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Tangible Experiences-Based Individual Differences Training for Teacher Candidates

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ABSTRACT

Teacher candidates were provided with tangible experiences-based individual differences training via plants in the framework of this study undertaken in 2013-2014 academic year. In the study designed as action research, teacher candidates were asked to plan the first two weeks of their teaching as first grade teachers in order to ascertain their approach to individual differences in the teaching process. A 14-week training process was designed to create awareness about individual differences and importance of getting to know students in this framework. Research data were collected with the help of qualitative techniques-observations and semi-structured interview questions- and analyzed descriptively

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Keywords:
Getting to know students, individual differences, tangible experiences based learning, action research.

Introduction

A comprehensive mission for schools is to educate students to be knowledgeable, responsible, socially skilled, healthy, caring, and contributing citizens (Greenberg, Weissberg, O'Brien, Zins, Fredericks, Resnik and Elias, 2003). Teaching and learning are the most important concepts for this mission in the education process. For effective teaching, educators must have more knowledge in and understanding of the learning process, particularly about how individuals learn. If educators relied upon how individuals learn, they would be better able to enhance their students' ability to learn (Sims and Sims, 1995). Therefore, teachers are responsible for all of their students' learning and for being familiar with the instructional techniques that promote effective learning for all (Henson, 2003). Because of its importance for teaching and learning process, from past to present, philosophers and scientists were into debate about how people learn (Hammond, Austin, Orcutt and Rosso, 2001).

Various theories describe differently the learning process. In the nineteenth century learning was studied scientifically. Psychologists tried to discover the best approach to teaching for effective learning. The twentieth-century debate on how people learn has focused largely on behaviorist vs. cognitive psychology. During and after the 20th centuries educational approach is based on learner- centered education which was affected by Dewey's, Piaget's and Vygotsky's constructivist ideas about child development and learning. For example John Dewey thought that education should be child-centered, and must begin with understanding the individuals (Hammond et al, 2001). Piagetian constructivists emphasized individual cognitive development of the child. For Piaget the child is the subject of study and learning is primarily an individualistic enterprise. So children should be educated according to their interests and needs. Vygotskian

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constructivism situated the individual within a socio-cultural context. According to Vygotsky learning was affected from social interactions of individual (Richardson, 1997).Many researchers and educators(Carroll,1963; Bloom,1979; Dunn and Dunn,1992; Ray, 1999; Tomlinson, 2000; Gregory and Chapman, 2002; Heacox,2002; Lubart, 2004; Rosenfeld and Rosenfeld,2004; Tomlinson,2014; Tóth,2014, Hanushek, 2014, Weimer 2002, McCombs and Whisler, 1997) also state that , for quality education ,teaching activities should be centered on students and be based on their prior knowledge and needs, individual choices, interests, needs, capacities, talents, abilities, learning styles, types of intelligences heredity, experiences, perspectives, backgrounds.. All of these features lead to individual differences. Hence, to be effective, schools must concentrate on their fundamental mission of teaching and learning for all children, and the teacher's goal is to understand the individual differences and also needs of the child and then to provide learning experiences to enable the student to uncover the curriculum. According to Ravitch (2000) that must be the overarching goal of schools in the twenty-first century (Hammond et al, 2001; Greenberg et. al, 2003).

Schools receive students with different behaviors and habits from all types of communities. Thus there is a heterogonous distribution among students in an average classroom. So, there are a variety of individual differences(ability (or intelligence), achievement level, gender, learning style, and ethnicity and culture that must be of concern to classroom teachers. Some of the most prominent are academic ability (or intelligence), achievement level, gender, learning style, and ethnicity and culture (Huitt, 1997). It is impossible to have students learn without learning about their characteristics, needs and problems because anything may be meaningful and sufficient for some students while they can be meaningless for the others. Education does not mean educating all students in a common program. Importance and value of education can only be realized by focusing on individual differences (Carroll, 1963; Bloom, 1979; Dunn and Dunn, 1992; Ray, 1999; Tomlinson, 2000; Gregory and Chapman, 2002; Heacox, 2002; Rosenfeld and Rosenfeld, 2004; Tomlinson, 2014; Tóth, 2014, Hanushek, 2014) and by providing individuals with educational activities that are appropriate for their interests, abilities and intellectual areas (Aktepe, 2005).

Why individual differences in education?

Institutions of higher education are always looking for ways to make their educational initiatives more effective. The inability to consciously control and manage the learning process in higher education in general, and various classes in particular, lies in a lack of understanding about the learning process and faculty teaching (Sims and Sims, 1995). In terms of teacher education, teacher training institutions are focused on the question of how trained the quality teachers and how they provide their students' learning, because teaching intended to result in learning. In this context, it can be argued that for quality teaching; qualified teachers should have the characteristics such as the ability to create learning environments based on the pedagogical expertise in their fields, provide creative learning that will allow learning to take place in an environment based on safety and respect for differences both as a group and as individuals, reflect their knowledge and experiences, feel responsible from student development and learning and carry leadership qualities.

During the observations of teacher candidates' in their teaching practices in primary schools, it was observed that teacher candidates planned their activities based around the curriculum, had difficulty with problems such as student unwillingness to participate in the activities or inability to understand the activities because teachers were not informed about the past knowledge and skills of the students, and that they had difficulty reaching the goal of their plans because they did not use the results of the evaluation activities in relation with the characteristics of their students in their next plan. This situation was seen as a lack of the teacher candidates' ability to know their students' individual differences and reflect this knowledge in their practices.

In terms of teaching training programs, teacher candidates are educated to provide students with learning opportunities. As expressed in Carroll (1963) and Bloom's (1979) learning models, "there are no students who cannot learn and everyone can learn provided that they are given additional time and learning opportunities". Appropriate conditions should be provided for learning to occur. Quality and well trained teachers are needed to accomplish this. Therefore, importance of training teacher candidates who emphasize differences during pre-service is undeniable to have quality teachers. It is necessary for teacher candidates in their prospective careers to be able to plan educational activities based on individual differences. So it can be

said that before service, teacher candidates should be educated about the importance of getting to know their students in accordance with their individual differences and how individual differences can be reflected in educational practices.

How can teacher candidates recognize the importance of getting to know students and individual differences?

In this study tangible experienced learning approach was adopted to create sensitivity and awareness in teacher candidates about getting to know students related to their individual differences. It was inspired by Kolb's experiential based learning theory. Kolb (1984) who emphasized the importance of learning by doing, individuals learn from their own experiences and only the outcomes of this learning can be assessed safely. Kolb (1985) defines learning as the process of association between processes of thinking and doing shaped by experiences.

Tangible experiences learning idea was affected by Kolb's concrete experiences idea (Kolb and Kolb, 2005), but tangible experiences are considered the most important insomuch that the main feature and first step of learning. Learning is only possible when learners actively experience what they learn and have tangible experiences. So, the framework of this study can be described through such key words as "constructivism," learner-centered," "tangible experiences –based learning."

Teacher candidates also need to engage in meaningful learning processes and have tangible experiences when they are "learners" themselves so that they can solve some of the problems they will face during their teaching professions. Therefore, teacher candidates in the study were provided with tangible experiences regarding getting to know students for affective learning process with individual differences. Tangible experiences learning process for teacher candidates' was being carried through the use of plants.

Why plants?

The reason for providing the training on individual differences through the use of plants can be explained in the following manner:

As can be seen in the following definition, living beings have many similar characteristics: Everything that can receive information about the conditions that lives in and can react to these conditions and most importantly everything that needs energy to do all these is a living being (TUBITAK, 2014). Therefore, plants and human beings are similar in many respects.

Human beings have many similarities in their life cycles in terms of heredity and environmental effects. Just like human beings, plants are also the products of heredity and the environment. It is known that biological characteristics of plants and human beings are shaped by environmental effects, can develop or regress through support and instructions and hence plant and human biological characteristics are affected from the conditions that they live in. Examination of the studies that focus on human beings and their development shows the use of multiple disciplines. For instance, studies in educational psychology identify learning principles for the individuals based on the studies on animals such as cats, dogs and rats by theorists such as Pavlov (Todes, 1999), Thorndike (1913b) and Tolman (1948). Also in this study, learning has attempted to explain by the use of similarities between human beings and the plants. The main reason for preferring the use of plants in the study is related to their reactions to environmental impacts by visibly drying (desiccation), blooming and withering in a short time.

Plants can sustain their lives under appropriate conditions for their own species in the diversity of plants. Plants get sick and feel stress due to some elements just like human beings do. These elements can be related to living organisms such as weeds, parasite plants, bacteria and viruses or related to some environmental factors such as water, temperature, light, lack of food, aridity and excess salt ratios in the soil (Kılıç Ekici, 2012). Plants need three principal elements to be sustained: Water, air and light (Alp, Onat and Kupık, 2011). However, the ecological conditions such as light, temperature or humidity for plants are different form one another. For instance, lack or excess of temperature in the environment affects vital processes such as blooming or growing. When food requirements for plants are not met in a regular fashion, they start to fade, yellow, shed their leaves and desiccate. Placement of the plants is as important as their nutritional needs. When the plants are not placed in correct locations, their chance for sustainability will decrease. In terms of water requirements, some plants will need to be watered 2-3 times daily under specific climate conditions whereas it will be sufficient to water some others 2-3 times a week. A good cultivator may

understand when the plant needs water by observation or touch. If there are indications for dryness in the plant, it probably needs to be watered (Alp, Onat and Kupık 2007; Alp, Onat and Kupık, 2011).

Just like plants, children may face problems when their needs are not met. Appropriate presentation of inborn characteristics and development may be varied based on environmental conditions and differences among individuals occur. While some individuals have suitable conditions for development, some others may not have the opportunity to realize themselves since they are not provided with suitable conditions. Individuals may face different learning experiences throughout the educational process based on these differences. The only method to prevent this from happening is the use of practices by well trained teachers that take individual differences into consideration. Therefore, the study aims to draw attention to the concept of individual differences by focusing on the differences among plants and the differentiation of their needs based on these differences and by associating them with different learning needs of students.

This study made use of interior decorative plants, in other words potted plants, cultivated in pots, vases and cases and are easy to carry. Temperature, soil-atmosphere humidity, soil structure, plant food element and light requirements of many potted plants are different form one another (Demirbaş, 2010). Since nature is a live model for human beings, it is possible to argue that learning will be more permanent when there is direct interaction between events and concepts with natural elements (Basal, 2003).Because of this reason this study tried to create awareness -in classroom teacher candidates who will be mainly responsible from student learning and who will determine student attitudes towards learning in the formal education process - about the importance and need for learning about getting to know students with their individual differences. Therefore, this study aimed to investigate whether tangible experienced based learning approach was effective to create sensitivity and awareness in teacher candidates about getting to know students related to their individual differences. For the purpose of the study, the following research problem was sought.

Is tangible experienced based learning approach impact on the awareness of elementary school teacher candidates' about importance of individual differences of the students in learning process?

Method

The study was designed as action research that can be defined as a research method that aims to increase quality through observing a social situation (Elliott, 1991). The reason for using the action research in this study is explained as follows: During the observations of teacher candidates' teaching practices, it was recognized that teacher candidates ignored the students' individual differences in elementary schools. Because learning is an individual process and the teachers must have responsible for students' learning, sought to action plan to raise the awareness of teacher candidates related to individual differences. In order to solution to this problem and the most appropriate method was thought to be the action research. Because; action research is a natural part of teaching, and one of the strongest designs to generate change and development in school and classroom environments (Yin, 2003; Acosta and Goltz, 2014). Action research involves systematic observations and data collection which can be then used by the practitioner-researcher in reflection, decision-making and provides a framework that guides the energies of teachers toward a better understanding of why, when, and how students become better learners (Parsons and Brown, 2002; Miller, 2007)

Whitehead (1985) expressed how the action process puts forward a simple representation of how the process feels:

1. I experience a problem when some of my educational values are negated in my practice;
2. I imagine a solution to my problem;
3. I act in the direction of the solution;
4. I evaluate the outcomes of my actions;
5. I modify my problems, ideas and actions in the light of my evaluations (Cited in: Ferrance, 2000).

Action research is situational since it is related to discovering the problem in a specific situation and solving it in its own environment (Köklü, 1993).Therefore action research can be undertaken concurrently with this research process to fill the gap between theory and practice about the getting to know students related to the individual differences.

Limitations

The study is limited to a 14-week training period undertaken with 25 teacher candidates selected through purposeful sampling from among last year students in the classroom teaching department of a state university in Turkey during the spring semester of 2013-2014 academic year. The study was designed with the supposition that teacher candidates would start their careers as first grade classroom teachers and the role of getting to know about first graders' individual differences in education was discussed.

The study is limited to the effectiveness of tangible experiences based learning approach. In this study teacher candidates tangible experiences were associated with first grades' individual differences. Because for a successful teaching experience, a teacher must be able to know their students from the first year. For this reason, first grades were decided to be the most suitable example for the teacher candidates' training about individual differences. The majority of students meet the social world in the first grade and the experiences received during this period shape their future lives. In this context, starting school has an important place in a child's life. For the first time in his/her life, the child who starts the first grade is faced with tasks such as participating in activities required by programmed instruction, following rules in a specific discipline, following teacher's instructions and most importantly learning literacy, arithmetic and similar topics (Erkan and Kırca, 2010). Therefore, first grade is crucial for both the students and the teachers. Teachers, one of the fundamental components of the education system, face important responsibilities during this process (Çöğenli and Uçansoy, 2014). Teachers should teach students by knowing them and recognizing their individual differences. The chance of school success for students who start primary school is related to their school maturity. Holistic cognitive, linguistic, physical, affective and social development during pre-school period forms the foundation for student learning. Success in school learning is based on preparation related to learning in which developmental areas are sufficiently supported. When children start school, they should be mature enough in terms of literacy preparatory skills, math skills, social skills, motor skills and affective development. If a child starts school lacking the related learning experiences in one or more of these skills and is not sufficiently supported, the student will have difficulty in learning, may face early failure and reflect the impact of this failure to subsequent learning experiences as well. Therefore, students should be identified and recognized from all aspects and educational activities should be planned in a supportive and constructive manner in order to prevent students from experiencing failure due to individual differences (Kutluca Canbulat and Tuncel, 2012).

Sample Group

The working group was composed of 25 last year students at elementary school teaching department selected through purposeful sampling. The candidates who took teaching practices class under the guidance of the implementing instructor were not informed of the purpose of the study. The criteria in student selection were the completion of educational psychology and other teaching courses since they were last year students. The reason for selecting only 25 last year students was related to easy accessibility of those teacher candidates by the researcher since she taught teaching practices and supervised those students. The working group was composed of 16 female and 9 male teacher candidates. Teacher candidates were coded as S1, S2, S3…S25 and student views were provided using those codes while presenting the data.

Role of the Observers

The two observers that participate in the research process as observers work in the field of educational psychology and have sufficient knowledge and experience in assessing learning needs and individual differences.

Role of Other Instructors

In research process 3 different instructors with training responsibility about the participants of this research were emphasized the individual differences in their lessons and they were observed the teacher candidate's applications related to the individual differences.

Role of Classroom Teachers

In teaching practices process the participants were made their applications in 4 different teacher's classrooms. These teachers observed the teacher candidates teaching practices related to the individual differences.

Table 1. Research process

Action research process	Research process
Identification phase	
A problem /topic of interest /who is it related to	It was observed that classroom teacher candidates were overlooked the students' individual differences in their school practices.
Identification of research questions	Identifying the problem and sub problems: • Are teacher candidates competent in identifying the information, skills and competences that the first grade students should possess? • Are teacher candidates competent in recognizing student characteristics and individual differences?
Looking for solutions to the problem	Planning the educational process with the following question: How can teacher candidates be provided with awareness about individual differences?
Data Collection	Planning Generating a checklist by using the criteria employed in School Admission Tests (cited in: Kutluca Canbulat and Canbulat, 2012) that define the characteristics first grade students should have. Selecting the working group from the teacher candidates in their last year who took teaching practice course and were supervised by the researcher Practice/Implementation Asking last year teacher candidates to plan the first two weeks of school to observe their approach to individual differences and how they would plan the first two weeks of teaching when they start their careers (1 class hour)
Data Analysis	Assessing the prepared plans by the researcher and two separate education experts by comparing the plans with the criteria found in the checklist, identifying the interobserver reliability and identifying the awareness levels of teacher candidates regarding individual differences.
Training phase	
Trying the new implementation in the framework of a systematic plan/what changes are foreseen?	Asking teacher candidates "to purchase a potted plant and take care of it for three weeks" without explaining the reason
Transforming the outcomes to implementation	Ensuring that teacher candidates take care of their potted plants by emphasizing that they will need the plants for an activity that will take place in three-week time
Corrected action Does the implemented training serve its purpose?/Which changes will be started following the training?	Asking teacher candidates to take photos of their potted plants and send them Observing the change in the plants
Reviewing the data/Are there differences between what we want to happen and what actually happens?/ What kind of changes shall we start?	3-week process I. week (2-hour course) Asking teacher candidates to come back with their potted plants at the end of the three-week period, Interviewing teacher candidates about the names, characteristics, care processes and conditions of their potted plants in a semi-structured interview during the lesson process observed by two observers, Comparing information about potted plants and their characteristics and comparing the potted plants of teacher candidates who followed appropriate care procedures and who did not, Discussing the reasons for well cared for plants, not so well cared plants, plants that dry or fade, Associating the discussion with student characteristics and individual differences, Asking teacher candidates to research the characteristics of first grade students II. week (2-hour course) Discussing the developmental characteristics of first grade students, Associating age appropriate knowledge, skills and behaviors with individual differences, Making assumptions about the relationship between individual differences, getting to know students and success based on the experiences with the potted plant III. week (2-hour course) Informing teacher candidates about the role of teachers related to the techniques for identification and determination of developmental characteristics of students, Informing teacher candidates about school maturity tests, their characteristics and scope, Having students watch a sample video regarding implementations about school maturity and school admission to get to know students, Emphasizing the importance of getting to know students with the help of true stories. In this phase the other instructors were referred the importance of individual differences for learning on their lessons.
Phase of observing changes	Teacher candidates teaching practices were observed by researcher and classroom teachers related to the individual differences during 3 weeks and they were given feedback about deficiencies in their applications. Asking teacher candidates again to plan their first two weeks of teaching as a first grade teacher
Data analysis	Comparing the criteria in the checklist to see if they are met and providing feedback Analyzing the development of teacher candidates and the outcomes of the activity
Reviewing the change and making decisions about future steps	
Was the change useful? Should it be continued? What can be done in the future? Is the change sufficient? What and to whom shall we tell about the outcomes of the research?	Assessing whether development has occurred in teacher candidates in terms of getting to know students and individual differences concepts. Explaining whether the change was sufficient or insufficient, Making inferences and providing suggestions as to what can be done in the future.

*Action Research Process has been generated based on Bassey,1998;KutlucaCanbulat and Tuncel,2012.

Data Collection Tools

Checklists. In the first phase of the study, teacher candidates were given the following instructions to identify their awareness about individual differences: "You have become a first grade teacher in your first assignment. "Plan the first two weeks of your teaching as a first grade teacher" The plans were checked to see if they involved individual differences. In order to assess teacher candidates in terms of using teaching approaches based on getting to know students and taking individual differences into consideration; a checklist was developed by benefiting from the observation criteria included in school admission tests(cited in: Kutluca Canbulat and Canbulat, 2012) shaped around questions such as "has the teacher included activities designed to know students?; has the teacher planned activities designed to obtain information about factors thought to be effective in learning readiness (attending pre-school, family and family relationships, environment)? And has the teacher planned activities designed to identify learning readiness in terms of cognitive, linguistic, social, affective and psycho-motor development? Observational data were collected with the help of this checklist. Observed performance levels of the candidates and the products to be evaluated were ticked as "yes" or "no" depending on the existence of the characteristics desired to be observed (Airasian,1996) and information regarding whether the performance was observed or not and performances in which candidates were successful or unsuccessful was obtained (Airasian,2001).

Interviews. The lesson/activity process was realized as assessment and informative interviews that can be planned in more detail and specifically in order to learn about the reasons and attributes of the elements of the problem. Interviews refer to an interaction process generated by two or more individuals by using face to face verbal and non-verbal communication tools and techniques for a specific purpose and the lesson/activity process was undertaken in interview format.

Data were collected with the help of semi-structured interview questions directed to teachers as the following: Which characteristics of the plant led you to choose it? Did you obtain information about plant care while purchasing your plant? If you have received information about whether your plant likes sunlight, whether it needs to be taken care of in the shade and how it is watered, did you provide plant care based on the information you obtained? What do you associate your plant's condition (lively, faded, dried etc.) with? What can be the purpose of this study that was undertaken with the use of plants? What do you think of the concept of individual differences?

Data analysis

Research data were analyzed descriptively, a frequently used method of analysis in qualitative studies. In descriptive analysis, which clearly defines the conceptual and theoretical structure of the study beforehand, data are summarized and interpreted according to previously identified themes or categories. Presentation of the data includes the questions used in research questions, interviews and observation processes or the dimensions in these processes. Direct quotations are often used to reflect the views of individuals who are observed or interviewed. The reason for selecting the method of descriptive analysis for analyzing data was related to previous identification of dimensions that would be observed or interviewed. The purpose of descriptive analysis is to transfer the findings of the analysis to the reader in an organized and interpreted fashion. Following the description of the data in a logical and intelligible manner, they are interpreted, cause and effect relationships are examined and some outcomes are provided. The researcher makes associations about the themes arrived at the end of the analysis; makes sense of these themes and may provide future suggestions. The descriptive analysis of research data was undertaken by following stages suggested by Yıldırım and Şimşek (2006):

1. Generating interview/observation codes: Observation codes are the codes related to interview questions used in the activity along with the codes used as school maturity indicators in the school admission tests.
2. Content validity of the checklist: The checklists used during the validity studies of the research were rated item by item by three experts in the field of pre-school teaching, classroom teaching and educational psychology on a 5-point Likert scale (5: very appropriate, 1: not appropriate at all) for intelligibility, relevancy of purpose and use of language and the views of the experts were sought. Mean scores, standard deviations and coefficients of variation for each item in the form were calculated. Analysis results show that scores for the items related to school maturity and getting to know first graders were homogenous; standard deviations were lower than 1 and coefficients of variation were lower than 25%. Therefore no items were removed from the tool. Expert suggestions related to interview form items, content or use of language were taken into consideration and necessary corrections were done to finalize the form.

3. Providing written data: In this phase, the plans teacher candidates were asked to prepare were obtained in written format. Dialogues between the researcher and the candidates during the activities were recorded in the form of notes by the observer.
4. Coding the interview/observation data: Related observation and interview results were transferred to forms.
5. Comparing the codes and reliability: Consistency of the information transferred to interview/observation forms for each observed/individual was examined by two observers by way of comparisons. During the comparisons about the teaching process of the candidates, the themes for each item ticked by the observer were checked and decisions on teacher candidates' plans were made based on "unanimity". During the activity process, the reports of two observers were compared and interobserver agreement (consistency of the rating by different observers) was investigated based on the agreement between assessments done on a lesson, video or document by two or more evaluators using the same assessment tool. Methods used in assessing interobserver agreement vary according to whether the test is continuous or categorical as well as on the number of evaluators. When the test results are categorical, one of the agreement coefficients that can be used is Cohen Kappa statistics. When a test with equal number of categories is used, Kappa statistics is used to assess the agreement between two observers(Cohen,1960; Shoukri, 2010; Kanık, Örekici Temel and Kaya,2010) According to Kappa statistics, reliability coefficient was calculated as $\kappa = 0.976$, $p<0.001$ which shows that the study is reliable.
6. Defining the findings: Data were defined according to research problem and supported by direct citations related to findings. In this phase, data were defined in an easy to read and comprehensible manner and unnecessary repetitions were omitted.
7. Interpreting the findings: Defined findings were explained, associated with research results and interpreted.

Implementation Process and Findings

I. Phase

25 elementary school teaching department last year students were asked to plan "first two weeks of their teaching as a first grade teacher" in the first theoretical lesson of teaching practices class and they were informed that those plans would be examined and feedback would be provided. Characteristics observed in teacher candidates' plans are provided in Table 2.

Table 2. Characteristics observed in teacher candidates' plans

Observed Characteristics	f	
	Yes	No
Pre-school attendance	2	23
Environmental and family characteristics	5	20
Accommodation, existence of a separate room or place to study, number of siblings, the birth order, socio-economic level of the family		
Health	2	23
Diseases		
Physical Disability- hearing loss, visual loss		
Cognitive development	-	25
Visual perception- perception of shapes, comparison, matching, classifying, ordering		
Audio perception- rhythm perception, stress, intonation,		
Attention and memory – perceiving details, recall		
Linguistic development	-	25
Speech attitude- willingness to speak, self-confident speech with proper tone of voice		
Grammatically correct speech- forming full and proper sentences		
Understanding the language and the instructions- Understanding what is said correctly and behaving appropriately		
Physical development	21	4
Fine motor- drawing lines, cutting, coloring		
General motor- balance, leaping, jumping		
Self-sufficiency- toilet training, tying own shoelaces etc..		
Affective development	12	13
Liking the school and willingness to go to school		
Ability to leave the parents		
Self-sufficiency- ability to stay alone		
Likes and interests		
Task related attitude		
Concentration		
Attitude towards success and failure		
Desire to succeed		
Diligence in tasks		
Physical strain- endurance		
Social development	5	20

Communication with adults and peers
Acting with the group
Patience
Following rules
Perceiving that the instructions given to the group is binding for the self as well
Ability to be a member of the group

Table 2 presents that expressions related to cognitive and linguistic development of the child are not present in any of plans prepared by the teacher candidates, only two of the candidates used expressions regarding the health situation and preschool attendance of the child and 5 of the candidates included expressions related to the child's environment. However, none of these expressions are about getting to know the child and include statements only related to the teacher activities undertaken in the two-week period.

The striking point in the examination of the two-week plans prepared by teacher candidates is that teachers plan to start teaching activities without considering the individual differences of their students and associate school readiness with mostly physical development. Some of the examples from the plans prepared by the candidates are provided below:

> *S7"I will include activities that will develop the finger muscles of my students. I will support muscle development through activities such as cutting, gluing and drawing so that they can hold the pencil and write better".*
>
> *S11"I will have my children play. I will provide activities related to their interests and activities that will make them get used to school".*
>
> *S8 "I will give a tour of the school so that they can get to know the school. I will show the cafeteria and the toilets. I will teach them the location of the classroom".*

It is observed from candidates' expressions that in these two weeks they have the objective of overcoming the deficiencies that are supposed to exist in the children whom they have not met yet. However, it may not be correct attitude to make judgments of students and plan activities without providing activities to get to know students. Sometimes students may have problems related to another developmental area, their families or immediate environment. In those cases mentioned above, it can be argued that planning activities based on individual differences and getting to know students is overlooked.

II. Phase: Asking for Potted Plants

After the plans were collected, teacher candidates were asked to purchase potted plants to take care of in their homes but the real purpose (that the plant care was a part of training on individual differences) was not relayed to them. They were only told that these potted plants would be needed in an activity that would be held at the end of the semester. Teacher candidates were asked to take care of their plants for three weeks and bring them to the lesson at the end of the care period. At the end of the three-week period, 9 teacher candidates brought to class violets, 5cacti, 1 dahlias, 2 begonias, 2 asters, 1calenduleae, 2 fuchsias, 1 carnation and 2 impatiens wallerianas. (Observation note: 9 of the plants brought to class at the end of three weeks were completely dried up, 3 plants shed their leaves and were left with dry leaves and the rest were lively, fresh and well taken care of although 4 of them had slightly yellowed parts).

III. Phase: Classroom Interviews

Findings obtained from classroom interviews with the teacher candidates are presented in Table 3, Table 4, Table 5, Table 6 and Table 7.The reasons for purchasing the type of potted plants preferred by teacher candidates are presented in Table 3.

Table 3. Reasons for preferring certain potted plants

Reasons	f
Looks pretty	8
Based on its color	4
Can live under any conditions- does not require special care	5
Random	8

Table 3 shows that 12 candidates prefer their plants due to their color and nice appearance, 5 selected their plants partially deliberately since those plants could live under any circumstances and did not require special care and 8 candidates selected their plants randomly without paying attention to any plant characteristics. Candidates explained the reasons behind their preference in plants:

> *S8 "When I went in the florist, I chose the plant that looked the best. There was no specific reason".*
>
> *S10 "It did not matter which plant, I bought it since you asked me to. I asked the florist to give me a plant, its color, appearance did not matter. I bought it for my task".*
>
> *S19 "It was important for me that the plant could live under any circumstances. I cannot take care of anything specifically; I may forget, or may delay the care, therefore I selected dahlias since I had heard that it is very vigorous. I selected it so that it won't bother me to take care of it".*

Table 4 displays teacher candidates' answers to the questions asked to identify how much they know about their plants in order to provide care.

Table 4. Learning about plant care and providing appropriate care

Plant care	Yes	Partially	No
Receiving information about plant care	12	5	8
Providing appropriate care	10	9	6

Table 4 presents that 12 of the 25 teacher candidates obtained information about their plants and their care, 5 stated that they partially knew plant care and 8 teacher candidates stated that they obtained no information at all. 10 of the teacher candidates who obtained information about plant care expressed that they took care of their plants appropriately, 9 said they could partially took care of their plants and a total of 6 teacher candidates were found not to take care of their plants in the appropriate manner.

It was pointed to teacher candidates that some of the violet plants were dry and faded and they had shed their leaves and they were asked the reasons for the differences among their plants. The answers are presented in Table 5.

Table 5.Teacher candidates' views regarding the differences among their plants

Reasons	f
Reasons for desiccating, fading or shedding leaves	
Size of the pot	4
Wrong manner of watering	2
Soil structure	1
Lack of sunlight	4
Reasons for looking lively knowing about the plant and its needs	9
Appropriate manner of watering	11
Exposure to sunlight	4
Talking with the plant	1

Table 5 shows that teacher candidates associate problems about plants such as drying, fading and shedding leaves with pot size, soil structure, watering and exposure to sunlight.

In the following statements students mentioned pot size as a reason:

> *S21"The pot was too small, the plant was stuck in it; that may have prevented it from developing"*
>
> *S6"It may have resulted from watering since the pot was too big. The leaves may have yellowed since water did not travel to tips from the root".*

Students mentioned exposure to sunlight as well,

> *S17"It may be related to exposure to sunlight. It may like the shade based on the type of the plant, maybe it was exposed to sunlight too much".*

A teacher candidate associated the plant's condition with the soil structure.

S13"It may be related to soil structure. All soil types may not be suitable for all plants. For instance there is clayed and sandy soil. There are soil types that permeate or hold water. It may be related to that".

The teacher candidate who expressed the importance of watering mentioned that;

S20 "It may have been caused by faulty watering, (giving it) less or more water. It is said that sometimes plants can dry if they are given excess water, sufficient amounts is good for everything and more is hazardous. Excess water can be bad sometimes just like insufficient amounts of water".

Regarding the reasons for plants looking lively, students mentioned that;

S5 "I like plants a lot. Therefore, I provided their needs such as water and sunlight and I also talked to it, that's why it is very lively and it bloomed".

S9 "Plants give you the same type of reaction that you give to them, if you show interest, they bloom; if you don't show interest, they die. Showing interest is both providing their physiological needs and approaching them with love".

After the candidates were asked their views on plants' reactions to proper care based on their characteristics and appropriate conditions, they were also asked their ideas about the reasons for including plants in the study. Table 6 provides the views of the candidates.

Table 6. Candidates' views on why plants were used in the study

Reasons	f
Similarities and differences with students	13
A teaching method	2
Related to teaching science	4
Related to environmental education	4
Experiment	2

Table 6 presents that the teacher candidates were mostly associated the use of plants in the study with students and their teaching and education. They expressed their views as can be seen in the following examples;

S7 "Teaching is also caring. Caring for children is educating them".

S20"Each students is different just like the plants, they live in different environments different families. Therefore, their learning needs may be diversified. While some parents are very interested in their children and provide everything for their children's development and support them, some parents may leave everything to school as if learning is limited to school".

When the candidate provided that answer, it was stated that this concept is called individual differences in educational terminology and teacher candidates were asked what kind of individual differences students may have. The answers to this question are provided in Table 7.

Table 7. Views of teacher candidates about the concept of individual differences

Views	f
Physical differences (Differences in hair color, eye color, weight and height)	14
Gender	3
Intelligence	9
Family	2
Culture	5
Environment	3
Economy	7

Table 7 presents that the majority of teacher candidates' definitions of individual differences focus on physical differences or intelligence. Economy takes the third place on the list. The expressions related to individual differences provided below are striking:

S10 "Physical characteristic may differ. Nobody is exactly like the others".

S3 "Students' weights and heights may be different. Some of them may be well nourished while others may not and this may cause physical differences among them".

S7"Their families are different. There are highly aware parents that they meet all the needs of their children. Sometimes there are parents that do not care for their children; they even make their children work. Therefore the viewpoints of the family towards education and the child are important".

S8 "Their intellectual levels may be different as a hereditary characteristic. So the teaching process may be differentiated".

S15"The economic situations may be different. We have many poor families in our country. That situation affects the family's perspective on education when they cannot even meet their primary needs".

S16 "Their culture and the environment they live in may be different. For instance, there is the concept of child brides. This issue is not frowned upon where it is common because they accept it as a reality of their lives. This (problem) can only be solved through education. In another culture, for example, if everybody in the family and the immediate environment received a good education and have a good profession; that can be a very important motivator".

Examination of candidates' expressions shows associations with physical characteristics, cognitive characteristics and socio-economic level as well as the family but there are no data regarding students' affective characteristics. The child is a whole with his/her family environment and health and should be recognized and identified holistically and in entirety (Güven, 2013). Ceyhan (2002) cites the aspects of a child to be identified and recognized as information regarding the child's identity, information regarding the child's physical developmental characteristics, information regarding the child's health, information regarding the child's success, information regarding the child's interests and abilities, information regarding the child's sense of self, information regarding the child's social adaptation, information regarding the child's family and information regarding the child's personality characteristics.

However, it is a very well-known fact that affective development has an important place in learning. Personal characteristics, interests, abilities, needs, willingness and attitudes of the individual are cited as the determinants of learning. Students' cognitive skills, prior knowledge, interests and learning styles as well as affective qualities and the quality of the social environment affect learning processes to a great extent. For instance, if the child is tired and stressed and has no self-confidence, he/she may not be affectively ready for learning. Or if the child has no proper study environment or is not sufficiently supported by the family, he/she may be affected emotionally which may affect his/her ability or desire to learn (Tomlinson, and Strickland, 2005; Heacox,2002).In their study, Zins, Weissberg, Wang and Walberg (2004) emphasized the fact that the social and affective qualities of the individual affect academic attitudes (motivation and commitment to study), behaviors (attendance, study habits, cooperative learning) and performance (grades, test results and having a good grasp of the subjects).

IV. Phase: Individual Differences Training

In this phase, the teacher candidates were informed of developmental qualities of first grade students, the knowledge, skills and behaviors that they should possess based on developmental areas, identification and recognition of developmental characteristics, school maturity tests, their characteristics and scope and the importance of individual differences in learning was emphasized. In this phase, plants were used in the discussions about the relationships between individual differences, recognizing student characteristics and achievement and assumptions were drawn. In this process, a sample video on school maturity and school admission tests used to get to know students was viewed and a real life stories were used to emphasize the importance of getting to know students. Teacher candidates who assessed this phase provided the following statements:

S19 "I questioned myself, we should have started the task like this….It is not enough to get good grades in exams to be a real teacher. It is necessary to care for children and shoulder their responsibility. The topic of individual differences surely was mentioned in each course (we took). However when you don't feel the meaning, the words are meaningless. Achievement means the teacher (related to the teacher). Therefore I need to start teaching by knowing my students in all aspects so that I can reach all my students, so that nobody is

left behind. I will explain things in a manner and in a suitable pace that all my students can understand"

S6 "I understood that I need to know my students with the help of the stories you read. The stories tell the role and responsibility of the teacher in student achievement or failure. Therefore, I say it is great that such a study was undertaken about "individual differences" concept which I had only known as a concept which I could not really comprehend until now; but I do now. Because I can tell now that the responsibility I feel towards my students' learning has increased".

V. Phase: Re-planning

Following the discussion with the candidates about the plants in the context of individual differences; it was emphasized that "getting to know" and "differences" were such as important area even for plant care, students were asked about their opinions about the students in the education system that are regarded as "one and the same" and they were requested to plan their first two weeks again with these ideas in mind. In this phase teacher candidates are expected to form correlations between the tangible experiences they gained with the help of the flowers and recognizing the individual differences of their students and transfer this to their planning. Table 8 presents the characteristics observed in the renewed plans at the end of the 14-week period about their two weeks of teaching when teacher candidates start their career as first grade teachers.

Table 8 shows that that the majority of teacher candidates included activities designed to get to know students in their plans. Candidates expressed the following in their remarks:

S18 "I guess we have understood that getting to know students is more beneficial in terms of the education that will be provided. I believe we have also comprehended that it is important to observe the students during tasks for this. For instance I would have them draw to accomplish this. But the purpose is not only to entertain the students. I would watch for effort while drawing, I would see whether the students are bored, enjoy the activity, how they share with their friends. I would look at the lines they draw, whether they are decent… can the students hold the pencil correctly. I would then ask to tell me what they draw. Here I would check if they can express themselves, whether there are problems in their speech; for instance some children cannot pronounce letters such as "r". then I would ask my students to cut the picture they draw….to see if they can cut them correctly and whether their finger muscles are developed or not..".

S17"First I need to know about my student. I would want to start with games; I also believe that we can get to know play age children better in games. It (the game) can be hide and seek. In this way, information can be obtained about general motor development and social adaptation. I would be sincere in the importance of cooperation with the parent by speaking to the family so that the child can develop in the best manner possible. If there is no cooperation with the family, one aspect of education will always be open (to problems)".

Table 8. Characteristics observed in the plans prepared at the end of the activity

Observed Characteristics	f	
	Yes	No
Pre-school attendance	24	1
Environmental and family characteristics	25	
Accommodation, existence of a separate room or place to study, number of siblings, the birth order, socio-economic level of the family		
Health		
Diseases	**22**	**3**
Physical Disability**-** hearing loss, visual loss		
Cognitive development	25	-
Visual perception- perception of shapes, comparison, matching, classifying, ordering		
Audio perception- rhythm perception, stress intonation,		
Attention and memory–perceiving details, recall		
Linguistic development	23	2
Speech attitude- willingness to speak, self-confident speech with proper tone of voice		
Grammatically correct speech- forming full and proper sentences		
Understanding the language and the instructions- Understanding what is said correctly and behaving appropriately		
Physical development	25	-
Fine motor- drawing lines, cutting, coloring		

General motor- balance, leaping, jumping		
Self-sufficiency- toilet training, tying own shoelaces etc.		
Affective development	24	1
Liking the school and willingness to go to school		
Ability to leave the parents		
Self-sufficiency- ability to stay alone		
Task related attitude		
Concentration		
Attitude towards success and failure		
Desire to succeed		
Diligence in tasks		
Physical strain- endurance		
Social development	25	-
Communication with adults and peers		
Acting with the group		
Patience		
Following rules		
Perceiving that the instructions given to the group is binding for the self as well		
Ability to be a member of the group		

VI. Phase: Comparison of the findings and the result

Table 9 shows that the comparisons of pre-training and the post training findings. Table 9 presents more indicators related to getting to know students in the plans prepared by teacher candidates related to individual differences and getting to know students. It can be claimed that teacher candidates have started to look at individual differences concept from a wider perspective at the end of the 7-week process. It can be claimed that awareness has been generated regarding the importance of getting to know students based on the statements of candidates such as "knowing about students is the main method to present the most appropriate educational service and it is an indispensable element of the teaching process".

Table 9: Comparison of characteristics observed before and after the training

Observed Characteristics	pre-training f		post-training f	
	Yes	No	Yes	No
Pre-school attendance	2	23	24	1
Environmental and family characteristics:	5	20	25	-
Accommodation, existence of a separate room or place to study, number of siblings, the birth order, socio-economic level of the family				
Health	2	23	22	3
Diseases				
Physical Disability**-** hearing loss, visual loss				
Cognitive development	-	25	25	-
Visual perception- perception of shapes, comparison, matching, classifying, ordering				
Audio perception- rhythm perception, stress intonation,				
Attention and memory **–** perceiving details, recall				
Linguistic development	-	25	23	2
Speech attitude- willingness to speak, self-confident speech with proper tone of voice				
Grammatically correct speech- forming full and proper sentences				
Understanding the language and the instructions- Understanding what is said correctly and behaving appropriately				
Physical development	21	4	25	-
Fine motor- drawing lines, cutting, coloring				
General motor- balance, leaping, jumping				
Self-sufficiency**-** toilet training, tying own shoelaces etc.				
Affective development	12	13	24	1
Liking the school and willingness to go to school				
Ability to leave the parents				
Self-sufficiency- ability to stay alone				
Task related attitude				
Concentration				
Attitude towards success and failure				
Desire to succeed				
Diligence in tasks				
Physical strain- endurance				
Social development	5	20	25	-
Communication with adults and peers				
Acting with the group				
Patience				
Following rules				
Perceiving that the instructions given to the group is binding for the self as well				
Ability to be a member of the group				

Discussion

Education is the best way to develop individuals, to have them adapt to their environments and acquire the feeling of achievement. For the last 20 years, the fundamental element in student achievement has been regarded as the role of the teacher during the educational process (Hanushek, 2014). Teachers' knowledge and recognition of students and individual differences point to the provision of appropriate and equal opportunities in learning to all students.

The students will not be able to assign the same meaning to new experiences or will not be able to interpret the new experiences in the same manner even though they are given the chance of participating in exactly the same learning experience due to differences in their prior knowledge and past experiences (Deryakulu, 2000). Hence, students should be recognized with their readiness levels, physical characteristics, socio-economic characteristics, cognitive characteristics, emotional characteristics, interests and abilities and their inadequacies and weaknesses. In order to know the individual, it is necessary to collect information about the individual and to assess and interpret this information meaningfully (Özgüven, 1998). Identifying the qualifications of individuals requires the description of individuals with their various characteristics and obtaining information about how they will behave in different circumstances. However, it is rather difficult to describe complex organisms such as human beings and to predict their behaviors. Focusing on similarities is generally more economical and easier whereas focusing on differences is harder and more costly but only through focusing on differences we can obtain the richness of the human nature and ensure diversity in the society (Kuzgun and Deryakulu,2004). Importance of individual differences and education based on individual differences is a problem that needs to be emphasized but often overlooked. Although teacher candidates are aware of the concept of "individual differences", they may have trouble in planning educational activities that take individual differences into consideration since the concept of "individual differences" is not practiced in teacher training system.

Teacher candidates learn the knowledge, skills and implementations about the teaching profession during their pre-service training. Therefore, this study implemented an applied approach to individual differences concept during pre-service training due to the need for qualified teachers that can plan educational activities by getting to know their students whose learning they feel responsible from. It is known that there are students from different family backgrounds at schools. Problems based on learning readiness stemming from these differences may be overcome with the help of qualified teachers. As Hanushek (2014) also states, environmental conditions, family background and characteristics based on these are not destiny. Individual's interests and abilities, failures and achievements, personal and social adaptation levels, problems, weak and strong points, attitudes and values, formative and inhibitive aspects of the environment and many other characteristics should be known in detail in order to get to know the individual. Teachers' knowledge and recognition of students and individual differences point to the provision of appropriate and equal opportunities in learning to all students. Hanushek (2014)found that lack of learning experiences based on family background in minority and poor urban children can be compensated by qualified teachers and stated that for instance, achievement deficits that were based on income were possible to overcome (Hanushek, 2014).

Being informed of a concept is directly related to experiences regarding it. Since knowledge can not be transmitted, instruction should consist of experiences that facilitate knowledge construction (Jonassen, 2009). Constructivism postulates that knowledge is constructed as individual's experiential worlds (Maclellan and Soden, 2004). Students learn by doing; therefore, actively engaging students in experience-based learning is one key to the construction of new meaning (Merriam, Caffarella and Baumgartner, 2007). Several authors cite the importance of teacher educators' modeling constructivist approaches that engage students in interdisciplinary exploration, collaborative activity, and field-based opportunities for experiential learning, reflection, and self-examination (Kaufman, 1996; Kroll and LaBosky, 1996; cited in AbdalHaqq, 1998) if future teachers are to be able to employ these strategies in schools. Applied studies are important in this regard since the importance of individual differences and getting to know students have an important role in teacher training.

The most important goal of educational systems is to allow the development of all children and support them in dealing with the possible problems they may face. Therefore, the assumption that all students have

the same qualities throughout the educational process is believed to be a hindrance to present student's subjective natures and potentials; in summary; their individualities (Özbay, 2002). The necessity for learning environments in which the needs for all students are taken into consideration in the learning-teaching process and for providing progress in their own paces is presented based on the understanding that each individual can learn in case appropriate conditions specially emphasized by Carroll (1963) and Bloom (1979) and sufficient time are provided. It is a well-known fact that learning environments synchronized with the characteristics of the individual will provide more successful and meaningful learning (Akçamete and Kargın, 1992).

Based on the data of this research designed to make teacher candidates aware of the importance of getting to know student's based on individual differences approach, we can say awareness about individual differences can be generated in teacher candidates.

In this context, to guide the teacher candidates at the beginning of their teaching careers exceptionally well since the study provided tangible experiences in getting to know students; a topic which can be regarded as the basis for learning in addition to theoretical knowledge provided by the study.

Suggestions

The topic of tangible experiences learning via plants should not be limited only to the importance of getting to know first graders and their individual differences; it can be applied to student at all educational levels.

Implementations regarding individual differences via tangible experiences learning can be used in various fields such as Mathematics Teaching, Social Sciences or Science Activities designed to get to know individuals that can be regarded as the starting point of teaching in the teacher training process should be included in all classes, students should be recognized with their competences and needs and implementations that will point to how teaching activities should be organized should be undertaken.

Practices that will allow teacher candidates to learn about individual differences among students should be prioritized in teacher training.

Much information about teacher training can be provided to teacher candidates with the help of concrete experiences. The important point for teacher candidates is to understand the meaning/purpose underlying the knowledge and learn how to reflect it in the teaching environment.

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