



Teachers' motivation to participate in training and to implement innovations



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HIGHLIGHTS

- Self-determination theory is beneficial in understanding teachers' work motivation.
- Autonomous motivation predicts teachers' intentions to participate in training.
- Autonomous motivation predicts teachers' intentions to teach an innovative subject.
- Controlled motivation does not predict teachers' intentions.

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ABSTRACT

Based on Self-determination theory, a mixed method design was used to explore 218 teachers' motivation and intentions regarding participation in training and teaching of an innovative academic subject (i.e., *Research Project*). Structural equation modeling revealed that autonomous motivation positively predicted teacher intentions to participate in relevant training and to implement innovation in the future, while controlled motivation did not. The findings imply that policy makers should encourage strategies that foster teacher autonomous motivation for promoting successful implementations of educational innovations.

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1. Introduction

In recent years, school innovations have become increasingly important for worldwide reforms in an attempt to improve education and to switch from traditional teaching practices (teacher-centered) to more creative student-centered approaches (e.g., cooperative, project-based learning). A notable example is Greece where many top-down reform efforts have been made in the last ten years in an attempt by the Ministry of Education to improve education and to align national curricula with international trends (e.g., Cross Thematic Curriculum, 2003; New books, 2006; New School-Priority the student, 2011). In the most recent educational change, an innovative new course namely *Research Project*, was

introduced to Greek high schools (10th to 12th grade) (<http://www.pi-schools.gr/>; <http://www.minedu.gov.gr/>). This is based on four pedagogical principles, (a) Inquiry based learning, (b) Interdisciplinary teaching-collaboration, (c) Differentiated learning, (d) Cooperative learning (Ministry of Education, 2011). The new subject requires students to work on interdisciplinary projects in small groups, and teachers to facilitate initiative, choice, experimentation, and individual/group responsibility (Ministry of Education, 2011). In Greece, apart from inductive training, further in-service education is not obligatory; in this context the first act was to support the implementation of this innovative subject by way of an optional in-service training program for high school teachers, provided by The National Organization for Teachers' Training (i.e., OEPEK) in June of 2011.

In the international educational arena, innovations are often introduced via centrally organized in-service teacher training programs (or continuous professional development programs). However, in many cases, participation in these programs is optional, and when it is mandatory there is no way of ensuring

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teachers' optimal engagement in these learning experiences. As Van Eekelen, Vermunt, and Boshuizen (2006) underlined teachers' *will to learn* must be present before their engagement in any learning activity regarding innovations. In their small scale qualitative study, they found that it was only the teachers who were *eager to learn*, and agreed with the new innovative views of teaching, who undertook the appropriate action to do so (Van Eekelen et al., 2006). Accordingly, Shulman and Shulman (2004) proposed that teachers' willingness to learn (i.e., motivation to learn) is one of the basic features of teacher learning and successful professional development. Motivational theorists suggest that autonomous motivation to learn is instrumental for optimal learning and performance, individual adjustment and psychological functioning, greater creativity, and persistence in many different educational settings (see Deci, Ryan, & Williams, 1996; Niemiec & Ryan, 2009; Reeve, 2002). This means that teachers' motivation to be involved in new learning experiences, such as in-service training programs, should be fundamental for the success of these programs.

In the present study we examined teachers' motivation in determining their intentions to participate in training and to implement the innovative subject *Research Project*. The examination of teachers' intentions and their prediction by motivational variables is very important because according to the Theory of Planned Behavior (TPB; Ajzen, 1991) intentions have greater possibility of being translated into behavior (Ajzen, 2002).

Our primary focus was teachers' motivation to participate in training as there is a consensus that students' learning is dependent on teacher quality, and therefore, teacher professional development is essential (Darling-Hammond, 2000; Fullan, 2009; Villegas-Reimers, 2003). The substantial influence of teachers' quality on student achievement and the connection between teachers' professional development and school improvement has been supported by both quantitative and qualitative studies (see Darling-Hammond, 2000; Villegas-Reimers, 2003; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007).

The second focus of our study was the examination of teachers' motivation to implement the innovation because teachers play a key role in the implementation of *Research Project* by organizing, grouping, motivating and guiding students (Ministry of Education, 2011). In recent years, the influential position of teachers in the educational procedure has led to the expansion of research in examining the contextual and dispositional factors influencing teachers' participation and implementation of school innovations. Findings from these studies support the idea that teachers' motivation is one of the most essential determinants for the successful implementation of educational innovations (Abrami, Poulsen, & Chambers, 2004; Cave & Mulloy, 2010; Gorozidis & Papaioannou, 2011; Lam, Cheng, & Choy, 2010; Schellenbach-Zell & Gräsel, 2010).

Recent studies show that teachers' motivation and cognition (e.g., self-efficacy, attitudes, appraisals, beliefs, goals) are vital for the impetus of their workplace learning (Geijssels, Sleegers, Stoel, & Krüger, 2009; Kwakman, 2003; Lohman, 2006; Runhaar, 2008; Vermunt & Endedijk, 2011). However, only few studies focused on teachers' reasons for participating in formally organized training promoting educational innovation. Livneh and Livneh (1999) administered the Characteristics of Lifelong Learners in the Professions Scale and found that self-motivation (internal) and external motivation (networking with others/salary improvement) to learn predicted K-12 educators' participation in professional development activities during the previous year. Hynds and McDonald (2009) in their qualitative study found that teachers decided to participate in a school-university partnership program mainly for intrinsic reasons (e.g., to link theory to practice, to improve students' learning, to collaborate, for pleasure, for

knowledge) but some extrinsic reasons also emerged (qualification achievement, fee payment). Stout (1996) recognized four motives affecting teachers' participation in professional development: gaining new skills/knowledge to enhance classroom practice, salary enhancement, eligibility to compete for a position/certificate maintenance, career mobility/CV building. In a similar fashion, studies in other work domains show that employees' motivation to engage in occupational training and development is determined by internal motivations (e.g., curiosity, knowledge) and external ones (e.g., compliance with authority, professional benefits) (Dia, Smith, Cohen-Callow, & Bliss, 2005; Garst & Ried, 1999; Noe & Wilk, 1993; Tharenou, 2001). Although these studies underscored the importance of both intrinsic and extrinsic reasons, we expected that some of these extrinsic reasons would be irrelevant for Greek teachers because their participation in continuous professional development is not considered a work duty and there are no monetary rewards in the form of payment or salary improvement for these activities (European Commission/EACEA/Eurydice, 2013).

Intrinsic and extrinsic motivations are key-constructs of Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000a) which can be used to investigate teachers' task specific motivation (i.e., participation in training, teaching innovation). Recently, some researchers supported the utilization of an integrated model with constructs from multiple theories as the most appropriate framework for the study of teachers' motivation (Cave & Mulloy, 2010; Jesus & Lens, 2005). However, SDT may uniquely provide a sufficient solution for the study of teachers' situational-level motivation (Vallerand, 1997). Especially in a context where monetary incentives are absent, engagement in continuous professional development is voluntary, and as teachers' wages have decreased substantially as a result of the Greek economic downturn (European Commission/EACEA/Eurydice report, 2012), SDT might unveil important intrinsic incentives for individuals' optimal motivation. In addition, it is a well-established theory applied in various domains internationally offering guidelines to improve practice (see Deci & Ryan, 2008; Ryan & Deci, 2000b), and it would be informative for policies aiming to foster teachers' involvement with educational innovations.

Based on SDT, Fernet and his colleagues (Fernet, 2011; Fernet, Senecal, Guay, Marsh, & Dowson, 2008) suggested that teachers' quantity and quality of motivation presents a wide variety, relative to the various work-related tasks they have to carry out. Indeed, highly motivated teachers in teaching or in class preparation could be less motivated to participate in further training and professional development, for a number of reasons: some training programs might be limited, or located out of their reach; or they feel satisfied and effective in the way they teach so no training is needed; or they just do not have the possibility, or the will, to devote their personal time for these activities. To this end, teachers' intentional engagement in any in-service training program becomes extremely important and worthy of scrutiny. Therefore, because in SDT, a pivotal concept is the existence of choice in a person's behavioral regulations, it provides an appropriate framework to base a study on teachers' volitional engagement in professional training promoting school innovations.

1.1. Self-determination theory (SDT)

SDT theory posits that peoples' behavior can be intrinsically motivated, extrinsically motivated, or amotivated depending on the reasons for their involvement in a given task (Ryan & Deci, 2002). Intrinsic motivation refers to engaging in an activity for the inherent enjoyment and pleasure derived from it, without the mediating effects of external rewards or pressures, and it is considered as the most self-determined type of motivation (Deci &

Ryan, 1985). On the other hand, extrinsic motivation concerns the participation in a task for contingent outcomes and not for the internal satisfaction derived from the task itself. According to SDT, there is a number of extrinsic motivation types that lie across a continuum from low to high self-determination. Thus, extrinsic motivation can be distinguished in a) external regulation, where reasons for engagement correspond to the attainment of material incentives, recognition, rewards, or to avoid punishment, b) introjected regulation, where self-determination is relatively higher than in the case of external regulation, but the reasons for engagement in an activity are not well internalized, such as when individuals become involved in a task in order to avoid feelings of guilt or shame, c) identified regulation, where reasons for doing an activity reflect the pursuit of fully-internalized meaningful outcomes that demand effort which is not pleasurable, and is considered as a highly self-determined form of extrinsic motivation (Ryan & Deci, 2000a). Amotivation refers to the lack of volition to do something, where people enact passively, unwillingly, or have no intention of doing the activity (Ryan & Deci, 2002). In addition, Deci and Ryan's theory makes a significant distinction between autonomous or self-determined (i.e., intrinsic motivation, identified regulation) and non-autonomous or controlling (i.e., introjected, external regulation) types of motivation. The difference between autonomous and non-autonomous external types of regulations lies in the degree that the person internalizes behaviors and experiences choice. Three decades of SDT development shifted the focus from intrinsic versus extrinsic motivation, to autonomous versus controlled motivation (Deci & Ryan, 2008). An ample body of research utilizing this concept has revealed that not only intrinsic motivation, but well-internalized forms of extrinsic motivation (e.g., identified regulations) have the most positive impact on human behavior in various life settings, in contrast to controlling types of motivation (i.e., introjected, external regulations) (see Deci & Ryan, 2008; Ryan & Deci, 2000b, 2002). In the literature the terms: self-determined types of motivation/autonomous motivation/self-determined motivation (i.e., intrinsic motivation, identified regulation), and controlling/non-autonomous/controlled motivation (i.e., introjected, external regulation) are commonly used interchangeably. For reasons of clarity, the terms autonomous versus controlled motivation will be adopted in the rest of the paper.

1.2. Self-determined motivation in work and teaching profession

Researchers in workplaces have systematically demonstrated that autonomous motivations are strongly related to positive outcomes (Baard, Deci, & Ryan, 2004; Blais, Briere, Lachance, Riddle, & Vallerand, 1993; Deci et al., 2001; Gagné et al., 2010). For example Gagné et al. (2010) found positive meaningful relationships between autonomous motivations and optimism, job satisfaction, affective and normative commitment, well-being, and self-reported health; whereas negative relationships emerged with turnover intentions and psychological distress. Also, autonomous motivation has been positively associated with psychological health, work and life satisfaction, and negatively with burnout and turnover intentions (Blais et al., 1993; Richer, Blanchard, & Vallerand, 2002).

Studies investigating teachers' self-determination in the workplace produced similar results. Fernet, Guay, and Sénécal (2004) found that autonomous motivation at work had positive relationships with job control, and personal accomplishment; and negative associations with job demands, emotional exhaustion, and depersonalization. University professors high in both autonomous motivation and job control could adjust better to job demands, and cope with burnout (Fernet et al., 2004). In a recent survey, Demir

(2011) indicated that teachers' intrinsic and extrinsic motivation significantly predicted students' achievement. But the most important predictor of student engagement was teachers' intrinsic motivation (Demir, 2011). In addition, it has been demonstrated that teachers who are intrinsically motivated in teaching are more likely to support and promote their students' autonomy, which in turn leads to increased intrinsic motivation of students (Pelletier, Séguin-Lévesque, & Legault, 2002; Reeve, Bolt, & Cai, 1999). Roth, Assor, Kanat-Maymon, and Kaplan (2007) found that teachers who experienced more autonomous (self-determined) types of motivation to teach, reported an increased sense of personal achievement, and reduced emotional exhaustion. Autonomous motivation for teaching was positively associated with students' autonomous motivation to learn, and students' perception that their teachers supported their autonomy (Roth et al., 2007). In the same vein, Taylor, Ntoumanis, and Standage (2008) showed that highly autonomous motivated Physical Education (PE) teachers try harder to understand their students, provide more help and support, give a meaningful rationale for the content of their teaching, in contrast to less autonomous motivated PE teachers. More recently, Hein et al. (2012) in a cross-cultural study in five European countries affirmed that autonomously motivated teachers were used to teaching by utilizing student-centered styles; while non-autonomous teachers employed more teacher-centered styles.

From Wang and Liu (2008) study it seems that pre-service teachers with higher levels of self-determined behavior have the tendency to demonstrate higher confidence in teaching the national curriculum, and they seem more satisfied with their training. Lam et al. (2010) found that autonomous motivation (intrinsic and identified) was highly and positively connected with positive attitudes towards persistence in innovative teaching; while the relationship with negative attitudes was high and negative. Lower levels of autonomous motivation were associated with negative attitudes towards persistence in educational innovation (Lam et al., 2010). Consistently, studies with Greek teachers present similar findings. Christodoulidis (2004) found that the higher the teachers' autonomous motivation, the greater their job satisfaction, and involvement in extracurricular activities to improve their self-efficacy. In addition, Gorozidis (2009) surveyed a sample of Greek teachers and noticed that their intrinsic motivation in work was positively connected to job satisfaction, mastery orientation, and self-efficacy to implement the newly introduced curriculum. It was found that the higher the intrinsic motivation of teachers, the higher the degree of implementation of the innovative curriculum and teachers' positive attitudes towards it, as well as their intentions to implement it in the future (Gorozidis, 2009). Also, an older study with undergraduate PE teachers showed that intrinsic motivation was a strong predictor of intention for future participation in similar courses (Goudas, Biddle, & Underwood, 1995).

It seems that teachers' autonomous motivation in every aspect of their work (e.g., in-service training) is a vital ingredient for their optimal functioning and professional growth. Fernet et al. (2008) showed that autonomous types of motivation (intrinsic, identified) are more domain specific than controlling types (introjected, external) for teachers. Thus, they suggested that it is very important to assess self-determined regulations (intrinsic, identified) in any different task relevant to teachers' work, because the task characteristics may change their level of autonomous motivation. Moreover, according to the SDT continuum they demonstrated that a simplex pattern of relations (see Ryan & Connell, 1989) exist in teachers motivational regulations for doing the same work task, meaning that every regulation correlates more positively with adjoining regulations than with more distant ones (Fernet et al., 2008).

1.3. Theoretical-methodological importance, purpose

A methodological strength of the present SDT-based study is the investigation of motivational hypotheses in an authentic environment where participants chose and implement very meaningful tasks. Task importance is critical to induce mastery/task-involving goals and intrinsic motivation (Nicholls, 1989, p. 88), which are necessary in motivation studies where individuals have a reason to achieve, to select a task and to exert maximum effort (Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012, pp. 78–80). Indeed, if we want to understand teachers' situation-specific motivation, such as teachers' *will to learn* (e.g., Van Eekelen et al., 2006) or *to implement* (e.g., Abrami et al., 2004) an innovative subject, we need to understand the underlying reasons that determine the consistency of behavior across situations which offer the same meaning for goal adoption that initiate and sustain behavior to do so (Mischel & Shoda, 1998).

Although relevant studies in education utilize either quantitative or qualitative methodology, here we select a mixed methods longitudinal design with the *concurrent transformative approach* (Creswell, 2003, p. 219), where the theoretical framework of SDT guides the research, while quantitative and qualitative data are collected simultaneously in order to triangulate and to complement participants' responses (Bryman, 2006). Hence, we gather quantitative and qualitative data (qualitative open-ended questions, close-ended questionnaires and written interviews) twice, from purposefully selected teachers having experienced the phenomenon under investigation (Patton, 2002).

To summarize, the purpose of the present study is to examine whether the SDT framework is suitable in giving insight about teacher situation-specific motivation in the circumstances under view. Moreover, we aim to explore what types of teacher motivation have the most optimal effect on their intentions to participate in future training, or to implement the new subject the following year.

1.4. Research questions-hypotheses

Based on literature review and SDT framework, research questions with corresponding hypotheses were formulated to guide the present study:

1. Why do teachers take part in training programs promoting educational innovations, if participation is voluntary?
Hypothesis 1(H_{1a}): Behavioral regulations of SDT will be present in teachers' responses. Evidence from relevant studies (e.g., Hynds & McDonald, 2009; Livneh & Livneh, 1999) implies that teachers will point out intrinsic as well as extrinsic reasons for participation, representing the SDT continuum.
Hypothesis 1(H_{1b}): A simplex pattern of relationships between variables will be present according to SDT (Ryan & Connell, 1989). As participation is not mandatory, it is expected that autonomous motivation will prevail.
2. Do all types of motivation optimally influence teacher intentions for future involvement with innovation?
Hypothesis 2a (H_{2a}): Teacher autonomous motivation to participate in training will positively predict their intentions to future engage in similar training; while controlled motivation will not have this positive effect.
Hypothesis 2b (H_{2b}): Teacher autonomous motivation to teach the new innovative subject will have a positive effect on their intentions to undertake teaching it the following year; while controlled motivation will not.
These relationships are to be expected because SDT literature presented above suggests that autonomous motivation leads to positive results; while controlled does not.

2. Methods

2.1. Procedure and participants

The present research was conducted the first year of the implementation of the new subject *Research Project* in Greek high schools. Prior to the study, approval from the ethics committee of the authors' university was obtained. The participants of the first training program (a fifteen-hour workshop conducted over two consecutive days) were from all over Greece ($N = 1010$) and had been invited via e-mail, to respond anonymously and voluntarily to the questionnaires. Additionally, an accompanying letter containing the study objectives was sent, assuring for their anonymity and asking teachers to provide some identification data in case they wished to participate in a subsequent survey, or whether they wished to be interviewed (in person or by e-mail) for research purposes. All participants of the training program were selected centrally (i.e., Ministry of Education) after they had sent an electronic application individually, responding to the invitation by the Ministry, without however having any obligation to do so. For this interdisciplinary project-based learning subject, all teaching specializations (e.g., science, math, physical education, technology, language) were considered suitable to teach it. Thus, participants in the training program and in the current investigation were in-service high school teachers, regardless of area of specialization.

During the school year of 2011–2012, e-mail questionnaires, using web-based software, were mailed to the teachers twice (October/beginning – June/ending). In both instances after the first mail dispatch, two reminders were sent within the following fifteen days. Responses obtained in Time 1 (beginning) survey were 218 (response rate 21.6%), from these, the teachers who completed the questionnaire in Time 2 (ending) were 71. In addition four teachers accepted to reply to written interviews (by e-mail), fifteen days after the completion of Time 2 survey. Participants' mean teaching experience was 14.13 years ($SD = 7.19$, ranging from 2 to 31 years of teaching); 80 were males (37%) and 138 females, while half of them ($n = 109$) held a postgraduate degree. According to the 2006 census by the Center of Educational Research, the sample of the study may be considered a national representative in terms of geographical distribution, and teaching experience (13.1 years), but not in terms of gender (50% males) or qualifications (only 8.7% held a master's) (Educational Research Center, 2007).

2.2. Measures (instruments)

2.2.1. Quantitative

2.2.1.1. *Time 1 (T1)* ($N = 218$). For the quantitative part of the questionnaire, teachers' self-determined motivation to participate in professional training was assessed using the Work Task Motivation Scale for Teachers (WTMST; Fernet et al., 2008) an instrument based on SDT, which was translated and adapted in Greek (Gorozidis & Papaioannou, 2012). This instrument consists of 5 subscales (intrinsic, identified, introjected, external, amotivation) with 3 items per scale, a total of 15 items. Following the stem "Why have you participated in this training program?" participants responded 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), "I don't know, I don't see any purpose in this training" (amotivation). Answers were given on a 7-point Likert type scale ranging from 1 (does not correspond at all) to 7 (corresponds completely). Cronbach alpha for WTMST scales were satisfactory (Intrinsic = .81, Identified = .75, Introjected = .79, External = .79, Amotivation = .67) and confirmatory factor analysis

produced satisfactory goodness of fit indices (TLI = .956, CFI = .967, RMSEA = .046, $\chi^2 = 117.24$, $df = 80$, $\chi^2/df = 1.47$).

2.2.1.2. Time 2 (T2) (N = 71). Similarly to T1, in T2 a slightly modified version of the same instrument (WTMST; Fernet et al., 2008; Gorozidis & Papaioannou, 2012) was used, in order to measure teachers' self-determination to teach the new subject. Following the stem "Why do you teach the new subject *Research project*?" participants responded to items such as, "Because I like doing it" (intrinsic), "Because I consider the subject of *Research project* important for the academic success of my students" (identified), "Because I would feel guilty not teaching it" (introjected), "Because my position might be in danger if I don't" (external), "I don't know, I don't always see the relevance of teaching it" (amotivation). Again, Cronbach's alphas were good (Intrinsic = .90, Identified = .84, Introjected = .83, External = .66, Amotivation = .76), and goodness of fit indices (TLI = .934, CFI = .950, RMSEA = .068, $\chi^2 = 105.53$, $df = 80$, $\chi^2/df = 1.32$) were acceptable.

In addition, teacher intentions to participate in future in-service training courses regarding the innovation were measured by a 2-item scale which was constructed based on TPB recommendations (Ajzen, 2002). The items were "During the next season I plan to participate in a training program about the implementation of the new subject", and "During next season I am determined to participate in a training program about the implementation of the new subject". In the same way teacher intentions to teach the new subject next year were measured by two items "During 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*". Participants responded in 7-point semantic differential scales (likely/unlikely, yes/no). Cronbach's alpha of the scales were .97 and .82 respectively.

In this study a basic aim was to test the impact of autonomous and controlled motivation on teacher intentions to participate in further training and to implement the new subject. Because amotivation measures the quantity rather than the quality of motivation, the present participants were motivated enough to get involved in this innovative subject, and as we wanted to keep the minimum amount of items, we decided to discard this variable from further analyses.

2.2.2. Qualitative

2.2.2.1. Time 1. In order to triangulate and to complement quantitative data with qualitative, all teachers but two provided answers to two open-ended questions "What were your reasons for registering for the *Research Project* training course?", and "Which was the most important reason for you?". To eliminate bias and to avoid possible influence on the teachers' answers, these two questions were placed on different pages prior to the SDT electronic questionnaire and participants did not have the option of revising their responses.

2.2.2.2. Time 2. In T2, qualitative data were obtained from four written interviews. The interview guide used included two questions relevant to this study. "What were the reasons that led you to participate in the training?" and "Which is the most important reason for you?"

Overall, inter-coder agreement for these analyses reached about 98% ($k_w = .95$).

2.3. Data analysis

To evaluate the factorial validity of the instruments confirmatory factor analyses (with maximum likelihood estimation method; Amos 16) were conducted, while scales reliability was verified with

Cronbach's alpha. In order to test hypotheses H_{1b} , scales scores and correlations were computed. In order to test hypotheses H_{2a} and H_{2b} , two structural equation models (SEM) were constructed. Firstly, to test if autonomous motivation to participate in training can predict teacher intentions to participate in further relevant training (H_{2a}), and secondly, to test if autonomous motivation to teach the new subject predicts teacher intentions to implement it the following year (H_{2b}).

Qualitative data from open-ended questions and the handling of the written interviews was aided by the computer software QSR Nvivo 8. Raw data were analyzed following the first three generic steps suggested by Creswell (2003) consisting of a) preparation and organization of the data, b) thorough reading to gain a *general impression* and c) *comprehensive coding*, creating codes and categories from text data (Creswell, 2003, p. 191). Thematic analysis of the data was conducted using a theory-driven approach using the three-step procedure proposed by Boyatzis (1998): a) generating a code, b) reviewing and revising the code in the context of the nature of the raw information, and c) determining the reliability of the coders and therefore the code (Boyatzis, 1998, pp. 35–36). This kind of analysis was chosen because our purpose was to check if our data fit well into the SDT framework (H_{1a}). However, the data that did not fit in any theory-driven categories were further analyzed inductively, generating new themes. In order to establish credibility and to check for the accuracy of the findings a *peer debriefer* (Creswell, 2003) enhanced the whole procedure by reviewing and asking questions, while a second analyst (coder) assisted the coding process, until consensus was met (*Analyst triangulation*) (Patton, 1990).

3. Results

3.1. Teachers' motivation to participate in training

3.1.1. Quantitative: Time 1 (N = 218)

Descriptive statistics, alphas, and factors' correlations for T1 measures are presented in Table 1. Variables' correlations were all in the hypothesized directions supporting the validity (convergent and discriminant) and reliability of the measures. Consistent with the self-determination continuum, all correlations between the five behavioral regulations (latent variables) revealed a simplex pattern where conceptually close constructs correlated positively to a higher degree compared to distant ones (Ryan & Connell, 1989) (H_{1b}). Intrinsic motivation highly correlated with identified regulation; while introjected and external regulations were significantly related. As it was expected, it is evident from scale means (Table 1), that participants scored high in autonomous behavioral regulations (intrinsic, identified) and low in non-autonomous motivations (introjected, external) to participate in the training program. All these findings support our initial hypothesis (H_{1b}).

3.1.2. Qualitative: Time 1

Qualitative analysis of open-ended questions generated two higher order themes corresponding to SDT, namely autonomous,

Table 1

Descriptive statistics, CFA correlations, Cronbach's alphas, for the WTMST to participate in training.

Variables	Mean	SD	Scale	Alphas	1	2	3	4
1. Intrinsic	5.74	1.19	1–7	.81	–	.86***	.09	–.10
2. Identified	5.85	1.14	1–7	.75	–	–	.19*	.02
3. Introjected	2.44	1.54	1–7	.79	–	–	–	.41***
4. External	3.30	1.69	1–7	.79	–	–	–	–

* $p < .05$; ** $p < .01$; *** $p < .001$.

and controlled motivation. Under the theme autonomous motivation two sub-themes were found a) intrinsic motivation, and b) identified regulation. Similarly, under controlled motivation two sub-themes were found a) introjected, and b) external regulation.

3.1.2.1. Autonomous motivation

- a) *Intrinsic* was the most predominant sub-theme (e.g., 69% of the participants described at least one intrinsic reason). Specifically some representative teachers' quotes are "...I like to learn", "For the sake of knowledge", "For the experience", "Curiosity for new things", "It was a challenge". All these quotes reflect internal reasons for the teachers' decision to participate in the specific training program, corresponding to the highest degree of self-determined behavior. According to SDT definition, engaging in an activity for the inherent pleasure and satisfaction, because it is interesting and challenging, out of curiosity or to explore a new stimulus, represent intrinsic motivation (Deci & Ryan, 1985; Ryan & Deci, 2000a).
- b) *Identified* was one of the most frequently presented behavioral regulations in teachers' answers (about 34% of the participants referred to identified reasons). For instance, many teachers reported that they participated in the innovative program because they consider the new subject very useful for their students, the school in general and for themselves. Some teachers wrote very expressively: "I know how much children like it, I think that pupils gain experiential knowledge and they have the motivation to learn, teachers learn along with their students and acquire better relationships with them", "I consider it an interesting case for the students, because they are getting involved in investigative procedures, and this subject departs from the traditional recipe (formula) of instruction/examination etc". These quotes are in accordance with the notion that identified regulation involves the participation in an activity because someone recognizes it as personally important and of great value (Ryan & Deci, 2002). Behaviors originating from identification are considered relatively autonomous because the person adopts them willingly without feelings of pressure or control (Deci & Ryan, 2008).

3.1.2.2. Controlled motivation

- a) *Introjected* regulation was represented in teachers' responses to a much smaller extent (only 5% of the respondents). Some typical quotes were "Concern over (possible future) demands", "Anxiety about the new curricula", "To understand what the system expects me to teach". As SDT posits when people act under the feelings of pressure, to avoid anxiety or to gain pride, introjection is evident (Ryan & Deci, 2000a).
- b) *External* regulation was apparent in a considerable number of responses (about 25% of the participants). According to current reform practices some high school subjects have been eliminated from the curriculum, or reduced in number of lessons per week (e.g., technology). As a result, many teachers in order to fill their work timetable registered for the training course regarding innovation in order to be able to replace their lost work hours. Accordingly, teachers replied "The reduction of teaching hours of my (specialty) subject in the new curriculum", "Fear of being left without a subject to teach". While some other external reasons were "To obtain the certificate" or "The acquisition of formal qualifications, in times of general insecurity". These

answers show that teachers' behaviors sometimes are controlled by external contingencies or demands (Ryan & Deci, 2000a).

3.1.2.3. *Other themes*. Some data that did not fit in any of the theory-driven categories shaped new themes. However the percentage of participants who provided these reasons was low: "past experience with projects" (8.2%), "Cooperative/collaborative learning" (3.7%), "to chat/exchange views with colleagues" (2.7%), "frustration with current situation" (1.4%).

3.1.3. Qualitative: Time 2

Similarly to study 1 qualitative analysis of the T2 interviews generated the same themes.

3.1.3.1. *Autonomous motivation. Intrinsic motivation*: "Because I like innovations in education" (Lola, English teacher, 7 years of teaching experience), "This new endeavor seemed interesting to me" (Bill, PE teacher, 27 years of teaching experience).

Identified: "The main reason is personal development, to be able to respond in the best possible way to teaching this course" (Nick, Technology, 7 years of teaching experience), "My belief is that this subject (research project) is essential for schools" (Jack, Informatics, 16 years of teaching experience), "As a subject, it seems very interesting to me, because the way it is taught is interesting. It puts the student at the center of the cognitive process, not asking him/her to memorize anything...".

3.1.3.2. *Controlled motivation. Introjected*: "Because of my specialty, this subject (research project) is the only lesson I can teach in high school. Thus, I considered my training imperative" (Nick, Technology, 7 years of teaching experience).

External: "The possibility of supplementing working hours" (Jack, Informatics, 16 years of teaching experience), "A basic disadvantage of our specialty (PE teacher) is occasionally being in a state of limbo regarding the schedule, and it is good to have an extra qualification (weapon) so as to be able to claim more working hours and to avoid being unprotected, having to run here and there" (Bill, PE teacher, 27 years of teaching experience).

All the findings generated from the qualitative data (T1–T2) confirmed our first hypothesis (H_1) and showed that SDT can provide the adequate foundation to illuminate teachers' motivation to participate in training promoting educational innovation.

3.2. Prediction of teachers' intentions

3.2.1. SEM: Time 1–Time 2 ($N = 71$)

In order to examine the effects of teacher autonomous versus controlled motivation regarding their future intentions to participate in relevant training or to teach/implement the new subject, two SEM models were tested. In these models autonomous and controlled motivation latent variables were constructed from the relevant observed variables (i.e., Autonomous = 3 intrinsic + 3 identified observed variables, Controlled = 3 external + 3 introjected observed variables), and likewise intentions latent variables were composed.

During the first analysis it was evident that the model was poor (e.g., for Model 1: TLI = .780, CFI = .821, RMSEA = .130, $\chi^2 = 161.18$, $df = 74$, $\chi^2/df = 2.18$) while modification indices inspection indicated that residuals of observed variables corresponding to identified regulation were interrelated and the same was found for external regulation items. Thus, after correlating error terms of identified, and external variables the model fit was improved adequately. In particular, for both models goodness of fit indices

suggested better data fit, for Model 1: TLI = .981, CFI = .986, RMSEA = .038, $\chi^2 = 74.84$, $df = 68$, $\chi^2/df = 1.1$, and for Model 2: TLI = .940, CFI = .955, RMSEA = .071, $\chi^2 = 91.94$, $df = 68$, $\chi^2/df = 1.35$. The theoretical justification for this decision is that correlated errors corresponded to the same construct (e.g., identified regulation). The methodological reason is that items of these subscales (construct) may convey similar meaning/wording (e.g., “because it is important for me to participate in training” and “because I find training important for the academic success of my students”), and ultimately this adjustment does not significantly alter measurement and structural parameters of the model (Bagozzi, 1983; Fornell, 1983).

In the first model (Fig. 1) it is evident that only teachers' Autonomous motivation to participate in the training program in T1 predicted significantly ($\beta = .32$, $p = .009$) their intentions to future participate in relevant seminars in T2. These findings support our hypothesis H_{2a} .

Likewise, in the second model (Fig. 2) only Autonomous motivation in teaching the new subject during the second phase (T2) measurement, contributed significantly ($\beta = .72$, $p < .001$) in the explanation of variance of intentions to teach this subject in the future (T2). Again our findings confirmed our hypothesis H_{2b} .

Our analyses comply with recommendations that when sample size is small, it may be appropriate to increase indicators per factor ratio, so in our models we constructed two latent variables with six indicators each (Boomsma & Hoogland, 2001; Marsh & Hau, 1999; Marsh, Hau, Balla, & Grayson, 1998). However, to further address the limitation of our small sample size ($n = 71$) and to verify our SEM findings, we conducted the same analyses using parceling techniques, in order to reduce the number of parameters to be estimated to a more optimal level (see Little, Cunningham, Shahar, & Widaman, 2002). Following recommendations by Kishiton and Widaman (1994), and Little et al., (2002), we tested both structural models with three domain representative parcels for each motivational factor (i.e., autonomous, controlled). In this approach each parcel represents a large domain (e.g., autonomous motivation) which is formulated by various sub-domains (e.g., intrinsic, identified regulation) (Kishiton & Widaman, 1994). Following Little et al., (2002) in order to optimally represent the latent variables factors we constructed three parcels per factor. Each parcel comprised of two items, one from each regulation (e.g., intrinsic item 1 + identified item 1) to represent all the facets of the latent factor (e.g., autonomous motivation). Results of these analyses produced the same pattern and magnitude of relationships (i.e., autonomous motivation predicted intentions to participate in training $\beta = .33$, $p = .008$, and intentions to teach the new subject $\beta = .68$, $p < .001$, whereas controlled motivation did not have any

significant effect on intentions), but with an even better model fit (i.e., Model 1: TLI = 1.02, CFI = 1.00, RMSEA = .00, $\chi^2 = 12.37$, $df = 17$, $\chi^2/df = .73$; Model 2: TLI = .974, CFI = .984, RMSEA = .66, $\chi^2 = 22.19$, $df = 17$, $\chi^2/df = 1.3$).

4. Discussion

4.1. General discussion

The findings of the present research regarding the positive effects of autonomous motivation on intentions were in line with theoretical predictions. Research hypotheses for teacher situational motivation were confirmed in the environment of Greek secondary education, where teachers voluntarily chose to pursue clear, specific, meaningful and challenging work tasks. Different kinds of data -quantitative and qualitative- complemented each other by providing a rich account of the situation and triangulating teacher responses (Patton, 1990). These findings are in agreement with existing findings indicating that teacher autonomous motivation is connected with positive outcomes such as job satisfaction (Christodoulidis, 2004), lower teacher burnout (Fernet et al., 2008), an increased sense of personal accomplishments and reduced emotional exhaustion (Fernet, Guay, Senécal, & Austin, 2012; Roth et al., 2007), stronger attitudes of persistence in educational innovation (Lam et al., 2010), students' autonomous motivation to learn (Roth et al., 2007) and more frequent use of student-centered teaching styles (Hein et al., 2012).

Qualitative analysis suggested that not only was every behavioral regulation from SDT continuum present in the data, but also in the respective volume similar to the quantitative findings. Although both intrinsic and extrinsic reasons for participation in training exist in teachers' minds, the most predominant are the most internalized forms of behavioral regulations (i.e., intrinsic, identified), corresponding to autonomous motivation. While from the qualitative data it is evident that external reasons may play an important role in teachers' decisions; quantitative analyses showed that these reasons have a controlling effect, which does not contribute to sustain prolonged involvement with this kind of professional learning. Accordingly, it seems that motivation to teach is mostly dependent on autonomous internal causes, because as was expected, only autonomous motivation would have a significant impact on teacher intentions to future implement the innovative subject.

For these Greek teachers, participation in training led to the acquisition of certification, which is a tangible external reward (e.g., qualification for their CV), whereas teaching the new subject did not relate to any external tangible reward. On the contrary, it

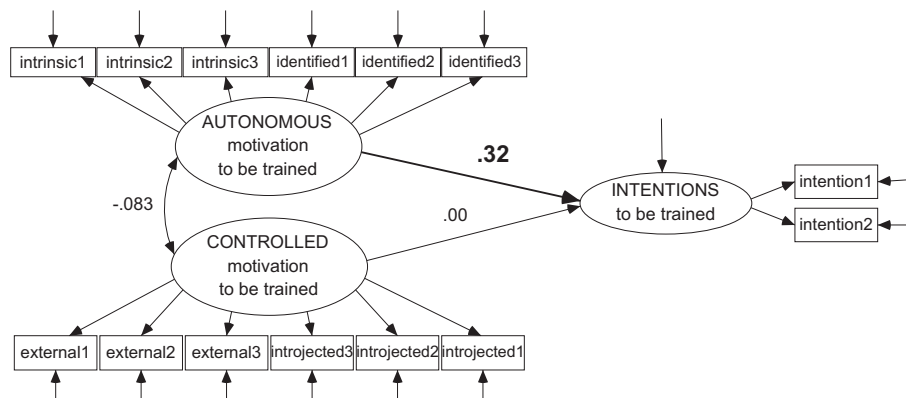


Fig. 1. Model 1: Structural model depicting relations between teachers' Autonomous, Controlled motivation and Intentions to participate in training. Number in bold is significant ($p = .009$).

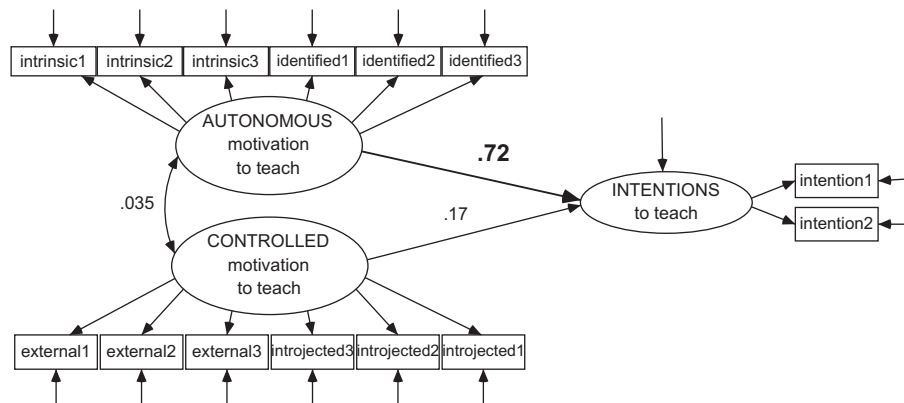


Fig. 2. Model 2: Structural model depicting relations between teachers' Autonomous, Controlled motivation and Intentions to teach the innovative subject. Number in bold is significant ($p < .001$).

was accompanied by a greater workload for preparation, which was acceptable to autonomously motivated teachers but not to controlled motivated teachers. This is especially true for educational systems with low or no accountability for teaching, which was still the case in Greece when this study was conducted. However, even if teacher evaluation is used to promote the implementation of the new subject, the present results indicate that this kind of motivation would be controlling with superficial and temporary results. Our findings are important not only for educational systems where continuous professional development is optional (e.g., Greece, Denmark, Ireland, Iceland or Norway; [European Commission/EACEA/Eurydice, 2013](#), pp. 57–58), but also for countries where external incentives are used to encourage participation in training (e.g., Spain, Bulgaria, Lithuania, Portugal, Romania, Slovenia, Slovakia; [European Commission/EACEA/Eurydice, 2013](#), pp. 57–58). Even when controlled motivation occurs, such as for some of the participants of the present study, only autonomous motivation leads to teachers' optimal engagement with professional training and school innovations. Thus, policy makers, regardless of their educational system, need to target the promotion and support of the autonomous motivation of teachers by creating the appropriate conditions in their educational environments.

In line with the matching hypothesis, the present findings show that different situations involving innovation have been very appealing to autonomously motivated individuals. However, the presence of innovation per se would have not been enough to understand what triggered teachers' goals and behaviors to participate in training and implement an innovative subject if we had not examined the reasons for teachers' involvement in these situations. Innovation was appealing for controlled motivated individuals too, but insofar as external reasons for involvement were present. Investigating individuals' reasons for involvement in situations raising curiosity is important to understand what triggers both choice and persistence. Importantly though, these reasons should be meaningful to participants and need to be examined in authentic settings. Methodological designs of laboratory studies testing dispositions in situations which are manipulated to raise curiosity and to trigger intrinsic motivation, choice and persistence might be misleading because they can hardly convey authentic reasons for participation in these experimental settings.

4.2. Implications

Our study shows that if teachers are autonomously motivated towards training, they will be more determined to participate in

such training during the following year, and the same rule applies in regards to the teaching of an innovative subject. According to TPB ([Ajen, 2002](#)) higher intentions are very likely to lead to the expression of a behavior, here, the implementation of the new subject and the participation to subsequent relevant training. This prolonged engagement in turn may lead to the successful adoption of the innovation. As [Bitan-Friedlander, Dreyfus, and Milgrom \(2004\)](#) found, the adoption of the innovation was successful only for teachers in their second year of in-service training. This shows that sometimes more training time is necessary for a new teaching practice to be adopted and implemented appropriately. In addition, [Yoon et al. \(2007\)](#) reported that professional development exceeding 14 h has a positive and significant effect on students, while below this threshold no impact is evident. More importantly, they revealed that teacher training for about 49 h can result in 21% increase in student achievement ([Yoon et al., 2007](#)). These findings, in conjunction with ours, imply that if teachers are more autonomously motivated to participate in training for this innovative subject, they might engage in this kind of professional development programs for the appropriate amount of time, which can produce positive impact to their students and the successful adoption of the innovation.

Self-determination theorists suggest that work environments promoting employee need for autonomy, competence and relatedness can increase their intrinsic motivation, and the full internalization of external motivators, leading to greater persistence, productivity, job satisfaction, positive work attitudes, organizational commitment and psychological well-being ([Gagné & Deci, 2005](#)). Accordingly, three basic supportive dimensions of school environments namely competence, autonomy and collegial support have been found to predict teacher motivation towards innovative teaching ([Lam et al., 2010](#)). Moreover, the basic needs for autonomy, competence and relatedness may significantly influence teachers' self-determined motivation but not controlled motivation regarding school innovations ([Schellenbach-Zell & Gräsel, 2010](#)).

Consequently, if policy makers and government officials aim to improve teacher participation in training, and implementation relative to educational innovations, they need to target teachers' basic needs satisfaction. Specifically, they must provide environments and conditions supportive of teacher autonomy, competence and relatedness needs, in order to foster their autonomous motivation across the tasks they have to carry out. We know from teacher professional development literature that teachers must have the right of choice to shape their training according to their needs, without restricting their personal time, while at the same time being able to be involved in the formulation of current reforms

(Armour & Yelling, 2004; O'Sullivan & Deglau, 2006). This means that teachers need to have the freedom to customize their training and to participate in individualized programs. These suggestions will lead to the satisfaction of teachers' need for autonomy regarding their training.

Teachers' need for competence can be satisfied through vicarious experiences, by watching innovative teaching models (Deglau & O'Sullivan, 2006), by their prior mastery experiences (Kulinna, McCaughtry, Martin, Cothran, & Faust, 2008) and by verbal persuasion in the form of feedback, encouragement and guidance (Martin, McCaughtry, & Kulinna, 2008; Martin, McCaughtry, Kulinna, & Cothran, 2009). Thus, the first step for teachers is to be participant observers in others' *Research Projects*; the second step is to pilot their own *Research Projects*; and the third step is to be monitored by experts and given frequent feedback.

Finally, in-service training that promotes cooperative professional learning opportunities may satisfy teachers' relatedness need. A growing body of research in education favors teacher training in collaborative learning environments because it produces multiple benefits (Borko, 2004; Butler & Schnellert, 2012; Cochran-Smith & Lytle, 1999; Lieberman & Pointer Mace, 2008; Putnam & Borko, 2000). This means that teachers engaging in *Research Projects* should compose and participate in collaborative networks throughout their training and during the implementation of this innovative subject.

The present findings also underline the necessity to investigate motivational hypotheses in real life situations where competence improvement and achievement have authentic meaning to participants. To understand the motivational determinants and consequences of dispositions such as *will to learn* (e.g., Van Eekelen et al., 2006) or *will to implement* (e.g., Abrami et al., 2004), it is important to examine the same individuals across different situations providing similar meaning for achievement (Mischel & Shoda, 1998). However, meaning is determined by the participants not by the experimenters. Participants find a task meaningful based on their past histories and life purposes (Kasser & Ryan, 1996; Nicholls, Pataschnick & Nolen, 1985) and therefore, task meaningfulness can be hardly authentic in laboratory environments. Authentic meaning that can trigger participants' goals to learn and achieve and experience intrinsic motivation can be found in real situations.

4.3. Limitations

In the present study we examined teachers' situational motivation and its predictions of their future intentions. It would be more interesting to examine the impact of motivation on teachers' actual behavior, but such an investigation in real life settings would have many methodological barriers to overcome. Thus, we chose to measure teacher intentions as a manifestation of their future behavior because there is solid evidence associating intentions with behaviors (Ajzen, 1991). Furthermore, because we focused on quality of teachers' motivation in specific work tasks, we did not examine their quantity of motivation (e.g., amotivation), nor the quality or quantity of teachers' motivation in mandatory situations (e.g., motivation in countries where training is compulsory), which are some other very interesting facets of this line of research.

In the current research, even though both types of data (quantitative and qualitative) were utilized to provide a better understanding of teachers' intentional behaviors, open-ended questions and written interviews were used instead of more intense forms of qualitative methodologies (e.g., in-depth face to face interviews). Nevertheless, Patton (1990, p. 24) illustrated that although written responses to open-ended questions are the most basic and simple (*elementary*) form of qualitative data, they do provide more information (*depth, detail*) and clarity to quantitative questionnaire responses.

The relatively low number of responses especially in T2 may limit the generalizability of SEM findings. Yet, even though we should be cautious in the interpretation of the findings due to small sample size; triangulation process and the rigorous analyses of quantitative and qualitative data provide us with relative confidence about the truth of our arguments.

Another limitation may be the low level of response rate (21.6%). However, recent studies addressing the subject of response rates in web-based surveys by teachers suggest that a low level response rate of less than 22% might be expected when a web based questionnaire is administered to teachers (Mertler, 2003; Shih & Fan, 2008). Moreover, participants were volunteers in their engagement with the innovation, which may incorporate some bias in their responses (e.g., they may already be the more autonomously motivated and positively predisposed teachers towards innovation).

A final point about our sample is that half of the participants held a postgraduate degree when the proportion of this qualification among Greek High School teacher population was only about 9% (Educational Research Center, 2007). If we consider this characteristic as an indication of teacher quality, then the notion of Guskey (1988) that when participation in instructional innovations is voluntary, teachers who decide to engage, at least initially, may already be high quality instructors.

4.4. Conclusion

The present research confirms that SDT can provide the theoretical foundation for understanding teachers' decisions to learn about and implement innovations. Although many studies have been conducted to understand teachers' work related motivation (e.g., Skaalvik & Skaalvik, 2011; Thoonen, Slegers, Oort, Peetsma, & Geijssels, 2011) to our knowledge there are no similar studies applying the SDT framework to this situation specific motivation of teachers. This study provides solid evidence that SDT suggestions must be taken into account when designing in-service training programs to implement innovations in education. Recent publications reported that there is not an adequate motivational theory to investigate teachers' cognitions, and proposed an integrated model with constructs from multiple theories (Cave & Mulloy, 2010; Jesus & Lens, 2005). Although this approach has many advantages (e.g., external validity), it could be very complicated and difficult to study. On the other hand, SDT provides a much simpler, but more comprehensive platform to investigate teachers' intentional behaviors, and proposes specific strategies to enhance teachers' motivation to the most optimal level. While three decades of SDT research have shown that this theory is valuable for the examination of student learning, our results support its usefulness in the area of teacher learning as well. However, further international research is needed in order to provide intercultural evidence of SDT application in teacher in-service professional learning across different educational settings.

Bearing in mind that teachers' engagement in professional development programs in many countries (e.g., Greece, Ireland, Denmark, Norway, Sweden, Netherlands; European Commission/EACEA/Eurydice, 2013) is not mandatory, and in-service training participation might be optional, it becomes extremely important to investigate their intentional motivation to become life-long learners and to pursue their professional learning. This is especially true, when educational contexts are affected by economic depression, which leads to salary reduction, and there is an absence of monetary incentives for participation in retraining. Such an environment might become a deterrent for teachers' voluntary involvement in further training, but maybe not for those teachers who are highly autonomously motivated. This line of research merits further attention in future studies of teacher professional

development and school innovation, and a substantial theory to guide practice regarding teacher professional growth seems to be SDT.

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