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Teachers' achievement goals and self-determination to engage in work  
tasks promoting educational innovations

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**Teachers' achievement goals and self-determination to engage in work tasks promoting educational innovations**

**Abstract**

The purpose of this research was to investigate the patterns of relationships between teachers' achievement goals, self-determined motivation and intentions to get involved with work-tasks promoting educational innovations. Participants were (a) 276 teachers who were involved in training to implement innovation, divided according to the condition of their recruitment (i.e., optional,  $n = 191$  vs. mandatory,  $n = 85$ ; Study 1); and (b) 140 teachers who implemented innovation (Study 2). Structural equation modeling revealed that: (a) in Study 1 only mastery goal predicted autonomous motivation, while performance avoidance goal predicted teachers' controlled motivation to participate in training and these patterns were invariant across conditions, (b) in Study 2 only mastery goal had an indirect effect on intentions to implement innovation, and this relationship was fully mediated by autonomous motivation, while only performance approach goal predicted controlled motivation. It is suggested that teachers' mastery goals and autonomous motivation should be targeted to foster teachers' optimal engagement with educational innovations.

*Keywords: Mastery goal orientation, performance goal orientations, autonomous motivation, controlled motivation, teaching innovation*

## 1. Introduction

Innovation is an important aspiration and general request for excellence in education. Educational innovation is defined as an informed evidence-based change in philosophy of teaching and learning, which leads to adaptation of instructional practices that better promote educational objectives (De Lano, Riley, & Crookes, 1994, p.489). According to OECD Center for Education Research and Innovation (2008), *a new or significantly improved curriculum* (product innovation) and/or *a new or significantly improved pedagogy* (process innovation) are types of educational innovations (OECD CERI, 2008).

The significance of innovative teaching in current worldwide reforms is indisputable, and it appears that teachers' motivation quality is one of the most instrumental factors for the successful adoption and implementation of innovative syllabus (Abrami, Poulsen, & Chambers, 2004; Cave & Mulloy, 2010; Gorozidis & Papaioannou, 2011; Lam, Cheng, & Choy, 2010; Schellenbach-Zell & Gräsel, 2010). While the top-down model of introducing educational innovations has been criticized as ineffective (e.g., Fullan, 2009), it is still in use in many educational systems worldwide (e.g., U.S. "Race to the top", U.K. "GCSEs"), such as in Greece where this study was conducted. Scholars attribute the failure of these efforts in their negligence of taking into account teachers' motivation to engage in professional development (Guskey, 1986, 2002) and the way teacher learning can be achieved (Lieberman & Pointer Mace, 2008).

Teacher learning is defined as the active process in which teachers participate in learning activities leading to cognition and behavior modification (Bakkenes, Vermunt, & Wubbels, 2010). This workplace learning can take place both formally, in organized schemes/tasks (e.g., in-service training), and informally in the class, *by doing* (e.g., teaching with new practices) (Tynjälä, 2008; Van Eekelen, Boshuizen, & Vermunt, 2005). An integral part of this process, in the context of educational innovations, is teachers' motivation (Shulman & Shulman, 2004; Vermunt & Endedijk, 2011). Indeed, it has been found that a precondition for the effectiveness of workplace learning activities regarding innovation (e.g., in-service training, implementing innovation) is teachers' intense willingness to learn (Van Eekelen, Vermunt, & Boshuizen, 2006). In addition, evidence in educational settings support the notion that individual motivational processes influence learning (e.g., Deci, Vallerand, Pelletier, & Ryan, 1991; Dweck, 1986), while optimal learning is closely

related to specific types-qualities of individual goals and motivation, namely mastery/learning goals (e.g., Ames & Archer, 1988; Linnenbrink & Pintrich, 2000) and autonomous motivations (intrinsic and identified regulations) (e.g., Deci, Ryan, & Williams, 1996; Niemiec & Ryan, 2009).

Currently, educational innovations are introduced and disseminated through teacher in-service training programs provided by authorities, and a frequently employed policy (e.g., in most European countries) is to motivate teachers through inducements (e.g., extra payment, job promotion) or compulsory participation (see European Commission/EACEA/ Eurydice, 2013, pp 60-61). However, these restrictive policies might be considered controlling and definitely do not reflect the characteristics of optimal motivational environments (see Deci & Ryan, 2000; Nicholls, 1989). In contrast to this trend, theory and research suggest that peoples' autonomy support is vital to their optimal functioning, and that controlling environments and motivational strategies thwarting peoples' autonomy lead to unintended outcomes, such as superficial learning, impaired intrinsic motivation, lower persistence and creativity (Deci, Koestner, & Ryan, 2001; Deci & Ryan, 2008; Ryan & La Guardia, 1999; Ryan & Weinstein, 2009).

Although the importance of teacher motivation has been underlined, to our knowledge, theoretically driven research focusing on the explanation of teachers' motivation qualities in the natural context of educational innovation is relatively scarce (e.g., Lam, Cheng, & Choy, 2010; Schellenbach-Zell, & Gräsel, 2010). This kind of research seems very promising to further our understanding of teacher psychological functioning; however, diverse evidence from a variety of educational systems and situations is necessary in order to draw safe conclusions and to generate the most effective guidelines to improve practice. In addition, the most relevant literature on the subject, addresses research problems partially by focusing on one theoretical approach without backing it up (triangulating) with another established theory to ensure a more holistic (multifaceted) and accurate approach. Following, propositions to conduct research integrating different theories to better explain behavioral processes (e.g., Hagger, 2009), we present a model of theory integration in the examination of teacher motivation with regard to innovation.

### *1.1 Theoretical framework*

Explaining the motivational processes underlying teacher's intentional behavior during educational innovations has the potential to give insights on how to succeed in attracting teachers to get deeply involved with innovations and to establish their prolonged optimal engagement. To this pathway we selected two robust theoretical frameworks that explain intentions from a qualitative perspective of human motivation. The first is achievement goals theory (AGT; Ames & Archer, 1988; Dweck, 1986; Nicholls, 1984), which deals with the quality of goals people adopt in achievement situations. The second, self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000), deals with the quality of peoples' motivational experiences in social environments (e.g, work, school, sport etc). These theories focus on the explanation of the qualitative diversity in motivational patterns and outcomes as a result of different achievement goal orientations (AGT; e.g., mastery vs. performance) and motivational regulations (SDT; e.g., autonomous vs. controlled), and have been successfully applied in various situations and life domains (Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012; Payne, Youngcourt, & Beaubien, 2007; Ryan & Deci, 2002). This approach is in line with recent work by other researchers proposing theoretical (e.g., Vansteenkiste, Lens, Elliot, Soenens, & Mouratidis, 2014) and applied motivational models (i.e., *Empowering Coaching*<sup>TM</sup>; Duda, 2013) that integrate AGT and SDT.

By integrating AGT and SDT frameworks a problem can be addressed from different perspectives, gaining a more complete image of the reality and verifying the validity of the findings. Briefly, while both theories deal with the person-environment interaction which produces qualitative differences in personal conduct, AGT focuses on the goals a person aims to achieve and emphasizes socialization factors influencing adoption of different goal orientations, whereas SDT focuses on the reasons of a behavior and emphasizes organismic needs fulfillment. Moreover, while both theories underscore the importance of competence beliefs for individual strivings, they examine it from a different point of view. In AGT one finds a clear qualitative approach to perceptions of competence, which addresses how different definitions of success lead to different conceptions of personal competence and goal orientations and how the latter impact cognition, affect and behavior. Importantly, these qualitative differences in the definition of competence are depicted in the measurement of achievement goal orientations. On the other hand, in SDT competence is more easily understood in quantitative terms, as a universal human

need which should be satisfied in order to foster optimal motivation. In addition to need for competence, SDT also emphasizes autonomy and relatedness needs fulfillment, which are not the central focus of AGT. To understand how to satisfy the need for competence from a qualitative perspective one has to combine it with the satisfaction of the need of autonomy. This can be hardly understood though, not only by newcomers to SDT like several policy makers and practitioners, but also by researchers who have yet to develop instruments adopting this qualitative approach in the measurement of the satisfaction of the need for competence.

From an applied perspective, SDT provides valuable guidelines for the creation of socio-psychological climates emphasizing autonomy and relatedness support. On the other hand, the focus of AGT on goals and different perceptions of success provides clear and easily understood examples for the formation of a mastery climate promoting personal improvement. For example, teachers who exclusively (100%) use teacher-centered instruction can set a goal to progressively (10% first month, 20% second month, etc) alter their instruction to a student-centered one and still perceive success despite slow progress towards student-centered instruction, as the latter is defined by normative standards.

Differences and commonalities of AGT and SDT have led to suggestions for complementary use when attempting to holistically understand human behavior in achievement situations (e.g., Butler, 1989; Ryan & Deci, 1989). Thus, in the present article an attempt towards synthesis was made by studying the relationships between motivational constructs of AGT and SDT, (i.e., teachers' achievement goals and motivational regulations) in order to decode teacher psychological functioning during the practice of educational innovation and to suggest solutions for their successful qualitative enrollment with these practices. Importantly, the model depicting connections of achievement goals and motivational regulations was tested across different situations, in order to examine whether they remain invariant across different conditions in the teaching process.

### *1.1.1 Achievement Goals Theory and Teachers' context*

Teacher focused AGT research has started gaining momentum very recently (e.g., Butler, 2007; Papaioannou & Christodoulidis, 2007). The basic tenet of AGT is that individuals' strivings in achievement situations depend on their judgments of personal competence relative to their interpretation of success (Dweck & Leggett, 1988;

Nicholls, 1989). Under this framework several important approaches have been proposed (e.g., Elliot & McGregor, 2001; Elliot, Murayama, & Pekrun, 2011; Nicholls, 1989) with the most prevalent the trichotomous model, in which people pursue either a mastery-learning goal (i.e., their aim is to learn and to improve personal competence, while evaluation of success is self-referenced), a performance approach goal (i.e., to outperform others) or a performance avoidance goal (i.e., to avoid looking incompetent compared to others) (Elliot & Church, 1997; Elliot & Harackiewicz, 1996). Because the trichotomous approach is the most well accepted and thoroughly examined model in achievement motivation literature (e.g., Maehr & Zusho, 2009), the focus of the study, literature review and further discussion will be centered on this tripartite classification.

Achievement goals researchers posit that individuals have predispositions towards specific goals (i.e., goal orientations) which are considered cognitive self-schemas linked to specific achievement settings (Roberts, Treasure, & Conroy, 2007). Following AGT definitions, teachers' achievement goal can be defined as teacher strivings to attain certain work-related goals. Based on how teachers define personal success in job-related activities, they may decide to pursue different goals when engaging in various work-tasks. Thus, they can be mastery/learning oriented (e.g., aiming to improve their teaching skills), performance approach oriented (e.g., aiming to gain normative positive evaluation by demonstrating better teaching abilities than others), or performance avoidance oriented (e.g., aiming to avoid looking incompetent when they teach compared to other teachers). Research suggests that different goals enable different motivational patterns of responses in cognition, affect and behavior (Ames & Ames, 1984; Dweck, 1986; Dweck & Leggett, 1988; Elliot, 1999).

In particular, it has been found that teacher mastery goal orientation connects positively to reflection, feedback and help seeking behaviors, self-efficacy, high quality instruction (e.g., cognitive stimulation), classroom mastery goal structure, individual reference norm utilization, perceived teacher support and low levels of inhibition, students' interest in class, the adoption and implementation of a reform (Butler, 2007; Butler & Shibaz, 2008, 2014; Cho & Shim, 2013; Gorozidis & Papaioannou, 2011; Retelsdorf, Butler, Streblov, & Schiefele, 2010; Retelsdorf & Günther, 2011; Runhaar, Sanders, & Yang, 2010). Moreover, teachers' mastery orientation has been consistently found to correspond to high levels of job satisfaction, engagement, interest in teaching, training participation, greater use of

adaptive coping strategies towards work threats and/or challenges, and low levels of burnout and occupational strain (Nitsche, Dickhäuser, Fasching, & Dresel, 2013; Papaioannou & Christodoulidis, 2007; Parker, Martin, Colmar, & Liem, 2012; Retelsdorf et al., 2010; Skaalvik & Skaalvik, 2013).

On the other hand, findings regarding teacher performance avoidance orientation present mostly maladaptive patterns of relations with work related cognitions and instructional behaviors (Butler, 2007; Papaioannou & Christodoulidis, 2007; Parker et al., 2012; Retelsdorf et al., 2010; Retelsdorf & Günther, 2011; Skaalvik & Skaalvik, 2013). Associations and effects of teacher performance approach goals have been found to be less consistent, with either negative (e.g., Hoffmann, Huff, Patterson, & Nietfeld, 2009; Retelsdorf et al., 2010; Retelsdorf & Günther, 2011), positive (e.g., Gorozidis & Papaioannou, 2011; Skaalvik & Skaalvik, 2013) or no significant (e.g., Butler & Shibaz, 2008; 2014; Papaioannou & Christodoulidis, 2007) relations with motivational processes and instructional practices.

Although this modern line of research provides some evidence relevant to teachers' participation in further training (Nitsche et al., 2013) or the implementation of innovative curriculum (Gorozidis & Papaioannou, 2011), teachers' motivational processes for engagement and continuation of educational innovations have yet to be examined. In addition, the inconsistencies and complexities regarding performance approach goals imply that performance oriented teachers may be more susceptible to the relative characteristics of each situation/task and context/environment they engage in; therefore, it seems meaningful to examine relevant hypotheses in a variety of circumstances to further illuminate this issue.

### *1.1.2 Self-determination theory (SDT) and Teacher motivation*

A fundamental focus of SDT is the reasons behind individuals' decision to engage in an activity; and one of its greatest contributions in understanding human functioning, is the distinction between autonomous (or self-determined) and controlled types of behavioral regulations guiding peoples' conduct (Deci & Ryan, 2000). Within self-determination continuum of human motivation (Ryan & Deci, 2009, p. 177) the basic types of autonomous motivation are *intrinsic* (i.e., doing something because it is interesting and enjoyable) and *identified* (i.e., because it is personally important and valuable) regulation, while *introjected* (i.e., to feel worthy or to avoid feelings of

guilt and shame) and *external* (i.e., to gain material incentives, recognition or to avoid punishments) regulations are considered controlled types of motivation (Ryan & Deci, 2000). Numerous studies in a variety of settings consistently show that autonomous in contrast to controlled motivation is connected to adaptive patterns and outcomes, optimal engagement, learning, performance and well-being (Deci & Ryan, 2000).

Indeed, recent studies in different countries and educational levels show that teacher autonomous but not controlled motivation is positively associated with personal accomplishment and job control and negatively associated with emotional exhaustion, depersonalization and job demands (Fernet, Guay, & Senécal, 2004; Fernet, Guay, Senécal, & Austin, 2012; Fernet et al., 2008; Roth et al., 2007). In a similar vein, teacher self-determined motivations (i.e., intrinsic, identified) have been related to positive attitudes and intentions towards innovative teaching and student-centered instruction, greater use of motivational strategies and student engagement, higher teaching efficacy and participation in training (Demir, 2011; Fernet et al., 2012; Gorozidis & Papaioannou, 2014; Hein et al., 2012; Jansen in de Wal, den Brok, Hooijer, Martens, & van den Beemt, 2014; Lam et al., 2010; Taylor, Ntoumanis, & Standage, 2008). All these findings align with the notion that teachers' autonomous motivation in every work task they carry out should be present for high quality educational achievements as well as their optimal learning and effective implementation of innovations. Although this line of research is rapidly expanding, until now teacher self-determined motivation in the context of educational innovation has not been investigated in joint consideration with teachers' achievement goals.

### *1.1.3. AGT-SDT integration and empirical links*

According to AGT mastery oriented individuals engage in an activity for its own sake, in order to learn and master the task in hand, to promote their personal competence; as a result they see challenges as opportunities for improvement and failures as valuable lessons to be learned (Dweck, 1986; Nicholls, 1984; 1989). Because task involvement is self-referenced and an increase in mastery is an end in itself, when individuals feel mastering a task, they experience success and higher levels of autonomous motivation (Nicholls, 1984). In contrast, performance oriented individuals engage in an activity as a means to an end, to gain favorable judgments for their competence or to avoid negative evaluations for their ability and make judgments about success based on normative criteria (Dweck & Elliott, 1983; Nicholls, 1984; 1989). Their task

engagement is dependent mainly on normative criteria or social evaluations (i.e., others' ability) of personal competence, which set the basis for controlled motivation.

While the links and impacts of goal orientations on behavioral regulations have been extensively examined with students (e.g., Barkoukis, Ntoumanis, & Nikitaras, 2007; Bell & Kozlowski, 2008; Van Yperen, 2006) and athletes (e.g., Ntoumanis, 2001; Nien & Duda, 2008), with regard to teachers research examining these relationships is limited. Two relevant studies were conducted in Finland (Malmberg, 2006, 2008) with student teachers and applicants to teacher education. In the first study it was found that mastery goal was positively linked with intrinsic motivation, performance avoidance related with extrinsic motivation, while performance approach had insignificant associations for student teachers and positive associations for applicants with extrinsic motivation for teaching (Malmberg, 2006). In the second study, Malmberg (2008) found that only mastery goal orientation predicted student teachers' intrinsic motivation to teach. In the Greek context, Christodoulidis (2004) carried out a study with in-service teachers and reported that only mastery goal orientation was positively connected with intrinsic and identified and negatively with external regulation for teaching; performance avoidance was positively related with introjected and external regulation and performance approach was significantly associated only with introjected regulation. In similar fashion, in work domain Dysvik and Kuvaas (2010, 2013) reported that intrinsic motivation had a positive association with mastery goals, a negative relationship with performance avoidance goals, and a low positive relationship or not significant association with performance approach goals; whereas both performance goals presented positive significant relationships with extrinsic motivation. However, while these studies employed the intrinsic versus extrinsic motivation distinction, they did not examine adaptive (i.e., autonomous) versus maladaptive (i.e., controlled) motivation, following the most recent conceptualization which supports the adaptive nature of high self-determined extrinsic regulations (e.g., identified) (Deci & Ryan, 2008).

Recent literature reviews (e.g., Elliot & Moller, 2003; Moller & Elliot, 2006) and meta-analytic findings are along those lines. For example, in a meta-analysis of 243 correlational studies involving mainly samples of students, Hulleman, Schrager, Bodmann, & Harackiewicz, (2010) found that interest (i.e., intrinsic motivation to learn, interest in psychology classes) had a strong positive relation with mastery goals, a very small positive relation with performance approach goals, and a low negative

relationship with performance avoidance goals. Papaioannou's et al. (2012) meta-analysis in sport and physical education revealed that autonomous motivation (intrinsic and identified) was positively related to mastery goals but it had no relationship with performance (both approach and avoidance) goals, whereas controlled motivation (external and introjected) was positively associated with performance approach and performance avoidance goals.

The compelling body of research presented above, underscores the importance of studying the relationships between AGT and SDT constructs in a variety of situations, contexts and across diverse achievement domains (e.g. education, sport, work), in order to decipher the complex psychological processes that determine individual achievement behavior. However, to our knowledge, all these relationships with their implications for practice have been overlooked in the extant literature with regard to in-service teachers and especially during a nation-wide reform effort aiming to promote educational innovations. To this end, it is oversimplistic to assume that what applies in every other sample (students, athletes, workers) is generalizable in teachers' case without examining it in natural settings. For instance, teachers combine characteristics from two different achievement domains, work and education, and as such they must be treated with extra caution. Teachers are professionals working in educational organizations and at the same time they are integral parts of the student class and school community. Moreover, current educational trends and every day practice put teachers in the position of a student, and make it imperative for their work to immerse in the role of an active learner throughout their career. In addition, it is very important to assess the linkage of goals with self-regulations in genuine, real-life situations where challenges and obstacles are meaningful for participants. Indeed, Papaioannou et al. (2012) suggested that the vast majority of experimental or intervention studies in achievement goals research have been conducted with artificial manipulations or with the use of hypothetical scenarios.

### *1.2. The present research*

The present research includes two studies investigating teacher motivational processes based on situation-specific hypotheses. In the first study, two different environmental conditions of recruitment were contrasted (optional vs. mandatory) to examine the equivalence of relationships between teacher achievement goal orientations and their

self-determined motivation with regard to the work task of participation in training to teach innovation.

The second study builds upon the findings of the first study and goes one step further by investigating the same model, regarding a different task (i.e., implementing innovative teaching), and its predictive ability on teacher intention to engage in similar behavior in the future. Intention is considered the major determinant of behavior (e.g., Ajzen & Fishbein, 1980) and its inclusion in the model aligns with the intentional perspectives of AGT and SDT (Deci & Ryan, 2002; Nicholls, 1989). Therefore intention was utilized as a manifestation of teacher future behavior because there is consistent evidence connecting intention to behavior (Ajzen, 1991).

### *1.3. General research questions and hypotheses*

Following literature review presented above three overarching novel research questions guided our work:

- 1) Are the patterns of relationships between teacher goal orientations and motivational regulations invariant across contexts or the work task in hand, hence, expressing only individual but not contextual variation?
- 2) Are teachers' goals determinants of their intention to continue with innovation?
- 3) Is performance approach goal facilitative for teacher autonomous motivation and intention to engage with educational innovation?

Based on theoretical postulates and the aforementioned empirical evidence we hypothesized that (a) mastery goal would present an adaptive pattern of relationships in any case; namely, a positive association with autonomous motivation and intention, and negative or no relationships with controlled motivation, (b) performance avoidance goals would present the most maladaptive patterns of relations in any situation and task; i.e., positive linkage with controlled motivation, negative or no associations with autonomous motivation and/or intentions, and (c) performance approach goals would be positively connected with controlled motivation, with positive or insignificant relationships with autonomous motivation and intention (Figure 1). In line with past research suggesting that autonomous and controlled motivation mediates the relationship between dispositional achievement goals and behavioral intentions (e.g., Papaioannou & Theodorakis, 1996), we assumed that

autonomous motivation would mediate the positive association of mastery goals with intentions to implement innovation.

**Please Insert FIGURE 1 about here**

Critical to this study was the measurement of performance approach goals using only normatively referenced items which is rare in existing research in work settings (Hulleman, et al., 2010). This allowed us to investigate the connection of performance approach goals with autonomous or controlled motivation without worrying about confounding results due to scale construction (Hulleman, et al., 2010).

*1.4. Research context - Recent educational innovations in Greece*

For the purposes of the present research two recent reform efforts which were implemented in Greece, were considered.

(a) At the end of the school year 2010-2011 (June), teachers of any specialization (including PE that is mentioned below) from Greek high schools, were invited to apply for an in-service training program. Participation was optional and seminars/workshops dealt with a newly introduced innovative subject for the official curriculum of Greek high school, namely *Research Project*. It should be noted that depending on the needs of their schools, all teachers could (were eligible to) implement the *Research Project* regardless of their academic subject area. This innovative subject was based on four pedagogical principles, namely inquiry based, differentiated, cooperative learning, and interdisciplinary teaching (Ministry of Education, 2011a). During the implementation of this subject teachers were considered to be the facilitators of the process and were expected to play multiple roles such as organizing, grouping, motivating and guiding students (Ministry of Education, 2011a).

(b) Before the beginning of the school year 2011-2012 the Ministry of Education decided to pilot test a new innovative PE curriculum in 167 schools, which were distributed all over Greece (FEK 2121/22-9-2011; Government of Greece, 2011). All schools were selected by the Ministry, requiring from all PE teachers in these *pilot* schools to participate in the training program of this reform effort. Basic characteristic of this curriculum is the focus on six basic standards to promote PE aims, offering autonomy to teachers to decide which aims to put more emphasis on,

based on the special characteristics and needs of their students and school; also, a central focus can be placed not only on motor/sport skills, but on the development of social-emotional and other life skills as well (Ministry of Education, 2011b).

Although these two educational innovations are not identical, they share certain similarities. Teachers attempting to implement these innovations have to redesign their lessons and instruction, to apply new student-centered teaching strategies, and to focus on new educational goals outside their tradition. The new teacher role and methods applied in both cases are very innovative compared to the traditional teacher-centered direct teaching that usually occurs in Greek schools. The first act of the Ministry to promote both innovations was two in-service training programs which were provided in the same format (workshops with small groups of teachers in two/three consecutive days, 15-21 hours). An important difference between these programs that might have affected teachers' motivation was their recruitment method. In the first case (optional condition), teachers voluntarily decided to participate in the training program, whereas, in the second case (mandatory condition), teachers were mandated to participate in training and to implement innovation.

## **2. Study 1**

According to AGT and SDT, environmental features play a very important role in the enhancement of specific goals and the promotion of people's self-determination. The optional versus mandatory recruitment method of teachers to participate in training creates a high controlling versus a low controlling condition of the work climate. It is essential to explore if a variation in this important feature of work environment changes the magnitude or even the valence of the associations between teachers' achievement goal orientations and autonomous and controlled motivation. For example, a matching hypothesis might posit that the connection of performance avoidance goal adoption with controlled motivation might be stronger in a high controlling environment (person-environment fit) than in a low controlling environment.

Moreover, because the link between performance approach goal orientation and self-determined motivation varies across studies, it is important to examine whether the variation of this association depends on the high controlling/mandatory or low controlling/optional dimension of the work environment. Again, in line with a

matching hypothesis, performance approach goal orientation might have negative or zero association with controlled motivation in a low controlling situation but positive linkage in a high controlling situation. Thus, for the purpose of the present study, two groups involved in different conditions (mandatory vs. optional participation in training) were considered, in order to investigate if there is a different response across people who have choice (low controlling situation) and people who are obligated to act in a certain way/ high controlling situation.

Following theoretical postulates and past research evidence that generally consider achievement goal orientations as antecedents of behavioral regulations (e.g., Barkoukis, Ntoumanis, & Nikitaras, 2007; Malmberg, 2008; Nien & Duda, 2008; Ntoumanis, 2001; Van Yperen, 2006), it was hypothesized that:

$H_1$ : Mastery goal orientation would predict positively autonomous motivation.

$H_2$ : Performance avoidance goal orientation would predict positively controlled motivation.

$H_3$ : The above patterns of relationships would be invariant across the two samples differing in condition of recruitment.

Due to ambiguous past findings regarding performance approach goal, no hypotheses were developed for the patterns of relationships between performance approach goal orientation and self-determined motivation. These findings and different opinions about the adaptive character of performance approach goal did not provide firm evidence in favor or against the matching hypothesis; hence no assumption was developed for the invariance of the relationship of performance approach goal orientation with autonomous or controlled motivation.

## *2.1. Method*

### *2.1.1. Participants and Procedure*

Following the approval of the University Ethics Committee, the first study was conducted at the beginning (October 2011) of the first academic year that (1) the innovative subject *Research Project* was included in the curriculum of Greek high school and (2) the new PE curriculum was piloted in 167 schools (99 primary and 68 secondary) all over Greece. Participants of the study were assured for the anonymity and confidentiality of their responses and were invited to reply to questionnaires voluntarily.

The first group (optional condition) consisted of secondary school teachers ( $n=191$ ) who specialized in various academic subjects (e.g., philologists, physicists, mathematicians, teachers of informatics, physical educators, etc.), geographically distributed all over the country. Participants selected to participate in the innovation following a public announcement/invitation of the Ministry of Education. Sixty-eight participants were males and 123 females, with 14.2 ( $SD=7.2$ ) years of teaching experience (ranging from 3-31 years), and 92 (48%) held a postgraduate degree. The second group (mandatory condition) comprised teachers with specialization in Physical Education (PE) ( $n=85$ ) working in the 167 pilot schools that were selected by the government during the time of “reform testing”. From these teachers 46 were males and 39 females, with 14.8 ( $SD=6.8$ ) years of teaching experience (from 3-30 years), and 17 (20%) held a postgraduate degree. Due to their job position they were obligated to participate in a specific training related to the new PE curriculum.

To investigate whether the one condition was indeed perceived as more controlling than the other, we have contrasted teachers' responses at the controlled motivation scale described below. This analysis revealed that teachers in the mandatory condition scored significantly higher in controlled motivation than teachers in the optional condition (mandatory  $M=2.65$ ,  $SD=1.2$  vs. optional  $M=2.07$ ,  $SD=1.01$ ;  $t(274)=-3.85$ ,  $p<.001$ ), supporting the differentiation between the two conditions (i.e., high vs. low controlling).

### 2.1.2. Instruments

#### 2.1.2.1. Teachers' achievement goal orientations in teaching innovation

To measure teachers' situation specific achievement goals regarding teaching of the new subject and PE curriculum, Teachers' Achievement Goals in Work Questionnaire (TAGWQ; Papaioannou & Christodoulidis, 2007) was utilized. This instrument has been proved valid and reliable in previous studies (e.g., Gorozidis & Papaioannou, 2011). In line with the suggestion of Hulleman et al., (2010) all performance approach items of this scale are normatively referenced. Each of the three sub-scales used (mastery, performance avoidance, performance approach), consisted of four items. The opening stem was “When teaching the new academic subject *Research Project...*”(Teachers) and “When teaching the new PE curriculum...”(PE teachers); and participants responded in items such as “My goal is to continuously develop my abilities as a teacher” (mastery goal orientation), “I will always try to outperform my

colleagues" (performance approach goal orientation), "I want to avoid teaching tasks in which I may look incapable" (performance avoidance goal orientation). Answers were given on 5-point Likert-type scales ranging from 1 to 5 (*strongly disagree* to *strongly agree* respectively).

#### 2.1.2.2. Teachers' self-determined motivation to participate in training

Teachers' situational motivation regarding their participation in training was assessed using the Greek version of the Work Task Motivation Scale for Teachers (WTMST; Fernet et al., 2008; Gorozidis & Papaioannou, 2014). In the present study 4 subscales (intrinsic, identified, introjected, external) were utilized, with 3 items per scale.

Following the stem "Why have you participated in this training program?"

participants answered to items as, "Because I like doing it" (intrinsic), "Because I consider my training important for the academic success of my students" (identified), "To not feel bad if I don't participate in training" (introjected), "Because my position might be in danger if I don't" (external). Responses were given on a 7-point Likert-type scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds completely*).

According to theory and research, intrinsic and identified regulation share certain qualities (e.g., internal perceived locus of causality, choice) therefore they can be combined to form an autonomous motivation composite; on the other hand, introjected and external regulation share other common characteristics (e.g., external locus of causality, coercion) thus they can be combined to form a controlled motivation composite (see Ryan & Deci, 2000; Vansteenkiste et al, 2004). Therefore, because our basic aim was to test the associations of teachers' achievement goal orientations with their autonomous and controlled motivations, two latent variables were constructed. Autonomous motivation was composed by 3 *domain representative* parcels (Kishton & Widaman, 1994) with the items of intrinsic and identified regulation; and controlled motivation comprised of 3 parcels with the items of introjected and extrinsic regulation.

#### 2.1.3. Data analysis

Data were analyzed using the SPSS 20 and Amos 16. To evaluate the internal consistency of the scales Cronbach's alphas were calculated. The factorial validity of each instrument and the measurement model was assessed via confirmatory factor analyses (CFAs) with maximum likelihood estimation method. Correlations between

latent variables were computed. Furthermore, multi-group structural equation modeling (SEM) analyses were conducted to examine the hypothesized model equivalence (i.e., the predictive relationships between teachers' goal orientations and their self-determined motivation to participate in training) across conditions (structural model invariance testing). We decided to examine the invariance of the full model. If the model would not be invariant then this would lead us to continue separately for each goal with the investigation of the invariance of the relationship between each goal and autonomous-controlled motivation. A baseline-unconstrained model (configural invariance) was compared against more restrictive models with additional constraints, testing the assumption of equality across groups for specific parameters each time (i.e., factor loadings, structural weights/paths, factor variance-covariance, structural residuals, measurement uniqueness). If a constrained model yielded worse model fit than the unconstrained one then the hypothesis of invariance would be rejected, suggesting that there is at least one different parameter across the two groups.

We relied on the TLI to interpret our findings because it is independent on small *df* and sample size (see Chen, Curran, Bollen, Kirby, & Paxton, 2008; Kenny, Kaniskan, & McCoach, 2014). The TLI varies along from 0 to 1, with values greater than .90 indicating a good fit, and greater than .95 reflecting an excellent fit (Hu & Bentler, 1999). Model fit was also determined by the normed  $\chi^2$  (i.e., chi-square to degrees of freedom ratio,  $\chi^2/df$ ). For normed chi-square ( $\chi^2/df$ ), values up to 2 or even as high as 3 considered acceptable (Kline, 2005; Tabachnick & Fidell, 2007). For model comparison we calculated the chi-square change ( $\Delta\chi^2$ ) and CFI change ( $\Delta CFI$ ) but because  $\chi^2$  is sensitive to sample size we emphasized  $\Delta CFI$ . Thus, we followed Cheung and Rensvold (2002) suggestion that if  $\Delta CFI$  between two models is up to .010 then the null hypotheses of invariance should be accepted.

#### *2.1.4. Results and discussion*

Before testing the full model, separate CFAs for each sub-sample verified the validity of each instrument (TAGWQ:  $n=191/85$ , TLI=1.00/.991, CFI=1.00/.993, RMSEA=.00/.023,  $\chi^2=45.97/56.24$ ,  $df=51$ ,  $\chi^2/df=.90/1.10$   $p=.67/.29$ ; WTMST:  $n=191/85$ , TLI=.949/.908, CFI=.973/.951, RMSEA=.089/.155,  $\chi^2=20.01/24.22$ ,  $df=8$ ,  $\chi^2/df=2.50/3.03$ ,  $p=.10/.002$ ). Alphas and latent factors' correlations for Study 1 variables are presented in Table 1. Structural Equation Models (SEM) across the total

sample and each sub-sample, depicting the structure of latent and observed variables shown in Figure 1 provided satisfactory goodness-of-fit indices. Specifically, for the total sample  $n=276$ :  $TLI=.968$ ,  $CFI=.974$ ,  $RMSEA=.039$ ,  $\chi^2=178.12$ ,  $df=125$ ,  $\chi^2/df=1.43$   $p=.001$ ; for each sub-sample:  $n=191/85$ :  $TLI=.967/.910$ ,  $CFI=.973/.927$ ,  $RMSEA=.038/.075$ ,  $\chi^2=159.57/184.53$ ,  $df=125$ ,  $\chi^2/df=1.28/1.48$ ,  $p=.20/.000$ . Moreover, all correlations between latent variables were in the expected directions establishing the concurrent and divergent validity of the measures. For the total sample, in line with AGT and SDT posits, mastery goal orientation was significantly correlated to autonomous motivation ( $r=.54$ ,  $p<.001$ ), while performance approach and avoidance goal orientations were interconnected ( $r=.43$ ,  $p<.001$ ) and both of them were associated with controlled motivation (approach  $r=.31$ ,  $p<.001$  and avoidance  $r=.41$ ,  $p<.001$ )(Table1).

**Please Insert TABLE 1 about here**

In multi-group SEM 1 (Figure 2), after establishing metric measurement invariance (M2; Table 2) which is considered a prerequisite (Chen, 2008), predictive relationships of the model were compared across conditions. The subsequent models (M3-M5) presented in Table 2 imply that the patterns and strength of relationships/paths between goal orientations and autonomous-controlled motivation are invariant across Teachers/low-controlling and PE teachers/high-controlling condition ( $H_3$ ). However, in M6 invariance of measurement uniqueness was rejected ( $\Delta CFI>.010$ ). These analyses revealed that only mastery goal orientation was significantly linked with autonomous motivation ( $\beta=.55$ ,  $p<.001$ ) ( $H_1$ ), whereas from performance goals only avoidance orientation was significantly connected with teachers' controlled motivation ( $\beta=.37$ ,  $p<.001$ ) ( $H_2$ ) to participate in training (Figure 2). These findings confirm  $H_1$ ,  $H_2$  and  $H_3$  hypotheses.

**Please Insert TABLE 2 about here**

**Please Insert FIGURE 2 about here**

### 3. Study 2

In Study 2 the same model was examined but now in a situation involving higher level of evaluation of teacher's competence. While in-service training (Study 1) did not involve any evaluation of teachers (e.g., no tests were applied), implementation of innovation in school (Study 2) involved both self-evaluation and others' (students, peers, headmaster) evaluation of teachers' competences. This condition is more likely

to energize teachers' achievement goals, particularly their goals to gain positive evaluation from others or to avoid negative evaluation of their competence, than in Study 1. Hence, the pattern of relationships between performance goals and motivational regulations might be different than in Study 1. For example, one might assume that high performance approach oriented teachers might be challenged by innovation implementation due to expectations to demonstrate high normative competence and, therefore, to be more autonomously motivated than low performance approach oriented teachers who are not challenged by expectations to demonstrate high normative competence. On the other hand, if the quality of achievement goals corresponds to the same quality of motivation regulations across situations (Nicholls, 1989; Duda & Nicholls, 1992), we would not expect this relationship but only a link between performance approach goal orientation and controlled motivation. Likewise, performance avoidance oriented teachers who are striving to avoid negative judgments of their competence, would certainly experience this evaluative situation as controlling.

In Study 2, intention to continue implementing the innovation was added in the model. Theoretical postulates of AGT and SDT support that mastery oriented teachers would be engaged with a work task for the task itself, whereas performance oriented individuals would be involved with a task as a mean to an end. Additionally, past research evidence suggest that teachers' mastery goal predicts through mediating variables their intention, whereas performance goals have no relation to intention (Gorozidis & Papaioannou, 2011). Based on these propositions, it was expected that:  
*H<sub>4</sub>*: Mastery goal orientation would predict positively autonomous motivation to teach the new subject.

*H<sub>5</sub>*: The relationship between mastery goal and future intentions to implement innovation would be mediated by autonomous motivation.

*H<sub>6</sub>*: Performance goal orientations would be positively linked with controlled motivation.

*H<sub>7</sub>*: Performance goal orientations would have insignificant relationships with intentions to teach innovation in the future.

### *3.1. Method*

#### *3.1.1. Participants and Procedure*

This study was conducted during the ending (June 2012) of the first school year of *Research projects* implementation in Greece. Following analogous procedures to Study 1, secondary school teachers ( $n=140$ ) of various specialties, who have implemented the new subject, decided to participate in the study. From these teachers 61 were males and 79 females, with 15.3 ( $SD=7.6$ ) years of teaching experience (from 3-35 years), and 84 (60%) held a postgraduate degree. Moreover, questionnaires were distributed to PE teachers from pilot schools who were asked to implement the new PE curriculum, but only twenty of them replied, thus these data were not enough to conduct SEM and therefore, they were discarded from further analyses.

### 3.1.2. Instruments

#### 3.1.2.1. Teachers' achievement goal orientations in teaching innovation

The same instrument with Study 1 was used, which was comprised of 12 items corresponding to 3 factors.

#### 3.1.2.2. Teachers' self-determined motivation to teach *Research Project*

Teachers' self-determination regarding the implementation of the new subject was assessed by a slightly modified version of the instrument used in the first study, in order to comply with the specific situation-task. For example following the stem "Why do you teach the new lesson *Research Project*?" participants responded to items as, "Because I like doing it" (intrinsic), "Because I consider the lesson *Research Project* important for the academic success of my students" (identified), "To not feel bad if I don't" (introjected), "Because my position might be in danger if I don't" (external).

#### 3.1.2.3. Intention to teach-implement *Project*

In order to assess teachers' intentions to future (next year) implement the innovation, a 2-item scale was constructed according to Ajzen's recommendation (Ajzen, 2002) which demonstrated good psychometric properties in previous studies (Gorozidis & Papaioannou, 2011, 2014). Following the statements "During the next season I plan to teach the new subject *Research Project*", and "During the next season I am determined to teach the new subject *Research Project*", teachers responded in 7-point semantic differential scales (from very likely to very unlikely, from definitely yes to definitely no respectively).

### 3.1.3. Data analysis

Analyses were conducted following the same procedures described in Study 1. The SEM which was constructed here intended to examine the linkages of teachers' goal orientations with their self-determined motivation and in turn with future intentions regarding the implementation of the innovative academic subject.

### 3.1.4. Results and discussion

Before testing the full model, separate CFAs verified the validity of each instrument (TAGWQ: TLI=.968, CFI=.975, RMSEA= .047,  $\chi^2=66.69$ ,  $df=51$ ,  $\chi^2/df=1.31$   $p=.07$ ; WTMST: TLI=.959, CFI=.978, RMSEA= .093,  $\chi^2=17.60$ ,  $df=8$ ,  $\chi^2/df=2.2$ ,  $p=.024$ ). Alphas and factors' correlations for Study 2 variables are presented in Table 3. Similarly to Study 1, CFA of the full model produced satisfactory goodness of fit indices (TLI=.974, CFI=.978, RMSEA= .037,  $\chi^2=183.83$ ,  $df=155$ ,  $\chi^2/df=1.19$ ,  $p=.057$ ), and factor correlations were in the hypothesized direction. Performance goals were interrelated and significantly associated to controlled motivation; mastery goal was significantly related to autonomous motivation and to intentions, while from behavioral regulations only autonomous motivation was related to intentions.

The hypothesized model (SEM 2; Figure 3) fitted well to the data with TLI=.975, CFI=.979, RMSEA= .036,  $\chi^2=183.92$ ,  $df=156$ ,  $\chi^2/df=1.18$ ,  $p=.063$  ( $n=140$ ). Only mastery goal orientation was positively linked with autonomous motivation ( $\beta=.54$ ,  $p<.001$ ) ( $H_4$ ) and in turn autonomous motivation was positively connected with intention ( $\beta=.74$ ,  $p<.001$ ) ( $H_5$ ); mediation analysis with bootstrap (1000 samples, CI at 95%, BC) revealed that mastery had an indirect effect on intentions (.39,  $p=.002$ ), and this relationship was fully mediated by autonomous motivation ( $H_5$ ). Although performance avoidance goal orientation had positive bivariate correlation with controlled motivation ( $H_6$ ) (CFA; Table 3), as a part of the structural model the unique variance between these two variables was not significant anymore. On the other hand, performance approach goal orientation positively predicted controlled motivation ( $\beta=.35$ ,  $p=.01$ ) ( $H_6$ ), but not intention ( $H_7$ ) (Figure 3).

**Please Insert TABLE 3 about here**

**Please Insert FIGURE 3 about here**

#### **4. General discussion**

Combining the findings from both studies, mastery goal emerged as the most adaptive motivational orientation across conditions and situations/work-tasks, which is consistent with theoretical assumptions and empirical research evidence (e.g., Butler & Shibaz, 2008; Daniels, Frenzel, Stupnisky, Stewart, & Perry, 2012; Gorozidis & Papaioannou, 2011; Retelsdorf & Günther, 2011; VandeWalle, Brown, Cron, & Slocum, 1999). Mastery oriented teachers are more likely to pursue their training participation relative to educational innovation autonomously (i.e., out of interest and pleasure, or because they highly value this task), irrespective of the circumstances (optional vs. mandatory recruitment).

Similarly, in both work tasks examined here, only mastery goal orientation emerged as a significant predictor of teachers' adaptive motivational regulations. These relationships are congruent with findings from studies involving students of all educational levels (i.e., primary, secondary, university), pre-service teachers, teachers, workers and athletes (Ciani, Sheldon, Hilpert, & Easter, 2011; Christodoulidis, 2004; Dysvik & Kuvaas, 2010; Malmberg, 2006; Nien & Duda, 2008; Ntoumanis, 2001; Papaioannou et al., 2009; Standage & Treasure, 2002) and suggest that mastery goal display analogous positive motivational patterns independent of the situation, context and teachers' specialization.

It was also found that only mastery goal orientation was positively associated with intention to future implement innovation at school. Mediation analysis yielded that mastery goal orientation might be connected with intentions indirectly through teacher autonomous motivation. These findings imply that mastery goal orientation may contribute positively to teacher autonomous motivation, which in turn can trigger their intention to implement innovations. Collectively, these results are in accordance with the notion that when individuals are mastery oriented (i.e., pursuing their personal growth), they engage in activities (i.e., participation in training) more optimally even in high controlling situations. Hence, teachers displaying a mastery oriented pattern enjoy to engage and persist in a challenging activity (i.e., innovative instruction), because they recognize it as an opportunity for further development of their skills and practices (Dweck & Leggett, 1988; Nicholls, 1989).

Regarding performance goal orientations, in agreement with prior teacher studies (e.g., Hoffmann et al., 2009; Retelsdorf et al., 2010), our findings yielded maladaptive or insignificant motivational patterns which were less stable across conditions and tasks, implying that these goals (performance approach and avoidance) are more context and situation specific. This seems particularly true for performance approach goal orientation, which had no relationship with autonomous motivation, while it was positively connected with controlled motivation to participate in training. However, as part of the model (SEM 1) including all goal orientations, performance approach had no significant contribution in the explanation of controlled motivation, and these patterns were invariant across conditions. This implies that mandatory vs. optional recruitment does not alter the motivational responses of performance approach oriented teachers. This outcome seems plausible, because during training teaching performance was not evaluated (e.g., there were no final test/exams assessing teachers' understanding of how to implement innovations), thus teachers did not have the possibility to exhibit their teaching ability. In contrast, when it came to the task of implementing innovation, performance approach goal relationship with controlled motivation was magnified yielding a direct contribution in the explanation of controlled motivation. Indeed, performance approach oriented individuals might have experienced controlled types of motivation (e.g., to be rewarded, conforming to authorities) when teaching innovative subjects, because during this task they had the chance to demonstrate superior competence relative to their colleagues who did not select to implement innovation. However, the combined associations of performance approach and controlled motivation was not large enough to explain teacher's intention to teach innovation in the future.

On the other hand, in relation to performance avoidance goal orientation it was found that its associations with autonomous and controlled motivation were more stable across conditions and tasks. Expectedly, in all cases performance avoidance goal orientation had insignificant relationships with autonomous motivation but positive relationships with controlled motivation. It seems reasonable that performance avoidance oriented teachers while striving to avoid unfavorable judgments in case of teaching innovation, might engage in training for external reasons (e.g., to comply with external demands or feelings of pressure, shame), regardless of the recruitment method, which might explain the magnitude of relationship and the predictive ability of this goal orientation on controlled motivation

to participate in training. It should be noted here that these particular teacher training programs did not include any evaluation; hence, this work task did not include any risks for teacher competence appraisal. However, in the implementation of innovation, the explanation of controlled motivation by performance avoidance goal was mediated by its relationship with performance approach goal.

The finding that performance approach goal orientations did not relate to autonomous motivation or intention, suggests that the multiple goal perspective (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002), supporting that performance approach goal is adaptive, does not apply to teachers' involvement with educational innovation. This is congruent with studies in work and teaching domains (Dyvsik & Kuvaas, 2013; Butler & Shibaz, 2008; Retelsdorf et al., 2010) showing that performance approach goals may not predict adaptive patterns and outcomes in situations and contexts where academic (graded) performance is not the first priority. Overall, our findings are in line with the theoretical tenets of AGT and SDT, and recent findings in the domain of teaching revealing adaptive motivational patterns for mastery goal oriented teachers and less adaptive motivational patterns regarding performance oriented teachers (Butler & Shibaz, 2008, 2014; Gorozidis & Papaioannou, 2011; Papaioannou & Christodoulidis, 2007; Retelsdorf & Gunther, 2011).

An unintentional finding was the relatively high proportion of qualifications of teachers in the optional conditions. Participants of the first study who got involved voluntarily (optional condition), and the second study who have implemented innovation held postgraduate degree in a higher proportion (48% and 60% respectively) than the general teaching population in Greece (9%; Educational Research Center, 2007). If we consider this extra qualification as an indication of teacher quality, then this finding supports Guskey (1988) who asserted that when involvement with instructional innovation is optional, then those who decide to engage in the first stages of educational reforms promoting innovations might already be teachers of high quality.

The present evidence supports the notion that teacher personal factors (i.e., motivation) are very important in the explanation of teacher adaptation in educational innovation (Vermunt, Bakkenes, Brekelmans, & Wubbels, 2008). Environmental cues (i.e., condition of recruitment) or task characteristics (i.e., evaluative) did not influence the general patterns of relationships between personal goal orientations,

regulations and behavioral intentions towards innovation. However, contextual factors such as the learning environment and school climate are instrumental for teachers' learning outcomes (Bakkenes et al., 2010) and their motivations (Janke, Nitsche, & Dickhäuser, 2015; Lam et al., 2010) in the context of innovation. Hence, because personal factors can be shaped by contextual factors, future research and interventions should focus on the learning environment and the whole educational philosophy connected with innovations.

#### *4.1. Implications*

Although teachers' quality of motivation regarding innovation is considered integral part of their learning and educational change, until recently it had received little attention. This situation is worrisome because the kind of motivation guiding teacher work behavior is essential for gaining qualitative in-depth educational results. Moreover, there is a global trend for policy makers to be concerned mostly with teacher motivation in quantitative terms because quantity is directly observable. However, when approaching teacher motivation in this way it is inevitable to construct educational work environments inducing performance goals and controlling reasons for implementing innovations.

Indeed, the general tendency in education is obligating or awarding teachers incentives (mostly materially defined) to promote their participation in professional development (e.g., European Commission/EACEA/ Eurydice, 2013). For example, according to the European Commission report (Eurydice, 2013), for most EU countries job promotion is the most important incentive for teacher' participation in training. In some educational systems it is imperative in order to stay in the profession and in other cases grants, monetary allowances, and salary increments are offered (European Commission/EACEA/ Eurydice, 2013). It is likely that these practices promote competitiveness and induce normative comparisons across educators. In addition, teachers may experience this kind of external incentives and pressures as controlling, which in turn may have undermining effects on their intrinsic motivation and interest (Deci, Koestner, & Ryan, 1999; Pelletier, Séguin-Lévesque, & Legault, 2002). Such controlling environments for school teachers are a reality in many countries worldwide, implementing high-stakes testing policies (for reviews see Ryan & Brown, 2005; Ryan & Weinstein, 2009). But the kind of motivation that will emerge by these policies is most certainly leading to superficial educational outcomes.

Alternatively, if the aim of an educational system is to foster the quality of student attainments, initially it should focus on promoting teacher quality of motivation and learning to the most optimal level in every aspect of their job (i.e., fostering mastery goal and autonomous motivation while diminishing performance goals and controlled motivation). This aim could be achieved if decision makers create a mastery oriented climate supporting teacher autonomy. The basic characteristics of such work environments include an emphasis on personal improvement, effort, persistence and collaboration with peers; the provision of frequent opportunities for cooperation and experimentation, feedback related to teacher's progress, corrective feedback and support by colleagues and specialists. These features of teachers' work environments are contrary to the promotion of competition between teachers and the stress with normative evaluation criteria (with rewarding and/or punishing extensions), which are currently used in many teacher accountability systems globally. AGT and SDT literature is generally congruent on how the most supportive environments can be constructed to foster teacher mastery orientation and autonomous motivation (e.g., Baard, 2002; Deci & Ryan, 2000; DeShon & Gillespie, 2005).

Indeed, recent studies demonstrated that teachers' work related mastery goal orientation as well as autonomous motivations for professional learning was predicted by their perceptions that work environments fulfilled their basic psychological needs for autonomy, competence, and relatedness (Janke et al., 2015; Jansen in de Wal et al., 2014). These suggestions are also congruent with literature in teacher learning acknowledging that the best suited environments for educational innovations are those promoting teacher collaborative learning, supporting partnerships, peer coaching, and communities of practice to emerge (Bakkenes et al., 2010; Lieberman & Pointer Mace, 2008). This implies that future interventions aiming to promote educational renewal should be developed incorporating knowledge about teachers' motivation together with knowledge about teacher learning.

#### *4.2. Limitations and future research*

One limitation of this study is that it was based on cross-sectional data and thus causality in relationships cannot be inferred, nevertheless, our analyses are supported by well established theoretical postulates and past research evidence confirming the present findings (e.g., Barkoukis et al., 2007; Conroy, Kaye, & Coatsworth, 2006;

Elliot & Church, 1997; Nien & Duda, 2008). In addition, in study 2, intention was served as an indicator of teacher future behavior, while teacher actual behavior would be a much more favorable outcome to include in the model. However, this decision was warranted by the substantial methodological obstacles that emerge when trying to infer teachers' motivation from objective measures of teachers' behavior in authentic settings, and it is supported by theory and research suggesting a strong bond between intentions and behavior (Ajzen, 1991).

Another limitation is that only teachers' self-reports were used and more types of data (e.g., interviews, observation) would be of great value to get a more comprehensive picture of the whole situation. The use of a social desirability scales and additional measurements of possible interrelated factors (e.g., perceived motivational climate) might have strengthened our arguments; however, limitations in the length of the questionnaire discouraged us from inclusion of these measures in the present research. A useful line of research in the future could focus experimentally and/or longitudinally, on the effects of differently structured educational environments for educators (mastery-autonomy supporting vs. performance-controlling) on their actual professional behavior and in turn on students' motivation and behavior. Furthermore, it would be very interesting to address the role of perceived need satisfaction in the whole process, because, motivational regulations depend on the degree to which innate needs are met by the environment, and also recent evidence supports that perceived need satisfaction may predict teachers' work mastery goals (Janke et al., 2015).

#### *4.3. Concluding remarks*

Our study provides some new insights on the underlying motivational patterns guiding teacher engagement with educational innovations. It appeared that the most essential personal motivational basis for teachers is the combination of mastery goal orientation with their autonomous motivation. Interestingly, although controlled motivation may provide some obvious extrinsic reasons for engagement with an activity, it failed to predict teachers' intentions. In a similar vein, performance approach and avoidance goals failed to explain autonomous motivation or intentions to implement innovation and were only related to controlled motivation. In general, these patterns of relationships, although not identical, seem to be universal across

different environmental conditions (high or low controlling), or work-tasks (more or less evaluative).

These findings are especially important to the current practices which are implemented globally. Top-down reform efforts often have negative impact on teachers' motivation and policy makers in their attempt to promote large-scale innovations are accustomed to establish controlling motivations. This choice might be justified if we naively assume that by engaging more people, independently of their type of motivation, we will have the expected results. However it seems that for this kind of choices there is the easy way and the right way. The right way is to provide the appropriate environment, cultivating teachers' mastery and fostering their self-determined motivation in work. This policy may be hard to be implemented under certain circumstances (e.g., political uncertainty, successive reforms without a long term acceptance and an agreed basic plan), because it might entail the general restructuring of the whole educational system and its philosophy. Baring this in mind, theoretical tenets of motivational theories such as AGT and SDT should not be overlooked, in the design of in-service training programs and educational environments for teachers' optimal motivation and engagement with innovations.

Significantly, the present study contributes in the expansion of knowledge and theory development through the integration of two prominent motivational frameworks. By providing empirical evidence in an under-researched area augments the work of other researchers (e.g., Janke et al., 2015) and supplements some very promising recent attempts in the field of motivation, for complementary use and integration of AGT and SDT (e.g., Duda, 2013; Vansteenkiste et al., 2014).

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**Table 1**

Alphas and CFA Factors Correlations across Conditions

Variables	alphas	1	2	3	4	5
<i>Optional (n=191) / Mandatory (n=85)</i>						
1) MASTERY	.73/ .79		.04/ .08	-.06/ -.10	.59***/ .47**	-.13/ .00
2) P. APPROACH	.85/ .87			.46***/.38**	.02/ -.02	.28**/ .32*
3) P. AVOIDANCE	.78/ .84				-.02/ -.02	.41***/ .41**
4) AUTONOMOUS	.85/ .95					.07/ .01
5) CONTROLLED	.78/ .74					

*Note.* \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$

**Table 2**

Fit Indexes for the Invariance of the Structural Model 1 across Conditions

<b>Model</b>	$\chi^2$	<i>df</i>	$\chi^2/df$	$\Delta\chi^2 (\Delta df)$	<b>RMSEA</b>	<b>TLI</b>	<b>CFI</b>	<b><math>\Delta CFI</math></b>
(M1) Unconstrained model (configural invariance)	348.45	252	1.38		.037	.945	.954	
(M2) Factor loadings constrained (metric invariance)	367.89	265	1.39	19.44 (13)	.038	.944	.951	.003
(M3) +Structural weights/paths constrained (regression weights invariance)	369.80	271	1.37	21.35 (19)	.036	.947	.953	.001
(M4) +Structural covariances constrained (factor variances & covariances invariance)	371.48	277	1.34	23.03 (25)	.035	.951	.955	-.001
(M5) +Structural residuals constrained	<b>381.30</b>	<b>279</b>	<b>1.37</b>	<b>32.85 (27)</b>	<b>.037</b>	<b>.947</b>	<b>.952</b>	<b>.002</b>
(M6) +Measurement residuals constrained <i>(invariance rejected)</i>	487.05	297	1.64	138.6***(45)	.048	.907	.910	.044

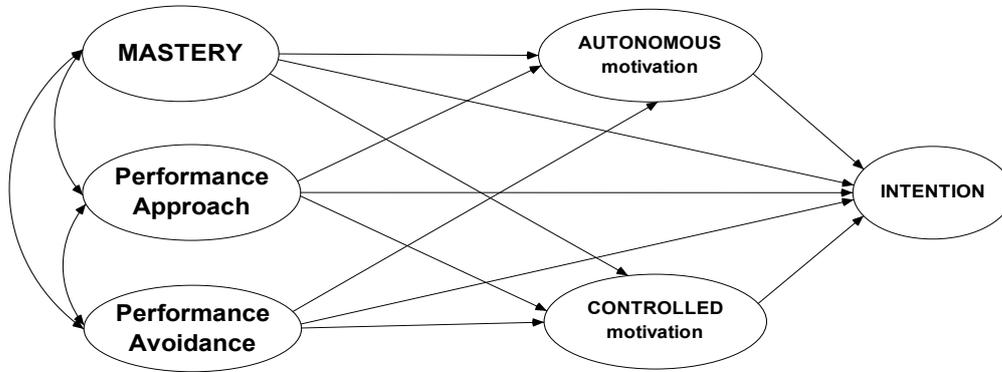
*Note:* + means that model parameter constraints were added to the previous ones (i.e., all the above constraints), \*\*\* $p < .001$ .

**Table 3**Alphas and CFA Correlations ( $n=140$ )

<b>Variables</b>	<b>alphas</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
1) MASTERY	<b>.82</b>		.15	-.09	.56***	-.06	.27**
2) P. APPROACH	<b>.86</b>			.62***	.15	.48***	.05
3) P. AVOIDANCE	<b>.78</b>				-.04	.46***	-.16
4) AUTONOMOUS	<b>.91</b>					.02	.67***
5) CONTROLLED	<b>.81</b>						.09
6) INTENTIONS	<b>.88</b>						

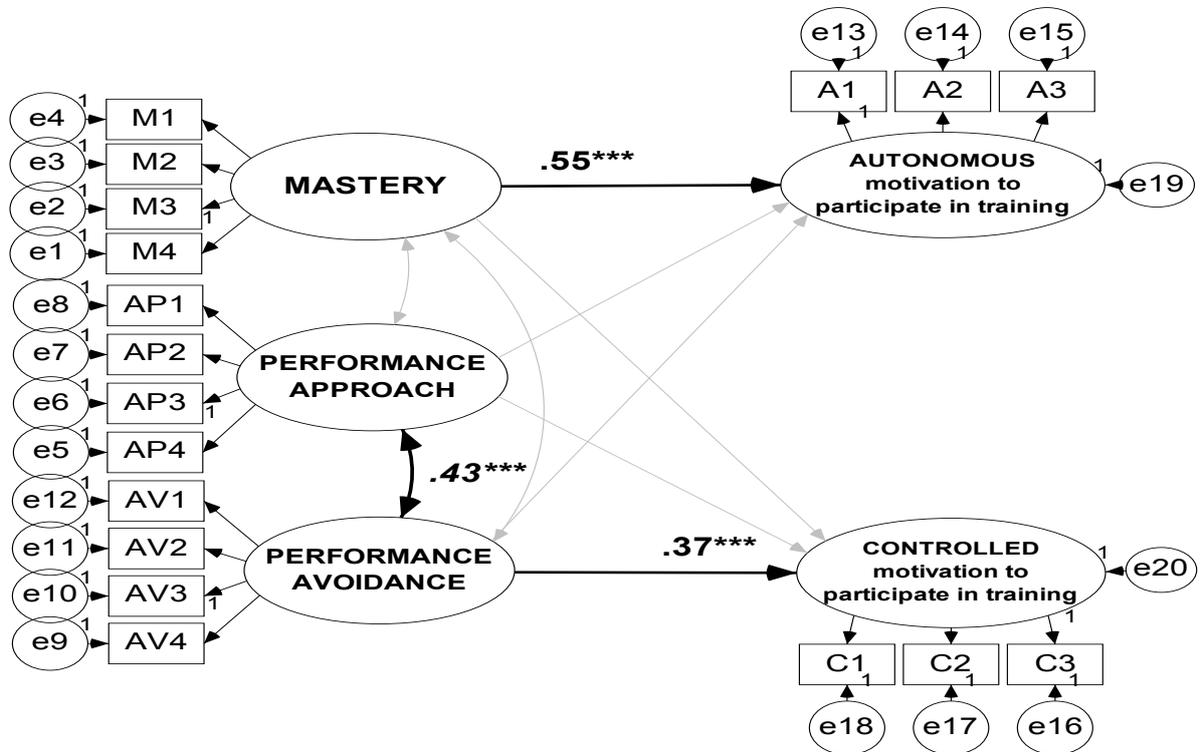
Note: \*\*\* $p < .001$ , \*\* $p < .01$

**Figure 1**



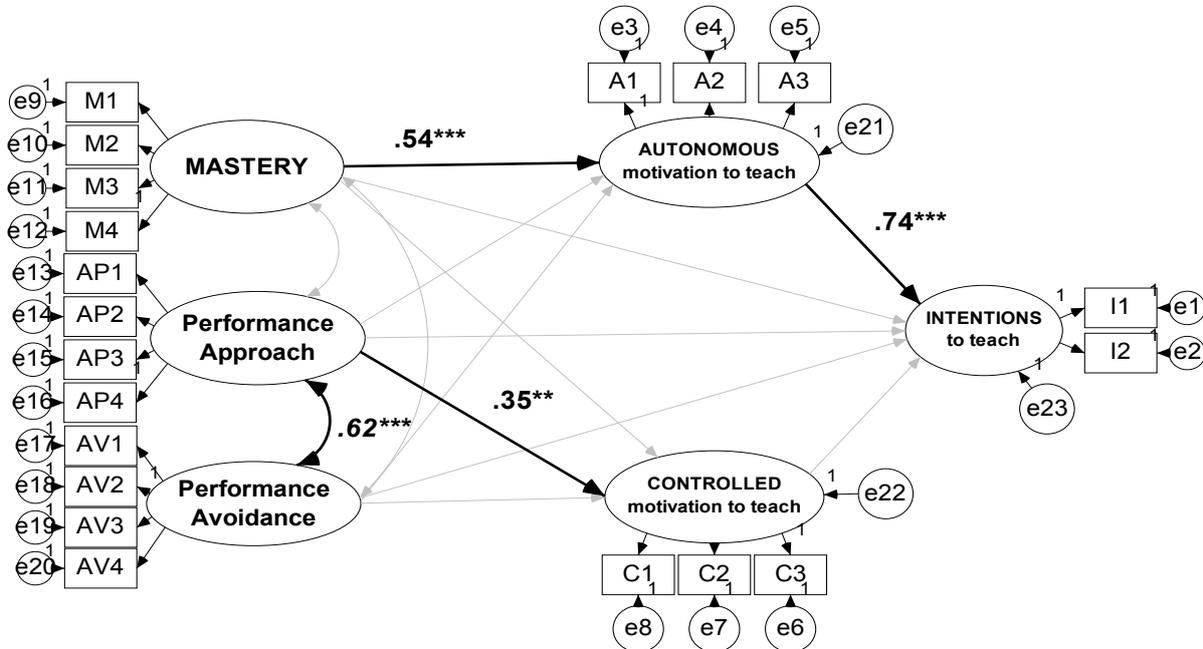
**Figure 1.** Summary of the hypothesized models to be tested. Intention part of the model was examined only in Study 2.

Figure 2



**Figure 2.** SEM 1, depicting relations between teachers' Achievement goal orientations and their Autonomous ( $R^2=.30$ ) and Controlled ( $R^2=.20$ ) motivation to participate in training. *Model 5* values and only significant paths and correlation are presented ( $***p<.001$ ).

**Figure 3**



**Figure 3.** SEM 2 depicting relations between teachers' Achievement goal orientations, their Autonomous ( $R^2 = .32$ ) and Controlled ( $R^2 = .20$ ) motivation, and Intentions ( $R^2 = .50$ ) to teach innovation. Only significant paths and correlation are presented (\*\* $p < .01$ , \*\*\* $p < .001$ ).

# **Teachers' achievement goals and self-determination to engage in work tasks promoting educational innovations**

## **Highlights**

- Teachers' mastery goal predicted autonomous participation in training
- Teachers' performance avoidance goal predicted controlled motivation
- The above patterns of relationships were invariant across teacher conditions
- Mastery goal relationship with intentions was mediated by autonomous motivation
- Performance goals did not relate to intentions to implement innovation