor) on the situational interest measures varied between boys and girls and among different grades. Cohen's η^2 was computed to examine the

effect size of the significant differences. The η^2 indexes ranged from medium ($\eta^2 > .06$) to large ($\eta^2 > .14$), indicating that the effects of task design are practically meaningful.

Table 2. Descriptive data of situational interest measures[a] by age and gender

	Seventh grade				Eighth grade				Ninth grade			
	Male (*n* = 32)		Female (*n* = 40)		Male (*n* = 44)		Female (*n* = 55)		Male (*n* = 32)		Female (*n* = 39)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Total interest												
Pass-shoot	14.36	5.10	14.77	4.22	12.91	4.48	13.06	4.96	12.34	3.55	11.41	4.10
Skill identification	13.69	4.91	14.93	4.17	14.11	4.46	14.06	4.51	13.06	3.97	12.49	5.24
Footwork	12.38	5.49	13.23	4.41	10.01	4.68	11.67	5.30	8.25	3.42	8.80	3.94
Chest-pass	7.53	2.92	8.00	2.34	8.21	2.83	8.76	1.91	7.38	2.86	9.56	2.80
Novelty												
Pass-shoot	14.84	4.46	13.05	4.57	12.34	3.75	11.36	4.10	10.56	2.41	10.90	4.66
Skill identification	12.22	3.89	11.18	3.56	11.07	4.01	10.11	3.05	9.84	3.55	10.92	3.42
Footwork	11.00	4.79	12.08	3.95	9.32	4.18	10.02	4.09	8.13	3.31	8.82	3.71
Chest-pass	8.44	4.39	9.43	3.88	7.57	3.19	8.82	3.00	6.91	2.37	9.23	3.55
Challenge												
Pass-shoot	15.03	3.84	11.23	4.00	14.14	3.59	10.55	4.09	11.72	2.85	11.36	5.20
Skill identification	9.59	4.75	9.68	3.38	11.02	4.16	9.18	3.32	8.41	2.93	10.30	3.42
Footwork	9.66	3.50	9.80	3.38	8.91	3.61	8.26	3.66	6.25	2.36	7.90	3.39
Chest-pass	9.22	3.05	9.25	3.27	7.55	3.33	7.82	2.97	7.72	1.61	7.13	2.60
Attention demand												
Pass-shoot	16.22	4.13	14.33	4.32	14.97	3.12	13.60	4.15	14.17	2.95	11.26	4.06
Skill identification	16.63	3.61	13.23	3.73	14.68	3.96	12.96	3.52	15.63	4.141	4.15	4.23
Footwork	14.72	3.80	12.80	4.03	11.93	4.87	12.09	4.56	10.28	2.91	11.08	3.77
Chest-pass	10.34	2.93	10.58	2.77	9.86	2.87	11.27	2.38	8.00	2.41	11.56	3.46
Exploration												
Pass-shoot	12.47	5.50	12.78	4.02	11.50	4.69	10.78	4.64	10.41	4.27	8.87	4.00
Skill identification	10.94	4.36	12.85	4.22	11.84	5.06	12.36	4.61	9.53	3.45	10.54	4.71
Footwork	10.22	4.54	11.13	4.38	9.64	4.36	10.02	4.55	7.41	3.28	7.82	3.69
Chest-pass	8.59	3.74	10.47	3.05	8.71	3.25	9.38	2.84	6.84	2.48	8.51	4.08
Instant enjoyment												
Pass-shoot	14.28	5.02	13.88	4.47	12.89	4.59	12.89	4.48	12.13	3.47	11.67	4.20
Skill identification	13.16	4.74	13.93	4.46	14.14	4.72	12.86	4.49	13.28	4.74	12.41	5.07
Footwork	12.06	5.35	12.60	4.66	10.11	4.64	11.33	5.15	8.22	3.11	8.90	4.34
Chest-pass	8.66	3.30	8.63	2.55	8.32	2.69	9.29	2.23	8.25	2.65	9.17	3.08

[a] Maximal score for each dimension is 20.

As also reported in Table 3, task design was found to have a main effect on situational interest measures. In addition, task-gender and task-grade interaction effects were found to be statistically significant. To examine the effects of task design in terms of personal interest and skill level, the students' responses were divided into above- and below-average groups based on the mean values generated in the repeated MANOVA, which were used to adjust means of the situational interest measures. The values were 3.84 and 30.12 for personal interest and skill levels, respectively. The analyses of above- and below-average groups showed a task-personal interest interaction effect on the situational interest measures, while the task-skill level interaction effect was found not to be statistically significant.

Effects of Task Design. Because the effects of task design and its interaction with other independent factors were of particular interest for the study, the univariate analyses were focused

on analyzing the effects of task design. As seen in Table 4, the two tasks with high cognitive demand received similar high rating scores in all dimensions. The univariate analysis revealed a consistent pattern, that chest-pass had the lowest score in every dimensional measure, followed by defensive footwork. Pass-shoot and skill analysis shared the highest scores among the measures. This pattern of task design effects was statistically significant across all situational interest measures (p = .00). A follow-up pairwise analysis to contrast the tasks revealed no significant difference between pass-shoot and skill analysis in most situational interest dimensions (p > .05).

Table 5. Contrast analysis of task design effects as mediated by gender, grade, personal interest

Measure by task	Gender				*P*	Personal interest				*P*	Grade						*P*
	Male *n* = 108		Female *n* = 134			Above average *n* = 116		Below average *n* = 126			Seventh *n* = 72		Eighth *n* = 99		Ninth *n* = 71		
	M	*SD*	*M*	*SD*		*M*	*SD*	*M*	*SD*		*M*	*SD*	*M*	*SD*	*M*	*SD*	
Chest-pass																	
Total interest	7.78	2.84	8.59	2.25	.03	8.37	2.64	8.06	2.41	.41	7.79	2.61	8.55	2.28	8.42	3.01	.16
Novelty	7.90	3.65	9.09	3.40	.02	8.52	3.51	8.67	3.55	.78	8.99	4.12	8.48	3.15	7.94	3.20	.36
Challenge	7.12	3.03	8.28	3.10	.01	7.83	3.19	7.72	3.03	.81	8.35	3.31	7.78	3.08	6.45	2.29	.02
Attention	9.68	2.91	11.04	2.70	.00	10.48	2.82	10.42	2.94	.88	10.47	2.82	10.76	2.64	9.55	3.44	.19
Exploration	8.34	3.39	9.69	3.16	.00	9.26	3.28	8.90	3.38	.46	9.64	3.48	9.18	3.03	7.68	3.44	.02
Enjoyment	8.48	2.88	9.15	2.51	.09	8.84	2.80	8.89	2.55	.89	8.64	2.88	8.96	2.42	9.10	2.98	.66
Defensive footwork																	
Total interest	10.69	5.09	11.86	5.00	.12	11.76	4.97	10.83	5.16	.21	12.85	4.90	11.19	5.16	8.38	3.68	.00
Novelty	9.81	4.33	10.70	4.14	.15	10.26	4.19	10.38	4.33	.85	11.60	4.35	9.97	4.06	8.32	3.56	.00
Challenge	8.89	3.58	8.77	3.59	.82	9.13	3.52	8.41	3.64	.17	9.74	3.41	8.71	3.68	7.03	3.02	.00
Attention	12.77	4.43	12.20	4.30	.38	12.51	4.06	12.36	4.74	.81	13.65	4.02	12.11	4.66	10.58	3.36	.00
Exploration	9.55	4.38	10.15	4.48	.36	10.25	4.46	9.41	4.40	.19	10.72	4.44	10.05	4.49	7.52	3.53	.00
Enjoyment	10.63	4.90	11.47	4.98	.25	11.48	4.96	10.61	4.93	.23	12.36	4.95	11.05	4.99	8.39	3.71	.00
Pass-shoot																	
Total interest	13.40	4.63	13.44	4.73	.96	14.18	4.23	12.40	5.07	.01	14.60	4.60	13.06	4.79	11.74	3.90	.01
Novelty	13.04	4.22	11.88	4.43	.07	12.38	4.23	12.37	4.57	.99	13.85	4.58	11.82	4.08	10.55	3.65	.00
Challenge	13.99	3.79	10.87	4.19	.00	12.63	4.08	11.64	4.55	.12	12.92	4.33	11.89	4.32	11.48	4.05	.19
Attention	15.39	3.70	13.52	4.32	.00	14.66	3.82	13.86	4.57	.19	15.17	4.32	14.21	3.94	12.71	4.00	.02
Exploration	11.73	5.05	11.25	4.52	.49	11.95	4.62	10.79	4.88	.10	12.64	4.70	11.14	4.76	9.61	4.21	.01
Enjoyment	13.43	4.65	13.06	4.50	.58	13.96	4.13	12.21	4.93	.01	14.06	4.69	13.05	4.56	11.74	3.87	.05
Skill analysis																	
Total interest	13.89	4.45	14.14	4.54	.71	15.51	3.77	12.03	4.63	.00	14.38	4.52	14.21	4.41	12.74	4.58	.21
Novelty	11.37	3.88	10.56	3.31	.12	11.26	3.57	10.42	3.56	.11	11.64	3.72	10.58	3.42	10.13	3.50	.07
Challenge	9.98	4.28	9.50	3.35	.39	9.72	3.75	9.68	3.82	.94	9.64	4.02	9.89	3.77	9.32	3.25	.76
Attention	15.78	3.83	13.17	3.71	.00	15.29	3.54	12.93	4.14	.00	14.74	4.03	13.74	3.74	14.81	4.40	.21
Exploration	11.18	4.59	12.28	4.34	.09	12.81	4.33	10.56	4.33	.00	12.00	4.35	12.32	4.58	9.96	4.05	.03
Enjoyment	13.72	4.67	13.17	4.56	.41	15.16	3.85	11.01	4.50	.00	13.58	4.57	13.47	4.58	12.81	4.90	.73

Note. The maximal score for each dimension is 20. Follow-up pairwise comparisons showed that scores of ninth grade students were significantly lower than that of seventh grade students.

M*ediation of Gender, Grade, and Personal Interest on Task Design Effects*. The gender-task, grade-task, and personal interest-task interaction effects (see Table 3) suggest that gender, grade, and personal interest mediated effects of task design in various situational interest dimensions. Contrast analyses were conducted to further explore the mediating effects. As reported in Table 5, the gender-task effects were observed in a few dimensions in various tasks. Chest-pass was more interesting, novel, challenging, attention demanding, and worth exploring for girls than for

boys, although both rated it lowest among the four tasks. In contrast, boys considered pass-shoot more challenging and demanding more attention than did girls. Yet, both considered it as having highest situational interest.

Personal interest mediated Total Interest and Instant Enjoyment in pass-shoot and Total Interest, Attention Demand, Exploration Intention, and Instant Enjoyment in skill analysis (see Table 5). It is apparent that these tasks seemed to be more interesting and enjoyable for those with above average personal interest in basketball than they were for those below the average. The mediating effect of personal interest, however, was not observed in chest-pass and defensive footwork across all situational interest dimensions.

Grade mediated effects of the defensive footwork and pass-shoot tasks in Total Interest, Novelty, Attention Demand, Exploration Intention, and Instant Enjoyment (see Table 5). A post hoc pairwise comparison across the three grade groups suggest that the two tasks became less interesting, novel, challenging, attention demanding, worth exploring, and enjoyable for the ninth graders in comparison mainly with the seventh-grade students.

Discussion

The purpose of the study was to examine situational interest as a function of learning task design in physical education. A multidimensional theoretical framework of situational interest (Chen et al., 1999; Deci, 1992) was used to guide this research. The framework views that certain characteristics of a learning task evoke situational interest by giving the learner a sense of novelty and challenge, demand high attention, encourage exploration, and generate instant enjoyment during the task-person interaction. In this exploratory study, we measured situational interest with these dimensions when the learners interacted with four learning tasks with different cognitive and physical demands. The data were collected and analyzed using a repeated measure research design to reveal the effects of task design on situational interest and the extent to which the effects were mediated by gender, grade, personal interest, and skill levels.

The data revealed that situational interest is a function of learning task design in physical education. The pattern observed in Table 2 clearly demonstrates that situational interest varied across different learning tasks. The result is consistent with the findings from research on reading in which situational interest was found to be a function of reading task design (Hidi & Baird, 1988). Additionally, because situational interest was measured in multidimensions that are considered to be its sources (Deci, 1992), the effects of task design on all five dimensional measures suggest the effects have impact on both direct and indirect sources of situational interest (Chen et al., in press). The results of contrast analysis further revealed the significance of task design effects.

A further examination of the data suggests that situational interest primarily was influenced by the extent of cognitive demand a learning task provided. Chest pass, a task considered by experienced teachers as low in cognitive and physical demand, was rated low in all situational interest dimensions. It was followed by defensive footwork, a task low in cognitive but high in physical demand, which received higher rating scores in all situational interest dimensional measures than did chest-pass. The pass-shoot and skill analysis tasks were both high in cognitive

demand. Both received higher ratings in all the dimensions than the previous two tasks. Yet, there was little difference found between the two tasks, although they had distinctive physical demands. The results reported in Table 3 further suggest that pass-shoot and skill analysis tasks had similar effects on Total Interest, Attention Demand, Exploration Intention, and Instant Enjoyment. It seems reasonable to conclude that once a learning task demands relatively high cognitive engagement, it is likely to be perceived as interesting and enjoyable regardless of the intensity of physical involvement the task demands.

Table 3. Multivariate analysis of covariance results: Effects of gender, grade, and task design on situational interest measures ($N = 242$)

Source	Wilks' Λ	*F*	H_0 *df*	Error *df*	*p*	η^2	Power
Between-participant factor							
Gender x Grade	.91	1.08	12.00	460.00	.13	.05	.80
Gender	.85	5.46	6.00	229.00	.00	.16	.97
Grade	.87	2.24	12.00	458.00	.01	.07	.95
Within-participant factor							
Task x Gender x Grade	.81	1.01	36.00	434.00	.45	.10	.92
Task x Gender	.74	3.21	18.00	217.00	.00	.26	.99
Task x Grade	.72	1.66	36.00	434.00	.01	.15	.99
Task x Personal Interest	.82	2.06	18.00	217.00	.01	.18	.98
Task x Skill	.88	1.28	18.00	217.00	.21	.12	.82
Task	.78	2.59	18.00	217.00	.00	.22	.99

There were developmental differences in situational interest measures across the tasks. Data presented in Table 4 clearly support Hidi and Anderson's observation (1992) that situational interest does decline with age or years in school. The decline was differentiated by tasks. It occurred in more dimensions in defensive footwork and pass-shoot tasks; both had higher physical demands than the other two tasks. The analyses that contrasted the responses of seventh, eighth, and ninth grade students (see Table 5) further demonstrated that the most differences occurred between the seventh and ninth grade students, suggesting the decline in situational interest developed gradually. Given the exploratory nature of the study and the cross-sectional data structure, this conclusion is preliminary. Further research with a longitudinal design is needed to examine this issue.

Table 4. Task Design effects on situational interest measures

	Total interest		Novelty		Challenge		Attention demand		Exploration intention		Instant enjoyment	
	M	***SE***	***M***	***SE***	***M***	***SE***	***M***	***SE***	***M***	***SE***	***M***	***SE***
Task design												
Chest-pass	8.24	.20	8.40	.28	7.48	.24	10.25	.22	8.78	.26	8.88	.22
Footwork	10.66	.39	9.92	.33	8.56	.28	12.13	.34	9.38	.35	10.52	.39
Pass-shoot	13.00	.37	12.10	.34	12.31	.32	14.02	.32	11.06	.38	12.85	.36
Skill analysis	13.66	.34	10.84	.29	9.74	.31	14.53	.30	11.34	.34	13.23	.35
	P = .00		*P* = .00		*P* = .00		*P* = .00		*P* = .00		*P* = .00	

Note. The maximal score for each dimension is 20. Follow-up pairwise comparisons showed no significant differences between pass-shoot and skill analysis tasks in dimensions of total interest, attention demand, exploration intention, and instant enjoyment.

Gender influence on interest has been observed in research in kindergarten children and elementary mathematics classes (Renninger, 1992), in which boys and girls responded differently in terms of situational interest in various learning tasks. In this study, the effects of task design on situational interest were also mediated by gender. However, it appears that the mediation effect occurred primarily in chest-pass, a task with low cognitive and physical demands and low situational interest. It seems that female students considered situational interest in such a task higher than their male counterparts did in terms of all dimensional measures. In the pass-shoot task, the male students considered the task more novel, challenging, and attention demanding. In a study on interdimensional relationships, Chen et al. (in press) found that Exploration Intention and Instant Enjoyment are two critically important dimensions leading to situational interest. Novelty and challenge have weak and indirect effects on situational interest in physical education settings. The data from this study seem to indicate that the mediation effect differentiated by gender may have little direct impact to prevent both male and female students from appreciating Total Interest and Instant Enjoyment.

Although there was a significant task-personal interest interaction effect on the situational interest measures (see Table 3), the mediation effect by personal interest was rather limited. Results presented in Table 5 show that statistically significant differences were found in only a few dimensions in the pass-shoot and skill analysis tasks. Personal interest did not impact any dimension in the chest-pass and defensive footwork tasks. In the pass-shoot task, Total Interest and Instant Enjoyment received higher rating scores from the students with above average personal interest in basketball. In the skill analysis task, those with above average personal interest rated Total Interest, Attention Demand, Exploration Intention, and Instant Enjoyment higher than those with below average personal interest.

When the main effect of task design is taken into account, the data seem to suggest that middle school students, regardless of their personal interest in the content, will not perceive low cognitive-demanding tasks (e.g., chest-pass and footwork in this study) differently in situational interest. Situational interest in high cognitive-demanding tasks (e.g., pass-shoot and skill analysis in this case), however, can be mediated by personal interest. These data echo the research findings in reading (Hidi & Baird, 1988) and other subject domains (Alexander et al., 1995), indicating that situational interest is highly received when the task or activity is from a content area consistent with the students' personal interest.

An unexpected, but important, finding from this study seems to be the fact that skill levels do not mediate the participants' rating of situational interest for different tasks. The absence of a significant Task x Skill interaction effect (see Table 3) indicates that students at various skill levels rated situational interest of the tasks in the same order. For instance, chest-pass was low, and pass-shoot was high. Research in other subject areas, in contrast, has shown that situational interest is likely to be mediated by students' prior knowledge levels about a subject (Alexander, Kulikowich, & Schulze, 1994).

In physical education, it has been observed (Lee, 1997) that students' thoughts, especially those about their own ability, can influence their motivation to learn and the outcome of learning. Given that the scope of the current study was limited to situational interest and task design, students' perceived ability was not measured. Nevertheless, based on the literature and the data, it

can be speculated that situational interest is likely to be mediated by students' perceived ability rather than the actual ability. Additional research is needed to further investigate the differentiated effect of perceived and actual ability on situational interest and motivation to learn.

This exploratory research has provided preliminary evidence that situational interest, one of the motivators for learning, is a function of learning task design in physical education. In general, the findings support the argument that learning tasks have motivational effects (Burke, 1995). Specifically, the learning tasks with different cognitive and physical demands may present different situational interest for students. Although the effects of task design varied across situational interest dimensions, it seems to be clear that cognitive demand of a learning task plays a critical role in generating situational interest. The effects of task design on situational interest appear to be mediated by students' grade levels, gender, and personal interest, but these mediation effects seem rather limited. In addition, physical skill levels appear to have little influence on the effects of task design on situational interest.

These findings may have significant implications for research and teaching in physical education. First, the findings suggest that situational interest may be directly influenced by learning tasks. Coupled with the findings that motivational mental disposition (e.g., achievement goal orientations) may have limited influence on learning behavior, the findings from this research call on researchers to link motivation to the learning content at hand (Burke, 1995). Second, although it is necessary for teachers to recognize the importance of creating a task-oriented social environment, they should also strengthen cognitive demand of a learning task to attract students with enhanced situational interest for greater motivation. Third, the effect of task design on situational interest is less likely to be influenced by skill levels. This finding may suggest that, when designing learning tasks, teachers should emphasize the task itself. Students with various skill levels are likely to be attracted to a task with enhanced situational interest.

It should be pointed out that not all the implications might be adopted without a careful assessment of specific content. Although basketball was selected as the stimulus content for this study based on its curricular popularity and student preferences, it represents only a limited portion of the physical education curriculum in secondary schools. The findings obtained in this content might have little impact in other content areas, such as gymnastics, outdoor adventure, or track and field. Teachers and researchers are advised to take necessary precautions when attempting to apply the findings from this study to teaching a different activity and interpreting task design effects of other content.

The findings need to be placed into a perspective of physical education. Although cognitive demand was found to be a determinant factor for situational interest, by no means should the finding be interpreted as suggestions to eliminate or de-emphasize the physical demand of a learning task. It appears clear in the data that a high physically demanding task can be situationally interesting if there is a strong cognitive demand built into the task. The implication is apparent for physical education: To improve interestingness of learning tasks, physical educators should increase cognitive demand rather than decrease physical demand.

Situational interest has been viewed as a complex cognitive phenomenon occurring during person-activity interaction since the beginning of the 20th century (Dewey, 1913). It is

considered part of cognition process in classroom research (Schraw et al., 1995). Interpretation of this study should be situated within the cognitive mediation framework (Lee, 1997; Lee & Solmon, 1992) that explains students' in-class motivational thought and actions in physical education. Within this larger framework (Lee, 1997) situational interest can be viewed as a factor, in addition to self-perception of ability, beliefs about task utility, and achievement goal orientation (Lee, 1997; Lee & Solmon, 1992), that may enhance student motivational thought and behavior. In this study, however, situational interest was examined with the absence of motivated behavior measures. The eventual effect of situational interest on students' learning remains unknown. Nevertheless, it is reasonable to infer, based on the cognitive mediation framework and the findings from this study, that students would demonstrate higher level of engagement in a learning task with high situational interest than in one with low situational interest.

This study is descriptive in nature. The results may not provide a direct link between situational interest and students' motivated behavior and learning in physical education. To pursue further understanding of students' motivation in physical education, it is necessary to examine the links by involving motivated behavior and learning achievement measures. The results about gender influence on task design effects should be interpreted and understood with caution. In this study, the data were collected in a controversial coeducational physical education setting in which boys and girls shared identical access to the curriculum and resources but were instructed in single-sex classes. The results could differ if the data were collected in a gender-integrated instructional environment.

The findings from this study have raised additional research questions that require studying student motivation from a pedagogical perspective. For example, a most immediate question is to examine the motivational effects of students' mental disposition (e.g., achievement goal orientation) and situational interest to provide teachers with information about how to address students' motivation issues in daily instruction. In addition, research on interest and its effects on learning in many subject areas (Renninger et al., 1992) has shown that, coupled with students' self conception of competence, situational interest contributes significantly to students' intrinsic motivation. The interaction between situational interest and perception of ability must be examined to address the association between situational interest and its effects on intrinsic motivation at different stages of learning in physical education.

Lee (1997) argued that learning must be authentic in order for the learner to initiate a strong motive to engage in the task. The authenticity lies in the provision of a learning setting where physical educators help students actively construct meaning grounded in students' own interactive experiences with the knowledge and skills (Newmann, Marks, & Gamoran 1996). In such a learning setting, achievement is demonstrated in students' disciplined, in-depth inquiries in the knowledge, skill, and values in the learning tasks. Continuing research on situational interest will provide us with a window through which the authenticity of learning can be further understood as we reveal motivational effects embedded within learning tasks.

References

Alexander, P. A., Jetton, T. L., & Kulikowich, J. M. (1995). Interrelationship of knowledge, interest, and recall: Assessing a model of domain learning. Journal of Educational Psychology, 87, 559-575.

Alexander, P. A., Kulicowich, J. M., & Schulze, S. IL (1994). How subject-matter knowledge affects recall and interest. American Educational Research Journal 31, 313-337.

American Alliance for Health, Physical Education, Recreation, and Dance. (1984). AAHPERD skills test manual: Basketball for boys and girls. Reston, VA: Author.

Anderson, R. C., Shirey, L. L., Wilson, P. T., & Fieldings, L. G. (1987). Interestingness of children's reading material. In R E. Snow & MJ. Farr (Eds.), Aptitude, learning and instruction: Vol. III, cognitive and affective process analyses (pp. 287-299). Hillsdale, NJ: LEA.

Asher, S. R., & Markell, R. A (1974). Sex differences in comprehension of high- and low-interest reading material. Journal of Educational Psychology, 66, 680-687.

Benton, S. L., Corkill, A.J., Sharp,J., Downey, R., & Khramtsova, I. (1995). Knowledge, interest, and narrative writing. Journal of Educational Psychology, 87, 66-79.

Berlant, A. R., & Weiss, M. R. (1997). Goal orientation and the modeling process: An individual's focus on form and outcome. Research Quarterly for Exercise and Sport, 68, 317-330.

Burke, D. J. (1995). Connecting content and motivation: Education's missing link. Peabody Journal of Education, 70, 66-81. Chen, A-, Darst, P. W., & Pangrazi, R. P. (in press). An examination of situational interest and its sources. British Journal of Educational Psychology.

Chen, A., Darst, P. W., & Pangrazi, R. P. (1999). What constitutes situational interest? Validating a construct in physical education. Measurement in Physical Education and Exercise Science, 3, 157-180.

Deci, E. L. (1992). The relation of interest to the motivation of behavior: A self-determination theory perspective. In K A. Renninger, S. Hidi, & A. Krapp (Eds.). The role of interest in learning and development (pp. 43-69). Hillsdale, NJ: LEA.

Dewey, J. (1913). Interest and effort in education. Boston: Houghton Mifflin.

Ecceles, J., Adler, T. F., Futterman, R., Goff, S. B., Kacazala, C. M., Meece,J. L., & Midgley, C. (1983). Expectancies, values and academic behaviors. In J. T. Spence (Ed.), Achievement and achievement motivation (pp. 75-146). San Francisco: W. H. Freeman.

Frick, R. W. (1992). Interestingness. British Journal of Psychology, 83,113-128.

Harter, S. (1978). Pleasure derived from optimal challenge and the effects of extrinsic rewards on children's difficulty level choices. Child Development, 53, 87-97.

Haussler, P., & Hoffmann, L. (1998). Qualitative differences in students' interest in physics and the dependence on gender and age. In L. Hoffmann, A. Krapp, K. A. Renninger, &J. Baumert (Eds.), Interest and learning (pp.280-289). Kiel, Germany: Institute for Science Education.

Hidi, S., & Anderson, V. (1992). Situational interest and its impact on reading and expository writing. In K A. Renninger, S. Hidi, & A. Krapp (Eds.). The role of interest in learning and development (pp. 215-238). Hillsdale, NJ: LEA.

Hidi, S., & Baird, W. (1988). Strategies for increasing text-based interest and students' recall of expository texts. Reading Research Quarterly, 23, 465-483.

Krapp, A., Hidi, S., & Renninger, K A. (1992). Interest, learning, and development. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), The role of interest in learning and development (pp. 1-26). Hillsdale, NJ: LEA.

Lee, A. M. (1997). Contributions of research on student thinking in physical education. Journal of Teaching in Physical Education, 16, 262-277.

Lee, A. M., & Solmon, M. A. (1992). Cognitive conceptions of teaching and learning motor skills. Quest, 44, 57-71.

Mitchell, M. (1993). Situational interest: Its multifaceted structure in the secondary school mathematics classroom. Journal of Educational Psychology, 85, 424-436.

Newmann, F. M., Marks, H. M., & Gamoran, A. (1996). Authentic pedagogy and student performance. American Journal of Education, 104, 280-312.

Papaioannou, A. (1995). Differential perceptual and motivational patterns when different goals are adopted. Journal of Sport & Exercise Psychology, 17, 18-34.

Papaioannou, A. (1998). Students' perceptions of the physical education class environment for boys and girls and the perceived motivational climate. Research Quarterly for Exercise and Sport, 69, 267-275.

Pintrich, P., Ryan, A. M., & Patrick, H. (1998). The differential impact of task value and mastery orientation on males' and females' self-regulated learning. In L. Hoffmann, A. Krapp, K. A. Renninger, & J. Baumert (Eds.), Interest and learning (pp. 337-354). Kiel, Germany: Institute for Science Education.

Pintrich, P. R., & Schunk, D. H. (1996). Motivation in education: Theory, research, and applications. Englewood Cliffs, NJ: Prentice Hall.

Reeve, J. (1996). Motivating others: Nurturing inner motivational resources. Needham Heights, MA: Allyn & Bacon.

Renninger, IL A. (1992). Individual interest and development: Implications for theory and practice. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), The role of interest in learning and development (pp. 361-398). Hillsdale, NJ: LEA.

Renninger, K. A., Hidi, S., & Krapp, A. (Eds.). (1992). The role of interest in learning and development. Hillsdale, NJ: LEA.

Roberts, G. C. (Ed.). (1992). Motivation in sport and exercise. Champaign, IL: Human Kinetics.

Schmidt, R. A. (1991). Motor learning and performance: From principles to practice. Champaign, IL: Human Kinetics.

Schraw, G., Bruning, R., & Svoboda, C. (1995). Sources of situational interest. Journal of Reading Behavior, 27, 1-17.

Solmon, M. A. (1996). Impact of motivational climate on students' behaviors and perceptions in a physical education setting. Journal of Educational Psychology, 88, 731-738.

Solmon, M. A., & Boone, J. (1993). The impact of student goal orientation in physical education classes. Research Quarterly for Exercise and Sport, 64, 418-424.

Spielberger, C. D., & Starr, L. M. (1994). Curiosity and exploratory behavior. In H. F. O'Neil, Jr., & M. Drillings, (Eds.). Motivation: Theory and research. Hillsdale, NJ: LEA.

Stevens, J. (1992). Applied multivariate statistics for the social sciences (2nd ed.). Hillsdale, NJ: LEA.

Theeboom, M., De Knop, P., & Weiss, M. R. (1995). Motivational climate, psychological responses, and motor skill development in children's sport: A field-based intervention study. Journal of Sport & Exercise Psychology, 17, 294-311.

Todt, E., & Schreiber, S. (1998). Development of interests. In L. Hoffmann, A. Krapp, K A. Renninger, & J. Baumert (Eds.), Interest and learning (pp. 25-40). Kiel, Germany: Institute for Science Education.

Treasure, D. C. (1997). Perceptions of the motivational climate and elementary school children's cognitive and affective response. Journal of Sport &Exercise Psychology, 19, 278-290.

Treasure, D. C., & Roberts, G. C. (1994). Cognitive and affective concomitants of task and ego goal orientations during the middle school years. Journal of Sport &Exercise Psychology, 16, 15-28.

Vlachopoulos, S., & Biddle, S. J. H. (1997). Modeling the relation of goal orientations to achievement-related affect in physical education: Does perceived ability matter? Journal of Sport &Exercise Psychology, 19, 169-187.

Walling, M. D., & Duda, J. L. (1995). Goal and their associations with beliefs about success in and perceptions of the purpose of physical education. Journal of Teaching in Physical Education, 14,140-156.

Xiang, P., & Lee, A. (1998). The development of self-perceptions of ability and achievement goals and their relations in physical education. Research Quarterly for Exercise and Sport, 69, 231-241.

Appendix A. Worksheet for Skill Identification Task

Name:	Grade:	Male/Female
1. Check the PASSING skills used by the players in the video.		
___ Chest pass	___ Baseball pass	___ Overhead pass
___ Bounce pass	___ Between-leg pass	___ Behind-back pass
2. Check the DRIBBLING skills used by the players in the video.		
___ Control dribble	___ Crossover dribble	___ Behind-back dribble
3. Check the SHOOTING skills used by the players in the video.		
___ Standing shot	___ Jump shot	___ Lay-up
___ Hook shot	___ Reverse lay-up	___ Dunk shot

Appendix B. Items in the Situational Interest Scale

Exploration intention	Attention demand
I want to analyze it to have a grasp on it.	My attention was high.
I want to discover all the tricks in this activity.	I was very attentive all the time.
I like to find out more about how to do it.	I was focused.
I like to inquire into details of how to do it.	I was concentrated.
Instant enjoyment	**Challenge**
It is an enjoyable activity to me.	It is a complex activity.
This activity is exciting.	This activity is complicated.
The activity inspires me to participate.	This activity is a demanding task.
This activity is appealing to me.	It is hard for me to do this activity.
Novelty	**Total interest**
This activity is new to me.	This activity is interesting.
This activity is fresh.	The activity looks fun to me.
This is a new-fashioned activity for me to do.	It is fun for me to try this activity.
This is an exceptional activity.	This is an interesting activity for me to do.