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Teacher training in technology based on their psychological characteristics: Methods of group formation and assessment

Kalliope Kounenou[a]*, Petros Roussos[b], Vasiliki Yotsidi[c]

[a]Department of Education, School of Pedagogical & Technological Education, 141 21 N. Herakleion, Athens, Greece
[b]Department of Psychology, University of Athens, Athens, Greece
[c]School of Pedagogical & Technological Education, 141 21 N. Herakleion, Athens, Greece

Abstract

Teachers, despite adequate training in Information and Communication Technology (ICT), appear to be reluctant to incorporate ICT into their teaching practices. This is an issue of major importance, not only for educational but also for career development reasons, since the acquisition of new skills broadens a professional's career identity and enriches his/her career opportunities. Research so far has tried to explore the factors related to teachers' reluctance and personality seems to be one of them. The paper presents the first stage of an extended research study on the specific field and discusses the research methodology used to explore personality traits, as well as other psychological characteristics, such as self-efficacy related to ICT use, and anxiety and attitudes towards ICT use. The sample consisted of trainee teachers who were divided into groups, according to their personality characteristics, based on the five-factor personality model of Costa and McCrae (1992). The instruments that were constructed for the present study and were used for the assessment of in-group cooperation and teachers' intention for ICT adoption in teaching are presented and discussed.

Keywords: ICT, career development, group training, assessment.

1. Introduction

Teacher training in technology has been a major objective lately. Evidence supports the contention that blended learning, incorporating the use of Information and Communication Technology (ICT), is a viable model both for teachers' professional development and formal teacher education courses (Belland, 2009; Owston, et al., 2008). Nevertheless, the outcomes have not yet been as expected. Although teachers are qualified enough (via training) to integrate ICT into their teaching practices, very few do so, bearing in mind the added educational value (Eteokleous, 2008). Teachers' reluctance towards the integration of technology into classroom practice obstructs not only the educational goals and processes in a modern school environment, but also their personal career prospects. Recent data has identified the context of teaching and the opportunity for reflection as the key components for teachers' professional development (Lawless & Pellegrino, 2007). Teacher reflection, in particular, has been characterized as an important professional skill (Valli, 1997; Stanley, 1998), as well as a vital tool for educational innovation (Richards, 1990; Richardson, 1998). Current views emphasize the social dimension of reflection, through

* Corresponding Author: Kalliope Kounenou. Tel.: +30 210 2896932
  E-mail address: kkounen@aspete.gr

collaboration and collegial dialogue (Hawkes & Romiszowski, 2001). However, teacher isolation, a definitive characteristic of the teaching profession (Little, 1990), as well as the lack of time, funds, will and vision (Lichtenstein & Little, 1990; Lieberman, 1995), all reduce the opportunities for teachers' collaboration, dialogue and reflection. Most of these practical and psychological obstacles are surmounted by dint of the ICT incorporation into teaching practices, since the use of technology enhances communication and reflection in a cost-effective way (Belland, 2009; Owston, et al., 2008), thus promoting teachers' professional development.

Personality has been found to influence teachers' career identity from its beginning, regarding their career choice content (e.g. Barrick, Mount & Gupta, 2003; Roussos & Politis, 2004), to the everyday exercise of their working role (e.g. Symonds, 1954). Teaching is not a mere matter of methods, techniques, and procedures, but also a function of teachers' personality. Thus, it is important to understand personality contributions in supporting or inhibiting the use of computer technology by teachers, for both educational and career reasons.

2. Aims of the Study

This study focuses on teachers' individual differences and particularly, on how teacher education/training might accommodate human personality and other psychological factors for the promotion of ICT integration into educational practices. Self-efficacy, anxiety and attitudes towards computer use, as well as the personality traits (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) based on the five-factor personality model of Costa and McCrae (1992) are examined in our study to differentiate between teachers, capable of fully or partly integrating ICT in their classroom practices and those, who despite adequate training remain hesitant towards ICT incorporation. With the aim to investigate the existing differences among teachers in relation to their intention to make use of ICT, different groups of teachers were formed.

3. Rationale of Group Formation

The teachers who participated in the study were divided into separate training-groups, based on the aforementioned specific psychological factors. These factors are delineated in the respective literature to have a crucial role on teachers' capability of integrating technology into their classroom. In particular, starting with the role of personality in technology use by teachers, it has been found that openness to experience (Roussos & Politis, 2004), acceptance of new ideas (Dexter, et al., 1999), and openness to change (Baylor & Ritchie, 2002) are among the factors to be of major influence. Along with openness to experience as a personality factor, another psychological variable of the study, namely the self-efficacy in computer use, has also been found to determine teachers' attitudes towards actual computer use (Marakas, Yi & Johnson, 1988). Self-efficacy perceptions and personality traits are interconnected, since physiological and affective states are considered to be one of the main sources of self-efficacy (Bandura, 1997). Another way of understanding teachers' willingness (or reluctance) towards ICT integration into teaching practice includes their positive, or negative, attitudes towards web/computer use (Eteokleous, 2008; Roussos, 2007). Positive attitudes towards computers predispose users towards actual use, whereas negative attitudes are associated with computer avoidance (Becta, 2004). Attitudes depend on a variety of state-like issues (i.e. training and knowledge of ICT, and usefulness of ICT), but also they are moderated by the subjective feelings of anxiety and confidence in using them (Roussos, 2007). Although, anxiety and self-confidence in acquiring new skills are substantial facets of personality, in terms of the dimension of neuroticism (Costa & McCrae, 1992), research examining the associations between teachers' personality and ICT use has paid little attention to the potential influential role of neuroticism, as a source of attitudes and self-efficacy beliefs in computer use. This is also the case with other personality factors (i.e. conscientiousness, extraversion, agreeableness, and the 30 facets of narrow domain personality) from the five-factor personality model of Costa and McCrae (1992), which currently stands as the dominant model of personality assessment and research, with universal validity (Digman, 1990; Goldberg, 1993).

The "Big-Five" personality model is also the most widely applied one, when the influential role of personality traits on team functioning and performance is investigated (Barrick & Mount, 1991; 1993; Kichuk & Wiesner, 1997; Peeters, Van Tuijl, Rutte & Reymen, 2006). The so-called "*group personality composition - GPC*" variable, has lately been a ubiquitous one at experimental designs of group formation (Halfhill, Sundstrom, Lahner, Calderone &

Nielsen, 2005), with the two dimensions of conscientiousness and openness to prevail, as moderators of group efficacy in most studies. Although people tend to form homogeneous teams to work jointly on various tasks, empirical work with regard to the diversity of teams, reveals that when the team members differ in conscientiousness and openness to experience, then this heterogeneity positively affects team performance (Eckel & Grossman, 2005; English, Griffith & Steelman, 2004; Mohammed & Angell, 2003; Mount, Barrick & Strauss, 1999; Sargent & Sue-Chan, 2001; Witt, Burke, Barrick & Mount, 2002). Conscientiousness in diverse groups is also associated with high levels of group satisfaction (English, Griffith & Steelman, 2004). On the contrary, the personality trait of extraversion contributes more in team building and efficacy when teams are homogeneous, rather than heterogeneous in this specific dimension (Bowers, Pharmer & Salas, 2000). Further personality facets, such as agreeableness, emotional stability and helpfulness have been found to contribute to the outcomes of collaborative work. Other relationship-related criteria, such as the level of members' communication and team co-operation, have also been associated with personality traits (Davies & Kanaki, 2006).

Based on the above evidence, participants in our study formed different groups each containing 3 members, in order to examine the links between the personality dimensions and the 30 personality facets, as well as the interconnection links among the aforementioned variables and teachers' ICT use attitudes, anxiety and self-efficacy beliefs. More specifically, groups were formed according to levels of neuroticism, openness to experience, extraversion, attitude and anxiety towards computer use and computer self-efficacy. Variables concerning levels of familiarity with computer use were taken into consideration. The experimental groups were homogenous and heterogeneous in order to explore potential differences in effectiveness concerning group work and task accomplishment, while members in control groups were distributed in a random way.

3.1. Sample

The sample consisted of trainee teachers distributed into 5 experimental groups and 5 control groups. Each group consisted of three members.

3.2 Instruments

The psychological measurement instruments that were used in this study consisted of:

The Profiler, (formally named TPQue), a questionnaire assessing the Five Factor personality model (Tsaousis, 1999; 2009). The specific inventory consists of 180 items measuring five broad dimensions, as well as 30 personality facets (6 facets for each dimension). Additionally, the Profiler consists of 24 items assessing social desirability responses. The psychometric evidence of the questionnaire (i.e. internal and temporal stability, factor, content, and construct validity) justifies the Profiler as a reliable and valid measure of the model. The psychometric evidence of the questionnaire supports the existence of the Big Five in Greek language (e.g. Furnham, Petrides, Tsaousis, Pappas & Garrod, 2005; Tsaousis, 2002; 2009).

The Greek Computer Attitudes Scale (GCAS; Roussos, 2007) - 30 items and 3 subscales:

a. The confidence subscale: measuring participants' confidence with computers; some of these items are concerned with the degree of engagement with computing.

b. The affection subscale: these items are aimed at assessing computer anxiety and feelings such as unease, threat, irritation, and incompetence with respect to computers.

c. The cognitive subscale: these items mainly addressed participants' perceptions about computing and computers.

Analyses of the GCAS data collected from all samples indicated internal consistency (coefficient alpha) reliability coefficients between 0.90 and 0.94. The test-retest data yielded a statistically significant, positive correlation [r = 0.83, p < 0.001]. The concurrent validity of the scale was calculated by correlating the scores on the scale to the participants' previous computer experience (independent criterion measure). Pearson's correlation was performed on the GCAS and computer experience data and a significant correlation was found in both cases (r(294) = 0.66, p < 0.001 and r(87) = 0.57, p < 0.001 for sample 2 and respectively).

Greek Computer Use Self-efficacy Scale (GCSES; Kassotaki & Roussos, 2006) - 29 items and 2 subscales: Participants are asked to indicate how competent they feel they are, in relation to:

• basic knowledge on the use of operational systems (e.g., MS Windows), office and Internet applications.

• basic concepts and dealing with simple problems related to computer use. Analyses of the GCSES data indicate internal consistency (coefficient alpha) reliability coefficients between 0.93 and 0.97.

A more recent unpublished study that correlated GCSES data with users' actual knowledge on computer use, indicated a high positive correlation ($r = 0.95$).

Computer Anxiety Scale (CAS; Roussos, 2006) - 15 items: Internal consistency (coefficient alpha) reliability coefficient was $\alpha = 0.91$. Convergent validity was calculated by correlating CAS data with two similar scales: CARS [$r(293) = 0.98$ $p < 0.01$] and CATS [$r(293) = 0.89$ $p < 0.01$].

Questionnaire on In-group Co-operation

A questionnaire was constructed by Kounenou, Papanikolaou & Roussos in order to assess in-group cooperation. It consisted of 29 items (ranked in a likert scale) and 3 subscales assessing: a) what the group members considered as important during group work and the degree of importance (5 items), e.g. *"active participation of all members", "communication with group members"* b) which of the factors assessed by the previous subscale satisfied group members during group work and the degree of satisfaction (5 items) and c) each member's involvement in group work and the degree of involvement (18 items), e.g. "*During cooperation with other members I suggested topics for discussion, work improvement and change". "I expressed my opinion only when it was asked for". "During cooperation I enjoyed listening to other members' opinions more and then, expressing my own".*

The internal consistency of the two subscales (Cronbach's α coefficient) were found to be 0.85 and 0.91, respectively.

Questionnaire on Intention for Future ICT Integration in Teaching Practice

A questionnaire was constructed by Kounenou, Papanikolaou & Roussos in order to assess trainee teachers' intention to integrate ICT use into their future teaching practice. The trainees were asked to consider themselves as actual teachers and to assess: a) the degree of their willingness, b) the frequency of future ICT use, c) the types of ICT that they intend to use, and d) the degree of importance of various parameters that could facilitate trainees to integrate ICT into their future teaching practice (11 items), e.g. *professional development, professional recognition, efficacy of preparation time, efficacy of technological knowledge, efficacy of pedagogical knowledge, existence of technological equipment and communication with students*.

The internal consistency of the quantitative part of the tool (Cronbach's α coefficient) was 0.85.

Procedure

Personality characteristics, computer use self-efficacy, computer use anxiety and attitude towards ICT were assessed prior to group formation and intervention (pre measure). Groups were divided into homogenous in all personality traits and semi-heterogeneous (in conscientiousness & extraversion). Trainee teachers were introduced to ICT in education. The intention for future ICT integration into teaching practice was assessed after ICT introduction and prior to intervention. Intervention was guided by ICT by education experts who are members of the current research program. Self-efficacy, anxiety, attitude towards ICT, in-group cooperation, as well as intention for future ICT integration into teaching practices were assessed after intervention (post measure) in order to explore individual and group differences in effectiveness, task accomplishment and intention to ICT integration into teaching practice.

4. Conclusions

The present paper, as a part of an extended program, combining ICT in education and psychological parameters is focused mainly on the psychological part of the study addressing the relative issues. Psychological characteristics of the individuals, as well as group formation based on these characteristics are expected to shed light on the psychological factors that facilitate or discourage teachers to integrate ICT into their educational practices, influencing their own professional development.

The research program entitled *"Design, implementation and evaluation of blended learning scenarios in a teacher training context accommodating their individual psychological characteristics (BleSTePsy)"* in the framework of *Archimedes III* is implemented through the Operational Program "Education and Lifelong Learning" and is co-financed by the European Union (European Social Fund) and Greek funds.

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