How can Situational Interest Promote Learning Strategies in Physical Education?

Cedric Roure[1], Gilles Kermarrec[2] & Denis Pasco[3]

[1]Catholic University of Louvain, [2]European University of Brittany, [3]University of Bourgogne Franche-Comte

Introduction

Considering the significant decrease in students' motivation to participate in physical education (PE) (Papaioannou, Bebetsos, Theodorakis, Christodoulidis & Kouli, 2006) researchers have investigated motivational constructs that can drive students toward successful learning and achievement. In this context, they consider situational interest (SI) as a powerful motivator for students (Chen, Chen & Zhu, 2012; Renninger & Hidi, 2011) in so far as it is related to their cognitive engagement and learning strategies (Shen & Chen, 2006; 2007; Zhu et al., 2009). Chen et al. (2012) have found, in a meta-analysis related to the motivational constructs used to engage students in PE, that SI was a primary motivator for them. Defined as the appealing effect of the characteristics of an activity on individuals (Chen, Ennis, Martin & Sun, 2006), SI appears to be relevant when linking students' motivation and learning strategies, in so far as learners must be motivated to be able to actively search, evaluate, and adopt effective learning strategies (Shen & Chen, 2006). However, little is known about the relationships between the dimensions of SI and learning strategies used by students. Thus, the aim of the study was to examine the effects of SI dimensions on students' learning strategies in PE.

Situational Interest in Physical Education

According to Chen et al. (2012), SI appears to be a powerful motivator for students, especially because it is strongly related to the content taught in PE lessons. Unlike motivational variables centered on student cognition, interest includes both an affective and a cognitive component. It has been demonstrated that these two components of interest's conceptualization are not equally involved in students' perceptions (Hidi, 2006). This is dependent on which forms of interest are experienced by the students participating in physical activity: individual or situational (Chen et al., 2006). Individual interest, which is more related to student cognition, refers to an individual's strong personal preference to be engaged in a particular activity, course or content. In contrast, SI relates more to the affective part of interest, and results from students' recognition of the characteristics of a specific learning task. In summary, experiencing interest involves affect and can be assumed to be combined or integrated with cognition depending on its development (Renninger & Hidi, 2016). Typically, SI is viewed as a shortterm result of the appealing features present in the environment and so is transitory, environmentally activated and context-specific.

In PE, SI has been conceptualized as a multidimensional construct including five dimensions: novelty, challenge, attention demand, exploration intention and instant enjoyment (Roure, Pasco & Kermarrec, 2016). More specifically, Chen, Sun, Zhu and Chen (2014) have defined these five dimensions as the following. Novelty relates to the difference between information known and unknown. Challenge refers to the difficulty of the task, as perceived by students, in relation to their ability. Attention demand corresponds to a student's cognitive involvement within a learning task. Exploration intention represents the characteristics of the learning tasks that encourage a student to discover and explore his environment. And instant enjoyment is defined as a positive feeling experienced by a student when participating in a learning task.

How can Situational Interest Promote Learning Strategies in PE?

The relationship between SI and learning strategies has been investigated through two studies conducted by Shen and Chen (2006, 2007). In their first study of a sixth-grade volleyball unit, they found that physical engagement and learning outcomes were directly influenced by the interactions between prior knowledge, interest, and learning strategies. More specifically, correlations were found between SI and learning strategies ($r = .49$, $p < .01$), and a path analysis showed that SI predicted learning strategies ($\beta = .46$, $p < .05$), when controlling for students' prior individual interest in volleyball. Shen and Chen (2007) investigated the relationship between SI and learning strategies further in a second study, by examining students' learning profiles during a softball course. Participants were 177 sixth-graders taken from three middle schools. Cluster analysis was performed on the basis of five variables: prior knowledge, SI, learning strategies, skill evaluation and individual interest. Even if the results confirmed that SI was correlated to learning strategies ($r = .46$, $p < .01$), the three-cluster solution showed significant differences across all variables except for SI. The results from MANOVA demonstrated the influence of prior knowledge and individual interest on learning strategies, but revealed a non-significant effect from SI toward learning strategies. Although this result was not congruent with their first study, due to the contrasting responses given, Shen and Chen (2007) explained that the level of difficulty of the learning task should have influenced the systematic use of learning strategies.

Assessing Learning Strategies from Students' Approaches to Learning

In these two studies conducted by Shen and Chen (2006, 2007), the relationship between SI and learning strategies has been investigated according to the Model of Domain Learning (Alexander, Jetton & Kulikowich, 1995), which is related to the Self-Regulated Learning (SRL) approach, based on the meta-analysis of Dinsmore and Alexander (2012). In contrast to SRL, the Students' Approaches to Learning (SAL) models are characterized as being derived from phenomenographic and qualitative methods. Although Marton and Saljo (1976) conducted the first study with students' interviews to explore their own situated motivation and learning processes, studies have moved to quantitative methods, using questionnaires to assess student motivation and learning. The body of literature has commonly differentiated a surface-level processing and a deep-level processing according to the cognitive dimension of handling information. This differentiation is related to a surface-level strategy or to a deep-level strategy, depending on the students' cognitive engagement within a learning task (Nelson Laird, Shoup, Kuh & Schwarz, 2008). Deep-level strategy is related to elaborating ideas, thinking critically and linking, as well as integrating one concept with another (Diseth & Martinsen, 2003). In comparison, surface-level strategy is defined by memorization and reproduction of the learning materials (Liem, Lau & Lie, 2008). It has been found that deep-level processing is related to gain an understanding of the meaning of the learning task, whereas a surface-level processing is related to focus attention on specific characteristics of the task and reproduction (Diseth & Martinsen, 2003). According to Murphy and Alexander (2002), a student who is interested in and engaged with the task will employ a deep learning strategy while the student who is less motivated will choose a surface learning strategy. These authors believe these choices reflect neither personality nor ability, but are dependent on the students' environmental stimuli and their perception of SI.

Even if empirical evidence has differentiated surface and deep learning strategies in PE, it was not until Kermarrec et al.'s studies (2004, 2007) that researchers were able to gain further insight into the different learning strategies used by students. According to these authors, three learning strategies could be used by students when they are engaged in a learning task: a surface, a deep, and a rich learning strategy. The surface learning strategy refers to a surface-level processing based on learning procedures and skills with repetition and focus attention. The deep learning strategy relies on a deep-level processing which favours a declarative or explicative monitoring of action. Individuals used verbal information on rules, performance or skills to build an understanding about the learning task. The rich learning strategy, which appears to be specific to PE according to previous research, is based on an extended-level processing in which students make relevant association of visual and kinesthesic information. Individuals used imitation processes when watching at their peers' performances and tried to reproduce them. They also used mental imagery when trying to imagine executing a skill in their mind in preparation for the real action (Kermarrec et al., 2004, 2007). A situational learning strategies scale has been validated in PE (Kermarrec & Michot, 2007) which allows researchers to assess the students' learning strategies in PE teaching-learning settings.

Purpose of the Study

Considering that previous studies have shown that SI affects student cognitive engagement and their learning strategies, and also that SI is a primary motivator for students, the purpose of this study was to examine the effects of SI dimensions on students' learning strategies in PE. This study is particularly relevant given that little is known about the relationship between SI dimensions and the different learning strategies used by students. Moreover, the learning strategies scale (Kermarrec & Michot, 2007) used in this study allowed the researchers to assess learning strategies from a situational perspective, which means that the learning strategies used by students were content-specific. In contrast to previous studies, this study investigates the relationship between SI and the students' learning strategies at a situational level, in order to understand if SI dimensions can have an effect on these learning strategies.

Method

Participants

The participants of the study were 148 tenth-grade students (M_{age} = 16.1, 15-17 years, *SD* = 1.3, 40% boys) drawn from a high school located in the northwest region of France. High school students were chosen to ensure that they were more likely to be able to use learning strategies. Permission to conduct the study was granted by the ethical board of the host university and an agreement was also obtained from the principal of the participating school.

Measures

Situational interest. The French 15-item SI Scale (Roure et al., 2016) was used to measure students' SI during learning tasks. The scale includes five SI dimensions: novelty (e.g. "what I did today was new to me"), instant enjoyment (e.g. "what I did was enjoyable for me"), exploration intention (e.g. "I wanted to analyze and have a better handle on what I was learning today"), attention demand (e.g. "what I was learning demanded my high attention"), and challenge (e.g. "what I was learning was hard for me to do"). Each dimension of SI consists of three items. The items were randomly arranged and each was rated on a five-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Roure et al. (2016) established the construct validity of the French SI Scale using exploratory and confirmatory factor analyses (Goodness of fit index (GFI) = 0.93, Normed fit index (NFI) = 0.93, Comparative fit index (CFI) = 0.96, Root mean squared error of approximation (RMSEA) = 0.06). They also reported internal consistency (Cronbach's alpha) for novelty (0.83), instant enjoyment (0.84), exploration intention (0.79), attention demand (0.76), and challenge (0.77) among middle and high school students.

Learning strategies. As students' learning strategies were considered as context-dependent processes, it was important to assess them using a relevant questionnaire. The French 24-item Situational Learning Strategies Scale (Kermarrec & Michot, 2007) was used in this study, because this questionnaire was developed and validated to measure students' learning strategies during a learning task in PE. The instrument consists of three learning strategies measured by six subscales: (1) a surface learning strategy composed of: to repeat (e.g. “I repeated a lot of times to achieve the exercise”) and to focus attention (e.g. “I tried to concentrate on something relevant during the exercise”); (2) a deep learning strategy composed of: to think about and seek an understanding of the content (e.g. “I tried different solutions to find the most effective”) and to listen to instructions (e.g. “I remembered the instructions during the task”); and (3) a rich learning strategy composed of: to look at and imitate (e.g. “I watched the demonstrations carefully”) and to visualize mentally (e.g. “I tried to do the skill in my mind”). Each learning strategy consists of eight items. The items were randomly arranged and each was attached to a four-point Likert scale ranging from 1 = *strongly disagree* to 4 = *strongly agree.* Kermarrec and Michot (2007) established the construct validity of the scale and reported internal consistency (Cronbach‘s alpha) for think about and seek an understanding of the content (0.67), listen to instructions (0.61), look at and imitate (0.63), visualize mentally (0.70), repeat (0.65), and attention focus (0.64) among high school students.

Data Collection

This study took place during the students’ regularly scheduled PE classes. The two teachers involved in this study were male, full-time certified PE teachers with teaching experience ranging from 20 to 25 years. The teachers were asked to design a learning task in body-conditioning that introduced new skills and knowledge. Body-conditioning was chosen as the subject matter for this study because the students were experiencing it for the first time, which allowed the researchers to control the effect of students’ prior knowledge. The data were collected during a 30-minute PE learning task that consisted of finding the maximum load students could bench-press. Students had (under supervision) several attempts at finding the weight they could safely bench-press once. During the learning task, no specific learning strategy was taught to the students, therefore those reported were self-developed. The complexity of this task was based on various elements such as the number of attempts during the task (to avoid weariness), the student’s weight choice for each attempt and how to increase it after a success, and the decision after having failed an attempt (decrease the weight or keep the same weight). When the task was over, students filled in the SI scale and the Situational Learning Strategies Scale. Researchers administered all the questionnaires and collected them directly after completion. To minimize students’ tendency to give socially desirable responses, students were encouraged to answer honestly and were assured that their responses would remain anonymous and confidential.

Data Analyses

Students’ responses to the two scales were aggregated respectively to the five dimensions of SI (instant enjoyment, exploration intention, attention demand, challenge and novelty) and to the three learning strategies (surface, deep and rich learning strategy). The statistical analyses were performed in the following steps. Preliminary analyses were conducted on study variables to examine normality, multicollinearity and internal reliability of the subscales. Pearson product-moment correlations were conducted to address the research question of interrelations between SI dimensions and students' learning strategies. Multiple regression analyses were used to examine the tenability of SI dimensions in predicting the learning strategies. Version 23.0 of SPSS (SPSS Inc, Chicago, IL) was used for all statistical analyses.

Results

Analysis of the skewness and kurtosis values revealed that data were normally distributed, and no problem of multicollinearity was found. Internal consistencies were good for both scales with Cronbach's alphas above .72 for all subscales. The results indicated that exploration intention correlated positively and significantly to the three learning strategies ($r = .45$, $p < .01$ for the rich learning strategy, $r = .37$, $p < .01$ for the deep learning strategy and $r = .34$, $p < .01$ for the surface learning strategy). Additionally, attention demand was correlated positively to these three learning strategies but with lower coefficients ($r = .19$, $p < .05$ for the rich learning strategy, $r = .20$, $p < .05$ for the deep learning strategy and $r = .26$, $p < .01$ for the surface learning strategy). Moreover, correlations between instant enjoyment and the surface learning strategy ($r = .23$, $p < .01$) and the deep learning strategy ($r = .20$, $p < .05$) were positive, whereas challenge only correlated positively with the rich learning strategy ($r = .18$, $p < .05$).

A series of multiple-regression analyses was conducted to examine whether SI dimensions could predict the learning strategies. In each analysis, the SI dimensions were independent variables, whereas the learning strategies were dependent variables. Regression analysis revealed that exploration intention was the only positive significant predictor for the three learning strategies ($\beta = .24$, $p < .01$ for the surface learning strategy, $\beta = .35$, $p < .01$ for the deep learning strategy and $\beta = .46$, $p < .01$ for the rich learning strategy).

Discussion

The purpose of this study was to examine the effects of SI dimensions on learning strategies in PE. In conjunction with teachers in charge of the classes, high-school students participated in a body-conditioning learning task demanding new skills and knowledge. Immediately after completing the task, the students filled in two scales assessing their SI and learning strategies. Findings confirmed the effect of SI on students' learning strategies in PE and provided relevant information about their relationship at a situational level.

Effects of Exploration Intention According to Students' Learning Strategies

The results from this study clearly demonstrated that exploration intention is a key dimension of SI in predicting students' learning strategies in PE. This association with the three learning strategies seems well-founded in so far as exploration intention is defined as the learning aspects that drive the learner to explore and discover. When the students are engaged in an exploration of the environment's possibilities, they tend to focus their attention on relevant information within the task (for the surface learning strategy), they think about and seek an understanding of the content when searching for the best way to achieve it (for the deep learning strategy), and they mentally visualize as a way of anticipating their performance when trying a new skill (for the rich learning strategy). The relationship between exploration intention and the three learning strategies is congruent with a meta-analysis made by Dinsmore and Alexander (2012), in so far as they have demonstrated that learners combine deep and surface strategy to achieve better performance in many tasks. We can assume, in this study, that students perceived an exploration intention which has led to the use of two or three learning strategies, to achieve the body-conditioning learning task. However, differences can be made based on the regression coefficients that explained the relations between this SI dimension and the learning strategies used by students.

In the SAL framework, the surface learning strategy is described as a low-cognitive engagement that leads to a lower level of performance (Ramsden, 2003). In this study, it can be noted that the regression coefficient from exploration intention towards the surface learning strategy is lower ($\beta = .24$) compared to those for the deep and rich learning strategies. This can be interpreted by the fact that exploration intention may be a useful way for students to focus their attention on the learning task, but it is less important when they are engaged in systematic repetitions of the task. This interpretation is congruent with Wulf and Prinz (2001) who have demonstrated the benefits of an external focus of attention when students are learning a new skill, principally based on the exploration of the environment's possibilities. The regression coefficient increases when exploration intention predicts the deep learning strategy ($\beta = .35$). It can indicate that this SI dimension is needed to listen to instructions, and to think about and to seek an understanding of the content. When students are involved in discovering the different possibilities offered by the learning task, they could investigate teachers' instructions given at the beginning of the task, and to repeatedly think about them as they are exploring the environment. In that sense, this result is congruent with many studies in PE which have clearly established that motivated students use teachers' feedback during learning tasks to regulate their performance and seek an understanding of the content (Gao, Hannon, Newton & Huang, 2011). It is also in line with previous studies in education which have shown that deep-level processing enabled students to combine information and process it, increasing the meaning of the learning task (Diseth & Martinsen, 2003; Liem et al., 2008). Finally, the highest regression coefficient is obtained when exploration intention predicts the rich learning strategy ($\beta = .46$). An interpretation could be that some students proceed by imitation to explore the different possibilities of the task, based on the successful skills they observed when watching their peers. Or, they could also visualize mentally what they planned to do and its consequences, before practicing the learning task themselves. In that case, exploration intention might activate an extended-level processing for the students engaged in the learning task (Kermarrec et al., 2004).

Practical Implications

The findings of the present study may have significant implications for teachers in PE. Consistent with the model of SI built in the French PE context (Roure & Pasco, 2016), exploration intention appears to be a major motivational component, as well as a dimension leading to students' cognitive engagement. This suggests that teachers should design learning tasks that require higher-order cognitive processes demanding active exploration (Roure & Pasco, 2017). As noted in a recent study (Jaakkola, Wang, Soini & Liukkonen, 2015), it would be beneficial to the practice of PE if students were given the freedom to make choices and given opportunities to affect the way learning tasks are carried out. Simultaneously, as attention demand and instant enjoyment are correlated to the learning strategies, teachers can enhance students' mental representations as a way to facilitate their exploration of the learning task while creating exciting and stimulating activities.

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