An examination of PE student teachers' and PE teachers' experiences with and beliefs of teaching styles

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Dedication

To my parents and beloved family for their fully support to my endeavor for accomplishing this journey!

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Abstracts

Study 1

This study is aimed at examining physical education student teachers' experiences with, beliefs about, and intention to use Spectrum teaching styles in the future (Mosston & Ashworth, 2002). Two hundred and eighty eight PE student teachers participated in the study whereas data were collected using a modified and translated version of the questionnaire developed by Cothran, Kulinna, and Ward's (2000). Participants in the study reported that as primary and secondary education students they had been more frequently exposed to reproduction teaching styles in their physical education classes whereas exposure to what can be described as productive styles had been substantially less frequent. In terms of beliefs, student teachers participating in the study perceive that the reproduction teaching styles provide students with more opportunities for fun, learning skills, and motivation for learning. In addition, as physical education instructors in the future student teachers stated that they are keener on implementing teaching styles from the reproduction cluster. Finally, the finding of the study confirmed student teachers' conceptions about their students' learning process influenced by their prior experiences as school students.

Study 2

The purpose of the present study was to explore PE student teachers' presuppositions, beliefs and mental models related with production and reproduction teaching approaches. The participants were 16 (10 males and 6 females) second year PE student teachers. A qualitative methodology was used and the data were collected by using semi-structure interviews. A multi-level analysis process was conducted which included open and axial coding (Strauss & Corbin, 1998).The findings revealed two framework theories that reflect the diversity of PE student teachers' beliefs of the teaching approaches. PE student teachers attributed different characteristics to both clusters of teaching approaches and

learning as well. More specifically, 5 PE student teachers were categorized within the first mental model and they appeared to hold the naïve presupposition that learning is dimensional and reproduction teaching approaches facilitate more effectively its' accomplishment. On the other hand 11 PE student teachers perceived that learning is multidimensional and it could be achieved through the implementation of production teaching approaches. Finally, the findings of the present study confirmed Vosniadou's (1994) suggestion that prior beliefs play an important role on learners' structure of the knowledge.

Study 3

The main purpose of the present study was to examine Greek physical education teachers' use of the Spectrum of teaching styles and perceived benefits of the styles for students. An additional goal was to explore the influence of the teachers' perceived ability to use and beliefs about teaching styles on the implementation of these teaching approaches. The participants of the study were 219 (132 males, 87 females) physical education (PE) teachers. The PE teachers reported using the command, inclusion, and practice styles more often than and the self-check, learner-initiated, and self-teaching styles in their own teaching. The PE teachers also perceived that the reproduction and production clusters of teaching styles to be equally effective in promoting fun, skill learning, and motivation for learning in their students. Results also highlighted that PE teachers' self-perceived ability had the highest influence on command style use and the teachers' perceived benefits to students of styles from the production cluster. The findings of the present study suggest that a variety of factors influenced PE teachers' tendency to implement a specific teaching style.

Study 4

The purpose of the present study was to examine physical education teachers' beliefs concerning production and reproduction teaching approaches. An additional objective was to explore the goals of the physical education lessons that they prioritize, and the teaching approach that they believe that promotes the achievement of each goal. Finally, the study aimed to identify participants teaching preferences and the underlying reasons that support these choices. Ten physical education teachers (male = 5 and female = 5) participated in the research, two of them holding a postgraduate degree. Their teaching experience varied between 10 and 25 years. The qualitative analysis results indicated that the majority of teachers more often implement reproduction rather than production approaches regardless the school level. Participants reported that they perceived themselves as self-efficacious to implement both teaching approaches. The findings revealed that there is pattern between the physical education class goals they set as top priority and their teaching preference. Furthermore, a variety of factors that can influence their teaching preferences such as course control, time management, active time, discipline and responsibility were identified.

Keywords: Teaching styles, learning, curriculum goals, self-efficacy.

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Chapter 1

Introduction

Over the last two decades we have witnessed educational reforms in several countries in the physical education (PE) field. For example, the establishment of the National Curriculum for Physical Education (NCPE, 1992; 1995; 2000) in the U. K. and the National Association for Sport and Physical Education standards (NASPE, 2004; SHAPE, 2014) in the U. S. . According to NCPE curriculum, PE teachers should provide their students with opportunities to acquire and develop skills, select and apply these skills, evaluate and improve their performance and knowledge, understand the fitness and health concepts. Similarly, according to NASPE (2004) framework PE teachers should promote their students' skillfulness to perform a variety of physical activities, understand concepts, principles, strategies and tactics and their application to physical activities participate regularly in physical activities, achieve and maintain physical fitness, develop personal and social responsibility, appreciate the merit of physical activity for health, enjoyment, challenge, self-expression and/or social interaction. Coherent with the aforementioned perspective are the directions of the Greek PE curriculum. More specifically, PE teachers should focus on students' motor development, through which fitness and health improvement are promoted and finally physical activity as a lifelong habit is adopted (HMERA, 2003).

Arguably it can be concluded that teaching is a challenging process since it demands that PE teachers are aware of the multidimensional goals they have to achieve. During PE lesson teachers have to deliver to their students a variety of activities. Simultaneously, their students (each one of them with different level of skills) have to move constantly, most of the times in a poorly equipped context. Thus, it can be said that

teaching in the PE context is a complex and a challenging job (Graham, 2008). Physical educators' development and qualification require the identification of these aspects (Bailey, 2001).

Learning in the PE field is also a complex process, because it is comprised of three interdependent dimensions: cognitive, motor, and affective. The cognitive learning includes a wide variety of physical education concepts, some of which are common to other academic domains (anatomy, physiology, etc.). PE teachers should aim at helping students learn to move and learn through the movement (Gallahue, 1996). In addition, Mohnsen (2008) outlined that PE teachers have to provide their students with the opportunity for practicing interdisciplinary activities. Nowadays, scholars who design curriculum tend to emphasize the cognitive dimension of learning by integrating concepts from the physical education domain in PE lessons (Chen, Rovegno, Todorovich, & Babiarz, 2003; Ennis, 2007) thus, making the learning context more and more demanding.

According to occupational socialization theory PE teachers' prior beliefs play an important role in shaping their professional profile (Lawson, 1983a). Consistent with this suggestion, Calderhead (1997) proposed that student teachers' conception about their students learning process is mainly based on their prior experience as school students. Similarly, Richardson (1997) from the perspective of the constructivist approach suggested that students generate their knowledge based on prior knowledge and experience and actively give new meaning in their knowledge. A wide range of factors influence (positively or negatively) physical education students' knowledge, beliefs, values, behaviour, teaching philosophy and teaching approaches about the content of the PE lesson during the phase of socialization (Capel & Blair, 2007).

The Spectrum of teaching styles is a powerful framework theory that provides PE teachers with alternative teaching and learning options in order to accomplish their goals

(Goldberger, Ashworth & Byra, 2012). Based on students' and teachers' involvement in the learning process Mosston and Ashworth (2002) classified the teaching styles with production and reproduction clusters. Researchers have stressed that the national standards in the U.S. (Garn & Byra, 2002) and in the U.K. (Goldberger & Howarth, 1993; Mawer, 1993) can be achieved through the use of spectrum teaching styles. In addition, the aforementioned studies imply that nowadays, the implementation of production teaching approaches become more imperative due to the multidimensional goals of PE curricula (e.g., NCPE, NASPE). However, findings of several studies (Cothran & Kulinna, 2000; Cothran et al. 2005; Kulinna &Cothran, 2003) suggested that although PE teachers implement a wide variety of teaching styles, the reproduction cluster dominates the instructional environment in PE. Moreover, researchers (Curtner-Smith & Hasty, 1997; Curtner-Smith et al., 2001) stressed that curriculum reform have not greatly influenced PE teachers' instructional choices nor expanded their teaching repertoire.

In the Greek PE educational context the Spectrum was integrated into the curriculum of undergraduate studies in 2000. Additionally, the Spectrum of teaching styles became an integral part of the amended Greek PE curriculum in order to provide a revised school based program for teachers and updated textbooks for students (e.g. Digelidis et al., 2006; Papaioannou et al., 2007). Furthermore a number of significant reforms established in the last decades in the Greek educational system (e.g., HMERA, 2003; HMERA, 2011) make urgent the implementation of a variety of teaching methods in order for the goals of the reforms to be achieved.

Physical education researchers have not yet attempted to give rational explanation about the wide use of reproduction teaching styles. Thus, research is needed to reveal the underlying reasons that urge physical educators to rely more often on the reproduction than on the production teaching styles. Also, the present study attempted to explore the

relationship between reproduction and production styles and lesson goals. Additionally, the influence of physical educators' prior experiences and beliefs on their teaching choice was examined. Furthermore, both Greek PE student teachers' and PE teachers' experiences with and beliefs of Spectrum teaching styles were examined. Finally, through the lens of Conceptual Change Framework Theory, PE student teachers mental models and students' underlying presuppositions and beliefs of teaching styles were explored. This theoretical approach to learning may enhance scholars understanding of the cognitive learning process in the physical education domain.

Purpose, Significance, Limitation and Delimitation of the studies

The purpose, significance, limitation and delimitation of these four independent but interrelated studies were presented below.

Study 1

Purpose: The Spectrum of teaching styles has been included in the curriculum of Greek PE departments for more than 10 years. However there is lack of information about PE student teachers' perceptions of and their intention to implement each one of the teaching styles in the future as PE teachers. Also, there is no evidence to what extent PE student teachers' prior experiences related with their intention to adopt or reject each of the Spectrum teaching styles. Based on PE student teachers' reports the purpose of this study was to examine: (a) their school experience with Spectrum teaching styles implementation in Greece; (b) their beliefs concerning the Spectrum teaching styles; (c) their intention to rely on and implement Spectrum teaching styles as PE teachers; and (d) the relation between their prior experiences with Spectrum teaching styles and their intention to implement these styles in the future.

Significance: The findings of this study can be used to explore PE student teachers' intention to implement as future PE teachers productive or reproductive teaching styles; thus, the effectiveness of the teaching methodology course could be evaluated.

Limitation: One of the goals of this study was to explore PE student teachers' beliefs about the Spectrum teaching styles and their intention to implement these styles as qualified PE teachers in the future. Since PE teacher students were enrolled in a specific Department of Physical Education then arguably it can be said that their beliefs about and their intention to implement these teaching styles could be influenced by the curriculum of that specific department. Taking this into consideration it can be assumed that these findings could not be generalized to the whole Greek educational community. Finally, the fact that PE student teachers recalled the frequency that their PE teachers have implemented each teaching style can be considered as a limitation, since it could not be accurate.

Delimitation: The study explored PE student teachers' beliefs of, experiences with and intention to implement the Spectrum of teaching styles. Participants were 288 PE student teachers enrolled in a specific university. However, they were coming from different areas of Greece, with different social and economic background. PE student teachers voluntarily filled in the anonymous questionnaires.

Study 2

Purpose: The present study can help scholars to identify the underlying reasons for PE student teachers to implement the cluster of production or reproduction styles. Researchers have not yet attempted to examine the relationships among PE student teachers' domain-specific knowledge and their beliefs about the production and reproduction teaching styles. The purpose of this study was to explore through the perspective of Framework Theory of Conceptual Change, PE students teachers': (a) presuppositions; (b) beliefs; and (c) mental models related with the production and reproduction teaching approaches.

Significance: The exploration of PE student teachers' mental models within the PE instructional settings can help researchers to understand the social or contextual factors that facilitate or constrain the learning process. In addition, this study can help scholars to expand their knowledge about student learning process in the specific domain. The understanding of PE student teachers' naïve concepts could help scholar to develop curriculum contents consistent with PE student teachers' beliefs. Consequently, it could help PE student teachers to reconcile faster their concepts and create scientific mental models.

Limitation: The main goal of this study was to explore PE student teachers mental models and underlying conceptual structure. The findings of the present study reflected participants' beliefs and knowledge; thus, the conclusion referred to this specific population.

Delimitation: In this study, only the specific PE student teachers' presuppositions, beliefs and mental models of production and reproduction teaching approaches were examined. Participants were 16 second year PE student teachers.

Study 3

Purpose: Although the Spectrum of teaching styles was integrated in the Greek PE context in 2006 based on a revised school program for teachers and students, there is a lack of evidence about the extent to which the Spectrum of teaching styles is implemented by PE teachers and their beliefs concerning these styles. Thus, it is imperative to conduct a study focusing on PE student teachers beliefs about and experiences with Mosston's Spectrum of teaching styles. More specifically, the study was designed to examine the following research questions: (a) What Spectrum teaching styles do Greek PE teachers use?; (b) Do perceptions of use of the Spectrum teaching styles differ among Greek PE teachers?; (c) Do Greek PE teachers differ in their overall perceptions of the educational benefits of the

Spectrum teaching styles to students (having fun, learning, and being motivation)?; (d) Do Greek PE teachers' perceptions of ability to implement the Spectrum teaching styles influence their use of the latter teaching styles?

Significance: The findings from the present study can provide useful information about the number of teaching styles that PE teachers implement in the PE course and their frequency of implementation. Also conclusions on PE teachers' perceptions about Mosston and Ashworth's spectrum of teaching styles can be inferred.

Limitation: A limitation of this study was the administration of self-reports regarding the use of Mosston and Ashworth's (2002) teaching styles. Also, although Spectrum of teaching styles was included in teachers' text books the instrument didn't examined to which extend participants were aware of the Spectrum of teaching styles. An additional limitation was the disproportional ratio between younger teachers and the other two PE groups (middle-aged and older). This limitation may be a side effect of the current fiscal crisis in Greece where a freeze has been placed on the hiring of new PE teachers in schools and has led to a larger cohort of older teachers.

Delimitation: The main purpose of the present study was to examine Greek physical education teachers' use of the Spectrum of teaching styles and their perceived benefits to the students. Another goal was to explore the influence of their perceived ability and beliefs about the teaching styles on the implementation of these teaching approaches. Participants were 219 PE teachers with a different educational, social and economic background. They were also coming from different geographical areas of Greece.

Study 4

Purpose: A qualitative study can shed light on the underlying reasons that urge PE teachers to rely on the production and reproduction clusters of teaching styles.

Significance: The findings of this study can be used to explore PE teachers' reasons to rely on the production and reproduction teaching styles. Also it can be inferred to what extent PE teachers' goals in PE lessons are related to the implementation of the production and reproduction teaching styles. Finally, the findings can help policy makers to establish more effective seminars for in-service PE teachers.

Limitation: The main goal of this study was to explore PE teachers' beliefs and use of reproduction and production teaching approaches by using a qualitative approach. Consequently, the findings of the present study reflected participants' beliefs and use of teaching styles; thus, the findings referred to this specific population without any further possibility of generalization.

Delimitation: The main purpose of the present study was to examine PE teachers' beliefs about production and reproduction teaching approaches. An additional objective was to explore the goals of the physical education lessons they prioritized, and the teaching approach they believed that promotes the achievement of each goal. Participants were volunteers chosen from a list of PE teachers of a specific area in Greece.

Definition of Major Terms

This section provides definitions of the major constructs that consist of the milestones of this study.

Occupational Socialization Theory Lawson (1983a, b) articulated the occupational socialization model and described it as 'all kinds of socialization that initially influence persons to enter the field of physical education and later are responsible for their perceptions and actions as teacher educators and teachers' (Lawson, 1986, p. 107). Additionally, he concluded that three distinctive kinds of socialization influence a person's beliefs and actions.

Acculturation is the first type of socialization which influences a person's beliefs during infancy and adolescence and urges her to be recruited in the physical education field.

Professional refers to the influence of undergraduate studies on PE student teachers. Lawson (1983a) defined this type as "the process by which … teachers acquire and maintain the values, sensitivities, skills, and knowledge that are deemed ideal for physical education teaching" (p. 4).

Organizational type according to Lawson (1983a) is in contrast with professional type. During this process PE teachers "prospective and experienced teachers acquire and maintain a custodial ideology and the knowledge and skills that are valued and rewarded by the organization… may produce a cognitive style in which the maintenance of order, the uses of proper procedures in the name of routine, and the tacit denial of the need to individualize instruction and cater to the needs of students are prevalent" (p. 4).

Conceptual Change Theory is a knowledge construction process which happens in a broader situational, educational and cultural context whereby learners slowly and gradually enrich and restructure their existing conceptions through the integration of new information in a domain-specific under the influence and facilitation of social-cultural factors (Vosniadou, 2007a; 2007b).

Naïve theories Learners during knowledge acquisition process form coherent conceptual structures that embedded in larger theoretical structures which in turn constitute learners' domain specific beliefs. Naïve theories separated into two categories: global explanatory theories and specific explanatory theories.

a) Global explanatory theories refer to the initial learner's attempt, mainly during its infancy, to give explanation about a specific physical phenomenon. They are characterized by learners' broad perception about nature and consist of ontological and epistemological presuppositions.

i) Ontological presuppositions are learner's assumptions about the nature of a specific phenomenon in the world (e.g., physical objects are stable and solid) (Vosniadou, 1994). They reflect learners' assumptions about the categories and properties of knowledge in the world (Chinn & Brewer, 1993).

ii) Epistemological presuppositions refer to learners' perceptions about and the nature and the development of the knowledge and include several dimensions as justification of the knowledge and the source of the authority. Epistemological presuppositions or beliefs are dynamic and they are evolved from objectivistic and absolutistic to more relatively and constructivist point of view (Vosniadou, 2007a).

b) Specific theories refer to learners beliefs formed through the daily observation of the world or information received from their cultural context or during their instruction in the educational context. These beliefs refer to properties or behaviours that learners attribute to a physical object.

Mental models are learner's representations of a specific phenomenon, mediating in knowledge's enrichment and reconstruction process. They are developed on the spot or retrieved from the memory based on presuppositions and beliefs as learners try to solve a problem. There are three kinds of mental models (Vosniadou, 1994):

a) Intuitive or initial: Formed mainly during pre-school period and reflect learner's initial attempt to interpret a phenomenon based on the observation (Vosniadou, 1991).

b) *Synthetic:* Formed during learner's attempt to integrate new information counter-intuitive to their prior knowledge. Most of the times learner distort the new

information in order to be compatible with their prior knowledge (Vosniadou, 1994)

c) *Scientific:* Reflects the evolution of synthetic mental models and represent learner's ability to understand scientific concepts (Vosniadou, 2007b).

Metaconceptual awareness refers to learners' lack of awareness that their point of view about specific phenomena is incomplete and/or contradictory to the prevailing scientific theory. Thus, they just assimilate and incorporate the new information in their existing knowledge (Vosniadou, 1996).

Production cluster of teaching styles. The learning according to this approach refers to a cognitive process. Teacher provides students with opportunities for participating actively in the learning process by exploring the new information, eliciting the answer and constructing their understanding (Mosston & Ashworth, 2008).

Reproduction cluster of teaching styles refers to a teaching approach in which teacher makes most of thinking and decisions while students simply recall and reproduce the provided information (Mosston & Ashworth, 2008).

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Chapter 2

Theoretical framework-Literature Review

During the last century the PE domain has been under the influence of the dominant education theory of behaviourism. Even though the past three decades constructivism gradually took his place, the influence of behaviourism on most of PE teachers' repertoire remains strong. For example the curriculum in the U.S., in most of the cases, contains multiple short-duration physical activities which could motivate skilful students to be actively involved in the PE lesson, it provides students with a relative limited learning implication for them (Ennis, 1999). A similar conclusion can be drawn by a number of studies (Curtner-Smith, 1999; Kirk & Kinchin, 2003; Mawer, 1999). More specifically it has been revealed that PE lesson is limited only in teaching skills relative to game sports. Additionally, PE teachers tend to put emphasis on students' motor development. Finally, Capel and Blair (2007) suggested that PE teachers in their endeavour to achieve the aforementioned goal tend to utilize mainly teacher-centred teaching styles.

Behaviorist tenets consider the thought as elusive and for this reason put emphasis on the observation of human behavior. Also they consider environment influence as an important factor in the learning process. Scholars from this perspective attempt to give rational explanations based on the behavior and the effect of this behavior on human (Light, 2008). Learning through the lens of this perspective is considered the result of the relationship between stimuli and response. The most prevailing paradigm of the theory has been the trial and error learning in which certain desirable responses dominate rival undesirable ones by using rewards. In addition, according to this approach learning occurs only when the new information has similar structure with the existing knowledge. Finally, they perceive that learning is domain-specific and not a general process (Thorndike, 1913).

Aligned with the aforementioned perspective Skinner (1953) agreed that learning occurs as change in learners' behaviour. Skinner in contrast to Thorndike perceived that the learner emits responses and not only elicits responses as a reaction to an external stimulus. Learner's response to a certain stimulus can be mediated or modified by reinforcement. Skinner perceived as reinforcement anything that strengthens learner's desired response or behaviour. Teachers and parents could play the role of the reinforcer in the educational setting. Teachers in order to be more effective should utilize the appropriate strategies in order to help students to adopt the desire behaviours and reject the inappropriate. Teacher should manipulate their students' behavior by awarding the desired behavior and punishing the undesirable (Chen, Ennis, Martin, & Sun, 2006). In the physical education field, according to the latest behavioral approach (Eldar, 2008) PE teachers have to be aware of basic principles that can be implemented in order to create an effective lesson and eventually promote desired changes in students' behaviour. Firstly, PE teachers have to create a learning environment which promotes students' motivation by including activities corresponding to the level of students' skills. Also, the lesson should include limited and well defined skills and activities of gradually increasing difficulty to promote students' competence and reduce the feeling of failure. A crucial factor for effective learning is PE teachers' feedback. Additionally, students should comply with rules and routines set by PE teachers. Finally, PE teachers should reinforce their students attempt even if their performance doesn't meet their criteria. However, even if PE teachers had followed all the aforementioned strategies it would be doubtful if they could achieve permanent changes in students' behaviour. According to the findings of a theory review conducted by Ward and Barrett (2002), all the required changes in students are temporary. Consequently, there is serious evidence that the implementation of behaviourist approach is not effective in the physical education field.

Alternatively, learning according to constructivism is a process in which learners create their new knowledge based on the interaction between their existing knowledge and the new knowledge. Based on constructivist approach Vosniadou (1999) argued that learning is a knowledge acquisition process in which learners revise and reconstruct their existing knowledge; it is specific-domain and it is influenced by individual, social, and contextual variables (Vosniadou, 2007a).

In the bottom line, the differences between behaviourist and constructivist approach in education are the following: In behaviourist approach teacher plays a tremendous role in the learning process by controlling the learning context and reinforcing the appropriate behaviour or punishing the inappropriate. Furthermore, changes in students' behaviour are temporary. On the other hand, according to constructivism, teacher is one of the variables comprising student's social environment which in conjunction with cultural factors and learner's personality could facilitate or constrain the learning process. Learners existing knowledge plays an important role in their attempt to understand and give rational explanation about every new information or problem that they have to deal with. During the lesson teachers play the role of the mediator by creating an attractive learning context.

According to Conceptual Change Framework Theory learners in their attempt to explain an unfamiliar situation or to solve a problem are likely to create naïve theories. Learners' naïve theories are contradictory to the dominant scientific theory. Thus, PE teachers should be aware of this phenomenon and should help their students also to be aware of the inconsistency between their naïve theories and the scientific theories. Thereafter, teachers should utilize instruction strategies to promote a learning environment that could help students not only to evolve their naïve theories to scientific concepts but to understand their way of learning as well. The interaction between all the members of the class or a particular class group during a conversation is likely to help them to give rational

explanation in a given problem (Vosniadou, 2007a). Metaphors could be another effective tool for PE teachers to utilize in order to promote students comprehension of complex and abstract concepts (Vosniadou & Ortony, 1989).

In the field of PE the implementation of the constructivist theory aims at students' engagement in both physical and cognitive activities. The cognitive part refers in the learning of a few but basic concepts. PE teachers could facilitate students' knowledge by implementing problem solving teaching styles to help students combine their prior knowledge with the new information. Finally, students' interaction could help them to give rational explanation concerning the learning concept (Ennis, 2007).

The Spectrum of Teaching Styles

Based on Mosston's (1966) spectrum Mosston and Ashworth (2008) attempted to articulate a universal theory concerning the teaching phenomenon. They perceived the Spectrum as a Universal theory because all the existing teaching styles are likely to be included in the Spectrum (Mosston & Ashworth, 2008). The initial form of Mosston's (1966) teaching styles consisted of eight styles: (1) teaching by command; (2) teaching by task; (3) reciprocal teaching; (4) small group; (5) individual programme; (6) guided discovery; (7) problem solving; and (8) creativity. The eight styles represented a continuum of teaching strategies where decisions shift between teacher and learner. This first Mosston's attempt was based on the "versus" approach whereby the level of effectiveness of each style is described as "least amount of value" or "greatest amount of value" (Mosston, 1981). Teaching styles effectiveness according to this approach associated with students' decision making and autonomy. Consequently, command style has the "lower amount of value" in the continuum because teachers make all the decisions and their students depend on teachers' authority. On the contrary, problem solving has the

"greatest amount of value" because students play an active role in lesson decisions, while their teacher creates a learning context which promotes independent learning.

In the second edition or revision of Mosston's Spectrum teaching styles (1981), he moved to the "non-versus" perspective. According to this perspective each style has certain objectives and leads to certain outcomes. Thus, teachers could utilize each style when they deem that it facilitates their lessons goals. For example, command style increases practising time, leads to discipline learning with rapid progress, and provides safety.

During the years the spectrum evolved in the current version comprised of 11 teaching styles: (A) command, (B) practice, (C) reciprocal, (D) self-check, (E) inclusion, (F) guided discovery, (G) convergent discovery, (H) divergent production, (I) learner's individual designed program, (J) learner initiated, and (K) self-teaching. Five of the teaching styles (A-E) represented the reproduction cluster of teaching styles because students "reproduce known knowledge, replicate models, and practice skills" (Mosston & Ashworth, 2002, p. 9). On the other hand, the remaining six teaching styles (F-K) represent the production cluster of styles in which the teacher guides students to discover the knowledge (Goldberger et al., 2012).These six styles promote student involvement in the learning process (see Fig. 1).

Spectrum is an integrated framework gives to each style a position in the continuum based on the structure and the function of each teaching style. Spectrum has the following features: a) each style creates a bond between teachers' behaviour, learners' behaviour and their consequences. Each style leads to specific learning outcomes. However no particular style can lead to total and complete learners' development but only the combination and the progressive implementation of all spectrum styles can accomplish this goal; b) each style has the same importance and value (Mosston & Ashworth, 1986).

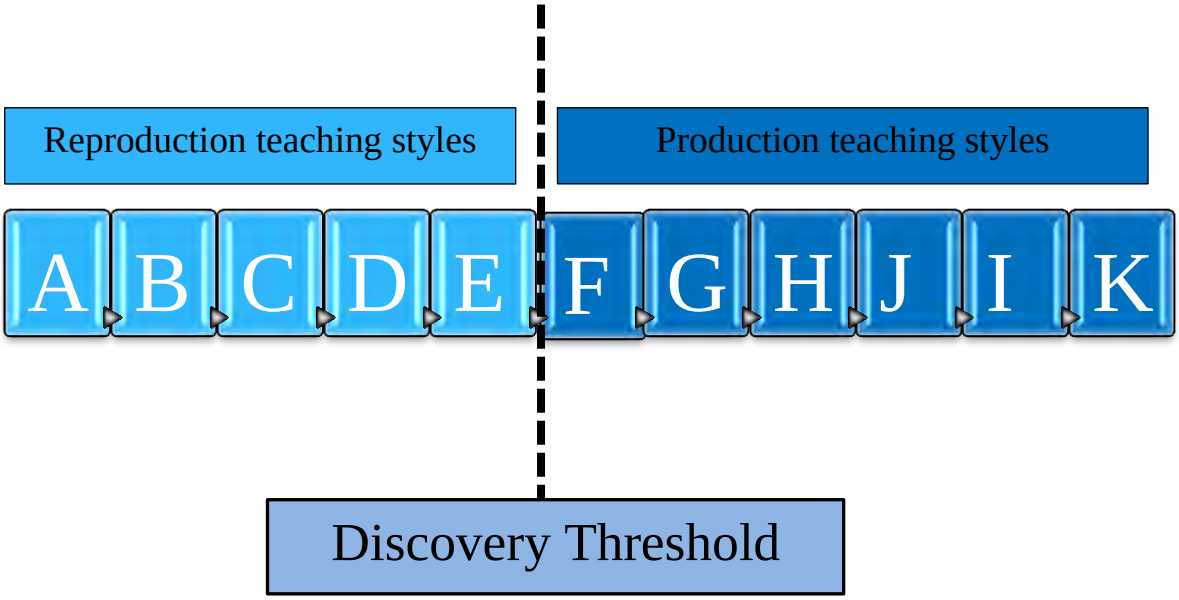

Figure 1.The clusters of teaching styles

Spectrum teaching styles implementation and perceived benefits

Many times during their career PE teachers are in a dilemma when and how to use the appropriate teaching method. Questions, such as "When is the best time to use this method" "Does this method fit on my style", represent a major concern for teachers (Williams 2001). A substantial number of studies attempted to examine PE teachers' beliefs and experiences with Spectrum teaching styles. More specifically, two studies revealed that PE teachers in both rural (Curtner-Smith and Hasty, 1997) and urban schools (Curtner-Smith et al., 2001) in the U.K. implemented direct teaching approaches more often than indirect. The findings of the latter study revealed also that PE teachers utilized the practise style, occasionally the command and discovery styles and very sparsely the self-check, inclusion, reciprocal and divergent teaching styles (Curtner-Smith, Hasty, & Kerr, 2001). Another study conducted in the U.S. (Cothran, Kulinna, & Ward, 2000) examined the use of Spectrum teaching styles through undergraduate students' reports. The findings suggested that the majority of PE teachers utilized mainly reproduction

teaching styles rather production. Also, undergraduate students reported as more beneficial the reproduction styles than the production. The findings of two comparable studies also revealed that American (Kulinna and Cothran, 2003) and Finnish PE teachers (Jaakkola and Watt, 2011) rated styles from the reproduction cluster in their most preferred styles with the only exception from the production cluster being the divergent production teaching style. In addition, PE teachers from both countries perceived reproduction styles to be more beneficial to their students than production styles.The findings of a cross-cultural study revealed that PE teachers tend to use a wide variety of teaching styles. However, the international cohorts of PE teachers clearly indicated country-specific tendencies in the use of and beliefs about the Spectrum styles. More specifically, Korean and Portuguese PE teachers implement reproduction styles (command and practice style) as compared to British, Canadian, and Australian PE teachers who reported greater use of production teaching styles. Also, PE teachers increased competence related with their intention to use the majority of spectrum teaching styles and held positive beliefs about styles beneficial outcomes. In the bottom line, the findings suggested that the vast majority of PE teachers relied on and held more positive beliefs about reproduction styles (Cothran, et al., 2005).

Teachers' Beliefs and Knowledge about Teaching

Teachers' beliefs play an important role in the adoption of behaviourist or constructivist approach. In the case that teachers perceived teaching as a teacher-centred process -where teaching authority is the main source of knowledge and expects from their students to reproduce the provided knowledge- then they are likely to adopt a behaviourist teaching approach. On the contrary, when teachers perceived that learner plays an important role in knowledge construction then they are more likely to adopt a

constructivist approach by creating an environment where students could interact and form the knowledge based on their own experiences (Chan & Elliott, 2004).

Teachers' knowledge refers to content knowledge, general pedagogical knowledge (basic rules and strategies for classroom management), knowledge of curriculum, pedagogical content knowledge, understanding of their students' personality and level of knowledge, knowledge of the educational setting (situational, contextual and general), and finally the knowledge of educational goals and values. From the aforementioned categories pedagogical content knowledge plays the most important role in teachers' knowledge for teaching and represents teachers content and pedagogy knowledge. Teachers based on their pedagogical and content knowledge could understand the variety of tasks that have to teach, their students characteristics and level of knowledge and skilfulness, and the diversity of problems that have to overtake in order to organize their lesson (Shulman, 1987).

Student Teachers and PE Teachers' Beliefs about Teaching Styles

Student teachers prioritize the knowledge transmission in their students (Mallette, Kyle, Smith, McKinney, & Readance, 2000). The findings of a study conducted in the U.K. (Hayes, Capel, Katene, and Cook, 2008) revealed that teachers and their school based mentors set as a first priority in physical education lesson the content knowledge. As content knowledge they perceived the skills, tactics and rules of physical activities or sport. On the other hand their tutors had set the same priority but they attributed to content knowledge broad characteristics as those that Shulman (1987) described. Student teachers emphasis on content knowledge suggested that they focus not only on PE lesson activities but on the teaching approach they implement in order to deliver these activities. PE students' conceptions about teaching, and students learning and motivation undergo changes mainly and more effectively during their educational period (Patrick & Pintrich,

2001). Pajares (1992) has noted that it is difficult to change student teachers' beliefs unless they challenged students' active participation in the learning process during program implementation. Similarly, Curtner-Smith (1999) suggested that PE student teachers were influenced mainly by their prior experiences form very strong and solid beliefs. Physical Education Teacher Education (PETE) programs could not facilitate the reconstruction of PE student teachers' robust beliefs. Likewise, Entwistle and Peterson (2004) suggested that student teachers' limited exposure to innovative teaching methods could not facilitate the reconstruction of their existing coherent beliefs. Additionally, student teachers' prior beliefs and the variety of teaching approaches implemented in the higher education are likely to lead students to misinterpret of the new information. Finally, the findings of a study (Entwistle & Tait, 1990) revealed that the majority of undergraduate students adopts a rather superficial approach during their studies and put emphasis on achieving their goals with a minimum of effort; this is likely to urge PE students to adopt teaching approaches similar to their PE teachers. Therefore, it is important to design a PETE course in order for students to become efficient learners by using their own experience and other teachers experience (Calderhead, 1991). Finally, Zeng, Leung and Hipscher (2010), suggested that pre-service programs include courses with teaching style strategies as Mosstons' Spectrum thus, helping their students to obtain the proper knowledge in order to cope with their future students' diversity.

Occupational Socialization Theory

Occupational socialization is a theoretical framework that focuses on examining: (a) the motives that urge an individual to choose the field of physical education; (b) the factors that influence the development of PE teacher's professional profile (Lawson, 1986). According to Lawson (1983a) socialization could be perceived as a "life-long

process" and it is consists of three types: (a) acculturation socialization; (b) professional socialization; and (c) organizational socialization.

Acculturation Socialization is the first kind of socialization; it begins with infancy and influences a person's decision to become a physical educator. During this period a variety of factors may influence not only a person's decision to be a PE teacher but also his/her construction of knowledge and beliefs about teaching approaches, course content, and pedagogical perspective (Lawson, 1983a). Lawson (1983a, b) assumed that this period may influence the generation of two professional profiles. PE teachers categorized within the first type put emphasis on coaching rather than on implementing the PE curriculum. PE teachers adopting this type of profile are mainly males with a sporting background. On the other hand, PE teachers categorized within the second type of professional profile prioritize the delivery of a PE lesson based on the curriculum. PE teachers within this category are mainly females and have experienced a high quality PE lesson.

Professional Socialization refers to the period of undergraduate studies. During this period PE student teachers "acquire and maintain the values, sensitivities, skills, and knowledge that are deemed ideal for physical education teaching" (Lawson, 1983a). Research stressed that this period has rather a weak influence on PE student teachers (Postareff L, Lindblom-Ylänne S and Nevgi 2007; 2008). However this period could be influential on PE student teachers' beliefs and teaching perspective only in the case they are exposed to innovative teaching approaches (Entwistle and Peterson, 2004).

Finally, *Organizational Socialization* refers to the period of becoming member of an organization; in this case, PE teachers' are included in a school society. During this period PE teachers learn and adjust and finally adopt the skills and the knowledge which are perceived as preferred and rewarded by the members of the teaching board. A variety of workplace factors (e.g., facilities, equipment, class size, schedule, other physical

education teachers, classroom teachers, administrators etc.) could influence his/her decision either to implement his/her pedagogical and teaching perspectives or to adopt the teaching approach that has been established by the school culture. A common phenomenon is that a conservative or bureaucratic school is likely to act as a deterrent to the implementation of innovative ideas by PE teachers (Lawson, 1983a, b). According to Zeichner and Tabachnik (1981) a dominant tendency in the teaching community is to urge PE teachers to apply only these perspectives and teaching practices which are compatible with the established school culture. Thus a PE teacher holding innovative ideas should adopt practices, ideas and perspectives that are encountered during the acculturation and professional period. The findings of previous studies (Curtner-Smith, 1997b, 1998; 2001; Williams & Williamson, 1993) argued that the workplace factors influenced PE teachers' beliefs and perspectives in either a negative or positive way. All these periods play a determinant role in the structure of PE teachers' professional profiles. Occupational socialization appears to influence PE teachers perspective even in the implementation of National Curriculum of Physical Education (Curtner-Smith, 1999).

The Framework Theory of Conceptual Change

Domain specific approach

Vosniadou (1987) approached learning through the lens of constructivist perspective and -based on previous theories relative with knowledge acquisition process- proposed the Framework Theory of Conceptual Change (FTCC). Conceptual change refers to knowledge reconstruction in a specific-domain approach contrary to the Piagietarian approach for a global reconstruction of knowledge. According to Piagietarian and Vygotskian domain general approach children learning process is based on stages and mechanisms commons to each field. Scientists who adopted this approach (McCloskey 1983; Posner, Strike, Hewson, & Gertzog, 1982) described the learning as a cumulative

process. According to this approach learning occurs as a theory replacement simply through the enrichment of prior knowledge. Vosniadou (2007a) argued that this theory couldn't give rational explanation about the knowledge re-organization and the difficulties that learners have to confront during the learning process and especially the learning of complex scientific concepts. In addition, this theory was criticized (Caravita & Hallden, 1994) for its emphasis only on the role that learner plays in the cognitive process without to take into account the social and cultural factors that influence the learning process. Finally, the global approaches have been criticized for the fact that they perceive the conceptual change as a short-term holistic and not as a gradual partially change process (Caravita & Hallden, 1994).

Prior to Vosniadou, other researchers (Chomsky, 1980; Novac, 1977) have proposed similar ideas for the need to be adopted the specific domain knowledge and the reconstruction approach. Chomsky (1980a) was the first scholar who suggested the domain-specific cognition. Conceptual change approach, as a domain-specific approach, examines distinct domains of thought and attempts to describe the processes of learning and development within these domains. In her attempt to reframe the classical conceptual approach (Kuhn, 1970; Posner, et al., 1982; Vosniadou, (2007b) proposed that learners' knowledge is domain-specific, and that during the learning process learners have to change their domain-specific theories (naïve or intuitive). The domain-specific theory is considered to be formed during the infancy and is influenced by social and cultural factors and not by their alternative theories and misconceptions as general approach suggested. Over the years a significant number of studies confirmed the domain specificity of learning in many scientific domains, such as astrology (Vosniadou & Brewer, 1992; Vosniadou, Skopeliti, & Ikosipentaki, 2004), mathematics (Christou, Vosniadou, & Vamkoussi, 2007;

Vamvakousi & Vosniadou, 2004), physics (Stathopoulou, & Vosniadou, 2007), and biology (Hatano, & Inagaki, 2003; Inagaki, & Hatano, 2006).

According to the domain-specific approach each domain could place on learners different constraints. During the learning process learners have formed entrenched presuppositions which are organized in a global or framework theory of naïve theories (Vosniadou, 1994). However, Vosniadou (2007a) noted that both general and specific domain approaches should be seen as complementary rather than contradictory approaches.

Concepts and conceptions

There is not an explicit definition of "concept" and researchers most of the times tend to argue that concepts embed in larger theoretical structures from which they derive their meaning as they change and evolve (Vosniadou, 2008). According to Chi (2008), concept has "several perceptible features and conceptual attributes, and a concept can be viewed as belonging to some category. For example, a *robin* has a red breast (a perceptible feature), lives in temperate climate (more of a conceptual attribute), and belongs to the category of *birds*." On the other hand, Pines (1985) argued that concepts are cognitive entities, invented and labelled by human. Furthermore, conceptions are described as learners understanding of concepts.

Similarly, Duit, and Treagust (1998) described concepts as pre-instructional students' conceptions about phenomena and concepts. Consequently, it can be said that concepts are the prevailing scientific knowledge; conception on the other hand is considered as learners' knowledge about scientific concepts which most of the times is incorrect and must be reconstructed. On the contrary, Entwistle (2007) described concepts as learners' internal and external knowledge representations of grouping objects or

behaviours generally shared by learners. Additionally, conception is referred to learners' personal knowledge for a concept (Entwistle & Peterson, 2004)

Prior knowledge - Naive theories

Children's form an intuitive understanding about their physical and social surrounding based on their daily observation and interaction with social-cultural factors. They tend to organize their knowledge in relatively coherent and narrow frameworks contradictory to the dominant scientific theory (Vosniadou, 2007b). Children's initial attempt to understand the world is the basis (foundation) in which students scaffold the news information (Vosniadou, 1992). Vosniadou (2007b) suggested that learners' prior knowledge is organized in "domain specific, theory like, structures". The term theory referred to the relatively coherent body of the knowledge which allows learners to give rational distinct explanations and make predictions and in no case a well formed scientific theory. Vosniadou (2007b) argued that by giving children's prior knowledge the character of naïve theories a generative feature is attached to them. Based on cognitive psychology conceptual change theory she accepted that the cognitive process is influenced by personal expectations based on past experience and prior knowledge (Vosniadou, 1996). This prior knowledge can facilitate or constrain the learning process depending on the extent to which the prior knowledge is consistent with the new information (Vosniadou 2004; 1996). In the case that the new information is consistent with learners' prior knowledge, they can easily integrate it to their existing conceptual schema (structure). Alternatively, if the new knowledge is in contrast with the prior knowledge, then learners can either add the new knowledge to the prior knowledge or distort the new information attempting to create a coherent conceptual structure. The learning outcome in the first case will be internally inconsistent since they will misinterpret the phenomenon. In the late case they will form misconceptions (Vosniadou 1991). According to Vosniadou (1994) conceptual structure

consists of two categories: framework theory and specific theory refer either to infants' attempt to explain a specific physical phenomenon through the observation or the interpretations of the information they receive through the social-cultural context (Vosniadou, 2002). Framework theory consists of ontological and epistemological presuppositions. Ontological presuppositions comprise learners' assumptions about the nature and concepts of a specific phenomenon within a specific domain (Chinn & Brewer, 1993). In addition, Vosniadou and Ioannides (1998) argued that ontological presuppositions represent learners' assumptions about the entities surrounding them, the properties of these entities and the categories that entities have been classified by learners. For example physical objects are stable and solid (Vosniadou, 1994). Epistemological presuppositions, on the other hand, comprise learners' assumptions about the nature and the development of concepts and depict learners' attempt to give rational explanation about the nature of their knowledge within a specific domain (Vosniadou & Ioannides, 1998). Epistemological presuppositions can be characterized learners' assumptions about themselves also (Vosniadou, 2007c). For example, the movement of inanimate objects is a phenomenon that needs explanation or explanations should be causal (Vosniadou & Ioannides, 1998).

On the other hand, specific theory is referred to learners' beliefs with which they describe the properties or the behaviour they attribute to a specific phenomenon (Vosniadou & Ioannides, 1998). Specific theory is formed either through the observation of the world or through the cultural information that learners receive during daily life. Specific theory is embedded within the framework theory (Vosniadou, 2002). In the case that learners have to revise the framework theory, then specific theory is constrained by the framework theory and this is due to the fact that presuppositions are relatively coherent since they are confirmed everyday through the observation (Vosniadou, 1994). For

example, the findings of the study (Vosniadou, 1994) revealed that students categorized the earth as a physical object and thereafter they attributed to it properties of a physical subject. Finally, both framework and specific theory involved in the construction of learners' mental models.

Mental models

Mental models are domain-specific knowledge structures which learner utilizes as a mechanism to create, enrich, or modify his/her knowledge conceptions about a specific phenomenon (Vosniadou 2001). Vosniadou (1994) defined mental models as 'a special kind of mental representation, an analog representation, which individuals generate during cognitive functioning, and which has the special characteristic that it preserves the structure of the thing it is supposed to represent' (p.48). Mental models are formed either on the spot or they are retrieved from learners' long-term memory in order to help them to solve a problem or to give a rational explanation about a phenomenon (Vosniadou, 2002). Mental models could be utilized by the learner: (a) in generating answers about a specific phenomenon by transforming his/her implicit knowledge to explicit. More specifically, in that case learners utilized mental models in their attempt to give rational explanation in a given problem and they could not retrieve the answer from their long-term memory nor deduct it from the provided information. Thus, it can be said that mental models could be used as a starting point for creating a theory; (b) as mediators in the understanding of the new knowledge. Learner's mental models could influence the interpretation of the new information. For example students' mental models of the earth restrain the understanding of the day/night circle; (c) as mediators in learners' attempt to revise their existing knowledge through the interpretation of the new information (Vosniadou, 2002).

Mental models embedded within global and specific theories and are constrained or facilitated by them. Also, mental models constrain or facilitate the interpretation of the

new information (Vosniadou, 1994; 2002). Additionally, due to the fact that they generated by the underlying knowledge (presupposition and beliefs) can help in understanding the structure of this knowledge (Vosniadou & Brewer, 1994). Mental models represent a continuum. At the one end of this continuum is learner's initial intuitive model and the other end the scientific model respectively (see figure 2.)

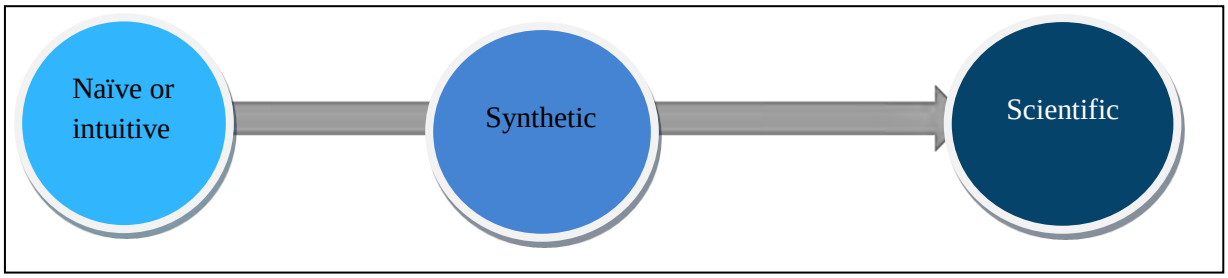

Figure 2. Schematic representation of mental models continuum

Vosniadou (1991; 1994) argued that three types of mental models exist: (a) intuitive or initial mental models which are formed in learners' attempt to create causal explanation about a specific phenomenon and discover that their initial explanation about this phenomenon is contrary to the new scientifically held concept; b) synthetic models which comprise a mix of learners initial models and scientifically models. When learners are confronted with scientific held concepts and realize that this new concept is in conflict with their initial model, they attempt to distort the new concept and reconcile it into their initial models; c) scientific models are consistent with the dominant scientific held view and they are constructed as a result of the evolvement of learners' naïve and scientific mental models (Vosniadou, 1999). According to Hatano and Inagaki (1997) conceptual change and thus learners' transition from one mental model to the other could occur both through internal and external process. The internal process refers to learner's internal cognitive process, while external transformation occurs through the mediation of situational, cultural, and educational variables.

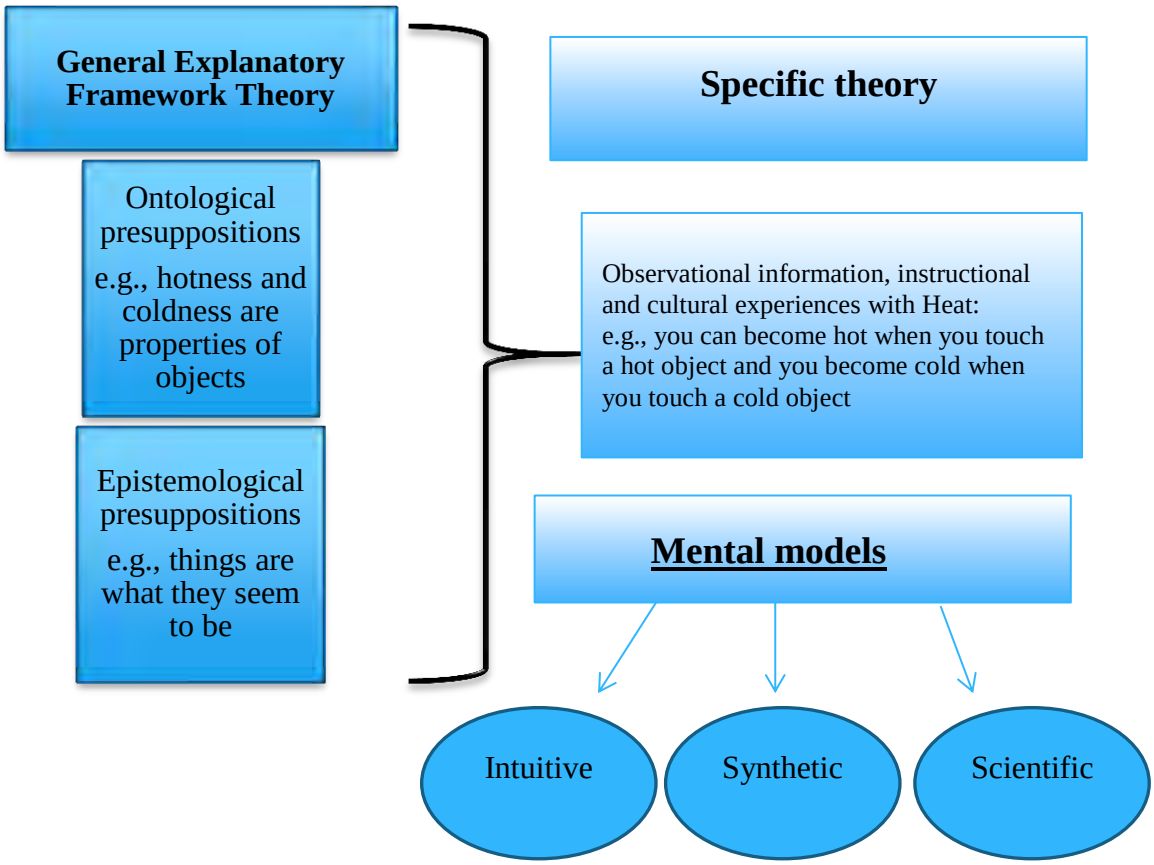

Figure 3. An example of hypothetical conceptual structures underlying students' mental models of heat[1].

Knowledge acquisition process – Kinds of Conceptual change

Findings of studies (Vosniadou, 1994; Vosniadou & Ioannides, 1998) supported the view that in science learning students' prior knowledge frequently differs radically from the new information. In this case, learner has to reconcile prior knowledge in order to be compatible with the new scientific view (Vosniadou, 1991). The simplest kind of conceptual change is the enrichment of the existing knowledge. Enrichment could occur in two ways: (a) when the learner has no prior knowledge or may have some relative to the new information knowledge and he/she simply adds the new information;(b) when learner's prior knowledge is partially correct and has to be integrated into the existing knowledge (Chi, 2008).

[1] Adapted from Vosniadou, S. (1994). "Capturing and Modeling the Process of Conceptual Change" *Learning and Instruction, 4*, p.45-69.

Learner's initial explanations about a specific phenomenon during infancy are likely due to the aforementioned reason to create preconceptions (Vosniadou, 2012). Revision, on the other hand, may occur when learner's existing knowledge is contradictory to the new information. Revision may occur either at the specific theory or framework theory level. However, the late is perceived as a complicated process which may lead learner to generate misconceptions. Mostly due to the fact that ontological and epistemological presuppositions are very solid as a result of their confirmation through the observation and the influence of social and cultural factors (Vosniadou, 1994). Fragmentation and misconceptions are the products of enrichment process. The first is described as a process according to which the new information is added to learners' existing framework theory. The late, on the other hand, is described as the process according to which learners distort the new information in their attempt to seek coherence with their existing framework theory. However, misconceptions could be perceived as learners' productive process in their attempt to understand the new information. Finally, synthetic conception is created as a result of learners attempt to seek mental coherence between their initial understanding of a specific phenomenon and the scientific theory. The product of this process could be perceived as contradictory to the scientific held beliefs but it is still coherent and valuable for the learning process (Vosniadou, 2012).

Conceptual change and implications to education-curriculum design

From the perspective of FTCC teaching is a demanding process and educators should aim at helping their students not simply reproduce the knowledge but understand the way of thinking in various disciplines. It is important for educators to help their students cope with their misconceptions (Vosniadou, 2007a). Learner's prior knowledge, as mentioned, plays a significant role in the learning process. Teachers should be aware of the fact that the provided information could be consistent or inconsistent with students'

prior knowledge. When the new information is consistent with prior knowledge, then it can be incorporated easily into the existing conceptual structures. This type of information will most likely be understood, even if it is presented as a fact without any further explication. However, when the new information is contrary to existing conceptual structures, it may not be adequate to simply present the new information as a fact. In this situation students seem to have two alternatives. One is simply to add the new fact to their existing conceptual structures. In this case the new representation will be internally inconsistent. The other is to distort the new fact to make it consistent with the existing structure. In this case the result will be a misconception. Learners, in their attempt to understand counter-intuitive information, must restructure the conceptual structures that they already hold in order to make them consistent with the new information. This cannot be done, however, in the absence of additional information. Teachers must help learners either to create explicitly a new explanatory structure or to facilitate a learning environment which could promote the discovery of it (Vosniadou, 1994).

Taking into consideration the aforementioned, teachers should try to plan and organize their lesson aiming not only at the enrichment of their students' prior knowledge but also at helping them to reconstruct it and form a new conceptual structure. This is likely to happen by planning and teaching long-term sequences of concepts during the year. Additionally, they should implement strategies and practices in each lesson aiming at promoting conceptual change by connecting the prior knowledge with the new information. Also, during the curriculum planning it will be useful to be included certain concepts that will help students to avoid later misconceptions and difficulties in learning. Teachers' instructions and practices should provide their students with knowledge and information consistent with their prior knowledge and help them to construct the new knowledge on their existing knowledge structure (Vosniadou, Vamvakousi & Skopeliti,

2008). Daily lesson should include skills that promote the intentional learning and lead students to long-term learning (Vosniadou, 2003). Therefore, teachers must create an environment that provides their students with chances to develop metaconceptual awareness. Practically that means that teachers have to promote students interaction helping them to consciously and intentionally reconstruct their existing knowledge. In a demanding for learners' environment as the above it is imperative that a motivational climate with strategies and activities be created (Vosniadou, 2007a).

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Chapter 3

Study 1

Physical Education Student Teachers' Experiences with and Beliefs about Teaching Styles[2]

Abstract

This study is aimed at examining physical education student teachers' experiences with, beliefs about, and intention to use Spectrum teaching styles in the future (Mosston & Ashworth, 2002). Two hundred and eighty eight PE student teachers participated in the study whereas data were collected using a modified and translated version of the questionnaire developed by Cothran, Kulinna, and Ward's (2000). Participants in the study reported that as primary and secondary education students they had been more frequently exposed to reproduction teaching styles in their physical education classes whereas exposure to what can be described as production styles had been substantially less frequent. In terms of beliefs, student teachers participating in the study perceive that the reproduction teaching styles provide students with more opportunities for fun, learning skills, and motivation for learning. In addition, as physical education instructors in the future student teachers stated that they are keener on implementing teaching styles from the reproduction cluster. Finally, the finding of the study confirmed student teachers' conceptions about their students' learning process influenced by their prior experiences as school students.

Keywords: teaching approaches, physical education, prior experiences, Mosston and Ashworth's Spectrum,

[2] *Journal of Physical Education and Sport*, 14, 52-59.

Teaching in the physical education (PE) context is a complex and a challenging job. Perhaps the main reason for this is the fact that PE teachers have to teach a wide variety of activities while their students, each one of them different in terms of skill, ability and interests, has to move constantly in an environment that is frequently poorly equipped. In addition, learning in PE must be linked to three interdependent educational dimensions, motor, cognitive, and affective (Graham, 2008). Within this challenging environment, the main goal for PE teachers is to help students learn. Undoubtedly, student teachers' education plays an important role and can greatly assist their learning to be effective instructors (Cothran & Kulinna, 2008) in a very complex instructional environment (Hardy & Mawer, 1999).

Development of teacher knowledge is influenced by a variety of factors. According to Lawson's theory on occupational socialization (1983a, 1983b), a PE teachers' knowledge keeps undergoing continuous evolution. The socialization period is divided into three stages, acculturation, professional, and organizational (Lawson, 1983a). During the period of acculturation a plethora of factors influence a person's decision to become a physical education instructor and his/her construction of knowledge and beliefs about teaching approaches, course content, and pedagogical perspective. Research on occupational socialization indicates that an individual's perception of PE is heavily influenced by his/her experiences in K-12 physical education (Curtner-Smith, 1999).Therefore, the conclusion to be reached is that PE student teachers enter university teacher preparation programs already having formed an initial professional profile.

A significant number of studies, based mainly on the constructivist approach, have stressed the important role of the acculturation period in the development of student teachers' beliefs and knowledge. More specifically, student teachers form their conceptions about their students' learning process mainly based on their prior experience

as school students (Calderhead, 1996). According to Richardson (1997), student teachers construct their knowledge based on their prior knowledge and experience (i.e., knowledge developed as a result of being a student in K-12 physical education classes) and actively give new meaning to their current knowledge. Likewise, the findings of another study (Patrick & Pintrich, 2001) confirm that teachers' conceptions about teaching, learning and motivation undergo changes mainly and more effectively during their educational period. From the above we can assume that physical education students' prior beliefs play an important role in their intention to adopt or reject specific instructional approaches as future physical educators. The influence of the undergraduate studies is also important (Lawson 1983a, b).

When planning and organizing lessons, teachers must make decisions about content to be taught and instructional processes to be implemented (Capel & Whitehead, 2010). Concerning the methodology of teaching Mosston and Ashworth's (2002) Spectrum of teaching styles is one of the most popular frameworks used to design and deliver instruction. The Spectrum consists of a continuum of 11 different teaching styles in which decisions shift between teacher and students. Teachers make specific lesson plans and choose appropriate teaching styles depending on their students' capability and skills. Selecting a teaching style is mostly dependent on the goals/objectives that the teacher wants to have their students meet. In addition, content does play a role in decision-making (Mosston, & Ashworth, 2002). The selection of a Spectrum teaching style will dictate the level of teacher and student involvement in decision-making (Mosston, 1981). In case that a reproduction teaching style is implemented, decisions about content, class organization, and feedback will be mostly made by teachers. The goal of reproduction teaching styles is to reproduce the demonstrated movement task or known information as accurately as possible. On the other hand, if a production teaching style is implemented, students will be

given the opportunity to make some or all decisions over learning process and will be provided with opportunities to produce a new skill or to discover new bits of knowledge (Mosston & Ashworth, 2002).

Over the past decade in a number of studies researchers have explored the extent to which Spectrum teaching styles are perceived and used by PE teachers from multiple countries around the world. Findings from studies conducted in the UK revealed that PE teachers teaching in schools situated in urban and rural areas tend to use reproduction teaching styles more often than production teaching styles. The practice style was reported to be used more often than any of the other Spectrum styles (Curtner-Smith, & Hasty, 1997; Curtner-Smith, Todorovich, McCaughtry, & Lacon, 2001). In another study, the reproduction styles were reported to prevail in the UK and were considered by respondents to be the most appropriate styles to promote all four standards of the National Curriculum in Physical Education. Actually, the standards in question concern the following areas: acquiring and developing skills, selecting and applying skills, evaluating and improving performance and knowledge, and understanding fitness and health (Macfadyen & Campbell, 2005). In a study conducted by Cothran, Kulinna, and Ward (2000), college students from the U.S reported that they perceived that their PE teachers used teaching styles from the reproduction cluster more frequently. Even though college students recognized the differences and benefits of each style, they reported that they believed the reproduction teaching styles lead them to learn more and promoted their motivation and fun in PE lessons more than in production style lessons. The findings about the use of and experience with Spectrum teaching styles in a subsequent study of U.S. PE teachers (Kulinna & Cothran, 2003) reflect those reported by Cothran et al. (2000) about U.S. college students (Cothran et al., 2000). More specifically, the PE teachers reported using reproduction teaching styles more often than production teaching styles. Only divergent

production from the production cluster was ranked in the teachers' five top choices. Noteworthy was the fact that although they perceived divergent production and guided discovery as very effective styles they avoided using them. Finally, they perceived the reproduction teaching styles as more beneficial to their students than the production teaching styles. In a cross-cultural study of South Korean, Australian, French, Portuguese, British, Canadian, and American physical education teachers, Cothran et al. (2005) found that the reproduction teaching styles were used more frequently and valued more highly by the teachers than teaching styles from the production cluster. Similar to the aforementioned were the findings of a study conducted in Finland (Jaakkola & Watt, 2011). The researchers found that Finnish PE teachers preferred using teaching styles from the reproduction cluster than the production cluster. In addition, they perceived these styles as more beneficial to their students than any of the production teaching styles.

Participants in the current study were PE students from a university teacher preparation program in which students completed many courses aimed at enhancing their knowledge and ability to teach, but more specifically two practicum courses, one delivered during their second year in the program and one during their fourth year. Both practicum courses were designed to give the student teachers opportunity to convert theory into practice, which helped them develop into more effective teachers.

During the practicum courses, PE student teachers have the chance to teach physical education activities to adolescents and children with emphasis being placed on lesson planning, management, and assessment. Student teachers were encouraged by their mentors to implement production teaching styles. In addition, two theory-oriented courses delivered during the first year of the teacher preparation program included information about the reproduction and production teaching styles. Including these courses in the curriculum is consistent with Zeng, Leung, and Hipscher's (2010) suggestion that teaching

style strategies, such as those associated with Mosston and Ashworth's Spectrum, should be included in curricular programs to help student teachers cope with their future students' diversity. The implementation of the Spectrum of teaching styles can facilitate the achievement of a variety of goals within the PE curriculum (Chatoupis, 2005).

Although the importance of Mosston and Ashworth's Spectrum has been well documented, little evidence is available to support PE student teachers' perceptions about Spectrum teaching styles. The Spectrum of teaching styles has been taught in Greek physical education teacher preparation programs for more than 10 years. It now seems time that student teachers' perceptions about the implementation of the Spectrum teaching styles were examined. The present study relied on PE student teachers' reports so as to further examine to what extent Spectrum teaching styles are implemented in Greece. Tracing PE student teachers' beliefs and their intention to rely on Spectrum teaching styles as PE teachers was an additional goal. Finally, exploring prior experience influence on PE student teachers' decision to actually implement the styles in question can be said to be a further goal of this research paper.

Methodology

Participants and Data Collection

Two hundred eighty eight PE student teachers, (158 males and 130 females), participated in this study. Their age was 20-22 years old (M=20.7, SD=3.41) and all of them studied in the Department of Physical Education. Seventy-four of them attended the first year and second whereas seventy of them were third year and the fourth year students. They voluntarily participated in the study which was conducted after receiving the ethical approval from Ethics Committee of the University. Also, the assent of PE student teachers was mandatory for participating in the study.

In addition, specific instructions, oral and written, were provided before research questionnaires could be filled in by students. Researchers were available to provide explanation throughout the data collection process

Instrument

Cothran, Kulinna and Ward's (2000) questionnaire was translated and modified in order to be used in the Greek educational context. The questionnaire includes a concise scenario for each Spectrum teaching style. Each scenario was followed by four questions. A fifth question was added so that the Greek version of the questionnaire could gauge PE student teachers' intention to implement each teaching style as PE teachers in the future. More specifically, the additional question was: "I intend to use this teaching style in the future as a physical education teacher". Another question was related to their experience with each teaching style during school years: "I had a physical education teacher that taught this way". For these two questions a 5-point Likert scale was used (from never to always). Three more questions were included related to their beliefs concerning this style, " I think this way of teaching would make class fun for my students", "I think this way of teaching would help students learn skills and concepts", "I think this way of teaching would motivate students to learn". For these three questions a 5-point scale was used too (from strongly disagree to strongly agree). Also, the questionnaire included background questions concerning gender and study year.

In order to produce an accurate translation of the questionnaire the following steps had to be taken. Firstly, the questionnaire was translated in Greek and then back to English by bilingual PhD students. The version produced was then evaluated by bilingual PhD students before an experimental version of the questionnaire could be established. A testing procedure was resorted to which involved a small group of six undergraduate

students so that the version in question could be tested. Finally, validity, reliability and internal consistency tests were conducted.

Data Analysis

The construct validity and the internal consistency of the scale were analyzed. A Confirmatory Factor Analysis (CFA) was performed using Amos 16 software (Arbuckle, 2008). The hypothesized factors structure of the translated scale was tested. The Non-normed Fit Index (NNFI), the Comparative Fit Index (CFI) and the Root Mean Squared Error of Approximation (RMSEA) were the indices that were used in order to examine if the model fit well. In the CFA model, only the perception items (2, 3 and 4 of each style) were used. Scale internal consistency was determined through Cronbach's alpha (Cronbach, 1951). MANOVAs were performed in order to investigate differences in PE student teachers' experiences with each teaching style and their intention to implement each teaching style as PE teachers in the future. In addition, items 2,3 and 4 were grouped together thus forming a new item for each style and then MANOVA was performed in order to analyze the PE student teachers' overall perceptions concerning the benefits of each style for students. Following Cothran, Kulinna and Ward's (2000) example repeated measures ANOVAs were performed aiming to examine their perceptions about students' motivation, fun and learning with each teaching style. A Pearson product-moment correlation coefficient was computed to assess the relationship between PE student teachers' experiences on teaching styles and their intention to implement them in the future as physical education teachers. Finally, Pearson correlation analysis was performed in order to examine the relation between PE student teachers intention to adopt each teaching style and their perceptions about each teaching style.

Results

Questionnaire Validity and Reliability

CFA findings suggested that the overall 11 factors teaching styles model fit the data well (Hu & Bentler, 1999): (CMIN = 824.91 [df =440], CMIN/df = 1.875, TLI = .891, CFI = .909, RMSEA = .055). The Cronbach's alpha value varied between .74 and .87 indicating good internal consistency for the scale. Therefore, the findings mentioned above suggest that the Greek version of the questionnaire is a valid and reliable instrument.

Physical education student teachers' experiences in physical education lesson

Repeated measures ANOVA revealed significant differences in PE students' experiences with Mosston and Ashworth's Spectrum (F[10,278] = 19.96, $p < .001$, η^2=.42). PE student teachers reported that their PE teachers in school relied more on the teaching styles of command, practice and guided discovery whereas the reciprocal teaching style as well as the learner initiated and the self-check teaching style were much less frequently resorted to. (Table 1).

Physical education student teachers intention to implement Mosston and Ashworth's spectrum of teaching styles

MANOVAs' findings revealed significant differences in PE student teachers' intention to implement Mosston and Ashworth's (2002) teaching styles for the study year (F[33,810] = 2.44, $p < .001$, η^2= .09) but no differences were found for gender and interaction between study year and gender. The examination of the univariate effects revealed significant effect of study year on guided discovery (F[3,278] = 3.07, $p < .05$, η^2= . 03), learner's individual designed program (F[3,278] =4.72, $p < .01$, η^2= .04), and self-checking teaching style (F[3,278] =6.81, $p < .01$, η^2= .06). Post-hoc polynomial contrasts investigating differences in students' intention to implement teaching styles by study year showed that second and fourth year PE student teachers tend to rely more on the guided discovery, learner's individual designed program and self-checking teaching style than first and third year student teachers. Descriptive statistics results (Table 1) showed that PE

student teachers as physical education teachers in the future are willing to rely more on the teaching styles of practice, command and inclusion whereas relying on the teaching style of learner's individual designed program as well as on the learner initiated and self–teaching approaches appears to be a less likely option.

Physical education student teachers' perceptions of the spectrum of teaching styles

A two-tailed multivariate analysis (two-way MANOVA) of variance was performed in order to examine differences in teaching styles benefits between study year and gender. The findings showed statistically significant multivariate effect for the study year (F[33,816] = 2.88, $p < .001$, $\eta^2 = .09$) but found no differences for gender and interaction between study year and gender. Examination of the univariate analysis showed statistically significant effect for the study year on guided discovery (F[3,280] =4.59, $p < .01$, $\eta^2 = .05$), on practice style (F[3,280] =3.40, $p < .05$, $\eta^2 = .04$), on self-teaching (F[3,280] = 3.57, $p < .05$, $\eta^2 = .04$), on learner's individual designed program (F[3,280] = 3.87, $p < .05$, $\eta^2 = .04$), on learner-initiated (F[3,280] = 3.91, $p < .01$, $\eta^2 = .04$), on self-check (F[3,280] = 3.32, $p < .05$, $\eta^2 = .03$), on command (F[3,280] =3.96, $p < .01$, $\eta^2 = .04$) and on convergent discovery (F[3,280] =3.38, $p < .05$, $\eta^2 = .04$). Post-hoc polynomial contrasts investigating differences in students' perception of teaching styles by study year showed that first year students are more inclined to perceive the self-checking style as more beneficial than PE teacher students attending in the second, third and fourth year. Descriptive statistics results (Table 1) showed that physical education students perceived the reciprocal approach and the teaching styles of inclusion, command and practice as being more beneficial whereas they viewed the learner's individual designed program, the learner-initiated approach and the self –teaching approach as less beneficial. The results of repeated measures ANOVAs for fun (F[10,278] = 12.26, $p < .001$), motivation (F[10,278] = 18.44, $p < .001$) and learning (F[10,278] = 25.82, $p < .001$) revealed that PE student

teachers' perceptions concerning the benefits of each style varied. More specifically, they perceived that inclusion, practice and reciprocal approach are maximally effective in promoting student satisfaction the most whereas convergent discovery, learner initiated and self-teaching were viewed as being minimally effective in promoting the same aspects of a PE lesson situation. Also, PE student teachers perceive that reciprocal, command and guided discovery are the most beneficial in promoting learning. On the other hand, learner's individual designed program, learner initiated and self-teaching were assessed as less effective in promoting learning. Finally the same students stated that the reciprocal approach as well as the teaching styles of command and inclusion can maximally enhance student motivation whereas learner's individual designed program, learner initiated and self –teaching enhance student motivation substantially less.

Table 1. Means and Standard Deviation for Greek PE student teachers' experiences with, intention to implement, perceptions of, perceived overall benefits of the Mosston and Ashworth's Spectrum of Teaching styles.

		Experiences		Intention		Overall perceived benefits		Perceived promotion of fun		Perceived promotion of learning		Perceived promotion of motivation	
	Teaching Styles	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
A	Command	2.86	1.22	3.37	1.05	11.80	2.08	3.85	.80	4.03	.77	3.92	.85
B	Practice	2.26	1.06	3.53	.84	11.75	1.94	4.00	.72	3.90	.83	3.85	.84
C	Reciprocal	1.84	1.10	3.23	.93	11.97	1.89	3.89	.77	4.10	.71	3.98	.80
D	Self-check	1.65	.98	2.94	.97	11.90	2.18	3.66	.97	3.75	.90	3.79	.91
E	Inclusion	2.01	1.00	3.26	.94	11.90	2.18	4.02	.77	3.92	.92	3.96	.85
F	Guided Discovery	2.14	.92	3.23	.85	11.64	2.01	3.81	.88	3.94	.80	3.89	.81
G	Convergent Discovery	2.00	.99	2.95	.90	11.22	2.22	3.64	.83	3.78	.84	3.80	.90
H	Divergent production	1.94	.97	3.10	.93	11.43	2.04	3.71	.75	3.85	.80	3.88	.84
I	Learner designed individual program	1.96	1.04	2.83	.93	10.95	2.30	3.80	.83	3.55	.91	3.61	.93
J	Learner-initiated	1.81	1.01	2.70	1.04	10.44	2.66	3.60	.91	3.43	1.05	3.41	.101
K	Self-teaching	1.92	1.07	2.37	.97	9.55	2.82	3.44	1.03	3.00	1.11	3.11	1.12

Relation between physical education student teachers' experiences and their intention to implement teaching styles

The findings of the Pearson's r suggested that the experience of physical education student teachers with guided discovery, self-teaching, reciprocal, self-check, inclusion, divergent discovery and command style significantly related to their intention to implement these teaching styles as physical education teachers in the future. In addition, learner's individual designed program, learner initiated, and convergent discovery moderately related to their intention to implement these teaching styles. Finally, there was no relation between physical education student teachers experiences with practice style and their intention to implement this teaching style as PE teachers in the future.

Relation between Physical Education Student Teachers Intention to Implement Teaching Styles and Their Perception about Their Benefits

Correlation between PE student teachers' intention and overall perceptions ranged from .43 to .61. The findings suggested that PE student teachers' intention to make use of a teaching style related with their perception about the teaching style in question.

Discussion

The Greek version of Cothran, Kulinna and Ward's (2000) questionnaire proved to be a reliable tool for assessing the variety of teaching styles implemented in the Greek educational context, and PE student teachers' perceptions about them. In particular the findings of the present study revealed that a variety of teaching styles have been used in the context of physical education in Greece. PE student teachers reports lead to the conclusion that Greek PE teachers tend mainly to use reproduction teaching styles and only rarely implement production teaching styles. The above finding is consistent with the findings of Cothran, Kulinna and Ward's (2000) study in which participants were college students as well. Present study findings are similar to the findings of other studies which, unlike the present study, used PE teachers' reports as a source of information (Cothran et al. 2005; Jaakkola & Watt, 2011; Kulinna & Cothran, 2003). The above finding is in

contrast with the prevailing constructivist approach which supports that learner plays an important role in the learning process and in any case should not be a passive recipient of teacher's authority (Shuell, 1986). Actually, a purely constructivist approach would dictate that production teaching styles should be implemented more frequently as they encourage more effective learning (Morgan, Kingston, & Sproule, 2005). Therefore, teachers should provide adequate stimuli to learner's interest by offering opportunities for connecting previously obtained knowledge with more recently presented bits of information, thus ensuring more meaningful learning. A rational explanation for this trend could be the fact that Greek PE teachers probably attach more importance to course control whereas student learning is believed to be a lower priority, as has been revealed by studies in the U.S. (Cothran & Ennis, 1997; Cothran & Kulinna, 2008) and in the U.K. (Curtner-Smith, 2001). As Thorburn and Collins (2003) reported, reproduction teaching styles have been considered to be a powerful means enabling PE teachers to control the learning environment; Furthermore, the effectiveness of reproduction teaching styles in motor skills acquisition (Byra, 2000) and the perceptions of PE teachers that reproduction teaching styles promote time management and students' knowledge (Cothran & Kulinna, 2008), may influence PE teachers' trend to adopt a reproduction teaching approach.

In the present study PE student teachers reported that PE teachers use more frequently the command and practice styles whereas the learners' initiated program and self-check styles are less frequently resorted to. Actually, although PE teachers' tendency to make use of reproduction approaches is pretty clear, there was an exception that did not follow this general rule. Greek physical education teachers tend to rely more on the guided discovery style which belongs to the cluster of production teaching styles. Actually, the same finding is confirmed by other studies, too (Cothran et al., 2005; Jaakkola & Watt, 2011; Kullinna & Cothran, 2003).

A reason to account for the popularity of guided discovery in Greece is that it can be said to bear resemblances to Socrates's method of elicitation. Actually, this fact has probably inspired PE teachers and encouraged them to incorporate guided discovery in their teaching style repertoire. After all, Greek education presents Socrates as one of the greatest teachers of all time. Therefore, wishing to identify with such a powerful paragon is absolutely reasonable.

The fifth item, which was added so that this study could gauge PE student teachers' intention to implement each teaching style as PE teachers in the future, revealed that they tend to be keen on adopting more often reproduction than production teaching approaches. Second and fourth year PE student teachers reported that they are keen on implementing more often the guided discovery, learner's individual designed program and self-checking teaching styles than first and third year students. Even though the first two teaching styles belong to the production cluster and the last one to the reproduction, we can assume that self-check provides students with a relative degree of autonomy in learning and allows for more decision making on students' part (Byra, 2006; Jenkins & Byra, 1997). Actually, both of these constitute more common features of production teaching styles. A rational explanation for this trend of PE student teachers is the fact that second and fourth year students attend practicum courses during this period of their studies and the influence of their teachers could motivate them to implement more often production teaching styles. However, it appears that this is a rather short-lived and weak influence. Consequently, it can be concluded that the above finding confirms Curtner-Smith's (1999) suggestion that professional socialization period has rather a weak influence on PE student teachers' beliefs, skills and knowledge.

In addition, PE student teachers perceived reproduction teaching styles as more overall beneficial than production. The above finding is similar to findings from college

student reports (Cothran, Kulinna & Ward 2000) and PE teachers' reports (Cothran et al., 2005; Jaakkola & Watt, 2011; Kulinna & Cothran, 2003). The findings of the aforementioned studies and the present study also indicate that there is a trend in physical education in many countries to perceive the implementation of reproduction teaching styles as more beneficial to their students. A reason to account for this is the fact that PE student teachers have a sporting background which makes them see transferring mainly knowledge content to their students as a top teaching priority. In their attempt to be more effective in teaching skills they prefer to adopt the same teaching approaches (reproduction) that PE teachers used to implement in school rather than to explore new pedagogical teaching approaches by expanding their knowledge and adopting production teaching approaches (Capel, 2007). Also, it is likely that the PE student teachers of the present study belong to Lawson (1983b) first type of PETE, according to which their first priority is coaching. Since the defining characteristic of reproduction styles is teachers' dominant role in delivering knowledge to their students while students in turn reproduce the bits of knowledge presented to them (Mosston & Ashworth, 2002); then PE student teachers are likely to adopt a reproduction teaching approach which is closer to a coaching viewpoint.

Even though the majority of the participants in the present study have already attended many courses in which teachers put emphasis on production teaching styles effectiveness, it seems that they tend to prefer using reproduction teaching approaches. A possible explanation is that PE student teachers based on their experiences during schooling form very strong and solid beliefs and consequently PETE programs could not help them to reconstruct their beliefs (Curtner-Smith, 1999). Students' prior beliefs and the variety of teaching approaches in higher education are likely to lead students to misinterpretation of the new information. In addition, according to Entwistle and Peterson

(2004), at least in British higher education, the limited implementation of innovative teaching methods influences students understanding. More specifically, their limited exposures to innovative teaching methods prevent PE student teachers from reconstructing their existing coherent beliefs and replace them with new innovative ones. In addition, the majority of undergraduate students adopts a rather superficial approach during their studies and put emphasis on achieving their goals with a minimum of effort (Entwistle & Tait, 1990); this is likely to urge PE students to adopt teaching approaches similar to their PE teachers. In consistency with the aforementioned conclusion was the finding of the present study that PE student teachers' intention to implement each teaching style related to their reports about their prior experiences and beliefs about each style. Although the relation is not high, it was very significant. Furthermore, this finding implies that prior beliefs are not the only factors to influence PE student teachers' perceptions about the teaching styles. According to Lawson (1983a, b) PE teachers are influenced by a number of factors during acculturation period; one of them is their experience from physical education lessons. This finding is in consistency with Calderhead's (1996) suggestion that student teachers' conceptions about their students' learning process are mainly based on their prior experience as school students. Likewise, Postareff et al. (2007; 2008) stressed that a short educational period is not enough for influencing pre-service educators to adopt a production teaching approach.

Further investigation of PE teachers teaching preferences must be conducted in order to confirm PE student teachers reports combined with observation in order to compare any new findings that may arise. Also, future studies through a qualitative approach should examine the deeper reason for which both PE teachers and PE student teachers tend to adopt a reproduction teaching approach. Finally, the findings could be a useful source of information for planning more effective undergraduate teaching courses.

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Chapter 4

Study 2

Physical education student teachers' mental models of production and reproduction teaching approaches[3]

Abstract

The purpose of the present study was to explore PE student teachers' presuppositions, beliefs and mental models related with production and reproduction teaching approaches. The participants were 16 (10 males and 6 females) second year PE student teachers. The data were collected by using semi-structure interviews. A multi-level analysis process was conducted which included open and axial coding.The findings revealed two framework theories that reflect the diversity of PE student teachers' beliefs of the teaching approaches. PE student teachers attributed different characteristics to both clusters of teaching approaches and learning as well. More specifically, 5 PE student teachers were categorized within the first mental model and they appeared to hold the naïve presupposition that learning is dimensional and reproduction teaching approaches facilitate more effectively its' accomplishment. On the other hand 11 PE student teachers perceived that learning is multidimensional and it could be achieved through the implementation of production teaching approaches. Finally, the findings of the present study confirmed Vosniadou's (1994) suggestion that prior beliefs play an important role on learners' structure of the knowledge. The two mental models highlight the developmental nature of students' learning concerning the production and reproduction teaching approaches. The diversity of students' mental models reveals students' diverse understanding of complex and sophisticated scientific concepts.

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Teaching physical education (PE) is a challenging and complex process mainly because PE teacher has to teach a variety of skills and cognitive concepts. Additionally, PE teacher has to achieve quantifiable goals, by delivering a qualitative and effective lesson (Graham, 2008). According to Capel (2007), PE teachers' education plays a determinant role in effective teaching. However, according to Lawson's theory on occupational socialization (1983a, 1983b), PE teachers' knowledge undergo continuous evolution. Lawson suggested that the socialization period is divided into three stages: acculturation; professional; organizational. Researchers suggested that each one of these periods could play an important role on PE teachers' perceptions and teaching preferences (Curtner-Smith, Hastie, & Kinchin, 2008). During the acculturation period, a variety of factors influence not only individuals' decision to become PE teachers, but also shape their knowledge and beliefs about teaching methods, course content and pedagogical point of view (Lawson, 1983a). Richardson (2003) shown that this period has an impact on students' beliefs about teaching and learning which may affect their teaching profile. On the other hand, during their professional socialization period, teachers' prior experiences are enriched by new information.

Physical education teachers' choice to implement production or reproduction approaches it could be influenced by a variety of factors. Teachers' knowledge is a continuous process. Lawson (1983a, b) articulated the occupational socialization theory according to which a plethora of factors influenced the shaping of teachers personality (professional profile) and therefore their teaching choices during the three occupational socialization periods. Especially, during acculturation period a variety of factors determine first and foremost their personal professional choice. Also, this specific period influence individual beliefs and their knowledge concerning their teaching and pedagogic approaches and the teaching content as well. Curtner-Smith, (1999) concluded that even

students participation in PE lesson and their interaction with PE teachers have a significant impact on their perceptions.

The Spectrum of Teaching styles

Spectrum is an integrated framework about teaching and learning (Mosston & Ashworth, 2008). Sanchez et al. (2012) suggested that Spectrum is a 'tool box' which provides PE teachers with 11 teaching options in order to cope with students' diversity and achieve the multiple PE goals. Since 1966 the Spectrum gradually evolved in the version of 11 teaching styles: (A) command, (B) practice, (C) reciprocal, (D) self-check, (E) inclusion, (F) guided discovery, (G) convergent discovery, (H) divergent production, (I) learner's individual designed program, (J) learner initiated, and (K) self-teaching. Mosston and Ashworth (2008) suggested spectrum "Two basic human capacities are reflected within the structure of the Spectrum: the capacity for reproduction and the capacity for production." Based on this assumption teaching styles were categorized within two clusters. Five of the teaching styles (A-E) represent the reproduction cluster because students "reproduce known knowledge, replicate models, and practice skills" (Mosston & Ashworth, 2002, p. 9). On the other hand six teaching styles (F-K) were categorised within the production cluster in which the teacher guides students to discover the knowledge (Goldberger Ashworth, & Byra, 2012). These six styles promote student involvement in the learning process. During the years researchers explored mainly the relationship between reproduction cluster of teaching styles and learning outcomes (Chatoupis, 2010). For example, researchers examined the influence of the reproduction teaching styles on motor development (Jenkins & Byra, 1997; Kolovelonis & Goudas, 2012), and on students' learning (Ernst & Byra, 1998). However, the last years a number of studies examined the influence of production cluster of teaching styles on students' critical thinking. More specifically, they examined the effect of the implementation of problem

solving teaching styles on students' critical thinking (Bonnette, McBride, & Tolson, 2001; Chen & Cone, 2003; McBride, Gabbard, & Miller, 1990). Additionally, researchers (Watson & Closkin, 2013) stressed the role of production styles on students' responsibility. Finally, Dyson (2002) that the implementation of constructivist approaches like cooperative learning could ensure students' motor skills development.

Dominant teaching trend in physical education context

Researchers (Garn & Byra, 2002) have stressed that the national standards (NASPE 1995, 2004; SHAPE, 2014) can be achieved through the use of spectrum teaching styles. Likewise, the NCPE demands the use of a broad range of teaching approaches in order to achieve curriculum goals such as students planning, performing, and evaluating movement (Goldberger & Howarth, 1993; Mawer, 1993). The Greek Ministry in order to help teachers and students to cope with the multidimensional goals of the enriched PE curriculum incorporated the spectrum of teaching styles both into the revised school program for teachers and within the updating of student textbooks (e.g. Digelidis et al, 2006; Papaioannou et al, 2007).

However a number of studies revealed that PE teachers in the U.K. (Curtner-Smith & Hasty, 1997; Curtner-Smith et al, 2001), in the U.S. (Cothran, Kulinna & Ward, 2000; Kulinna & Cothran, 2003), in Finland (Jaakkola & Watt, 2011) and in Greece (Syrmpas & Digelidis, 2014; Syrmpas, Digelidis & Watt, 2015) tend to rely more often to reproduction than production teaching approaches. Based on similar findings Anderson and Helms (2001) suggested that are crucial for students' education to change educators' perspective for teaching. Educators should aim at adopting a constructivist rather than a transmissive approach. Similarly, Kirk and Macdonald (1998) stressed that constructivist approach could be the driving force to motivate the structure of an alternative pedagogical framework in physical education context. However, Fischler (1994) suggested that even if

PE teachers adopt a constructivist perspective that does not mean that they intend to implement it. Researchers (Duit, Treagust, & Widodo, 2008; Widodo,& Duit, *2002;* Widodo, Duit & Müller, 2002) confirmed that teachers held transmissive rather than constructivist perceptions about the learning process.

The Greek PE context

A specific curriculum proposed for vocational education (elementary and middle school) designed in order to promote students' motor development through students' fitness and health improvement and gradually the adoption of physical activity as a lifelong habit (Hellenic Ministry of Education and Religious Affairs, (HMERA), 2003). Additionally, the Greek Ministry (HMERA, 2006) modified the PE syllabus aiming at the promotion of students' lifelong physical activity and the adoption of a healthy lifestyle through the implementation of self-regulation techniques and the development of life skills (Goudas et al., 2006; Theodorakis et al., 2006). Finally, high school curriculum designed to emphasize on students' physical, motor, mental, social and moral development in order to adopt physical activity as a lifelong *habit* (HMERA, 1990).

The curriculum of undergraduate studies in physical education contain course which its main goal is to teach students to convert theory into practice and acquire the appropriate experience in order to be well prepared to teach the PE lesson. Also, include courses with pedagogical content. Teachers should be able to develop the pedagogical knowledge and skills necessary to design instructional experiences for students' learning through conceptual change processes. Teacher educators should then assist students in learning conceptual change pedagogy. Therefore, understanding the ways in which teachers interpret conceptual change pedagogy and put it into practice is a significant step for teacher education in conceptual learning.

The framework Theory

One of the dominant theories in cognitive psychology field is the Framework Theory of Conceptual Change (FTCC) (Vosniadou, 1994; 1999; 2007a) which is widely used to describe and elucidate the complexity of learning process. Duit and Treagust (2003) described FTCC as "a powerful framework for improving science teaching and learning". The FTCC is a useful theory for exploring learners' prior beliefs (Vosniadou, 1994), and depicts learners' initial attempt, to understand and analyze information related with a specific phenomenon receiving from their social and cultural context (Vosniadou & Brewer, 1994). This initial attempt to decipher the structure and function of the world is the foundation in which learners structure any new information they receive from their surroundings (Vosniadou, 1992). Vosniadou (2013) argued that the learning process through the perspective of conceptual change is a gradual, slow and longitudinal process. Since infancy learner's knowledge enriched or radical reconstructed under the influence of personal, social, cultural and contextual factors (Vosniadou, 1999; Vosniadou & Brewer, 1987).

According constructivist approach learners existing knowledge plays an important role in learners attempt to understand and give rational explanations about every new information or problem that they have to deal with. In their attempt to explain an unfamiliar situation or to solve a problem learners are likely to create naïve theories. Learners' naïve theories are contradictory to the dominant scientific theory. Teachers during the lesson play the role of mediator by creating an attractive learning environment. Also, it is important to help their students to be aware of the inconsistency between their naïve theories and the scientific theories. Teachers should utilize instruction strategies promote a learning environment with chances for their students not only to reconstruct their naïve theories to more scientific but better understand their way of learning. The

interaction between all the members of the class or partially participating in a group conversation it is likely to lead them to give rational explanation in a giving problem (Vosniadou, 2007a). According to FTCC theory (Vosniadou, 1994) learning could be take place with the form of enrichment or reconstruction. Enrichment is the process according to which learners incorporate the new information to their prior knowledge in their attempt to assimilate the new information. Fragmentation and misconceptions are the products of enrichment process. The first described as a process according to which the new information added to learners' existing framework theory. The late described as the process according to which learners distort the new information in their attempt to seek coherence with their existing framework theory. However misconceptions could be perceived as learners' productive process in their attempt to understand the new information. Finally, synthetic conception created as a result of learners attempt to seek mental coherence between their initial understanding of a specific phenomenon and the scientific theory. The product of this process could be perceived as contradictory to the scientific held beliefs but still is coherent and valuable for the learning process (Vosniadou, 2012).

These initial learners' developing concepts are organized in two categories of naïve theories framework and specific theories. Framework theories are organized into ontological and epistemological presuppositions. Ontological presuppositions comprise learners' assumptions about the nature and concepts of a specific phenomenon within a specific domain (Chinn & Brewer, 1993). Epistemological presuppositions on the other hand comprise learners' assumptions about concepts nature and development and are learners' attempt to give rational explanation about the nature of their knowledge within a specific domain (Vosniadou & Ioannides, 1998). Epistemic beliefs are not static but

subject to an evolution during learners attempt to adopt information from social and contextual factors (Vosniadou 2007a).

Specific theories on the other hand referred to the interrelated learners' beliefs which formed in their attempt to attributed characteristics and behaviours to a specific phenomenon, either through observation or influence of cultural factors (Vosniadou & Ioannides, 1998). Both framework and specific theory play an important role in mental models generation (Vosniadou, 1994).

Mental models on the other hand, are structures of the learners' specific knowledge which are used in order to understand, analyze and represent the structure and function of the world around them (Brewer, 1987). Learner construct mental models automatically or retrieving from the long term memory when they have to solve a problem or to give reasonable explanations for a specific phenomenon. Learner it is likely to make use of mental models in order to enrich or modify the existing knowledge related with a specific phenomenon (Vosniadou, 2001). Vosniadou (1991; 1994) suggested that three types of mental models exist: a) Initial or intuitive, this referred to learners' initial attempt to understand a specific phenomenon and most of the times are in contrast with the prevailing scientific concept. Formed mainly during infancy and reflect children cognitive attempt to understand phenomena observed their social and cultural surrounding. b) Synthetic, are a hybrid form of the initial and the dominant scientific concept. Developed during the educational period and reflect learners attempt to reform the existing knowledge which most of the times is in contrast with new information receiving from the instructor. c) Scientific, are the evolution of the synthetic mental models and reflect learners cognitive ability to fully understand complex and abstract concepts forming this way a cognitive framework which is in consistency with prevailing scientific view (Vosniadou 1991; 1994).

The conceptual change theory has been used in other contexts in order to examine pre-service teachers learning process (Trundle, Atwood, & Christopher 2006; Atwood, & Christopher 2007). In addition scholars have used Conceptual change theory to examine both well- and ill-structured domain so it is reasonable to assume that Conceptual change theory is an applicable theory and can help us in our attempt to understand the PE students learning process to teach in the physical education domain. Arguably it can be concluded that it is important to be explored student teachers' initial beliefs in order researchers understand their cognitive background and its' role in the learning process (Vosniadou, 2002). By exploring and understanding PE student teachers' beliefs about teaching approaches could help scholars' deeper understanding of student learning process in the specific domain of teaching in physical education. Consequently, curriculum developers are likely to help PE student teachers by providing with new information related to their naïve theories facilitating this way the cognitive process. According to Vosniadou (1994), instructors should help students to understand their naïve theories which consist of the foundation of mental models. Therefore, the provided knowledge could help initially PE student teachers to understand misconceptions that they are likely to hold about the properties that they attributed to teaching approaches. Only then their mentors could help them faster reconcile these concepts by creating scientific mental models (Vosniadou, 2007b). Finally, PE student teachers' mental models within PE instructional settings can help scholars to understand the social or contextual factors that facilitate or constrain the learning process.

Purpose

The purpose of the present study was to explore PE students teachers' presuppositions, beliefs and mental models related with production and reproduction

teaching approaches. An additional goal was to explore the factors that facilitate or constrain the learning process.

Methodology

Participants

Participants were 16 PE student teachers randomly selected in a Greek University from second year students of the four-years PE Teachers Education (PETE) program (M=20.31, SD=0.87). Both male (62, 5%) and female (37, 5%) were represented in the study. Based on the PETE curriculum, second year students have little information about reproduction teaching style and no information about production teaching style. All PE student teachers were fully informed of the nature of the study and they provided assent. The study was conducted with the approval of the University Ethics Committee.

Data collection

An interview guide was designed in order to explore PE teachers' experiences and beliefs about production and reproduction teaching styles. Following Patton (2002) instructions, open-ended questions were used concerning their teaching styles and methods in relation with their background and experience or, their knowledge and attitudes. Interview structure was in consistency with Vosniadou and Brewer's (1992, 1994) recommendation according to which researchers should use factual and generative questions to unravel mental models and underlying conceptual structure. A factual question is one that students can answer by repeating information they have received. A correct answer could be the result of knowledge reproduction. Students may reproduce information they adopted through their interaction with social or contextual factors. For example, in this study, the question: "Do you think that course control is important for an effective learning?" is a factual question because the specific question prompts the student to recall from his/her memory and reproduce the answer. Student's correct answer in this

factual question is not evidence that he/she has fully understood the specific concept. However, factual questions are useful to reveal learners' exposure to theoretical facts that could influence learners' knowledge.

On the contrary, generative questions "confront children with phenomena about which they do not have any direct experience and about which they have not yet received any explicit instruction" (Vosniadou, 1994, p. 50). These kinds of questions are more likely to reveal students' mental models because students have to retrieve relevant information from their prior knowledge to answer the question. For example, in this study, the question "Can you please describe PE teacher's role in this lesson plan?" is a generative question, because students do not have culturally relevant information to answer this question. Both question types have been used in the present study.

The interview protocol included a short thread of background questions (e.g. sporting background, experience with teaching style during schooling, coaching or teaching background etc.). Also, the interview included a short scenario of each teaching styles (e.g. two photocopies with examples of a PE lesson plans delivered respectively through practice teaching style and guided discovery). The PE teachers were prompted to describe teachers' and students' role in both scenarios. Furthermore, they were also prompted to describe under which circumstances and why they will implement both teaching styles. Additionally, interview included questions about PE students' perceptions relating with course control and students' motivation, autonomy, critical thinking, discipline and safety. Finally, PE student teachers' perceptions about which teaching styles and why promotes each of the aforementioned characteristics were explored. The data were audiotaped and transcribed. Codes were used aiming at ensuring participants anonymity. Thereafter, the participants coded are from B01 to B16.

Data trustworthiness

Data trustworthiness was established through the use of five strategies described by Shenton (2004): (a) the adoption of well-established research methods, (b) random sampling,(c) background, qualifications and experience of interviewers, (d) negative case analysis, and (e) peer review. The data collection protocol was in consistency with qualitative methodological recommendation from conceptual change (Vosniadou et al., 2001) which permits the exploration of PE students' mental models. Furthermore, it permits the examination of the factors influence the formation of mental models. Two of the authors have examined a sample of data independently and proposed themes. They subsequently compared these themes and resulted in a joint list of themes. Next the entire data were independently coded based on the list theme. Then both examined the data and in those cases that disagreements come through they argued and then come to agreement. Finally, the inter-rater reliability assessed and found to be was 90%. Additionally, a wide range of elicitation methods (e.g., visual, open-ended generative and factual questions) were implemented in order to explore PE teachers' beliefs concerning teaching styles.

Data analysis

NVivo6 qualitative software was utilized as a coding tool. All documents were analyzed by using content analysis (LeCompte, Tesch, & Preissle, 1993). Scholars have implemented the Framework Theory of Conceptual Change to examine both well- and ill-structured knowledge domains. Domains such as law, argumentation, history, art, medicine, and design perceived as ill-structured domains (Alexander, 2006). These domains perceived as ill-structured because: "(a) each case or example of knowledge application typically involves the simultaneous interactive involvement of multiple, wide-application conceptual structures (multiple schemas, perspectives, organizational principles, and so on), and (b) the pattern of conceptual incidence and interaction varies substantially across cases nominally of the same type" (Spiro, Feltovich, Jacobson, &

Coulson 1995, p. 92). As Limon (2002) suggested ill-structured domain as history may include definitions no generally accepted and concepts with different interpretation when each one of them applied to a specific context. Arguably it can be said that there are more than one correct answer. Thus, the interpretation of concept's effect varies on the same type of cases (Duffy, & Jonassen, 1992). Teaching is by its nature a multidimensional and complex task (Graham, 2008) which teacher applies on a various contexts and cases (Mishra, Spiro, & Feltovich, 1996). For these reasons data analysis was an arduous task.

The mental models classification was based on prevailing scientific theories. Thus, the attribution of specific characteristics on production and reproduction teaching styles respectively occurred on the basis which of two teaching styles promotes effectively specific teaching goals. More specifically, a multi-level analysis process was conducted which included open coding for categorizing students' responses (Strauss & Corbin, 2008). This process was followed repeatedly initially for each PE student teacher as a unique case and across all PE student teachers. That process was helpful in identifying similarities and differences in their responses.

Also, the aforementioned process allowed researchers to infer PE students mental models through the thoroughly examination on their responses about teaching styles. Then, an additional analysis using axial coding process was conducted (Strauss & Corbin, 2008) in order to identify features that define mental models held by PE student teachers. Taking into consideration the fact that this first attempt to identify mental model could be considered as a subjective process, a re-analysis of each student responses was conducted. That was helpful to confirm that the features which were attributed by PE students to each mental model were correctly identified (Vosniadou & Brewer, 1994).

Results

The findings revealed two mental models of reproduction and production teaching: an initial mental model and a synthetic mental model. PE students give different meaning to production and reproduction teaching styles. These two mental models are generated under the constraints of a set of ontological presuppositions and beliefs about teaching and learning. Mental models was identified based on the following criteria emerged through the data analysis. More specifically, PE student teachers categorized within each mental model based on their assumptions about: (a) the nature of the learning process (e.g. transmissive or constructivist, dimensional or multidimensional), (b) PE teachers authority or students active participation influence on the learning process.(c) the benefits that PE student teachers attributed to production and reproduction teaching styles respectively.

PE students within the initial mental model (N = 5) formed their understanding of reproduction and production teaching styles based on their previous sporting and school experiences. PE students in the synthetic mental model (N = 11) formed their understanding of reproduction and production teaching styles based on a teaching theory. Data analysis revealed a pattern between PE student teachers beliefs about the most effective teaching styles to promote students' learning and their intention to implement this cluster of teaching styles in the future as certified PE teachers.

Teachers' authority leads to students discipline, course control and, effective learning which is dimensional and transmissive.

Five PE student teachers (B01, B02, B03, B05, and B10) were categorized within this initial mental model. This initial mental model is generated under the constraint of a set of ontological presuppositions and beliefs.

Ontological presuppositions: PE student teachers based on their prior experiences and background perceived that PE teacher's authority plays a determinant role in the learning

process by ensuring students' reproduction of knowledge. PE student teacher B01 for example stated that:

> Learning is a process which should rely exclusively on PE teachers' knowledge. Teachers authority is a determinant factor for an effective learning process… the lesson will flow normally additionally, students will learn effectively and faster since the PE teacher plans the lesson structure.

Also, they interpret learning as a transmissive process in which PE teachers should rely on the knowledge reproduction. Furthermore, they consider that learning should focus only in the development of a specific goal (motor development). Learning is understood as dimensional (i.e. one dimension). In particular, B05 stated:

> Yes students will learn effectively, because PE teachers has the cognitive background and he/she is trained to give all the appropriate information or to demonstrate the skill and then to give the feedback to his/her students. Then students could learn more effective the skill.

Beliefs: PE student teachers' ontological presuppositions influence their beliefs about teaching styles and generate their mental models. Based on the ontological presupposition that learning is dimensional, PE student teachers in this study generated the belief that learning in the physical education domain should promote skillfulness. For example, B05 PE student teacher perceived that *"*PE lesson should focus on student's motor development*"*.

Additionally, students within this initial mental model believe that reproduction teaching styles promote: (a) course control, as for example B01 PE student teacher stated: "This way I can control better the course… due to the fact that the lesson will be planned by me then it is easy to predict any source of distraction or danger";

(b) students' effective learning, as B02 stated:

> This way (reproduction) PE teacher could notice and give feedback to his/her students. In contrast in the case that a student performs a skill and then they should evaluate his/her performance based on internal feedback or the feedback by another student then it is likely due to the lack of knowledge to receive incorrect feedback.

(c) discipline (B05 "Hm… students will be more disciplined and will not screamed nor will be distracted";

(d) and safety (B10) reported:

> Since the lesson is planned and organized by me then it is easier to detect promptly possible sources of danger and prevent to occur. Students should follow my instructions and they have just to perform the skills that I have planned.

On the other hand, according to PE students quotes revealed that production teaching approach promotes students' autonomy and motivation. For example as a PE student teacher (B05) stated:

> By providing to students with opportunities for active participation they will feel more willing to participate in the learning process… this will help not only to develop their personality but they could be able to control better their life in the future";

Additionally, another student teacher (B03) stated "In the case that students feel that their opinion counts and their PE teacher trust them then they will participate more actively in the learning process.

Also, PE student teachers within this mental model perceived that production teaching style promote students' critical thinking. More specifically, student teacher (B1) reported that: "PE teacher should probe his/her students to discover the answer by posing them question, only this way they will learn effectively".

However, one of them (B05) held the naïve belief that teachers' authority could promote students' critical thinking. This belief was characterized as naïve because, according to prevailing constructivist theory, critical thinking could be achieved through teachers' mediation and learners' active participation in the learning process. PE student teacher formed this belief based on the ontological presupposition that teacher's authority plays a determinant role in the learning process. Thus, he is likely to believe that PE teachers' questions guide students to discover the answer to a given problem.

(B05) "*Through PE teacher guidance students should discover the answer".*

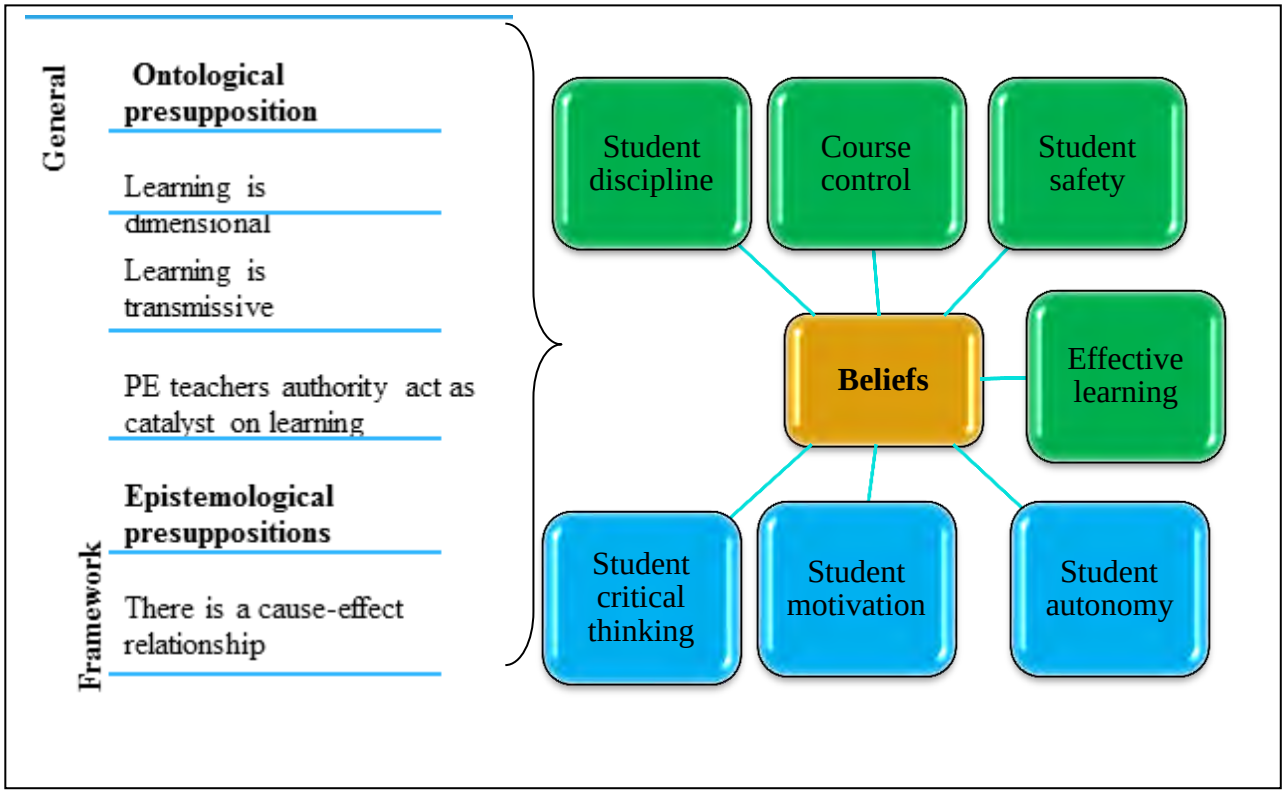

Figure 4. The hypothesized conceptual structure underlies PE student teachers' initial mental model of reproduction and production teaching styles.

Students' active role in the learning process promotes students autonomy, motivation and responsibility factors that lead to effective learning which is multidimensional and constructivist.

Eleven PE student teachers (B04, B06, B07, B08, B09, B11, B12, B14, B15, B16,, and B13) have been categorized within this first synthetic mental model which is generated under the constraint of a set of ontological presuppositions and beliefs.

Ontological presuppositions: PE student teachers within this synthetic mental model interpret the teaching as a constructivist process in which teacher act as mediator of students' knowledge while students play an active role in the learning process. More specifically, B15 stated: "Learning is effective when PE teacher give the information, pose a question and then urge students to discover the answer. PE teacher should stimuli his/her students to probe into questions".

Unlike, PE teachers within previous mental model they generated they interpret as multidimensional. For example, B13 PE student teacher perceived that:

> The implementation of this approach leads students to be critical thinking. They learn not only new skills but knowledge as well… also this way they will develop their responsibility and thus they will behave appropriate not only during lesson but in general in their life. Additionally, they will be friendly and willing to cooperate with peers. Finally they will be aware of what is useful to them and thus they will make better choices in their life…PE teachers should create a learning environment which helps students develop their personality in order to be responsible and active citizens in the future.

Beliefs: Based on their responses can be concluded that they have constructed a general framework which differs from the previous one. Additionally, they attributed different

characteristics to production and reproduction teaching styles respectively compare to PE student teachers was categorized within the initial mental model. It appears that through the enrichment process they attributed to reproduction and production teaching styles different characteristics. PE students within this mental model production teaching styles promote: (a) students' effective learning, more specifically, B06 student reported:

> Learning is more effective when PE teacher facilitate his/her students to discover the mistake because then is easier to them to confront with it and finally to perform well. In contrast, in the case that PE teacher gives them the feedback then it is likely to don't understand it;

(b) critical thinking, as B15 stated: "In the case that PE teacher creates a learning context where students through their interaction with their teacher try to discover a solution to a given problem then they developed their critical thinking".

While, B04 stated that: "a person with critical thinking will be an active citizen in the future";

(c) autonomy, B07 stated: "This way (reproduction approach) PE teacher allow his/her students to actively participate in the learning process"; additionally, B04 consider that production teaching approach promotes: *"students initiation, autonomy and express of opinion… which in its turn help students to be active persons and active citizens in the future";*

(d) motivation in particular B16 stated: "I will implement this approach (production) because in my point of view promotes students motivation… a motivated students actively participated in the learning process and learn effectively";

(e) satisfaction B12 reported: “This approach (production) promotes the cooperation between teacher and students and jointly make the decisions as a result students enjoy the lesson ”.

(f) Finally, PE student teachers within this mental model yielded students’ responsibility as an additional to the aforementioned characteristics of production teaching styles. For example B06 said: “Students’ active participation in the learning process and autonomy promotes their responsibility”; Similarly *B09 reported: “*Students’ active participation in the learning process lead them to behaving responsible”.

On the other hand they reported that reproduction teaching styles ensure course control and students’ safety. For example B09 stated:

> “A lesson delivered by PE teacher is organized and so the site in which students exercised is prescribed, so PE teacher has consider any possible source of danger, while when students has an active role in the learning process and PE teachers’ instructions and guidance are limited then is likely to occur an accident”.

Finally, two PE student teachers (B09, B13) in contrast with aforementioned PE students consider that production teaching styles could promote course control. For example B09 stated: *“*This approach (production) promotes course control because students have active role in the learning process and thereafter they feel more responsible and they realized that their contribution is important for lessons effectiveness”. Although both students held different beliefs they categorized within this scientific mental model because they share common general and specific framework. Both PE students (B09, B13) added that students’ responsibility promotes course control. It could be assumed that PE student teachers within this mental model were informed during their first year studies about the benefits of students’ autonomy, motivation and responsibility and since this information is

in consistency with their prior beliefs included these beliefs in their existing knowledge structures (schema). Based on their assumptions the production teaching styles promote students active role, whereas the learning is multidimensional and constructivist process.

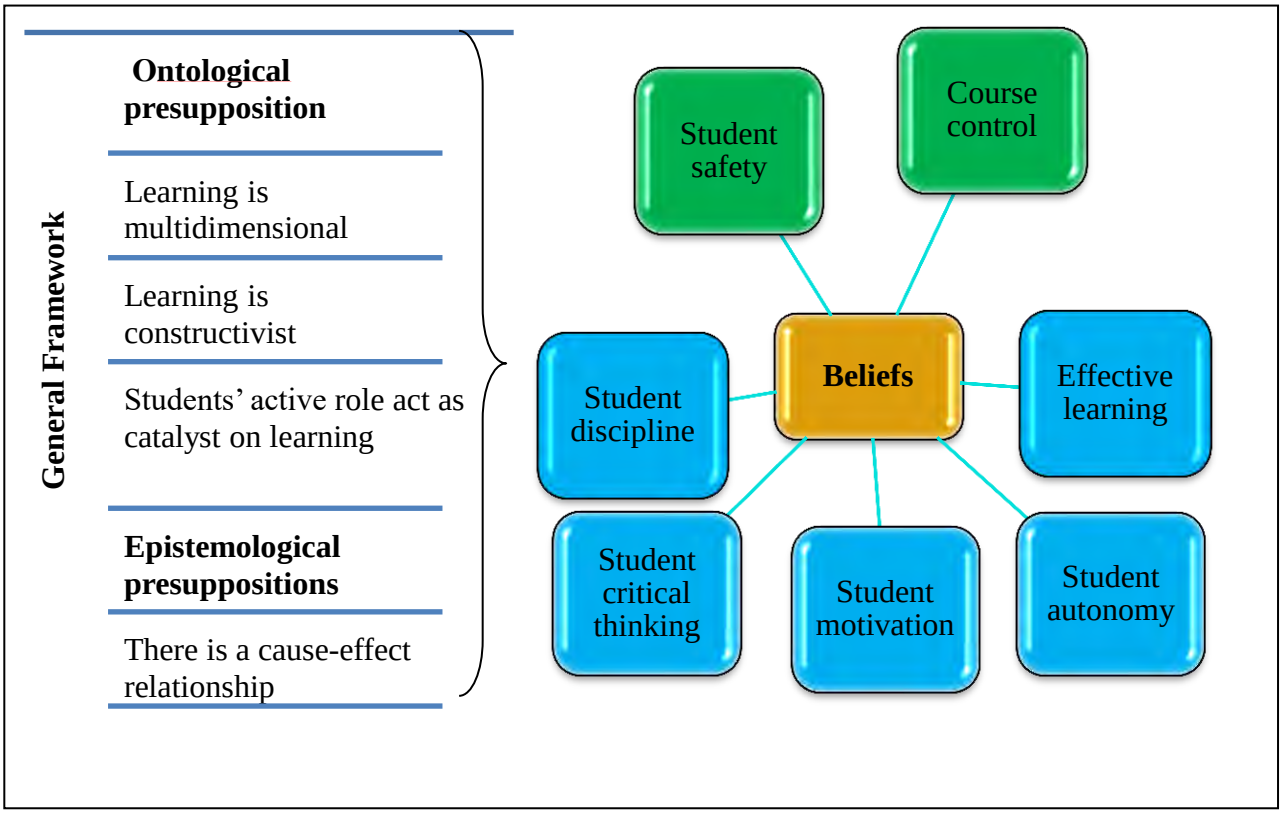

Figure 5. The hypothesized conceptual structure underlies PE student teachers' synthetic mental model of reproduction and production teaching styles.

Discussion

The purpose of the present study was threefold to explore: (a) PE student teachers mental models of production and reproduction teaching styles; (b) the conceptual structures underlying of PE student teachers' mental models of production and reproduction teaching approaches; and (c) the factors that influence their presupposition and beliefs and consequently the generation of mental models. The findings revealed two mental models generated by the underlying conceptual structures. Following Vosniadou

and Brewer's (1992, 1994) example the first could be characterized as initial mental model, generated mainly by PE student teachers' entrenched presuppositions formed under the influence of their prior experiences and beliefs. The late could be categorized as synthetic and its generation has been influenced by the scientific theory. The identification of two mental models are in consistency with the findings of previous studies which suggested that learners held a variety of diverse presuppositions and beliefs which urge them to form various types of mental models (Vosniadou & Brewer 1992, 1994; Ioannides & Vosniadou 2002).

More specifically, five PE student teachers within initial mental model have formed the ontological presupposition that learning is a transmissive process. The aforementioned findings is in consistency with these of previous studies (Widodo, & Duit, 2002; Widodo, Duit and Müller, 2002) which imply that teachers perceive learning as transmissive rather than a constructivist process. Also, they form the ontological presupposition that the learning in physical education context should be mostly focus on students' motor development. Thus, it can be concluded that PE student teachers held the entrenched presupposition that learning is dimensional. However, this specific student teachers' presupposition could be perceived as contradictory to the goals of the curriculum, according to which skills development should be the main but not the only goal. According to Vosniadou and Brewer (1992) learners' entrenched presupposition could constrain the learning process. So, in this specific case PE student teachers have a difficulty to understand the multidimensional structure of PE lesson. A rational explanation for this specific PE student teachers' presupposition could be their sporting background. According to Lawson (1983a) PE teachers professional profile influenced significantly by their experiences. Consequently in the case that the PE student teachers experienced a physical education with emphasis on sports then arguably they may perceive that they

should adopt a similar approach. Take into consideration that PE student teachers emphasize on motor skill acquisition. Since the findings of the literature (Garn & Byra, 2002; Mosston &Ashworth, 2002) support reproduction teaching styles have designed and proved to be more effective to motor skill development in conjunction with PE student teachers' presupposition that teachers' authority act as a catalyst in students' skills learning could be inferred that urge them to report that they will be keen on adopting a reproduction teaching approach. The aforementioned finding is in consistency with Vosniadou's (1996) suggestion that learner based on his/her initial perceptions form specific expectations which also influence the learning process.

The finding of the present study is also in consistency with the findings of previous studies (Vosniadou, 1994; Vosniadou, & Ioannides 1998) according to which learners are not 'tabula rasa' (void of knowledge). On the contrary they have already formed an initial and very solid perception of the teaching subject matter long before their academic studies. More specifically, the participants stated that were not knowledgeable or at least familiar with production teaching approaches, nonetheless they had formed certain perceptions of them based mainly on their experiences during schooling and their sporting background. PE student teachers reported that they were convinced for the correctness of their beliefs. Although, in a few cases they question their beliefs they did not adopt an alternative belief and thus a teaching choice. For example B01 stated that "learning is more effective when PE teacher is the source of knowledge" but during the interview he reported that "this way (production approach) students learn more effectively" and immediately he stated that "this is in contrast with my prior statement*"*. However, he stated that I prefer reproduction teaching approach because "I am not sure that this teaching method is effective but in the case that is effective I would love to see it". The above finding confirms Vosniadou's (2002) suggestion that learners' initial perceptions are very solid due to their daily

confirmation through the observation and under the influence of personal and social factors (Vosniadou, 1992) and due to learners' lack of metaconceptal awareness (Vosniadou, 2002). One of PE student teachers categorized within mental model have formed the naïve theory that critical thinking developed with reproduction teaching approach. The reason that aforementioned beliefs was described as flawed is the finding of previous study (Knight & Waxman, 1991) which implies that reproduction teaching approaches influence rather negative than positive students' critical thinking. Also, Goldberg and Howarth (1993) stressed that NCPE setting goals such as "judging", "decision making", and "evaluating" are efficiently achieved through students' active participation in the learning process. Teaching strategies that encourage students to explore a range of movement possibilities, or to problem-solve activate their critical thinking skills (Bonnette, McBride, & Tolson, 2001; Chen & Cone, 2003; Konstantinidou, Pollatou, & Zachopoulou, 2005). A rational explanation for this naïve belief could be PE student teachers' misinterpretation of teacher's role in the development of critical thinking. The B05 PE teacher interprets as dominant PE teacher's role in problem solving activities while he underestimate students' role. He reported "PE teacher through his questions help their students to discover the correct answer".

On the other hand PE student teachers have been categorized within synthetic mental models held the presupposition that learning is multidimensional and a constructivist process. Both presuppositions are in congruence with Kirk and Macdonald's (1998) constructivist approach that the learning could be considered as multidimensional since students implicitly or explicitly learn more than one subject during a physical education lesson. However, PE student teachers held misconception. More specifically, they consider that the multidimensional learning could be achieved effectively through the production approach. These presupposition and belief could be perceived contradictory to

Mosston's Spectrum Framework Theory which implies that each teaching style leads to specific outcomes (Mosston & Ashworth, 2008). Most of the curriculum goals (e.g. socio-moral, cognitive and affective) may indeed effectively be promoted through the production teaching styles. Nevertheless, students' skills and physical development could be more effectively accomplished through reproduction teaching styles (Goldberger, 1995; Mosston & Ashworth, 2008). Thus, it is counterintuitive to be suggested that the implementation of production teaching styles could effectively promote each one of the reported PE lesson goals. As Goldberger, Ashworth and Byra (2012) suggested PE teachers should implement a variety of teaching approaches aiming at accomplishing PE lessons diverse goals. Considering that PE student teachers misinterpret the effectiveness of production teaching styles to accomplish most of PE lesson goals then it can be said that this finding of the present study confirmed Vosniadou's (2013) suggestion that misconceptions are learners' erroneous understanding of scientific theories. She argues that misconceptions urge learners to generate synthetic mental models.

Furthermore, PE student teachers' ontological presupposition that learning is a constructivist process and relies on students' active participation in the learning process it appears to influence their belief that production cluster of teaching styles promotes also students responsibility. Mosston and Ashworth (2008) suggested that students' responsibility related with the shift of decision making. Learners' decision making ability could be promoted progressively though the implementation each one of the Spectrum of teaching styles. Researchers suggested that the implementation of production teaching styles could promote students' personal and social responsibility (Watson & Closkin, 2013). Thus it can be concluded that PE student teachers belief is aligned with the prevailing theory. However, PE student teachers presuppositions are likely to constrain their learning process. More specifically, their presupposition that PE teachers authority

act as a catalyst to course control or students safety is contradictory to their belief that students' active participation promotes their responsibility. For example B04 reported "reproduction teaching approach ensures course control….when PE teacher control the course then the context is safe, otherwise lurks the unexpected". The aforementioned PE student teachers belief could be perceived as misconceptions. Previous study (Ennis et al., 1999) suggested that a learning environment, such as Sport for Peace curriculum, promotes students autonomy and active participation in the decision making it is likely not only to enhance students responsibility but their safety as well. Additionally, disruptive students could be integrated in the learning process ensuring this way students discipline. Also, this specific belief is contradictory to Hellison's, (2011) suggestion that the promotion of students' responsibility could facilitate their discipline. This misconception could be stem from PE student teachers' lack of experiences with PE lessons delivered effectively through production teaching approaches.

Additionally, the findings of the present study confirmed Vosniadou's (1994) suggestion that the learning process involves the enrichment of learners' existing knowledge. Based on their responses it could be assumed that students were categorized within this mental model assimilated the new information they received under teacher's instruction into their existing knowledge. More specifically, two PE (B09, B13) student teachers were categorized within this mental model consider that students' active participation promotes course control. It could be assumed that both PE student teachers were informed during their first year studies about the benefits of students' autonomy and motivation on the learning context and they just added course control to the benefits of production styles. Since this information is in consistency with their prior beliefs they integrated these beliefs in their existing knowledge structures. This finding is confirmed Vosniadou's (2012) suggestion that synthetic mental models formed under the influence of

assimilated knowledge in the existing structured knowledge. Learners' conceptual change through knowledge enrichment may occur but is likely to decelerate the learning process and be a source of misconceptions. These misconceptions generated during learners attempt to synthesize the received new scientific information into the existing cognitive schema contributing this way on mental models generation. Vosniadou (1991) suggested learners attempt to seek mental coherence between their prior beliefs and new beliefs information. In the case that new information is contradictory to their existing belief they tend to distort the new information in order to adjust it to their beliefs and as a result they form misconceptions. In any case students misconceptions should not perceived as a flawed cognitive process but rather as a productive process in which learner attempt to give rational explanations to unfamiliar phenomena (Vosniadou, 1991).

Conclusion and Future Implication

The findings of the present study imply that a significant number of PE student teachers perceived the learning as a transmissive and dimensional process emphasized on the teachers' dominant role. However, the majority of PE student teachers perceived that learners should have an active in the learning process which is constructivist and multidimensional. Interestingly they reported that prefer to implement production teaching approaches although they have not prior experiences with this teaching approach. A rational explanation could be Richardson (2003) findings that curriculum developers should bear in mind that newly qualified teachers could hold constructivist beliefs dogmatically. However, as Fischler, (1994) stressed that could be a distance (gap) between teachers perceptions and teaching practices that they made use.

The findings of the present study suggested that curriculum developers should aim to motivate students in order to seek the lifelong learning through the development of metaconceptual awareness (Vosniadou, 2003). This could be achieved through instructors'

awareness of PE students teachers' misconceptions (Vosniadou, 2007b). Instructors by understanding PE student teachers' misinterpretation should create a learning environment which promotes the discovering of mismatch between their beliefs concerning learning and critical thinking and the prevailing scientific theory (Vosniadou 1991). This could be achieved by learners' active participation in learning process which in turns will promote their self-determined learning. Similarly, considering that learning process occurs in a broader social and cultural context Vosniadou, et al. (2001) suggested that instructors should plan the lesson by providing their students with learning opportunities in a context similar to the learning subject matter. That implies that instructors during practicum should urge their students to implement production teaching approaches. Thus PE students should be informed that each teaching approach lead to specific outcomes and therefore they should apply the most appropriate depending on the context each time. Also following Dyson (2002) suggestion PE student teachers should be informed that the implementation of innovative approaches is not a smooth and simple process but requires a systematic effort on their behalf in order to effective implement them. Also by promoting students initiation and through cooperative learning (Vygotsky, 1978) may help them to understand that production teaching approaches lead to critical thinking and cognitive development. By cooperative learning students it is likely to develop metaconceptual awareness as well.

Also as Vosniadou, et al. (2001) suggested students interaction creates a learning environment in which students with different approaches about a subject matter test their personal beliefs and gradually could revised them. This way instructor should help them to modify their learning process setting as ultimate goal to form faster scientific mental models (Vosniadou, 2007b).

Finally, along with the aforementioned strategies instructors should enable PE student teachers to understand that motor learning development is one of PE lessons goal

but the only one. According to PE curriculum, PE teachers should contribute not only to students' motor skills development. Besides movement or knowledge reproduction lead students to limited motor and cognitive performance (McBride, Gabbard, & Miller, 1990). Instead PE teacher has to fulfill the multidimensional criteria have been established by policy makers and aim at students' cognitive, affective, social-moral and physical development. Consequently, it can be said that the majority of PE lesson goals could be achieved effectively through production teaching approaches but not only with them.

The present study was a first attempt to PE student teachers' presuppositions, beliefs and mental models which play a determinant role on their teaching choices. However, a future study should shed a light on PE student teachers' motivation and personal traits such self-efficacy, self-esteem and perceived control of learning process it is likely to influence their cognitive learning.

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Chapter 5

Study 3

An examination of Greek physical educators' implementation and perceptions of the spectrum teaching styles[4]

Abstract

The main purpose of the present study was to examine Greek physical education teachers' use of the Spectrum of teaching styles and perceived benefits of the styles for students. An additional goal was to explore the influence of the teachers' perceived ability to use and beliefs about teaching styles on the implementation of these teaching approaches. The participants of the study were 219 (132 males, 87 females) physical education (PE) teachers. The PE teachers reported using the command, inclusion, and practice styles more often than and the self-check, learner-initiated, and self-teaching styles in their own teaching. The PE teachers also perceived that the reproduction and production clusters of teaching styles to be equally effective in promoting fun, skill learning, and motivation for learning in their students. Results also highlighted that PE teachers' self-perceived ability had the highest influence on command style use and the teachers' perceived benefits to students of styles from the production cluster. The findings of the present study suggest that a variety of factors influenced PE teachers' tendency to implement a specific teaching style.

Keywords: Teaching styles, physical education, perceived ability, student outcomes

[4] *European Physical Education Review*

Mosston and Ashworth's (2002) Spectrum of teaching styles is a teaching framework widely known and implemented by physical educators. Sanchez and her colleagues (2012) describe it as a 'tool box' which provides physical education (PE) teachers alternative options for addressing student diversity and accomplishing multiple PE goals. Mosston and Ashworth (2002) classified the teaching styles with production and reproduction clusters based on students' and teachers' involvement in the learning process. Styles A-E are representative of the reproduction cluster because students are mainly asked to "reproduce known knowledge, replicate models, and practice skills" (Mosston & Ashworth, 2002, p. 9). Teacher involvement in the learning process is high in these five reproduction teaching styles. Styles F-K are representative of the production cluster because the teacher guides the learners in the discovery of knowledge (Goldberger, Ashworth, & Byra, 2012). Student involvement in the learning process is high in these six production teaching styles.

The use of Spectrum of teaching styles

Since the Spectrum was devised by Mosston (1966) and extended by Mosston and Ashworth (2002) substantial research has been conducted to explore the utility of this instructional framework. Previous literature has acknowledged the pedagogical merit of the Spectrum but reinforces that teachers will often employ styles in a hybrid manner rather than as a unique approach (Tinning, 2010). Furthermore, many of the studies exploring the influence of Spectrum teaching styles in classroom instruction have not adequately matched subject content with the compatible style (Chatoupis, 2010).

In the context of teaching practices in physical education, Chatoupis (2009) proposed there is ample room to explore the effects of Spectrum styles on student learning outcomes in physical education. In prior investigations researchers have examined the

influence of the reproduction teaching styles on motor skill acquisition (Jenkins & Byra, 1997; Kolovelonis, Goudas, & Gerodimos, 2012), on learning (Ernst and Byra, 1998), and on skill evaluation (Glodberger and Gerney, 1986). Similarly, researchers have studied the extent that the production teaching styles can influence students' critical thinking (Chatoupis, 2013; Cleland & Pearse, 1995; Cleland, Helion, & Fry, 1999). As yet, in only a limited number of studies has the influence of Spectrum teaching styles on behaviour-related objectives been examined. For example, Goudas et al. (1995) explored the extent that teaching styles can facilitate and constrain motivational climate in PE. Morgan, Sproule, & Kingston. (2005) assessed the influence of direct and indirect teaching styles on motivational climate and students' motivation. Continuing clarification of the association between the implementation of particular styles and students' academic, social, and physical development should remain key priorities in Spectrum research.

Although researchers are beginning to understand the impact that the Spectrum teaching styles have on learners' social, cognitive and motor behaviours, the majority of investigations have typically focused on the extent to which spectrum based teaching approaches are explicitly used in the PE setting and PE teachers' perceptions of the spectrum styles used. More specifically, previous findings indicate that PE teachers in both rural (Curtner-Smith & Hasty, 1997) and urban schools (Curtner-Smith et al., 2001) in the U.K. implemented direct teaching approaches more often than indirect. The findings of two comparable studies also revealed that American (Kulinna & Cothran, 2003) and Finnish PE teachers (Jaakkola & Watt, 2011) rated styles from the reproduction cluster in their most preferred styles with the only exception from the production cluster being the divergent production teaching style. In addition, PE teachers from both countries perceived reproduction styles to be more beneficial to their students than production styles. Specific consideration of cultural influences regarding the Spectrum were highlighted in a cross-

cultural study that included PE educators from France, the U.S., South Korea, Portugal, the U.K., Canada, and Australia. The findings revealed a wide variety and different teaching styles being used by physical educators in these countries. However, the international cohorts of PE teachers clearly indicated country-specific tendencies in the use of and beliefs about the Spectrum styles. Korean and Portuguese PE teachers preferred the use of reproduction styles (command and practice style) compared to British, Canadian, and Australian PE teachers who reported greater use of production teaching styles. However, in most cases, PE teachers perceived reproduction teaching styles as more beneficial for their students. SueSee and Edwards (2011) also found that although a sample of PE teachers in Australia reported implementing a wide range of styles, observational recordings of their teaching, did not support their self-reports. Results specifically identified that PE teachers occasionally implemented the command, reciprocal, self-check and convergent discovery teaching styles, whereas the practice style still dominated their teaching repertoire.

An alternative perspective of how teachers use the Spectrum was presented by Syrmpas and Digelidis (2014) through findings based on PE student teachers' reports concerning their own experiences with Spectrum teaching styles. More specifically, the results indicated that students perceived Greek PE teachers tending to use reproduction styles more frequently than production styles. Correspondingly, Cothran, Kulinna, and Ward (2000) found that college students in the U.S. reported experiencing teaching styles from the reproduction cluster most frequently in their PE classes. The impact of this type of finding and the continued emphasis of the reproduction styles in teachers' professional practice reinforces that PE teachers' prior beliefs and experiences play an important role in their knowledge construction (Richardson, 1997). Curtner-Smith (1999) suggested that PE teachers' teaching perceptions are heavily influenced by their prior experiences in K-12

physical education. Similarly, Syrmpas and Digelidis (2014) also proposed that PE student teachers' school experiences influence their future teaching choice.

Finally, Cothran and Kullina (2008) suggested that PE teachers' needs for achieving course control, time management and promoting students' knowledge are important factors that urge them to rely more on the reproduction teaching styles. Despite the growing demand to incorporate a wider range of teaching approaches to meet the multidimensional goals of PE, the general findings from use oriented studies support the notion that styles from the reproduction cluster dominate the instructional environment in PE.

Educational reform and the Spectrum in Greece

A series of top-down reforms in Greece (HMERA, 1990; 2003; 2006) were designed to align the PE curriculum with the prevailing educational trends in U.S. (NASPE, 1995, 2004; SHAPE, 2014) and U.K. (DES, 1992; 1995; DFEE, 2000). The general aim of PE lessons in compulsory education is to promote students' physical, psychological, and cognitive development and assist in their social integration. PE in Greece is compulsory for all school students. Students participate in physical activities two hours per week in compulsory education, and one hour per week in high schools. A specific curriculum focus on students' motor development is proposed to support improvements in fitness and health and the adoption of physical activity as a lifelong habit (HMERA, 2003).

In 2006 the educational authorities in Greece (HMERA, 2006) modified the PE syllabus to promote students' lifelong physical activity and a healthy lifestyle by implementing self-regulation techniques and through the development of life skills (Goudas et al., 2006; Theodorakis et al., 2006). Additionally, the Spectrum of teaching styles became an integral part of the amended Greek PE curriculum, assisted by the

provision of a revised school based program to teachers and updated textbooks to students (e.g. Digelidis et al., 2006; Papaioannou et al., 2007). The PE teacher resources included, amongst other materials, ready-made the Spectrum-based lesson plans. It is important to note that most Greek PE teachers had had no previous undergraduate or professional development experiences with or knowledge of Spectrum teaching styles prior to 2000. Recent acquisition of Spectrum knowledge has occurred through the use of the PE guidelines books and participation in optional seminars or workshops. Current undergraduate studies now include courses aimed at enhancing PE student teachers' knowledge and ability to teach in accordance with the Spectrum of teaching styles theory. Finally, the influences of existing curriculum trends on PE teachers' practices in Greece are yet to be appraised. This type of evaluation should be considered in relation to previous findings that revealed recommendations made as a part of the NCPE have not influenced PE teachers' instructional choices nor expanded their teaching repertoire (Curtner-Smith & Hasty, 1997; Curtner-Smith et al., 2001).

The purpose of the study

The purpose of this study was to explore Greek PE teachers' and student teachers' self-perceptions about the use and benefits to students of Spectrum teaching styles. More specifically, the study was designed to examine the following research questions: (a) What Spectrum teaching styles do Greek PE teachers use?; (b) Do perceptions of use of Spectrum teaching styles differ among PE teachers?; (c) Do Greek PE teachers differ in their overall perceptions of the educational benefits to students (having fun, learning, and being motivation) of the Spectrum teaching styles? (d) Do Greek PE teachers' perceptions of ability to implement Spectrum teaching styles influence their use of Spectrum teaching styles?

Methodology

Participants and Data Collection

The participants in the present study were 219 Greek PE teachers (132 males and 87 females). One hundred and seventeen of the teachers (53%) worked in elementary schools, while 102 (47%) worked in middle and high schools. A significant number of those PE teachers (N = 44) held a postgraduate degree. The majority of the participants (155) were recruited through professional development meetings in different areas of Greece and following their provision of consent they participated voluntarily in the study. Oral and written instructions were provided and each participant completed the questionnaire anonymously. In order to recruit an additional number of participants a web questionnaire was designed that was an exact copy of the hardcopy questionnaire. An email was sent to 100 PE teachers who were members of the educational union. The email included a short guide for completing the online questionnaire and an assurance that their responses will remain anonymous. Sixty four of the email recipients submitted the online format of the questionnaire. Data collections were conducted after receiving the ethical approval from Ethics Committee of the University.

Instrument

A Greek language adaptation of Kulinna and Cothran's (2003) Spectrum teaching styles questionnaire was used in the current study. Brief descriptive scenarios for each teaching style (A-K) were included on the questionnaire followed by five statements each of which was answered using a 5-point Likert response scale anchored at the extremes. The first statement that the participants reported on related to their experiences with each teaching style, the second, third, and fourth statements to their beliefs about the benefits to students of each teaching style, and the final statement to their ability to implement each teaching style. Following are the five statements and scales used: (a) I implement this teaching style in the physical education lesson (never–always); (b) I think this way of teaching would

make class fun for students (strongly agree-strongly disagree); (c) I think this way of teaching would help students learn skills and concepts (strongly agree-strongly disagree); (d) I think this way of teaching would motivate students to learn (strongly agree-strongly disagree); and (e) My teaching ability to implement this style is: (poor ability-exceptional ability). Demographic information was gathered from each participant about gender, teaching experience, source of knowledge about the Spectrum of teaching styles, and for the teachers, the level of school taught (i.e., elementary, middle, or high school).

Data treatment analysis

Prior to analysis the data were examined for accuracy of data entry, missing values, fit distribution, and univariate and multivariate outliers. More specifically, normality was checked for each cell of the analysis (i.e., skewness and kurtosis > 2.58). Univariate outliers were examined by using *z* scores > ± 3.29. Also, multivariate outliers were detected by using the Mahalanobis distance method with $p < .001$ (Tabachnick and Fidell, 2007).

Mean and standard deviation scores were calculated to describe teachers 'experience with each teaching style, perceived ability to implement, and teachers' perceptions of students having fun, learning, and being motivated for each teaching style. Construct validity of the scale was analyzed by Confirmatory Factor Analysis (CFA) using AMOS version 20 software. In the CFA model, only the perception items (2–4 of each style) were used. Cronbach's alpha reliability coefficients were estimated for all items related to teachers' perceptions of teaching styles.

Differences in PE teachers' experiences with the various teaching styles and their overall perceptions of benefits to students, as related to age, gender, teaching experience, and school level, were examined by performing separate MANOVAs and post hoc tests. For the analysis of PE teachers' perceived overall benefits for students statements two,

three, and four (having fun, learning, and being motivated) were grouped to form a new variable for each teaching style. A repeated measures ANOVA was conducted to analyse the PE teachers' perceptions about students having fun, learning, and being motivated.

Hierarchical regression analyses were performed for each teaching style, where the reported use of the teaching style was the predicted variable, and PE teachers' perceived ability to implement each teaching style and their perceptions of each style were the predictor variables. Perceived teaching ability was entered as the first step of the analysis and PE teachers' perceptions for fun, learning and motivation as the second step.

Results

The missing value analysis revealed that the data were randomly missing (p = .97). The total number of missing values in each case was less than 5%. Therefore, following Tabachnick and Fidell's (2007) guidelines, mean scores were used to replace the missing data. Eight cases with extremely high z scores were identified as univariate outliers and were deleted. Finally, through the Mahalanobis distance analysis 10 of the multivariable outliers ($p < .001$) were found and subsequently deleted leaving 219 cases from the initial 237 intact for the final analyses. The findings of Confirmatory Factor Analysis (CFA) demonstrated that the data were a good fit for the 11-factor structure teaching styles model (NC = 1.439, TLI = .962, CFI = .969, RMSEA = .042). All goodness-of-fit indices were above accepted levels (Marsh et al., 2004) demonstrating good construct validity of the Greek version of the questionnaire form. Cronbach's alpha coefficients for the items 2–4 of each style (perception items) varied between .87 and .94 indicating high internal consistency.

MANOVA contrasts for teaching styles use

Descriptive statistics revealed that the PE teachers used the command, inclusion and practice teaching styles most frequently and the learner's individual designed program,

learner initiated, and self-teaching styles infrequently (see Table 1). MANOVA results showed a significant multivariate effect for PE teachers' ability to implement different teaching styles (F[11,207] = 2.70, p < .05, η_p^2 = .12). Subsequent post hoc tests indicated that PE teachers with higher scores on perceived teaching ability to use the Spectrum teaching styles implement the inclusion (F[1,217] = 12.54, p < .001, η_p^2 = .05) and convergent discovery (F[1,217] = 12.80, p < .001, η_p^2 = .06) teaching styles more often compared to the PE teachers who scored themselves lower on perceived teaching ability. Results of the MANOVA for the school level variable revealed a significant effect (F[11,207] =2.72, p < . 01, η_p^2 = .13). Post hoc polynomial contrasts showed that the elementary school PE teachers used the practice (F[1,217] = 7.40, p < .01, η_p^2 = .03), self-check (F[1,217] = 9.75, p < .01, η_p^2 = .04) and divergent discovery (F[1,217] = 4.45, p < .05, η_p^2 = .02) teaching styles more often than the middle school and high school PE teachers. MANOVA results for gender, teaching experience, and age of PE teachers showed no significant differences in relation to teachers' self-reported use of teaching styles.

Descriptive statistics presented in Table 1 showed that PE teachers perceived the inclusion, the practice and the command teaching styles as most beneficial for their students and learner-designed individual program, learner-initiated, and self-teaching styles least beneficial. Examination of the univariate analysis showed statistically significant effects for perceived teaching ability level in relation to perceived benefits to students for the guided discovery (F[1,217] = 15.51, p < .001, η_p^2 = .07), practice (F[1,217] = 21.60, p < .001, η_p^2 = .09), self-teaching (F[1,217] = 14.18, p < .001, η_p^2 = .06), learner-designed individual program (F[1,217] = 7.51, p < .01, η_p^2 = .03), learner-initiated (F[1,217] = 7.60, p < .01, η_p^2 = .03), self-check (F[1,217] = 4.23, p < .05, η_p^2 = .02), inclusion (F[1,217] = 7.42, p < .01 η_p^2 = .03), command (F[1,217] = 15.22, p < .001, η_p^2 =

.07), and convergent discovery (F[1,217] = 27.79, p < .001, η_p^2 = .11) teaching styles. The descriptive results for the set of significant differences indicated that PE teachers with higher scores on their self-reported teaching ability perceived teaching styles to be more beneficial (having fun, learning, and being motivated) for their students.

Table 2 *Means and Standard Deviation for Greek PE teachers.*

		Use of teaching styles		Perceived teaching ability		Overall perceived benefits	
	Teaching Styles	M	SD	M	SD	M	SD
A	Command	3.66	0.87	4.50	0.70	12.26	2.18
B	Practice	3.11	0.94	4.36	0.73	12.36	2.06
C	Reciprocal	2.43	1.04	3.90	0.94	11.00	3.12
D	Self-check	2.20	0.98	3.80	1.02	10.40	2.99
E	Inclusion	3.55	1.06	3.50	1.15	12.51	2.10
F	Guided Discovery	2.80	0.97	3.94	0.87	11.62	2.42
G	Convergent Discovery	2.63	0.93	3.91	1.01	11.23	2.52
H	Divergent production	2.77	0.94	4.00	0.92	11.75	2.47
J	Learner designed individual program	2.13	1.02	3.72	1.11	10.25	2.94
I	Learner- initiated	1.90	1.00	3.51	1.10	10.25	3.20
K	Self-teaching	1.74	0.86	3.50	1.08	8.92	3.37

Regression analysis of teaching style use and perceived benefits

Hierarchical regression analyses explained variances of PE teachers' perceived ability to implement each teaching style for their reported use of the 11 teaching styles. The regression scores ranged from .02 to .23. In addition, the relationship between the PE teachers' perceived ability to implement and perceptions about benefits to students (having fun, learning, and being motivated) for each style resulted in explained variances ranging from .21 to .51. The reported use of command (β = .32) and convergent discovery (β = .23) were the teaching styles best explained by PE teachers perceived ability. PE teachers who perceived fun as more beneficial for students implemented practice (β = .25), reciprocal (β = .39), guided discovery (β = .20), learner –designed individual program (β = .28), and learner-initiated program (β = .29). The reported use of self-check (β = .25) and divergent discovery (β = .23) teaching styles were best explained by PE teachers' perception that these teaching styles promoted students' learning. Finally, PE teachers who perceived motivation as more beneficial for students were more willing to implement self-teaching (β

= .26) and inclusion (β = .26) teaching styles. The results of the hierarchical regression analyses are presented in Table 2.

Table 3 *Hierarchical Multiple Regression Analysis Predicting Teaching Styles Use From Perceived Ability, Fun, Learning and Motivation*

Teaching style	Step	Predictor	*B*	*SE B*	β	R^2	ΔR^2
Command	1	Perceived ability	.05	.08	.41***	.17	-
	2	Perceived ability	.41	.10	.32**		
		Fun	-.12	.11	-.12	.21	.04 (p<.01)
		Learning	.16	.13	.13		
		Motivation	.22	.15	.20		
Practice	1	Perceived ability	.53	.09	.37***	.13	-
	2	Perceived ability	.21	.09	.15*		
		Fun	.36	.41	.25**	.30	.17(p<.001)
		Learning	.09	.09	.07		
		Motivation	.26	.41	.20		
Reciprocal	1	Perceived ability	.47	.07	. 43***	.18	-
	2	Perceived ability	.20	.06	.18**		
		Fun	.39	.11	.39***	.51	.33(p<.001)
		Learning	.32	.11	.34**		
		Motivation	-.09	.11	-.09		
Self-check	1	Perceived ability	.39	.06	.40***	.16	-
	2	Perceived ability	.18	.07	.19**		
		Fun	.07	.11	.07	.40	.24(p<.001)
		Learning	.24	.11	.25*		
		Motivation	.22	.12	.23		
Inclusion	1	Perceived ability	-.14	.06	-.16*	.02	-
	2	Perceived ability	-.30	.06	-.33***		
		Fun	.09	.14	.07	.21	.23(p<.001)
		Learning	.31	.16	.23		
		Motivation	.36	.16	.26*		
Guided discovery	1	Perceived ability	.34	.07	.30***	.09	-
	2	Perceived ability	.09	.07	.07		
		Fun	.23	.10	.20*	.29	.20(p<.001)
		Learning	.22	.12	.18		
		Motivation	.25	.13	.19		
Convergent discovery	1	Perceived ability	.44	.06	.48***	.23	-
	2	Perceived ability	.21	.06	.23***		
		Fun	.23	.12	.21	.40	.17(p<.001)
		Learning	.17	.12	.17		
		Motivation	.14	.13	.13		
Divergent production	1	Perceived ability	.36	.07	.35***	.12	-
	2	Perceived ability	.14	.06	.14*		
		Fun	.02	.11	.02	.38	.26(p<.001)
		Learning	.33	.13	.31*		
		Motivation	.26	.13	.24		
Learner's individual program	1	Perceived ability	.33	.05	.33***	.11	-
	2	Perceived ability	.13	.05	.13*		
		Fun	.26	.09	.28*	.32	.21(p<.001)
		Learning	.21	.12	.12		

		Motivation	.02	.12	.13		
Learner initiated	1	Perceived ability	.33	.06	.37***	.14	-
	2	Perceived ability	.13	.06	.14*		
		Fun	.26	.10	.29**	.36	.22(p<.001)
		Learning	.21	.12	.24		
		Motivation	.02	.12	.02		
Self-teaching	1	Perceived ability	.22	.05	.28***	.08	-
	2	Perceived ability	.01	.05	.01		
		Fun	.15	.06	.21*	.34	.26(p<.001)
		Learning	.11	.09	.16		
		Motivation	.18	.09	.26*		

(* p < .05, ** p < .01, *** p < .001)

Discussion

In the present study Greek PE teacher's use of the Spectrum teaching styles and perceived benefits of each style to their students (i.e., having fun, learning, being motivated) were examined. An additional goal of this study was to explore the influence of their perceived ability and perceived benefits of using teaching styles on the implementation of these teaching approaches.

PE teachers reported they used a wide variety of teaching styles in their PE lessons, however, scores revealed the use of teaching styles from the reproduction cluster more frequently than styles from the production cluster. Specifically, PE teachers indicated greater use of the command, inclusion and practice teaching styles compared to the self-teaching, learner-initiated, and learner-designed individual program teaching styles. However, several styles did not follow this cluster trend. The findings indicate that the PE teachers used the guided discovery, divergent discovery, and convergent discovery teaching styles more often rather than teaching styles from the reproduction cluster such as the reciprocal and self-check. Findings from previous studies support the perspective that there is a preference to implement the divergent discovery instructional approach rather than other teaching styles from the production cluster (Cothran et al., 2005; Jaakkola & Watt, 2011; Kulinna & Cothran, 2003).

Curtner-Smith (1999) suggested PE teachers' background and schooling experiences play important roles in the formation of their professional profile. The Greek PE curriculum has only recently extended its content to incorporate the full range of Spectrum styles so it can be assumed that the school experiences of the majority of PE teacher participants were likely associated with participation in traditional games and activities primarily delivered using direct instructional approaches (command and practice Spectrum teaching styles). Consequently, the likelihood exists that the influence of prior experience has led to the adoption of traditional direct instructional approaches (Lawson, 1986). It is also possible that PE teachers involved in the present study who typically utilise reproduction styles may have prioritised class control, an attribute normally linked with linked with direct teaching approaches (Cothran & Ennis, 1997; Cothran & Kulinna, 2008; Curtner-Smith, 2001). The current findings reflect a similar teaching pattern demonstrated in previous studies (Jaakkola & Watt, 2011; Kulinna & Cothran, 2003) in which the implementation of reproduction teaching styles fosters teacher decision making while limiting student decision making. Therefore, the use of reproduction teaching styles can be perceived as teachers adopting a pedagogical framework to facilitate greater control of the learning environment (Thorburn & Collins, 2003). The PE teachers' rationale to rely on the command and practice styles reflects the applied Spectrum perspective that reproduction teaching styles are the ideal approaches for achieving subject matter objectives such as time management, behavioural objectives such as class control (Mosston & Ashworth, 2002), and promoting a controlled learning context (Byra, 2006). Furthermore, the Greek PE teachers' preference for implementation of the reproduction teaching styles could also stem from their focus on other instructional elements such as promoting students' skill acquisition (Byra, 2000) and developing students' knowledge (Cothran & Kulinna, 2008).

The results of the present study partially support the findings from a previous investigation (Jaakkola & Watt, 2011) where higher levels of perceived ability to teach were found to be associated with the implementation of a larger range of teaching styles. PE teachers in the current study who reported higher perceived teaching ability to implement Spectrum teaching styles only indicated they used the inclusion and convergent discovery teaching styles more frequently. Although these teaching styles are situated within different clusters, the inclusion style of teaching provides students much opportunity for decision making and is situated next to the discovery threshold, the line that separates the reproduction and production clusters (Mosston & Ashworth, 2002). However, the results of the regression analyses showed that PE teachers' perceived ability appears to be an important factor but not the sole factor that may influence the implementation of the majority of the teaching styles. This is exemplified by the finding concerning the inclusion teaching style, in which the use of this approach was not influenced by PE teachers' perceived ability but rather from their perception that this specific style promotes students' motivation for learning. PE teachers' choice to implement various teaching styles in many cases appears to be influenced by their willingness to promote their students' fun, learning, or motivation in relation to that particular style. This reinforces the proposition that PE teachers attribute different features to each teaching style in relation to both personal and students' contexts.

According to the Greek PE curriculum (HMERA, 2003) students should be learning to efficiently perform a broad variety of skills from different sports. It could be proposed that although Greek PE teachers perceived themselves capable of implementing production teaching styles they tended to consistently use reproduction styles because they perceived them as more effective for students' skill learning. If this is the case, the findings seem to confirm Green's (2008) suggestions that personal, contextual, and situational

variables urge PE teachers to adopt reproduction teaching approaches. In this particular case, the Greek PE curriculum, which aims to improve students' skill learning through the performance of a wide variety of skills, could be perceived as a contextual factor, whereas, PE teachers sporting background could be perceived as a personal factor. Since teaching styles from the reproduction cluster dominate the practice setting in sports (Mallett, 2004), it should not be surprising that teachers, many of whom coach, would also use these same teaching styles to teach their students in PE classes.

Interestingly, PE teachers' perceptions of the benefits to students of each teaching style revealed that although they rated the reproduction teaching styles as more beneficial, they reported, in most cases, that the production teaching styles were similarly beneficial to their students. Noteworthy was the fact that PE teachers' reports revealed a trend to perceive problem solving teaching styles as highly beneficial for their students and to more frequently implement these styles. However, the above findings are contradictory to the reported use of teachings styles from the production cluster and raises questions about the underlying reasons that lead PE teachers to rarely implement teaching styles from the production cluster. In previous studies (Cothran et al., 2005; Jaakkola & Watt, 2011; Kulinna & Cothran, 2003) researchers have shown that PE teachers extensively use teaching styles from the reproduction cluster so it may be that PE teachers formed the belief that reproduction cluster of teaching styles is more effective irrespective of their reported perception that the production cluster of styles was of benefit to their students.

Findings of the present study are broadly aligned with Tinning's (2010) implications that the Spectrum of teaching styles represents a useful continuum of strategies that can be used in a contextual and discretionary manner. PE teachers will typically consider different self- or student-related characteristics when using each teaching style rather than simply implementing a style as proposed within the Spectrum

framework. Thus, the Spectrum of teaching styles is an approach that could be linked with the planning decisions PE teachers undertake based on their knowledge of pupils' skills and lesson content, which according to Tinning (2010) are characteristics of good teaching. This interpretation is supported by Goldberger, Ashworth, and Byra (2012) who suggest that the selection of teaching styles varies among teachers and is dependent on the lesson goal or the learning priority that is set by the teacher relative to the student outcome characteristic being prioritised.

The present study was an initial attempt to identify the variety of teaching styles being implemented in the Greek PE context. Basic findings have been generated that can now assist researchers to understand the underlying reasons as to why PE teachers might use specific teaching styles. In future research it would be beneficial from the incorporation of the direct observation of teachers to provide objective evidence of the teaching styles that are actually executed in Greek PE classes. This approach may overcome the limitation of self-reporting the use of teaching styles.

In conclusion, the findings of the present study revealed that PE teachers reported that they implemented a wide variety of teaching approaches. Even though, PE teachers' perceived teaching styles from both clusters to be equally beneficial to students, they reported using teaching styles from the reproduction cluster more than the production cluster. According to Postareff and her colleagues (2007), undergraduate pedagogical studies can be considered as a short period of professional preparation and possibly not long enough to influence future educators in adopting a new set of instructional strategies like the Spectrum production teaching styles. Student teachers do not enter programs of higher education "tabula rasa" (void of knowledge); they enter with many beliefs about teaching already formed from prior experiences During undergraduate studies they should be influenced by a wide variety of teaching methods, however, limited exposure of PE

student teachers to innovative teaching may impair the full development of their in-service pedagogical approach (Entwistle & Peterson, 2004). Therefore, policy makers should consider the implementation of teacher training courses that will systematically promote the reconstruction of student teachers' naïve beliefs and modes of learning (Vosniadou, 2003). Additionally, it would likely be helpful for both early career and experienced PE teachers, as a part of their professional development, should participate in courses that target the construct of teaching styles and the practical application of each approach.

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Chapter 6

Study 4

Physical Education Teachers' Experiences and Beliefs Concerning Production and Reproduction Teaching Approaches.

Abstract

The purpose of the present study was to examine physical education teachers' beliefs concerning production and reproduction teaching approaches. An additional objective was to explore the goals of the physical education lessons that they prioritize, and the teaching approach that they believe that promotes the achievement of each goal. Finally, the study aimed to identify participants teaching preferences and the underlying reasons that support these choices. Ten physical education teachers (male = 5 and female = 5) participated in the research, two of them holding a postgraduate degree. Their teaching experience varied between 10 and 25 years. The qualitative analysis results indicated that the majority of teachers more often implement reproduction rather than production approaches regardless the school level. Participants reported that they perceived themselves as self-efficacious to implement both teaching approaches. The findings revealed that there is pattern between the physical education class goals they set as top priority and their teaching preference. Furthermore, a variety of factors that can influence their teaching preferences such as course control, time management, active time, discipline and responsibility were identified.

Keywords: Teaching styles, learning, curriculum goals, self-efficacy.

Previous research examining teaching quality in the physical education context reported that physical education (PE) teachers set measurable and well defined goals and systematically attempted to design and deliver a lesson plan aimed at achieving these goals (Gallahue & Cleland-Donnelly, 2007). These goals are likely to vary from country to country. The U.S. government has established standards, through the National Association of Sport and Physical Education the National Physical Education (NASPE 2004), to which physical education teachers should promote their students motor skills acquisition, cognitive learning, physical activity levels enhancement and affective learning. In the U.K. on the other hand National Curriculum Physical Education (NCPE) introduced in 1992 (Department of Education and Science and the Welsh Office 1992), modified in 1995 (Department for Education, 1995), and revised in 2000 and 2003, operates in relation to four established goals. More specifically, physical education should promote motor skills acquisition and development, critical thinking development, development of performance evaluation and cognitive development.

Physical education in Greece is designed to promote students' physical, motor, mental, social and moral development in order to embrace physical activity as a lifelong habit (Hellenic Ministry of Education and Religious Affairs 1990). However in vocational education a specific curriculum was designed aiming at the improvement of students' fitness and health through their motor development and the adoption of a physical activity lifestyle (HMERA, 2003). The Greek Ministry (HMERA, 2006) also modified the PE syllabus to promote students' engaging in a healthy and active lifestyle by implementing self-regulation techniques and through the development of life skills (Goudas *et al*. 2006, Theodorakis *et al.* 2006). Subsequent to these changes an innovative course was introduced to the Greek high schools. The "Research Project" course was guided by the following pedagogical values: a) Inquiry based learning; b) Interdisciplinary

teaching-cooperation; c) Differentiated teaching for personalized learning; and (d) Cooperative learning. More specifically, the implementation of this course encourages PE teachers to facilitate students' interdisciplinary knowledge through the cooperation in small groups by promoting their initiation, experimentation, personal and social responsibility. (HMERA, 2011).

The aforementioned goals highlight that the PE lesson constitutes a multidimensional environment that necessitate the implementation of various teachings methods in order to accomplish these goals. Mosston and Ashworth's Spectrum of teaching styles can be seen as a "tool box" which could help physical education teachers cope with students' diversity and additionally to achieve PE curriculum goals (Sanchez *et al.* 2012). The Spectrum is comprised of at least eleven teaching approaches, each one of them leads to different learning outcomes (Goldberger *et al.* 2012). Previous literature has proposed a range of different perspectives and orientations of the Spectrum. For example, the Spectrum of teaching styles has been perceived as a continuum in which decisions shift between teacher and students (Mosston and Ashworth 2002). Additionally, Mosston and Ashworth (2002) identified two clusters of teaching styles (reproduction and production). The first cluster was characterized as reproduction because students mainly reproduce the information or skills that the physical education teacher delivers or demonstrates to them and is based on memory recall (Mosston & Ashworth, 2002). Whereas the production cluster included teaching approaches in which the physical education teacher stimulate students to produce knowledge or skills and is based on discovery (Goldberger Goldberger, Ashworth, & Byra, 2012).

The Greek Ministry in order to help teachers and students to cope with the multidimensional goals of the enriched PE curriculum incorporated the spectrum of teaching styles as a part of both a revised school based program for teachers (Papaioannou

et al. 2007) and within the updating of student textbooks (e.g. Digelidis *et al.* 2006). The PE teacher resources included, amongst other materials, ready-made spectrum-based lesson plans. It is important to be noted that most Greek PE teachers were not familiar with Spectrum of teaching styles prior to 2000, when it became integral part of the Greek PE academic curriculum. Since then undergraduate studies have included theoretical and practical course content related with spectrum framework theory. Taking into consideration that most PE teachers were qualified before this period then it could be supposed that their knowledge regarding spectrum has occurred through the use of the PE guidelines books and participation in optional seminars or workshops. At this point it should be noted that the in-service training for PE educators in Greece is optional, however newly qualified PE teachers are obliged to attend an intensive workshop before they can be recruited into schools.

Researchers proposed that NASPE goals (Garn & Byra, 2002) can be achieved through the Spectrum of teaching styles. Similarly, NCPE goals' achievement demand the use of a broad range of teaching approaches (Goldberger & Howarth, 1993, Mawer, 1993). However, the findings of studies (e.g., Curtner-Smith *et al.* 2001; Curtner-Smith Hasty, & Kerr, 2001) revealed that the NCPE reform was not acting as a catalyst in changing physical education teachers' choices in accomplishing the multidimensional goals of the National Curriculum. PE teachers' pedagogical choices are influenced by a variety of factors. According to Lawson's theory on occupational socialization (1983a, b) the socialization period is divided into three stages, acculturation, professional, and organizational (Lawson, 1983a). Acculturation period is the most influential period on PE teachers' personality. During this period a person constructs his/her knowledge and beliefs about teaching approaches, course content, and instructional perspectives. Therefore, the

conclusion to be reached is that PE student teachers enter university teacher preparation programs already having formed an initial professional profile.

Previous findings highlighted that physical education teachers typically resort to reproduction rather than production teaching approaches (Cothran *et al.* 2005, Cothran, Kulinna, & Ward, 2000; Curtner-Smith, *et al.* 2001; Jaakkola & Watt, 2011; Kulinna & Cothran, 2003). Self-reports studies of use, also reinforce that physical education teachers perceived reproduction teaching styles as more beneficial for their students (Cothran *et al.* 2005, Jaakkola & Watt, 2011).

Nevertheless, there might be a distance between physical education teachers' reports about the use of teaching styles and the reality. For example, a study conducted in Australia, based on physical education teachers' reports, and revealed that a variety of teaching styles were implemented in the physical education context (SueSee & Edwards, 2011). However, field observation and video recording of a sample of physical education teachers revealed that they resorted basically to a few reproduction teaching styles. The only exception to this tendency was the implementation of the convergent discovery teaching style. Cothran and Kulinna (2008) explored physical education teachers' knowledge regarding Metzler's direct, peer and inquiry teaching models and the factors that influence their decisions to implement these approaches. The findings revealed that class management, time management and effective learning were the most important factors that influenced their decision to implement direct teaching styles.

Recent research (Syrmpas, Digelidis, & Watt, 2015) indicated that many Greek PE teachers are keen on frequently implementing reproduction rather than production teaching styles. Based on the aforementioned findings it is reasonable to question why Greek physical education teachers, although they perceived reproduction and production teaching approaches as equally beneficial, tend to implement mainly reproduction teaching

approaches. The purpose of this study was to examine PE teachers': (a) beliefs about and the more profound causes that urge them to implement production or reproduction teaching approaches; (b) beliefs concerning the goals of Physical Education curriculum and which of teaching approaches facilitate better each of them; (c) self-efficacy to implement teaching approaches; and (d) sources of knowledge for reproduction and production teaching approaches.

Methods

Participants and Data Collection

The present study involved 10 participants (6 males and 4 females). The PE teachers in the sample were randomly recruited by a list of school of a district in Central Greece. PE teachers from both primary schools (N=5) and secondary (N=5) schools were recruited. Two of them hold a postgraduate degree. Their ages ranged from 45 to 57 years old. Teaching experience levels of the participants varied between 10-25 years. All of them had a coaching experience in a variety of sports. Their participation in this study was voluntarily. Primary and secondary PE teachers taught their students for two sessions of 45 minute lessons each week. Only one primary PE teacher taught in an experimental school and had to teach students four times a week for 45 minutes each time. The study was conducted with the approval of the University Institutional Review Board. Finally, informed consent was received from all participants.

Interview Guide

Procedure

PE teachers responded to the semi-structured interview questions within sessions of approximately 25 to 40 minutes in duration. The data obtained through these interviews were recorded and then transcribed for further analysis. An interview guide was designed in order to explore physical education teachers' experiences and beliefs concerning production and reproduction teaching approaches. More specifically, following Patton's

(2002) instructions, open-ended questions were used concerning their teaching approaches and methods in relation with their background and experience, their knowledge and attitudes. The interview protocol included a short thread of background questions (e.g. teaching experience, sporting background etc.). Additionally, physical education teachers were asked to describe the structure of an ordinary daily lesson. Also, the interview included a short but precise sample with a scenario of each teaching approach (e.g. two photocopies with examples of a physical education lesson plans delivered through practice teaching style and guided discovery respectively). The physical education teachers were asked to describe teachers' and students' role in both scenarios. Furthermore, they were prompted to describe how and on which occasion each teaching approach is more applicable and give rational explanations. Finally, they were asked to report their source of knowledge for these teaching approaches. In order to facilitate participants' confidentiality, a coding process was used. More specifically, names were replaced with the letter A or B, depending on whether the participant taught in elementary or secondary education following by a number. For example, the first interviewee coding was of an elementary PE teacher and coded as A01.

Data trustworthiness

The data trustworthiness established through the implementation of strategies described by Shenton (2004). More specifically, researchers adopted: (a) well-established research methods; (b) random sampling; (c) background, qualifications and experience of interviewers; (d) negative case analysis; (e) peer reviewing; (f) and tactics that help ensure honesty in interviewees. Additionally, LeCompte and Goetz (1982) recommendations were followed, so that threats to study's validity and reliability could be spotted and fully eliminated to any possible extent. More specifically, in order to ensure external reliability, the following strategies were followed: (a) interviews took place in school classrooms or

sport centers, so that respondents could feel comfortable with the physical environment, (b) data were collected during formal discussion after arranging an appointment with each participant.

The framework to establish internal reliability incorporated the random selection of two respondents from the participant group who were invited to confirm that their views as phrased in the interview were accurately transcribed. In addition, a peer reviewer analyzed data so that the threat of any possible bias could be fully eliminated. Finally, a wide range of elicitation methods (e.g., textual and open-ended generative questions) were utilized to support the identification of PE teachers' beliefs concerning approaches to teaching.

Data analysis and coding processes were conducted with the use of the NVivo6 statistic package. Specific qualitative analysis procedures proposed by LeCompte and Preissle (1993) were adopted that included a multi-level thematic analysis incorporating constant comparison and analytic induction to identify common themes representative of all participants. Initially, researchers independently examined and coded the data. Then researchers searched for patterns between the codes. The emerging themes jointly reviewed and in those cases that disagreements come through they argued and then come to agreement. Finally, a list of themes were developed and named (Braun & Clark, 2006). Consequently a negative case analysis was conducted in order to be confirmed the themes emerging from data analysis.

Results

The main intent of the present analysis was to identify the underlying reasons that influence PE teachers to rely on teaching styles from the reproduction and production clusters. PE teachers' statements elicited a variety of factors that guide their decision to rely on specific approaches. Thematic analysis identified the following main themes that are reported in these results: (a) Learning as a transmissive or a constructivist process; (b)

PE teachers' style preferences lesson goals and effective teaching approach; (c) Contradictory beliefs about the factors influencing implementation teaching approaches; (d)Perception that production teaching approaches promote students' motivation and autonomy; (e) PE teachers' self-efficacy to implement each teaching approach; and (f) Sources of knowledge

Learning as a Transmissive or a Constructivist Process

The findings of the present study suggested that the majority of PE teachers (A01, A02, A04, B01, B02, B03 and B05) held the belief that learning is rather a constructivist than a transmissive process. For example B03 stated:

> Students should self-act. PE teacher should plan the lesson in such a way that his/her students could explore the correct answer to a given problem or situation. Then they will never forget the answer, otherwise if you give the answer they will forget it'.

However three of them (A03, A05 and B03) believe that learning is a transmissive process where PE teachers' authority acts as a catalyst on students learning. As A05 reported:

> It is not possible students to learn without my guidance. Especially in elementary school the majority of students do not have the cognitive and the motor background, but mainly the cognitive to confront with difficulties and give rational explanation to a given problem. Thus PE teacher should be the source of knowledge.

PE Teachers' Style Preferences

A major trend in the results highlighted that most PE teachers use reproduction teaching methods more frequently although they reported that production teaching methods are equally or more effective for achieving explicit teaching goals. More specifically, seven PE teachers reported that they prefer to be the main source of knowledge and their students simply to reproduce the new information. Four of them who

teach in the primary education system (coded A01, A03, A04, and A05) and three who teach in secondary education system (coded B01, B03, B05) stated that they delivered PE lesson mainly through reproduction teaching approach. For example, A01 PE teacher reported: “During lesson I convey the knowledge to my students and I always try to organize a structured lesson because in my opinion this way I can effectively facilitate the learning process”.

Also, one of them (A04) point out that he implement more frequently reproduction teaching approach, however, he delivers occasionally in fourth, fifth and sixth class, the lesson through production teaching approach. He stated that:

> PE teacher should combine both methods... for example, recently I appointed as a task to learn about winter Olympic game, while I ask sixth graders to self-evaluate their behavior based on their textbook. Students’ autonomy assists students’ learning, but when students are unfamiliar with a teaching skill or concept then students have to follow my instructions.

In contrast a primary physical education teacher (A02) and two secondary physical education teachers (B02, B04) reported that they more frequently implemented production than reproduction teaching approaches. For example, A02 PE teacher reported that:

> Firstly, I make use of reproduction teaching approach in first and second grades and then progressively move to production teaching approach… in any case when I demonstrate a skill I use to ask them to express their opinion e.g. did I perform well or not the skill and why?

Similarly B02 PE teacher stated: “In my point of view learning should be based on students’ effort and in no case on PE teachers’ authority. Student should discover knowledge… also students that way are likely to enrich my knowledge”.

Regardless of their teaching choice, the majority of physical education teachers' reported that they frequently implement problem solving teaching methods. For example PE teacher (B03) reported that: "I usually put questions to my students in my attempt to lead them to the scientific acceptable response or I ask them to discover the correct or fault movement".

Lesson Goals and Effective Teaching Approach

Based on interviewees reports revealed that PE teachers set different goals as their top priority. More specifically, three PE teachers (A04, B02 and B04) set as their priority their students physical activity levels, especially B02 who reported: "I planned my lesson based on students need for increased mobility. That is my main goal because in my point of view two hours per week are inadequate, so I try to increase their physical activity".

In addition, three PE teachers (A03, A05 and B05) set as their high priority motor skills' development. For example, as A03 stated:

> My main goal is to lead my students to learn a few skills. I am aware that is not possible for all them to play, for example, volleyball efficiently, but it is likely to learn the skills in order to actively participate in a game in the future.

Furthermore, two (B01 andB03) teachers also indicated that the adopting of lifelong physical recreational activities is their top priority. Teacher B03 reported: "In my point of view PE teacher should lead students in the adoption of exercise habits in order to engage in lifelong physical activity". On the other hand PE teacher A01 stated: "Of course, I perceive as more important the cognitive and motor skill's goal. However, due to the fact that students' skills vary I put more emphasis on students' cognitive development".

However, a PE teacher A02 stated:

> I don't believe that I have to set a priority on my lesson goals. I try to organize my lesson plan in such way that I will achieve all of them or, at least, most of

them. In my point of view, it is not useful for students to perform well a specific skill, but it is important to exhibit a responsible behavior and develop critical thinking.

Furthermore, the findings revealed that physical education teachers' preferences are congruent with the teaching approach that perceived as more beneficial for achieving their priorities. The reports of the aforementioned participants revealed that their goals could be more effective facilitate through the implementation of reproduction teaching approach, which finally they adopt.

However, two PE teachers were not following this tendency. More specifically, PE teacher B02, perceived the development of students' fitness as the most important, proposed that it could be effectively facilitated by the implementation of a reproduction teaching approach. Nevertheless, she reported that she more frequently uses production teaching approaches. Alternatively, PE teacher B01 prioritized lifelong physical activity as most important goal and perceived production teaching approach as the most effective for accomplishing this goal, however she reported that frequently rely on reproduction teaching approach.

Contradictory Beliefs about the Factors Influencing Implementation of Teaching Approaches

Based on PE teachers' reports can be inferred that they more frequently rely on reproduction teaching approach influenced by their perception that variable this approach could be more effective for promoting course control, class management, and studies' discipline and responsibility. According to their responses, discipline and responsibility were perceived as prerequisite elements of an effective learning process. As teacher B05 reported: "In cases that PE teacher is the source of knowledge, and then design and control are more effective during the lesson. Course control is an important factor because their absences constrain lesson's accomplishment".

Also, PE teachers perceived time management and active time as a catalyst in effective teaching. They reported that both could be achieved efficiently with reproduction teaching approach. As teacher A04 stated: “I think that, due to the limited time of the lesson, the reproduction teaching approach is more effective for time saving, understanding of game demands and the essence of the game”.

In addition, B04 stated: “I was informed that students’ actual activity during PE usually lasts approximately 8 minutes, but the specific approach (production approach) diminishes students’ active time even more”.

Alternatively, a number of physical education teachers believed that the production teaching approach could facilitate their teaching goals and course control, classroom safety and discipline as well. More specifically, A02 stated: “The PE teacher through reproduction teaching approach has total course control but this lasts for a certain period, on the contrary through production teaching approach PE teachers could promote students’ personal responsibility and then course control could be permanent”.

While, B02 reported: “By providing students opportunities for autonomy and actively participation in the learning process then they exhibit responsibility”.

Finally, B03 stated:

I use to create an environment in which students participate in the decision making this way I try to make them responsible for their behavior and consequently I ensure their safety. I take the control only when a risk of accident occurs.

Perception that Production Teaching Approaches Promote Students’ Motivation and Autonomy

The vast majority of PE teachers reported that production teaching approach promote effective student motivation and autonomy. More specifically, A04 stated that students’ autonomy was positively supported when: “PE teacher tries to provide to

students active role in the learning process. For example allows to students participate in the decision making".

In regards to students' motivation, teacher B04 reported: "I emphasized that everyone is gifted with different skills, so they should focus on improving their performance rather than perform better than other students. This should be the rule not only in physical education context but in every field".

PE Teachers' Self-efficacy to Implement Each Teaching Approach

PE teachers' statements also revealed that they perceived themselves self-efficacious to implement both teaching approaches. As a PE teacher (A05) reported: "I perceive that I can equally implement both approaches".

Although PE teachers stated that they are able to implement both teaching approaches however two of them clearly reinforced that not only the production teaching approach but teaching styles from the reproduction cluster such as the *self-check* are ineffective. Teacher A04 reported:

> I tried two or three times to deliver my lesson through self-check and I created criteria sheets. Unfortunately, students were distracted and the active time was decreased'. In addition, B04 pointed out that: 'the production teaching approach is not effective because students' active time is most of the time negligible.

Sources of Knowledge

Most of the PE teachers comments highlighted they were knowledgeable of most of reproduction approaches through their undergraduate studies. In contrast, they primarily informed of production teaching approaches either through textbooks or seminars. The participants in the present study reported that they were not taught production teaching approaches during undergraduate studies. Nevertheless, five of them learnt about production teaching approach during mandatory seminars which took place just before their recruitment in education. But, they reported that the influence of these seminars was

weak or ineffective, and thus reproduction teaching approach is their typical teaching style. Indeed B1 reported:

> Our prior belief formed primary during schooling play an important role in shaping of our personality….Consequently, whatever you will teach me in a seminar it will affect me, but in case that I get tired, or having to deal with difficulties, then I will follow again my prior teaching approach (reproduction) because I am familiar with it and I am aware that it works…After all you can teach an old dog new tricks".

While, teacher A05 stated that: "Seminars should last more time because from my point of view the stimuli is not enough and additionally I would prefer it to be more experiential".

Noteworthy to be mentioned was the fact that two participants reported (A02, B03) that their experience with production teaching approach through textbooks urge them to revise their prior beliefs. Participant A02 reported: "Later I discovered that the curriculum includes a lesson plan delivered this way (production) and that was my first inspiration. After that aiming to teach effectively I read the textbooks". He also stated that:

> Initially the implementation of the production teaching approach was difficult, because both students and I were used to a different teaching approach. However, I insisted on my decision, because I think that this way I lead my students to effective learning. Finally, the lesson runs smoothly.

While, B03 reported that: "From my point of view, nothing happens if you don't make an effort and the PE teacher should constantly be informed about the new teaching tendencies in order to be able to meet students' needs".

Discussion

The present study was an initial attempt to explore the underlying reason that PE teachers resorted to reproduction and production teaching approaches. Another purpose of

this study was to examine the goals of the physical education lessons that they prioritize, and the teaching approach that they believe that promotes the achievement of each goal. The findings of the present study suggested that a variety of factors can influence PE teachers' teaching preference. Interestingly, most of PE teachers perceived that learning should be a constructivist rather a transmissive process, but reported they typically implemented reproduction teaching approaches more regularly than production teaching approaches. Only three of the participants stated that they regularly used production in preference to reproduction teaching approaches. The aforementioned finding could be perceived as pedagogical contradiction, but a rational explanation for this could be the fact that they reported and the findings of previous study (Syrmpas, Digelidis, & Watt, 2015) confirmed that Greek PE teachers frequently resorted to problem solving teaching methods and more specifically to the Socratic method. Taking into consideration that problem solving teaching approaches promote critical thinking (Bonnette, McBride, & Tolson, 2001; Chen & Cone 2003; Konstantinidou, Pollatou, & Zachopoulou, 2005) then arguably it can be said that they perceive the learning as a constructivist process even if most of them frequently resort to reproduction teaching approaches.

The findings also highlight that a pattern exists between PE teachers teaching choice and the lesson goals that prioritize. The aforementioned finding is aligned with Goldberger, and colleagues' (2012) suggestion that the implementation of the various teaching styles varies and is dependent on the goal or the priority that is set by the teacher relative to the characteristic being prioritised. The vast majority of the participants in the present study reported that they prioritise students' motor skills and physical skills development which could be more effectively accomplished through the implementation of the reproduction teaching approach. For example, A03 reported that:

> I have been a football coach for many years…….I perceived reproduction teaching approach as the more effective approach in achieving learning outcomes, because, especially for younger students, it is hard to learn; you should demonstrate again and again and then you realize that students don't perform well. Then you should demonstrate again and again. The feedback should be continuous.

Furthermore, the findings suggested that the majority of the participants perceived the reproduction teaching approach promotes students' motor skill and physical development which is congruent with Byra's (2000) perspective based on the review of the existing spectrum and Mosston and Ashworth's research. A possible explanation for PE teachers' tendency to prioritise students' skillfulness and physical development could have arisen from the fact that they are familiar with these characteristics as an outcome of their own school experience (Capel 2007). Since all of them reported that they have coaching experience then it could also be assumed that the PE teachers' sporting background may influence teaching style preference. Thus, PE teachers of the present study could be categorized within the type of physical educators (Lawson 1983b) for who coaching is their first priority. However, the fact that three of the respondents were not following this tendency implies that PE teachers' goal prioritization could be a crucial but not the only factor that influences their decisions on implementing a specific teaching approach. This interpretation aligned with Cothran and Kulinna's (2008) suggestion that a variety of factors influence physical education teachers teaching choices.

A recurring outcome of the present study linked with Cothran and Kulinna's (2008) findings was that course control and time management influence PE teachers' decision to frequently resort to reproduction teaching approaches. Physical educators in the present study perceived course control as a key component fora successful lesson. As they reported, reproduction teaching approaches help them to establish course control and

consequently time management, student discipline, and safety. This finding is consistent with earlier scholars' suggestions that class management (Gallahue & Cleland-Donnelly 2007) and time management (Rink 1996) could be perceived as a prerequisite for effective physical education. Given this generally accepted assumption, and the set of findings supporting that class control is normally linked with direct teaching approaches (Cothran & Ennis 1997, Cothran & Kulinna 2008; Curtner-Smith, 2001) then it was understandable that PE teachers of the present study relied on reproduction teaching approaches.

Additionally, PE teachers, who reported that they frequently resorted to production teaching approaches, also foster an appreciation of students' motivation and autonomy, as important factors for promoting effective learning. This was supported from the point repeatedly stressed during interviews regarding the importance of students' motivation and autonomy on effective learning (e.g. A03 stated: "It is important to provide students with opportunities for active participation in learning process and involvement in the decision making because this way they motivated to learn and thus the learning is more effective"). Findings of previous studies support these PE teachers' beliefs. More specifically, a high level of student motivation can foster creativity, promote high quality of learning (Ryan &Deci 2000) and lead to greater involvement in physical activity (Papaioannou *et al.*2006).

An additional factor that may influence teachers' teaching choices is exemplified in the result that they perceived that the production teaching approach promotes greater course control, maintenance of a positive level of student discipline, and facilitates time management during lessons. Specific beliefs of the PE teachers' in the current study are congruent with the findings of a previous study (Ennis *et al.* 1999). Ennis *et al.* suggested that a learning environment, such as "Sport for Peace" curriculum, promotes students autonomy and active participation in the decision making framework of the class

environment. Additionally, it is likely to enhance students' acceptance of responsibility and promotion of safety. Furthermore, the production approach may better support the integration of disruptive students within the learning process thus supporting student behavior management goals.

Although many PE teachers reported that they attended seminars for spectrum teaching approaches just before their recruitment in public schools, their perception was not influenced sufficiently to consistently implement production teaching approaches. Curtner-Smith (1999) also suggested that the of lack of use of production approaches may be due to the fact that PE teachers' are influenced by their prior beliefs was also reinforced by one of the PE teacher's (B01) comment:

The experiences of adolescence and mainly sporting background shape your professional profile. I was lucky to be under the instruction of very talented coaches and I participate in a high level in track and field events so my experiences are very strong. As challenging and interesting to be a new experience delivered through a seminar because of these previous experiences the influence could be temporary. At the first opportunity I will return to the usual track because I know better and because I have tried it and it works best.

This pre-existing view, combined with a limited influence from participating in seminars, inhibits the broader implementation of production teaching approaches. Also, an additional restraining factor in regular adoption of production teaching approaches could be the fact that these seminars were compulsory for PE teachers, thus representative of an extrinsic motivator. Gorozidis and Papaioannou's (2014) findings further reinforce that the influence of the seminar approach to professional learning is temporary and superficial. Based on PE teachers' reports it can be concluded that their decision to frequently adopt production teaching approaches was influenced more by their motivation to deliver efficiently the lesson and less by seminars. They reported that in their attempt to be more

effective teachers they seek alternative sources of knowledge such as that text books, books and internet. Thus, it could be proposed that they were intrinsically motivated. This is consistent with Gorozidis and Papaioannou's (2014) suggestion that intrinsic motivation plays a determining role on teachers' decision to adopt innovative teaching methods. In addition, researchers (Pintrich, Marx, & Boyle, 1993; Vosniadou, 2001, 2007b) stressed that motivation can act as a catalyst on learning process.

PE teachers of the present study reported that perceived themselves capable to implement both teaching approaches. Physical education teachers' self-efficacy to implement each teaching style is an important predictor of their intention to implement each teaching style (Syrmpas, Digelidis, & Watt, 2015). Additionally, the findings of a study (Jaakkola & Watt, 2011) revealed that PE teachers' confidence to teach may urge them to implement teaching styles that require greater students' involvement in the learning process. Based on the aforementioned findings it could be expected that the teachers of the present study will equally resort to reproduction and production approaches. However, this not verified from their statements. A rational explanation that they did not frequently resort to production teaching approaches could be the fact that they possibly misinterpret the outcomes of production teaching approach implementation and attribute to their structure the lack of course control, the ineffective time management and poor learning of students. For example, B04 stated: 'I try sometimes to provide my students with opportunities for making decisions. Unfortunately, it was not work. They made noise and they could not make a common accepted decision. As a result students' active time was decreased'. Additionally, A03 stated that: 'I tried to teach by using reciprocal and self-check teaching styles a couple of times but students make noise, they hustle and bustle forth and there. They could not understand the exercise and in general the lesson was not effective'.

Arguably, it can be inferred PE teachers held the naïve belief that students will adjust immediately to the new learning context may serve as an explanation for the rejection of not only of the production teaching approaches but even these reproduction teaching approaches which encourage a relative level of autonomy for students. Several respondents (e.g., B04, A03) appeared to disregard that both the students and teachers are not typically familiar with these teaching approaches. According to Dyson (2002) the implementation of a new or innovative teaching styles such a cooperative learning it is not a simple, smooth and undisturbed process. This type of change in approach requires that PE teachers make a persistent effort to adjust class management practices and improve lesson organization.

Implications and Limitations

Based on the findings of the present study policy makers and curriculum developers should consider the implementation of a formalised longitudinal pre and in-service professional development structure because as the research of both Postareff and colleagues (2007, 2008) and Bitan-Friedlander and colleagues (2004) highlights that the limited early exposure, of undergraduate students and the late stage exposure of in-service teachers, to innovative knowledge is ineffective. Also, policy makers should design seminars aiming to promote PE teachers' intrinsic motivation. Based on self-determination theory this might occur by creating a learning environment which fulfil PE teachers' need for competence, relatedness and autonomy (Baard, Deci, & Ryan, 2004). A working environment like that could reinforce PE teachers' intention to implement innovative teaching methods (Lam Cheng, & Choy, 2010). In addition, the perspectives of the current participants provide support for the findings of Abrami and colleagues (2004) whereby, the promotion of teachers' perceived ability to implement innovative teaching approaches could be useful but in no case considered as a panacea. Thus, professional developers

should provide professional learners with opportunities to attend programs that train teachers to successfully deliver production teaching methods. As Guskey (2002) stressed PE teachers' perceptions and teaching preferences could be change only in the case that they experienced a successful and efficiently delivered innovative lesson. This is long-term and gradual process which demands the combination of training and implementation of innovative or new approaches with tangible evidence on students learning.

This study was an initial attempt to highlight the teaching choices of physical educators and the supporting reasons that influence them to implement production and reproduction teaching approaches in the Greek physical education context. However, the findings also support the real world furtherance in understanding the reasons to maintain an encouragement of PE teachers to adopt a variety of teaching styles. Due to the limited number of participants the findings of the present study cannot be generalized to all Greek physical education teachers. Nevertheless, the findings can help policy makers to design efficiently educational workshops in order to motivate physical education teachers to be more familiar with production teaching approach and finally more frequently implement them.

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Chapter 7

General Conclusion

The findings of both quantitative studies (study 1 and 3) revealed that a variety of teaching styles implemented in the Greek PE context. However the findings of both studies suggested that Greek PE teachers tend to rely more frequently on reproduction rather than on production teaching approaches. PE student teachers' reports aligned with the findings of a previous study (Cothran, Kulinna, &Ward, 2000). Similarly, PE teachers' reports confirm the findings of previous studies (Cothran et al. 2005; Jaakkola & Watt, 2011; Kulinna & Cothran, 2003) which consistently revealed that PE teachers tended to implement reproduction teaching approaches rather than production teaching approaches.

PE student teachers also reported that they intended to implement reproduction teaching approaches rather than production teaching approaches. Also the findings of this specific study suggested a weak influence of the curriculum on PE student teachers' intention to implement specific teaching approaches from the production cluster of teaching styles.

The qualitative study two also confirmed that the curriculum influences partially PE student teachers' beliefs. Also this specific finding is aligned with Vosniadou's (2002) suggestion that learning is a rather slow and gradual process. Both scholars Vosniadou (1994) and Curtner-Smith (1999) proposed that PE learners form solid beliefs based on their experiences during schooling. More specifically, the findings of the follow-up qualitative study (2) indicated that PE student teachers form presuppositions that learning is dimensional and transmissive process on the basis of their prior beliefs.

These specific PE student teachers held the presupposition that learning in PE context must put emphasis on skills, which in their turn could be developed through PE teachers' instruction. Since Mosston and Ashworth (2008) articulated that reproduction teaching styles promote motor development then they reported their preference to

implement reproduction teaching styles. However, a significant number of second-year student teachers appear to be influenced of the curriculum. They reported that the learning is a multidimensional and constructivist process. Based on these presuppositions they generate a synthetic mental model and this was due to the misconception they held that production teaching approaches could accomplish PE lesson goals in total. This belief is contradictory to Mosston and Ashworth's (2008) proposition that reproduction teaching approaches could effectively promote students' skill development. Additionally, the findings confirmed Vosniadou's (2013) suggestion that misconceptions urge learners to generate synthetic mental models.

The findings of the study three suggested that PE teacher's perceived ability to implement each teaching style may play an important role in their decision to adopt or not each style; however, their ability did not constitute the only factor. The findings suggested that, in many cases, PE teachers teaching choice is not influenced by PE teachers' perceived ability but rather by their perception that this specific style promotes students' motivation for learning. This reinforces Goldberger, Ashworth, and Byra's (2012) proposition who suggest that PE teachers teaching choice is dependent on the lesson goal or the learning priority set by them.

A common finding of both qualitative studies (2 and 4) was that PE student teachers who reported that they intend to implement reproduction teaching styles and PE teachers who tend to implement more frequently reproduction teaching approaches perceived learning as a transmissive process. Alternatively, PE student teachers who reported that they intend to implement production teaching styles and PE teachers who tend to implement production teaching approaches more often perceived learning as a constructivist process. The aforementioned findings are aligned with the findings of previous studies (Duit, Treagust, & Widodo, 2008; Widodo, & Duit, 2002; Widodo, Duit

& Müller, 2002) which proposed that educators held transmissive rather than constructivist beliefs about the learning process. Additionally, the findings of the current study confirmed occupational socialization theory proposition (Lawson, 1983a) that acculturation period is an influential period on PE teachers' personality. More specifically, the findings of the present study are in consistency with those of previous studies (Curtner-Smith, 1999; Richardson, 1997) according to which PE teachers' prior beliefs play an important role in their decision to adopt a reproduction approach. Finally, the findings are aligned with Goldberger, and colleagues' (2012) suggestion that the implementation of each teaching styles varies and is dependent on the goal that PE teachers prioritize. In this specific case the majority of PE teachers set as their priority goal students' skills and physical development. Thus, arguably they tend to rely on reproduction teaching styles since these styles, according to Mosston & Ashworth (2008), are perceived as the most appropriate for accomplishing these goals. In the bottom line the findings of the present study confirmed Green's proposition that personal, contextual, and situational variables urge PE teachers to adopt reproduction rather than production teaching approaches.

Implication

The findings of the aforementioned studies reinforce the findings of previous studies (Postareff, Lindblom-Ylänne, & Nevgi, 2007; 2008) which imply that undergraduate curriculum must include a wide range of pedagogical courses. These courses should integrate innovative teaching methods. Also, instructors should promote learners' active participation in the learning process in order to urge learners' self-determined learning (Vosniadou, 1991). Furthermore, considering Vosniadou and her colleagues' (2001) suggestion instructors should plan the lesson by creating a context similar to the learning subject matter. In this specific case, instructors should urge their students to implement production teaching approaches. Additionally, instructors should

urge PE student teachers to take into account Dyson's (2002) suggestion that the implementation of innovative approaches requires a systematic effort on their behalf in order to finally implement them effectively.

Also policy makers should consider Bitan-Friedlander, Dreyfus, and Milgrom's (2004) suggestion that the limited exposure of PE teachers to innovative teaching approaches could be ineffective. Another aspect that should be taken into account is the Postareff, Lindblom-Ylänne, & Nevgi's (2007; 2008) suggestion according to which in-site PE teachers should be encouraged to be trained in the implementation and informed of the benefits of innovative teaching approaches, such as production teaching approaches. Additionally, during these educational seminars it is important for PE teachers be stressed the multidimensional character of PE lesson. It is also crucial for the effectiveness of these programs that PE teachers be informed by professional developers that each teaching style could promote specific goals. Thus, they must implement each time the teaching style that promotes mostly the goal they prioritize.

Finally, the findings of the present study provide support for the findings of Abrami and colleagues (2004) whereby teachers' perceived ability to implement innovative teaching approaches could be useful but it could not be considered as a panacea in any case. PE teachers' beliefs for specific teaching approaches appear to influence the implementation of these approaches. Thus, professional developers should provide PE teachers with opportunities for delivering production teaching methods successfully.

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Appendix I

Ethics Committee (Department of Physical Education and Sport Science) approval of conducting the study from the

ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΙΑΣ
ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΦΥΣΙΚΗΣ ΑΓΩΓΗΣ ΚΑΙ ΑΘΛΗΤΙΣΜΟΥ

Εσωτερική Επιτροπή Δεοντολογίας

Τρίκαλα:2/05/2012
Αριθμ. Πρωτ.:559

Αίτηση Εξέτασης της πρότασης για διεξαγωγή Έρευνας με τίτλο: Τα νοητικά μοντέλα των φοιτητών, οι πεποιθήσεις τους και οι στάσεις τους για τις μεθόδους διδασκαλίας.

Επιστημονικώς υπεύθυνος επιβλέπων: Διγγελίδης Νικόλαος

Κύριος ερευνητής φοιτητής: Σύρμπας Ιωάννης

Ίδρυμα & Τμήμα: Τ.Ε.Φ.Α.Α Τρικάλων Πανεπιστημίου Θεσσαλίας

Η προτεινόμενη έρευνα θα είναι:

Ερευνητικό πρόγραμμα ☐ Μεταπτυχιακή διατριβή ☐ Διπλωματική εργασία X Ανεξάρτητη έρευνα

Τηλ. επικοινωνίας: 2431047052, 6944634364
Email επικοινωνίας: jsyrmpas@gmail.com

Η Εσωτερική Επιτροπή Δεοντολογίας του Τ.Ε.Φ.Α.Α., Πανεπιστημίου Θεσσαλίας μετά την υπ. Αριθμ. 5-3 /25-4-2012 συνεδρίασή της εγκρίνει τη διεξαγωγή της προτεινόμενης έρευνας.

Ο Πρόεδρος της
Εσωτερικής Επιτροπής
Δεοντολογίας – ΤΕΦΑΑ

Τσιόκανος Αθανάσιος
Αναπληρωτής Καθηγητής

Appendix II

Participants' Consent forms according to the standards of Ethics Committee of the University of Thessaly

Έντυπο συναίνεσης φοιτητή σε ερευνητική εργασία

1. Σκοπός της ερευνητικής εργασίας

Σκοπός της έρευνας είναι να εξερευνηθεί η γνώση των φοιτητών φυσικής αγωγής σχετικά με τις παραγωγικές και αναπαραγωγικές μεθόδους διδασκαλίας.

2. Διαδικασία μετρήσεων

Θα χρειαστεί να απαντήσετε σε επώνυμα γραπτά ερωτηματολόγια. Στη συνέχεια κάποιοι από εσάς θα χρειαστεί να παραχωρήσετε προφορικές συνεντεύξεις. Αναφορικά με τον τρόπο διασφάλισης της ανωνυμίας και της προστασίας των προσωπικών δεδομένων σας θα ληφθούν τα παρακάτω μέτρα. Όλα τα έγγραφα που θα χρησιμοποιηθούν στην παρούσα έρευνα θα φυλάσσονται μετά τη συλλογή τους σε ασφαλή χώρο σε φωριαμό που βρίσκετε στο Τ.Ε.Φ.Α.Α Τρικάλων. Επιπλέον, σε κάθε μαθητή θα δοθεί ένας κωδικός ο οποίος θα αποτελεί την ταυτότητά του για την έρευνα. Τα ηχογραφημένα αρχεία των συνεντεύξεων θα αρχειοθετηθούν με τη χρήση των παραπάνω κωδικών σε ηλεκτρονικό υπολογιστή, ο οποίος διαθέτει κωδικό ασφαλείας.

3. Δημοσίευση δεδομένων – αποτελεσμάτων

Η συμμετοχή σας στην έρευνα συνεπάγεται ότι συμφωνείτε με τη δημοσίευση των δεδομένων και των αποτελεσμάτων της, με την προϋπόθεση ότι οι πληροφορίες θα είναι ανώνυμες και δε θα αποκαλυφθούν ονόματα ή προσωπικά στοιχεία σας.

4. Πληροφορίες

Παρακαλούμε πολύ, μη διστάσετε να κάνετε ερωτήσεις γύρω από το σκοπό ή/και τον τρόπο πραγματοποίησης της έρευνας. Αν τυχόν έχετε κάποιες αμφιβολίες ή ερωτήσεις, ζητήστε μας να σας δώσουμε πρόσθετες εξηγήσεις.

5. Ελευθερία συναίνεσης

Η συμμετοχή σας στην έρευνα είναι εθελοντική. Είσαστε ελεύθεροι να μην συναινέσετε ή να διακόψετε τη συμμετοχή σας όποτε επιθυμείτε.

Για τον φοιτητή/τρια: Συναινώ να συμμετάσχω στην έρευνα Ναι ❒ Όχι ❒

Ημερομηνία: __/__/__

Υπογραφή ερευνητή

_____

Σύρμπας Ιωάννης
Υποψήφιος διδάκτορας

Για περισσότερες πληροφορίες:
Νικόλαος Διγγελίδης,
Επίκουρος Καθηγητής
Πανεπιστήμιο Θεσσαλίας
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Έντυπο συναίνεσης φοιτητή σε ερευνητική εργασία

1. Σκοπός της ερευνητικής εργασίας

Σκοπός της έρευνας είναι να εξερευνηθεί η γνώση των φοιτητών φυσικής αγωγής σχετικά με τις παραγωγικές και αναπαραγωγικές μεθόδους διδασκαλίας.

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Η συμμετοχή σας στην έρευνα συνεπάγεται ότι συμφωνείτε με τη δημοσίευση των δεδομένων και των αποτελεσμάτων της, με την προϋπόθεση ότι οι πληροφορίες θα είναι ανώνυμες και δε θα αποκαλυφθούν ονόματα ή προσωπικά στοιχεία σας.

4. Πληροφορίες

Παρακαλούμε πολύ, μη διστάσετε να κάνετε ερωτήσεις γύρω από το σκοπό ή/και τον τρόπο πραγματοποίησης της έρευνας. Αν τυχόν έχετε κάποιες αμφιβολίες ή ερωτήσεις, ζητήστε μας να σας δώσουμε πρόσθετες εξηγήσεις.

5. Ελευθερία συναίνεσης

Η συμμετοχή σας στην έρευνα είναι εθελοντική. Είσαστε ελεύθεροι να μην συναινέσετε ή να διακόψετε τη συμμετοχή σας όποτε επιθυμείτε.

Για τον φοιτητή/τρια: Συναινώ να συμμετάσχω στην έρευνα Ναι ❒ Όχι ❒

Ημερομηνία: __/__/__

Υπογραφή ερευνητή

_____

Σύρμπας Ιωάννης
Υποψήφιος διδάκτορας

Για περισσότερες πληροφορίες:
Νικόλαος Διγγελίδης,
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Έντυπο συναίνεσης Καθηγητή Φυσικής αγωγής σε ερευνητική εργασία

1. Σκοπός της ερευνητικής εργασίας

Σκοπός της έρευνας είναι να εξερευνηθούν οι πεποιθήσεις των καθηγητών φυσικής αγωγής σχετικά με τις μεθόδους διδασκαλίας αλλά και η συχνότητα χρήσης τους.

2. Διαδικασία μετρήσεων

Θα χρειαστεί να συμπληρώσετε έναν αριθμό ανώνυμων ερωτηματολογίων.

3. Δημοσίευση δεδομένων – αποτελεσμάτων

Η συμμετοχή σας στην έρευνα συνεπάγεται ότι συμφωνείτε με τη δημοσίευση των δεδομένων και των αποτελεσμάτων της, με την προϋπόθεση ότι οι πληροφορίες θα είναι ανώνυμες και δε θα αποκαλυφθούν ονόματα ή προσωπικά στοιχεία σας.

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Για τον καθηγητή/τρια: Συναινώ να συμμετάσχω στην έρευνα Ναι ❒ Όχι ❒

Ημερομηνία: __/__/__

Υπογραφή ερευνητή

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Appendix III

Sample pages of Publications or Presentation based on the data of the dissertation

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Original Article

Physical education student teachers' experiences with and perceptions of teaching styles

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Abstract:
This study is aimed at examining physical education student teachers' experiences with, beliefs about, and intention to use Spectrum teaching styles in the future (Mosston & Ashworth, 2002). Two hundred and eighty eight Physicak Education student teachers participated in the study whereas data were collected using a modified and translated version of the questionnaire developed by Cothran, Kulinna, and Ward's (2000). Participants in the study reported that as primary and secondary education students they had been more frequently exposed to reproduction teaching styles in their physical education classes whereas exposure to what can be described as productive styles had been substantially less frequent. In terms of beliefs, student teachers participating in the study perceive that the reproduction teaching styles provide students with more opportunities for fun, learning skills, and motivation for learning. In addition, as physical education instructors in the future student teachers stated that they are keener on implementing teaching styles from the reproduction cluster. Finally, the finding of the study confirmed student teachers' conceptions about their students' learning process influenced by their prior experiences as school students.
Key words: teaching approaches, physical education, prior experiences, Mosston and Ashworth's Spectrum.

Introduction

Teaching in the physical education (PE) context is a complex and a challenging job. Perhaps the main reason for this is the fact that PE teachers have to teach a wide variety of activities while their students, each one of them different in terms of skill, ability and interests, has to move constantly in an environment that is frequently poorly equipped. In addition, learning in PE must be linked to three interdependent educational dimensions, motor, cognitive, and affective (Graham, 2008). Within this challenging environment, the main goal for PE teachers is to help students learn. Undoubtedly, student teachers' education plays an important role and can greatly assist their learning to be effective instructors (Cothran & Kulinna, 2008) in a very complex instructional environment (Hardy & Mawer, 1999).

Development of teacher knowledge is influenced by a variety of factors. According to Lawson's theory on occupational socialization (1983a, 1983b), a PE teachers' knowledge keeps undergoing continuous evolution. The socialization period is divided into three stages, acculturation, professional, and organizational (Lawson, 1983a). During the period of acculturation a plethora of factors influence a person's decision to become a physical education instructor and his/her construction of knowledge and beliefs about teaching approaches, course content, and pedagogical perspective. Research on occupational socialization indicates that an individual's perception of PE is heavily influenced by his/her experiences in K-12 physical education (Curtner-Smith, 1999).Therefore, the conclusion to be reached is that PE student teachers enter university teacher preparation programs already having formed an initial professional profile.

A significant number of studies, based mainly on the constructivist approach, have stressed the important role of the acculturation period in the development of student teachers' beliefs and knowledge. More specifically, student teachers form their conceptions about their students' learning process mainly based on their prior experience as school students (Calderhead, 1996). According to Richardson (1997), student teachers construct their knowledge based on their prior knowledge and experience (i.e., knowledge developed as a result of being a student in K-12 physical education classes) and actively give new meaning to their current knowledge. Likewise, the findings of another study (Patrick & Pintrich, 2001) confirm that teachers' conceptions about teaching, learning and motivation undergo changes mainly and more effectively during their educational period. From the above we can assume that physical education students' prior beliefs play an important role in their intention to adopt or reject specific instructional approaches as future physical educators. The influence of the undergraduate studies is also important (Lawson 1983a, b).

When planning and organizing lessons, teachers must make decisions about content to be taught and instructional processes to be implemented (Capel & Whitehead, 2010). Concerning the methodology of teaching Mosston and Ashworth's (2002) Spectrum of teaching styles is one of the most popular frameworks used to

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Article

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An examination of Greek physical educators' implementation and perceptions of Spectrum teaching styles

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Anthony Watt
Victoria University, Melbourne, Australia

Abstract

The main purpose of the present study was to examine Greek physical education (PE) teachers' self-reported use of the Spectrum of teaching styles and their perceptions of the benefits of adopting these styles for their students. An additional goal was to explore the teachers' perceived ability to implement these teaching approaches. The participants of the study were 219 (132 males, 87 females) PE teachers. Using an adaptation of Kulinna and Cothran's (2003) Spectrum of teaching styles questionnaire, the PE teachers reported greater implementation of the command, inclusion, and practice styles than the self-check, learner-initiated, and self-teaching styles in their teaching. The PE teachers also perceived that the reproduction and production clusters of teaching styles were equally effective in promoting fun, skill learning, and motivation for learning in their students. Results also revealed that the teachers' self-perceived ability was highest for command style use and their perceived benefits of the styles for their students were highest for the practice approach. The findings of the present study reinforce that a variety of personal experience factors can influence PE teachers' tendency to implement a specific teaching style.

Keywords

Teaching styles, physical education, primary school, secondary school, teacher perceptions, perceived ability

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Physical Education Student Teachers' Mental Models of Production and Reproduction Teaching Approaches.

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INTRODUCTION AND PURPOSE

1 PE Teachers Education

According to Capel (2007), PE teachers' education plays a determinant role in effective teaching. However, following Lawson's theory on occupational socialization (1983a, 1983b), PE teachers' knowledge undergoing continuous evolution. Especially, during the acculturation period a variety of factors influence not only PE teachers' decision to become a physical education teacher, but also their knowledge and beliefs about teaching methods, course content and pedagogical point of view (Lawson, 1983a).

2 Theoretical Framework

Framework Theory of Conceptual Change (FTCC)

Within Conceptual Change Theory, learning occurs through a conceptual change process and mental models are scaffolds to support future learning. Vosniadou (1994) identified three types of mental models :

Initial or intuitive: Reflect children cognitive attempt to understand phenomena through the observation of their social and cultural surrounding;

Synthetic: Reflect learners attempt to combine aspects of initial mental models with aspects of culturally accepted domain knowledge;

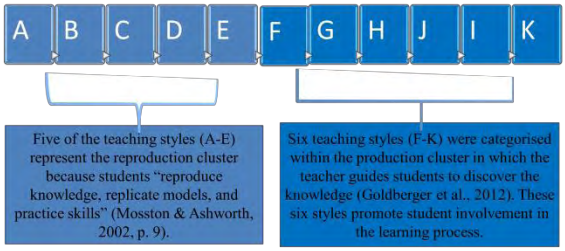
Scientific: Reflect learners cognitive ability to fully understand complex and abstract concepts. As a result they construct a cognitive framework which is in consistency with prevailing scientific view (Vosniadou 1991; 1994).

According to Vosniadou (1994), conceptual change is understood as a continuous process that occurs through enrichment or revision. In the **enrichment** process, students move from one mental model to another by adding new knowledge to their conceptual structure consistent with their actual understanding of phenomena.

Revision is required when the new knowledge to be learned is inconsistent with the existing conceptual structure and involves the revision of beliefs or presuppositions. In this case, misconceptions are more likely to occur as students attempt to assimilate new knowledge into their conceptual structure that contains theory contradictory to this new knowledge.

Spectrum Framework Theory

Spectrum is an integrated framework about teaching and learning (Mosston & Ashworth, 2002). Sanchez et al. (2011) suggested that Spectrum is a 'tool box' which provides PE teachers with 11 teaching options in order to cope with students' diversity and achieve the multiple PE goals. Mosston and Ashworth (2002) articulated: "Two basic human capacities are reflected within the structure of the Spectrum: the capacity for reproduction and the capacity for production." Based on this assumption teaching styles were categorized within two clusters.



3 Purpose: explore PE student teachers' presuppositions, beliefs and mental models related with production and reproduction teaching approaches.

METHODS

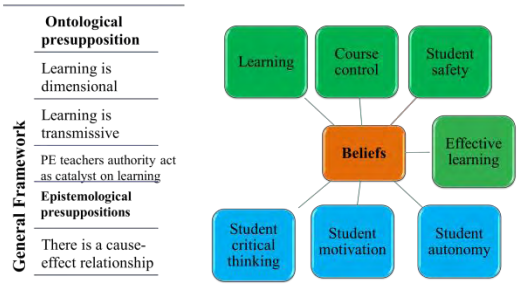
Participants: 16 second year PE student teachers (10 males and 6 females).

Procedure: A qualitative ethnographic methodology was used and the data were collected by using semi-structure interviews.

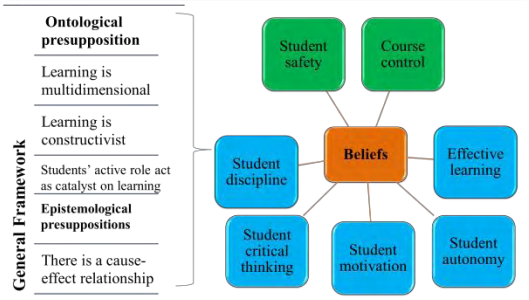
Analysis: A multi-level analysis process was conducted which included open and axial coding (Strauss & Corbin, 1998).

RESULTS

Initial Mental Model (N=5)
Teachers' authority leads to students discipline, course control and, effective **learning which is dimensional and transmissive.**



Synthetic Mental Model (N=11)
Students' active role in the learning process promotes students autonomy, motivation and responsibility factors that lead to effective learning which is multidimensional and constructivist.



CONCLUSIONS

- The two mental models highlight the developmental nature of students' learning concerning the production and reproduction teaching approaches. The diversity of students' mental models reveals students' diverse understanding of complex and sophisticated scientific concepts;
- The findings support Vosniadou's (2007) suggestion that learners come to education not as "tabula rasa" but having already formed an initial understanding about the world based on their subjective feelings. They tend to organize their initial knowledge in relatively coherent frameworks different from the dominant scientific theory. These naïve theories are very robust due to daily confirmation through the observation and the lack of metacognition awareness;
- Additionally, the findings of the present study are aligned with Vosniadou's (1994) suggestion that learners in their attempt to assimilate the new information forms misconceptions and that the learning process involves the enrichment of learners' existing knowledge.

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