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**Nasser Al Rawahi**  
Sultan Qaboos University  
College of Education  
Department of Curriculum &  
Instruction, P.O.Box 32, P.C 32

## An Exploratory study of Cognitive and meta-Cognitive Learning strategies used by Omani physical education students

**Nasser Al Rawahi**

### Abstract

This study focuses on exploring the learning strategies and motivation beliefs used by Omani physical education students to learn physical education theoretical knowledge derived from multi-physical education study courses. One hundred and six physical education students who are currently enrolled at the physical education department at Sultan Qaboos University in Oman volunteered to participate in this study. Data was collected by adapting the Motivated Learning Strategies Questionnaire (MSLQ), which comprises three main categories, namely cognitive, meta-cognitive learning strategies and motivation beliefs. Results revealed that the learning strategies and motivation beliefs were implemented between high and moderate levels by participants to acquire physical education theoretical knowledge. Results also indicated statistical differences in learning strategies between males and females in favour of female students. Results suggested some implementations to be made at physical education department level including various improvements and changes in pedagogical approaches, activities and materials, which enhance candidates' use of all strategies for improved achievement. Students should also be exposed extensively to different cognitive and meta-cognitive learning strategies and how they are effectively implemented.

**Keywords:** Cognitive, Learning, Meta-cognitive, Strategies, Physical Education.

### Introduction

Learning in a physical education context, particularly acquiring the theoretical knowledge, is similar to learning in other subjects where it is related to the implementation of multiple learning strategies and motivation beliefs that students apply to master physical education tasks. The theoretical knowledge can be defined as all physical education terminologies, concepts, rules and motor movement skill techniques etc. Within the last few years, there have been considerable discussions among educational researchers about factors influencing students' academic achievements. The majority of these arguments indicated that actual learning and successful academic achievements are the result of using learning strategies and motivation beliefs (Zimmerman & Martinez-Pons, 1990<sup>[16]</sup>; Pintrich, Smith, Garcia & McKeachie, 1991<sup>[10]</sup>, 1993<sup>[11]</sup>; Garcia & Pintrich, 1996<sup>[2]</sup>; Kitsantas, Winsler & Hui, 2008<sup>[6]</sup>; Randi, 2009)<sup>[12]</sup>. These are self-directive processes and self-motivation beliefs that enable students to transform their mental abilities into academic performance (Zimmerman, 2008)<sup>[14]</sup>. Learning strategies and motivation beliefs have been defined and classified differently according to different researches and inquiries but they can be simply defined as the total effort that students need to process, understand and adopt to acquire information introduced in learning-teaching processes (Tay, 2013)<sup>[13]</sup>. In other words, learning strategies can be described as the whole of the performed activities of a learner to give meaning to information in cognitive and affective processes (Kafadar, 2013)<sup>[5]</sup>. These processes embrace cognitive, meta-cognitive and motivation strategies applied by learners to enhance learning and knowledge acquisition.

The theoretical framework underlined in this study is based on social cognitive theory that views learning as occurring under two main themes. The first one is called learning strategies and includes five components, namely rehearsal, elaboration, organization, critical thinking, and meta-cognitive strategies. The second theme, named motivation beliefs, consists of six sub-themes including intrinsic, extrinsic, task value, control of learning, self-efficacy and test anxiety (Pintrich, Smith, Garcia and Mc Keachie framework 1991)<sup>[10]</sup>.

**Correspondence**  
**Nasser Al Rawahi**  
Sultan Qaboos University  
College of Education  
Department of Curriculum &  
Instruction, P.O.Box 32, P.C 32

In physical education, and other subjects, it is argued that understanding students' learning strategies and motivation beliefs stems from the assumption that students are active agents for learning and, as such, an understanding of their learning strategies could provide some insight into developing teaching approaches which could maximize learning. Kretschmann (2014) asserted that understanding students' learning strategy profiles may influence physical education teachers' teaching strategies and enable them to personalize teaching efforts according to students' individual motivational propositions. Also, learners are found to be able to adopt their methods and strategies in learning and to develop their own learning initiatives based on their learning objectives (Olausson & Braten, 1999). Furthermore, and as a consequence of that, they performed better in their academic life. Other studies had also proven that curricula, which were designed according to learning strategies, tended to produce high achievers. (Bail *et al.*, 2008; Ray *et al.*, 2003). Another study in the physical education context concluded that the selection of a learning strategy should be based on the students' perceived value of the task to be learnt and that teachers should structure activities which can foster value clarification processes among students (Frank, 1999) <sup>[1]</sup>.

Exploring students' profile of learning strategies in the physical education context is still at a stage of infancy. Most researches conducted in this area are related to learning strategies used by physical education students to learn sport skills; however, no research has focused on PE theoretical content knowledge. This area was studied extensively in other subjects and different instruments were implemented aiming to investigate cognitive and meta-cognitive learning strategies. One of the most widely used instruments is the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich, Smith, Garcia and McKeachie (1991) <sup>[10]</sup>. This study adopted this instrument with a main focus on cognitive meta-cognitive and motivation strategies used in Omani physical education to learn theoretical content knowledge. Two main questions guide this investigation, which are:

Q1: To what extent do Omani physical education students use learning and motivation strategies in learning physical education tasks?

Q2: Are there any statistical differences in cognitive, meta-cognitive learning strategies and motivation beliefs used by Omani physical education students in terms of their gender?

### Materials and methods

This study is a self-report instrument based on the Motivated Strategies for Learning Questionnaire (MSLQ), which was developed to assess university students' motivational beliefs and their use of different learning strategies (Pintrich *et al.*, 1991) <sup>[10]</sup>. The motivation strategies used in this study focus on six sub-categories, namely Intrinsic, Extrinsic Motivation, Task Value, Control of Learning, Self-efficacy and Test Anxiety. The learning strategies included in this study are related to the main categories: cognitive and meta-cognitive strategies. The former includes four sub-categories, namely Rehearsal, Elaboration, Organization and Critical Thinking. The questionnaire was firstly translated into the Arabic language by the researcher with the help of two experts in English and Arabic language. After the first modification, the validity of the scale was achieved by sending it to experts in the physical education and psychology departments at Sultan

Qaboos University to assess the content and to determine whether the items were suitable for the main suggested categories and sub-categories. Some modifications were made to the last version of the scale. In order to ensure the reliability of the scale, it was implemented within a small group of physical education students. Finally, the Cronbach's Alpha for cognitive learning strategies, meta-cognitive strategies and motivation beliefs were calculated and reached 0.883, 0.788 and 0.857 consequently. This result confirmed the accepted reliability level in educational literature.

### Participants

Participants in this study were physical education students from the department of physical education at Sultan Qaboos University in Oman. A total of 106 students, 57 male and 49 female, agreed to be involved in this study. They were drawn from four academic years (Year one 21.7% (n=23), Year two 30.2% (n=32), Year three, 18.9% (n=20) and Year four, 29.2 % (n= 31). Consent to conduct the study was obtained officially from the Assistant Dean of Students at the college of education and they were guided on how to answer the study questionnaire and they were told that there were no right or wrong answers. They should read the questions carefully and answer them according to how they would react most of the time to each statement in the questionnaire.

### Results

This study aimed to explore learning strategies and motivation beliefs used by Omani physical education students in learning physical education tasks. Participants responded to a 5-point Likert scale adopted from the Pintrich (1991) <sup>[10]</sup> scale, which is widely used in international studies around the world. To facilitate answers and interpretation of this study data, means were classified into three main levels based on Oxford (1990) <sup>[8]</sup>. Mean scores that fall between 1.0 and 2.4 are defined as low strategy use. Mean scores occurring between 2.5 to 3.4 are labelled as medium strategy use, and mean scores falling between 3.5 and 5.0 are labelled as high strategy use.

### Learning strategies and motivation beliefs used by Omani PE students

To answer the first question of this study, means and standard deviation for each main category and sub-category were calculated. General descriptive statistics in Table 1 revealed that the mean value of cognitive and meta-cognitive learning strategies ranged from 3.22 to 3.43, indicating that physical education students use cognitive and meta-cognitive learning strategies at a medium level. Results showed that at the cognitive learning strategies level, Organization was reported at the top of the learning strategies implemented by participants (M=3.47, SD=1.04) followed by Rehearsal Strategy (M=3.43, SD=.115) then Elaboration Strategy (M=3.38, SD=.992) and finally Critical Thinking strategy (M=3.22, SD=.934).

The analysis in Table 1 also showed that Extrinsic and Control of Learning, as two sub-categories of motivation belief strategies, were reported as the highest level used by participants (M=3.70 and 3.49 respectively). In contrast, other motivation strategies such as Intrinsic, Task Value, Self-efficacy and Test Anxiety were used at medium level by participants in learning physical education tasks.

**Table 1:** Means and Standard Deviations of learning strategies and motivation orientations

Main Categories	Sub-categories	N	Mean	S.D.	Level of Use
Cognitive Learning Strategies	Rehearsal	106	3.43	1.15	Medium
	Elaboration	106	3.38	.992	Medium
	Organization	106	3.47	1.04	Medium
	Critical thinking	106	3.22	.934	Medium
Total		106	3.37	.514	Medium
Metacognitive		106	3.31	.565	Medium
Motivation beliefs	Intrinsic	106	3.25	.616	Medium
	Extrinsic	106	3.70	.770	High
	Task value	106	3.36	.581	Medium
	Control of learning beliefs	106	3.49	.659	Medium
	Self-efficacy	106	3.39	.611	Medium
	Test anxiety	106	2.99	.701	Medium
Total			3.36	.656	Medium

**Gender differences in using learning strategies and motivation orientations**

Descriptive statistics in Table 2 showed that physical education female students are better at implantation of cognitive and meta-cognitive learning strategies as well as using motivation belief strategies to enhance their learning.

**Table 2:** T-test result of learning strategies and motivation orientations in terms of gender differences

Main Strategies	Male 57		Female 49		Df	t-value	Sig (2-tailed)
	M	SD	M	SD			
Cognitive learning Strategies	3.26	.483	3.51	.064	104	-2.550	.012*
Metacognitive learning strategies	3.17	.541	3.47	.552	104	-.30684	.005*
Motivation orientations	3.26	.455	3.49	.431	104	-.2642	.010*

The results in Table 2 showed that there is a significant difference at ( $\alpha \leq 0.05$ ) in meta-cognitive and motivation strategies implementation according to participants' gender. It is clear enough that implementation of these strategies varies according to academic year. It is clear that female PE students implement these strategies more than their male counterparts.

**Discussion**

The main focus of this study was to investigate Omani physical education students' use of learning strategies and motivation orientations to master theoretical subject knowledge, which is studied in different courses at their preparation program. The study revealed that Omani PE students integrate multiple types of learning strategies and motivation orientations in mastering subject knowledge and enhancing their learning processes. The findings indicated that the three main categories, cognitive, meta-cognitive and motivation orientations were used at a medium level. Thus, it can be concluded that most participants don't use these strategies on a frequent and satisfying basis and they were not very encouraging among students.

The results showed that organization and rehearsal is the most frequently used cognitive learning strategy among Omani physical education participants compared to other cognitive and meta-cognitive learning strategies. This finding indicates that Omani PE students prefer strategies that help them to easily memorize learning information, to help them organize knowledge in ways such as clustering, outlining and summarizing. These strategies may be helpful in the short term

memorizing of knowledge and they might be effective for achieving high marks and grades but they are not meaningful for long-term memory and achieving a deep understanding of the subject knowledge base (Ghazali Yusri & Nik Mohd Rahimi, 2010) [3]. This result may also be attributed to the nature of the education system where emphasis is given much more to learning for achievement rather than learning purely for the sake of learning and as a consequence of this emphasis students are more concerned about memorizing information to ensure high achievement.

Critical thinking and meta-cognitive learning strategies have been implemented by Omani PE students at the lowest level compared to other strategies. Rhee and Pintrich (2004) indicated that there is a close relationship between the use of cognitive and meta-cognitive strategies. This means that Omani physical education students' use of critical thinking and meta-cognitive strategies were affected by their use of cognitive strategies. Students should be trained more in critical thinking skills and meta-cognitive learning strategies to cope with large amounts of information.

The other main factor that plays a crucial role in the learning and implementation of cognitive and meta-cognitive learning strategies is motivation. It includes a combination of variables or factors implemented to enhance learning, such as intrinsic, extrinsic, task value, self-efficacy and learning control. These factors have a significant impact on human achievement in a wide range of settings including health, work, education and sports. This study proved that Omani physical education students use these factors at medium levels except the extrinsic motivation factor, which was being used at a high level by the participants. Students with high extrinsic motivation, task value and control of learning believed that they were capable of improving and controlling their academic performance through the employment of several learning strategies (Ng Abdullah and Abu Bakar, 2006) [7]. Self-efficacy, anxiety and control beliefs are motivational beliefs that trigger and sustain behaviour towards a certain goal. The social cognitive theory recommends that these beliefs are individual factors that have an influence on learning. Existing studies indicate that highly effective students have much more positive learning behaviour, such as by engaging in more challenging tasks, expending greater effort, persisting longer, being less anxious and having more self-regulation than the less effective students (Joo, Bong & Choi, 2000) [4]. It can be concluded that students with high motivation beliefs involved more behavioural-cognitive strategies such as note taking, goal setting and self-evaluation in comparison to those who have low motivation beliefs.

The results from this study also showed statistical differences between males and females in cognitive, meta-cognitive and

motivation orientations in favour of female students. According to Zimmerman and Martinez-Pons (1990) <sup>[16]</sup> female students make use of more transformation and organization strategies more frequently compared to male students. They use more meta-cognitive strategies and many of them have beliefs in the significance of cognitive strategies (Pekljaj & Pecjak, 2002) <sup>[9]</sup>.

### Conclusion

The results of this study have different limitations at different levels. One of the main limitations is the lack of a literature review in the physical education context. Unfortunately, there is little knowledge about cognitive and meta-cognitive learning strategies in the physical education context. This implies the need for a future focus on these strategies aimed towards improving the quality of teaching and learning processes. Also, more concern must be given to identifying learning strategies and how students implement them in real learning contexts. Training programs should also be organized for students on how to effectively implement different types of learning strategies and how they can benefit from them for high level achievement. In addition, educators at education programs should orientate students toward focusing on multiple learning strategies including meta-cognitive and critical thinking skills. Finally, further investigation into the relationship between learning strategies and other fundamental variables such as learning strategies and teaching styles, learning strategies and academic achievement are needed.

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