

## Turkish primary science teachers' perceptions of an ideal teacher education system

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### Suggested Citation:

Korkmaz, H. & Altindag, A. (2017). Turkish primary science teachers' perceptions of an ideal teacher education system. *Cypriot Journal of Educational Science*. 12(4), 193–201.

Received August 18, 2017; revised October 21, 2017 ; accepted December 24, 2017.

Selection and peer review under responsibility of Prof. Dr. Huseyin Uzunboylu & Assoc. Prof. Dr. Cigdem Hursen, Near East University.

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### Abstract

The goals of this descriptive study were to determine Turkish pre-service science teachers' perceptions of an ideal teacher education system. The sample consisted of 137 pre-service teachers, including 74 females and 63 males. The questionnaire was based on open-ended questions and was developed to investigate ideal teacher education system components as perceived by pre-service science teachers. Descriptive statistics were used to analyse the data. The results of this study showed that the Turkish pre-service science teachers defined the ideal teacher education system components as the following: the personality of the teachers, the teacher educators as possessing professional knowledge, teacher education curriculum and professional development process. The results and implications of this study are discussed in the context of teacher education studies.

Keywords: Teacher education, primary science teachers, ideal teacher education.

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## 1. Introduction

Everybody accepts that education is important for a better tomorrow. For the success and effectiveness of any educational setting, the teacher is a decisive factor. Generally, teacher educational researchers refer to the policies and processes planned to equip prospective teachers to have special qualities, including knowledge, attitudes, values and skills. Teacher educators, researchers and policy makers have been searching for the best models of teacher education. Yet there is no clear definition of the essential how to be 'an ideal teacher education system' in general or an ideal science teacher education in particular (Anderson & Mitchener, 1994; Feiman-Nemser, 1990; Fraser, Tobin & McRobbie, 2012; Kennedy, 1990; Ladd & Sorensen, 2015; van de Grift, van der Wal & Torenbeek, 2011).

Kennedy (1990) proposed that teacher education programmes can be classified as either emphasising teaching students as a large body of knowledge or preparing them to think and use problem-solving strategies to analyse and learn from new situations. According to him, these two perspectives are beneficial frameworks that can be used to study teacher education programmes. Feiman-Nemser (1990) reported that teacher education researchers have focused on either structural issues including general organisation of education or conceptual issues including the different views of teaching and theories of learning to teach that drive programmes. Conceptual orientation was delineated by Feiman-Nemser (1990) as five frameworks, including academic, practical, technological, personal and critical/social. These five frameworks carry with it a different set of assumptions, goals and expectations. Below are given some explanations relating to these.

According to Feiman-Nemser (1990):

- *the academic orientation* is 'primarily concerned with the transmission of knowledge and the development of understanding' (p. 221).
- *the practical orientation* 'focuses on the elements of craft, technique and artistry that skillful practitioners reveal in their work' and on 'the primacy of experience as a source of knowledge about teaching' (p. 222).
- *the technological orientation* 'focuses attention on the knowledge and skills of teaching. The primary goal is to prepare teachers who can carry out the task of teaching with proficiency. Learning to teach involves the acquisition of principles derived from the scientific study of teaching' (p. 223).
- *the personal orientation* 'places the teacher-learner at the centre of the educational process . . . The teacher's own personal development is a central part of teaching' (p. 225).
- *the critical/social orientation* 'portrays an optimistic faith in schools as agents of social change and preservers of social inequalities' (p. 226).

Later, some researchers compared and analysed these perspectives based on the similarities and differences. Kennedy (1998) described four dimensions for training teachers: *generic teaching practices, subject-specific teaching practices, curriculum and pedagogy and how students learn*. In this context, most teacher educators agree that it is not enough to have great materials, very good programmes for teachers and an incorporation of education philosophy concerning the very best in the practice of educational methods (Hamrich, 1998). Sher and O'Reilly (2009) compared teacher education programmes that focused on subject matter with those that focused on pedagogy.

Other researchers study the features of teacher education programme design for developing a deeper understanding (Antoniou & Kyriakides, 2013; Antoniou, Kyriakides, & Creemers, 2011; Blank & de las Alas, 2009; Broad & Evans, 2006; Timperley, Wilson, Barrar & Fung, 2007; Watson & Beswick, 2011; Yoon, Duncan, Lee, Scarloss & Shapley, 2007). Timperley, Wilson, Barrar and Fung (2007) analysed teacher education programmes in terms of the content and process of the programmes and categorised 84 design features of programmes. His study also included the characteristics of the

teacher education institutions, and the social context of their work. Blank and de las Alas (2009) pointed out that more effective teacher education programmes have features such as follow-up steps in teacher education institutions, active learning methods, collective participation and substantive attention to how students learn specific content. Another group of researchers as Sztajn, Campbell and Yoon (2011) reviewed and criticised these studies for shifting our attention away from relevant conceptual and theoretical frameworks, and in another study, Opfer and Pedder (2011) analysed them for being based on process–product logic, meaning that programmes are defined by visible processes or features rather than by the functions these processes serve.

The above-mentioned studies lack consensus about ideal teacher education programmes. In this context, each country creates its own ideal system based on the social, cultural, economic, technological and environmental needs. The current social, cultural, political, technological and educational context in Turkey demands better science teachers today than was required over the past few decades. As cited in Ekiz (2004), 'teachers now have to respond to a variety of challenges at the structural and individual level' (Sacks, 2000). Teachers play a vital role in any solutions and successes of current reform efforts (DeBoer, 1991, 2000; Yager, 1992). Thus, most policy makers, stakeholders, teacher educators or researchers draw attention to the important role of teachers and the teacher education system for national and global development, and it is worthwhile to ask prospective teachers their perspectives on the quality of the ideal teacher education system (Novoa, 2007). To develop better understanding about how we can create an ideal teacher education system, we should learn our pre-service teachers' views about it. This study aims to learn more about an ideal teacher education system through Turkish pre-service science teachers' eyes. Also, determining the perspectives of an ideal teacher education system held by pre-service science teachers will help us to understand who the science teachers of tomorrow are, and this should contribute to improvement of the teacher education curricula. In this context, the research question in this study is defined as 'What is the perception of the ideal teacher education system among Turkish pre-service science teachers?'

## **2. Method**

This study was conducted using qualitative research method.

### *2.1. Sample*

The sample consisted of 137 pre-service science teachers (74 females and 63 males) from Akdeniz University, Antalya, Turkey. Participants ranged in age from 20 to 24 ( $M = 22.1$ ,  $SD = 2.9$ ). All the participants in this study were from the primary science education department. Students were in their 4th year of university education.

### *2.2. Instrument*

The questionnaire included open-ended questions about demographic information as, 'Please define your ideal teacher education system- According to my opinion, an ideal teacher education should be .....'. Qualitative content analysis was used in this study. The concept of an 'ideal teacher education system' has two relevant meanings for this study. The first meaning of an ideal teacher education system refers to the qualities to be desired; the second refers to an ideal teacher education system, without tangible specifications, qualifications or characteristics.

### *2.3. Procedures*

On the last day of the Fall Semester of the 2013–2014 academic year, pre-service science teachers were required to complete the open-ended questionnaire following regular course procedures. All the participants were informed about the aim of the study and were guaranteed that the data would be

used for research purposes only. Also, the participants remained anonymous. The researchers in this study hoped to enable participants to spontaneously and genuinely reflect their perspectives.

### 2.4. Data analysis

Data were analysed qualitatively, using the inductive technique of 'open coding' (Gibton, 2001; Huberman & Miles, 1998; Shkedi, 2003; Staruss & Cobin, 1990). The open coding process was realised in three phases. In the first phase, participants' responses were classified according to similar content, concerning qualities of an ideal teacher education system. The classified qualities were basic categories formed based on the participants' words. In the second phase, these formed basic categories were organised into categories called 'the qualities of the ideal teacher education system'. In this phase, the literature relating to an ideal teacher education system was searched and some research results were used during organising categories. In the last phase, they were gathered into four core categories in terms of their relationship qualities of an ideal teacher education system. In order to validate the content analysis, a process of extraction of categories independently was executed and scored by the authors. Inter-rater agreement was calculated as 96%. Disagreements were discussed and charted after consensus. In addition, a joint discussion (a focus group) with pre-service science teachers who had responded to the questionnaire regarding their intentions in the statements was held. The findings in this study are reported in the form of frequency and percentage distributions.

## 3. Results

The core categories relating to qualities of the ideal teacher education system as found in the analysis of the content of the open-ended questions are presented in Tables 1–4. The statements, relating to the qualities, in the tables include the details of the answers given by the pre-service science teachers to the open-ended question. The quality of most of the pre-service science teachers mentioned in this study was written in bold in the table.

### 3.1. Personality of the teacher educators

The first category entitled personality of the teacher educators includes qualities that depict the attitude of the teacher educators to his/her teacher students, his/her profession and the general characteristics of the person. As seen in Table 1, there were five characteristics enumerated based on the teacher education literature, as cited in Arif, Rashid, Tahira and Akhter (2012).

Table 1. Perceptions of the personality of the teacher educators

Core category-1	Qualities	f(%) (N = 137)
The personality of the teacher educators	Conscientiousness	34(25)
	Emotional stability	58(43)
	Openness to experience	51(37)
	Agreeableness	82(60)
	Extraversion	49(36)

- 1) *Conscientiousness*: Dependable, hard-working, organised, self-disciplined, persistent, responsible
- 2) *Emotional stability*: Calm, secure, happy, unworried
- 3) *Agreeableness*: Cooperative, warm, caring, good-natured, courteous, trusting
- 4) *Extraversion*: Sociable, outgoing, talkative assertive, gregarious
- 5) *Openness to experience*: Curious, intellectual, creative, cultured, artistic, sensitive, flexible imaginative. (p. 163).

As seen in Table 1, according to most of the pre-service science teachers' responses relating to the personality of teacher educators, 'agreeableness' is depicted as a very dominant and important character (60%). Regarding other qualities of the personality of the teacher educators, there were four qualities of the personality that were mentioned by the pre-service science teachers in our sample. In sequence, these were 'emotional stability' (43%), 'openness to experience' (37%), 'extraversion' (36%) and 'conscientiousness' (25%).

### 3.2. Teacher educators as possessing professional knowledge

This category included six characteristics relating to teacher educators as possessing professional knowledge, as seen in Table 2. He is defined as a professional person who has disciplinary, curriculum and teaching knowledge in his field knowledge. The six characteristics relating to this category are given in detail in Table 2.

Table 2. Perceptions of the personality of teacher educators as possessing professional knowledge

Core category-2	Qualities	f(%) (N = 137)
The teacher educators as possessing professional knowledge	Subject knowledge and skills	77 (56)
	Curriculum knowledge	79 (58)
	Knowledge of learners	93 (68)
	Teaching methodology	62 (45)
	Knowledge of context	89 (65)
	General pedagogical knowledge	58 (43)

- 1) *Subject knowledge*: Scientific concepts, history of science, social, ethical issues, problem solving skills, application of science, manipulative skills.
- 2) *Curriculum knowledge*: Use extra material, add to basic content with new information, incorporate contemporary issues into the lesson.
- 3) *Knowledge of learners*: Classroom management, adaptation of teaching procedures to pre-service teachers' needs, helping pre-service teachers experiencing personal or professional problems, relating course content to pre-service teachers' lives and needs.
- 4) *Teaching methodology*: Use of new technology, organising activities outside of the classroom, adaption of teaching to the pre-service teachers' needs, use of different teaching models, evaluation of performance, use of hands-on activities.
- 5) *Knowledge of context*: Communication and good relations with pre-service teachers, teaching experience in the classroom, awareness about the difficult conditions in the country.
- 6) *General pedagogical knowledge*: Use of pedagogical theories in the class.

Table 2 shows the pre-service science teachers' perceptions about the teacher educators as possessing professional knowledge. Among the teacher educators as possessing professional knowledge qualities, 'knowledge of learners' was opted for by the most of the pre-service science teachers (%68). The other five qualities were defined as 'knowledge of context' (%65), 'curriculum knowledge' (%58), 'subject knowledge and skills' (%56), 'teaching methodology' (%45) and 'general pedagogical knowledge' (%43) by the pre-service science teachers in this study.

### 3.3. Teacher education curriculum

This category includes qualities of teacher education curriculum. Six characteristics were specified as seen in Table 3.

Table 3. Perceptions of the teacher education curriculum

Core category-3	Qualities	Total f(%)
Teacher education curriculum	Theory–practice dialectic	122 (89)
	Diversity of learning spaces and curriculum sites	49 (36)
	Sociology and anthropological insights	62 (45)
	Meaningful internship and school experience	126 (92)
	Multicultural education and teaching for diversity	74 (54)
	Interdisciplinary approach	36 (26)

- 1) *Theory–practice dialectic*: gaining a deeper understanding of the connection between knowledge, learner, learning and teaching methods, opportunities to engage with theory as well as the field, practicum courses.
- 2) *Diversity of learning spaces and curriculum sites*: Providing a greater ‘space’ outside the classroom /school for cultural, social, personal and professional development of the teacher, including laboratories, theatre, cinema, science centres, museums, farm, workplace, home, community and media and to equip him/her to develop pedagogical approaches and create an environment that supports learning for all students based on their needs.
- 3) *Sociology and anthropological insights*: Social context as a source for rejuvenating teaching and learning.
- 4) *Meaningful internship and school experience*: Curriculum and pedagogy and school internship, mentoring, more time for school experience.
- 5) *Multicultural education and teaching for diversity*: Knowledge and experience with students from different cultures, diversity in the instructional arrangements for science teaching, gaining experience in meeting the diverse needs of all students, adding or increasing more specific practicum course and internship programmes to efficiently prepare teachers to meet the needs of today’s diverse primary science classes and to teach students from social, cultural and linguistic backgrounds.
- 6) *Interdisciplinary approach*: Integrating of multiple disciplines into science education.

As seen in Table 3, all of the pre-service science teachers stated that six qualities of the teacher education curriculum should be included as follows: (1) Meaningful internship and school experience (92%), (2) theory–practice dialectic (89%), (3) multicultural education and teaching for diversity (54%), (4) sociology and anthropological insights (45%), (5) diversity of learning spaces and curriculum sites (36%) and (6) interdisciplinary approach (26%).

### 3.4. Professional development process

This category includes qualities of the professional development process. Six characteristics were specified as seen in Table 4.

These qualities, mentioned by the pre-service science teachers in this study, can be specified from the most to the least mentioned as follows: feedback about professional development (67%), library and technological sources (61%), international collaboration (57%), workshops, seminars, meetings (32%), teachers as researchers (24%) and collaboration with stakeholders (21%).

Table 4. Perceptions of the teacher education curriculum

Core category-4	Qualities	Total f(%)
Professional development process	Workshops, seminars, meetings	44 (32)
	International collaboration	78 (57)
	Collaboration with stakeholders	29 (21)
	Library and technological sources	84 (61)
	Teachers as researchers	33 (24)
	Feedback about professional development	92 (67)

- 1) *Workshops, seminars, meetings*: Opportunities and financially supporting personal growth and competencies via scientific meetings, drama, craft, music, self-development workshops
- 2) *International collaboration*: International collaboration on the Internet, international projects, exchange programmes
- 3) *Collaboration with stakeholders* : Open and deliberative discussion between stakeholders for education quality improvement efforts
- 4) *Library and technological sources* : Digital libraries and sources, provide best educational software for using classroom teaching and classroom management
- 5) *Teachers as researchers*: Action research to improve practices, experience for educational research methods, participate in research activities with teacher educators
- 6) *Feedback about professional development*: feedback about professional development apart from formal exams, useful feedback connected.

#### 4. Conclusions and implications

This study was conducted on the perceptions of the ideal teacher education system and proposed a set of standards for the ideal teacher education system through the eyes of Turkish pre-service science teachers. Four most important qualities of an ideal teacher education system, including *the personality of the teachers, the teacher educators as possessing professional knowledge, teacher education curriculum and professional development process*, were defined by the pre-service science teachers in this study. Interestingly, although all participants in this study are from the primary science teacher education departments, most of their perspectives have reflected the ideal teacher education system in general, and not science teacher education system in particular.

The teacher education curriculum plays a major role for educating highly skilled teachers. Meaningful internship and school experience as the quality of an ideal teacher education system was mentioned by most of the pre-service teachers in this study (92%). In general, internship programmes are assumed to facilitate *the transition from student status in a profession's preservice teacher education programme to the status of a full-fledged member of the profession* (Ratsoy et al., 1987). In teacher education institutions in Turkey, there is generally more time for theoretical courses and less time for teaching experiences. In this context, the duration of field experiences should be increased. In addition, field experiences should be organised to engage student teachers in real school issues and actual teaching problems through learning by doing. Also, 89% of participants emphasised the necessity of a theory–practice dialectic, as explained by Shulman (1986, 1987). Kennedy (1998, 2016) has defined this experience as learning for teaching.

It also emerged that 54% of teachers consider knowledge multicultural education and teaching for diversity of special needs education. Since 2011, the numbers of Syrian refugees and Syrian students in Turkey has been increasing. This situation will require to reassesses teacher education programmes in terms of the multicultural context. So far, Turkish pre-service teacher education programmes have not included multicultural education courses. A curriculum including a multicultural education course conveys the theoretical, conceptual and practical issues of diversity and their relationship with the different education areas, using a variety of theoretical lenses, e. g. critical, feminist, sociocultural, post-colonial, postmodern and post-structural. A fundamental aspect of the programme is transformation—of self, schools and schooling and society (Xu, Hao & Huennekens, 2016).

The qualities of teacher educators have a key role in educating future teachers. Agreeableness is defined as an important characteristic of teacher educators by most of the teacher students (60%). In an earlier study relating to qualities of teachers by Beck (1967), similar results were found. Teacher educators are also a role model for their students. We have no teacher educator standards, which need to be developed in Turkey.

Consequently, the quality of teacher education system is one of the most important elements influencing the learning of teachers and the quality of education. Thus, policy makers in education should put much effort in the development of policies to guarantee and improve the quality of teacher education. As mentioned above, we need more research results conducted by different perspectives, methodologies and samples to develop a deeper understanding of the ideal teacher education system

The conclusions of this study may open the way to further discussion and a deeper understanding of the perspectives of an ideal teacher education system as follows: Are there similar or different characteristics in the perspective of an ideal teacher education system in other cultures, other countries, other educational environments, in other subject teaching areas and in different grade levels of the pre-service teachers, if so, what are they? How can we create or design meaningful internship and school experience as a quality of an ideal teacher education system?

Furthermore, the field would be advanced with more fundamental research into how teachers differ in the way they learn (e.g., based on gender, culture, concerns, attitudes, motivation, subject pedagogy). This aspect would advance the quality of interventions tailored to the needs of teachers. Finally, similar to Kennedy (2016), we suggested to focus not so much on the specific effective features, but on how they are combined in a theory of action, for future researchers.

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