Measurement Scale Development: Researcherly Disposition in Teacher Education in Turkey

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Abstract

Despite being an important dimension of teachers' professional development, researcherly disposition is not sufficiently emphasized in initial teacher education. Researcherly disposition can be explained as intentional affective, cognitive and operational tendency to follow existing research in specific contexts, engaging in research production and sharing research, in order to strengthen the link between learning, research and teaching and to direct instruction. This research aims to develop an instrument for identifying researcherly disposition in teacher education context. For the construct validity, exploratory factor analysis was conducted with data collected from 350 pre-service teachers and confirmatory factor analysis with another study group of 325 pre-service teachers. Then, final scale was used with 338 participants. After the model was verified, the Researcherly Disposition Scale was developed as 18-item four-factor scale. Cronbach Alpha coefficient correlation of scale was found out to be (α)=.88 and the total explained variance appeared to be %55.60. Thess four-factor structure indicated that the Researcherly Disposition Scale was valid and reliable for future studies. Additionally, female pre-service teachers in Turkey have higher researcherly disposition. Those who participated two or more congress have higher researcherly dispositions compared to those who participated to one or none. Also, those who follow one or more journals have higher researcherly dispositions compared to those who do not follow any journal. Researcherly disposition differs by departments of pre-service teachers. For recommendation, pre-service teachers should meet up with research-oriented professionals who elaborate on teaching and they should be encouraged to follow educational research journals and academic congresses in initial teacher education.

Keywords: Teacher-researcher; researcherly disposition; inquiring-teacher, scale development; teacher education and Turkey

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Introduction

Dispositions of teachers towards research play a major role in the quality of teaching service as well as pedagogical technological content knowledge. As implied by Dunn (2021), disposition development is necessary in teaching profession for sustainable development and teaching expertise, with a focus on developing the attributes of teachers to critically engage with subject content and knowledge. Knowledge in teaching profession brings researcherly disposition on agenda. A better understanding of teachers' researcherly dispositions connected to teaching practices could lead to developing more successful learning environments and a better classroom management. Cochran-Smith and Lytle (2009) claim that research basically serves two goals in teacher education. The first one is improving practice and knowledge which leads to enhancing local practices, and the latter is contributing to the broader knowledge on teaching which leads to literature development and stronger research community in teacher education. Some recent studies also stress the significance of supporting development of researcherly disposition especially in professional learning networks and communities (Hadar & Brody, 2016; Yokuş % Yanpar Yelken, 2019).

When the literature is reviewed about researcherly dispositions of teachers, it is seen that the issue of researcher-teacher is not sufficiently emphasized, which is an important dimension of in initial teacher education and teachers' professional development. There should be a balanced relationship between research and teaching as it is similar to that of knowledge and action. Edward (2001) claims that it is unnecessary to make a distinction between theory and practice, knowledge and action, research and practice. However, Edward regretfully informs that teacher training is usually based on these dualisms; but this is really not an ideal situation as theory is left unrelated to practice, however, teacher's role as a researcher is very important and best teaching practitioners are those who are constantly interested in theory. This explanation addresses the problematic issue that research is accepted as a theoretical effort in education community and teaching is seen as more valuable than practice. Guberman and Mcdossi (2019) argue for finding a balance between research, teaching and leadership in teacher education. They study with 16 research-oriented educators in teacher education in Israel and conclude that teaching and leadership is fed by research. When it comes to teachers, the gap between teaching and teacher-researchers is often felt and a stress is put on this dilemma (teacher vs. researcher) (Shkedi, 1998). In study of Shkedi, it appears that there is a difference between the teacher's world and researcher's world. Shkedi suggests a course during pre-service or in-service training in which they will be exposed to research more as a part of teacher professional development.

In study of Dunn (2021), a professional learning initiative focuses on encouraging teachers to explore research evidence, identify possible teaching practices, make decisions, and trial context-specific solutions. This study prefers using the term inquiry disposition of teachers rather than researcherly disposition and deals with skill, inclination and sensitivity related to inquiry-based teaching profession. 109 teachers in urban schools in California involve in this mixed-method study. The findings indicate that there is developed a typology of four teacher inquiry dispositions. This typology includes 'the inquisitive teacher', 'the best practice teacher', 'the technical teacher', and 'the transmissive learner'. Inquisitive teacher has innovative mindset and utilizes research to trial new teaching practices. The best practice teacher persists with professional goals related to classroom practice and reflects on new teaching practices. The technical teacher implements ideas with minimal critical evaluation of impact. The transmissive learner is inclined to passivity and accept new ideas uncritically. This typology indicated the significance of research and evidence-based teaching which is closely handled as a part of developing researcherly disposition in teaching profession.

The construct of researcherly disposition has emerged in the literature mostly related to teacher educators. Researcherly disposition is introduced to literature as a dimension to support the progress of professional development. As Menter (2017) claims, three approaches exist: research in teacher education-mainly carried out by teacher education practitioners; research on teacher education-mainly carried out by education policy scholars; and research about teacher education-carried out by scholars to explore the wider social significance of teacher education.

Tack and Vanderline (2014) define researcherly disposition as teacher educator's "habit of mind to engage with the research both as consumers and producers to improve practices and contribute to knowledge based on teacher education". They emphasize that the theoretical structure of researcherly disposition consists of three interrelated dimensions: affective, cognitive and behavioural dimension. In the affective dimension, the individual's tendency to become an educator-researcher, to value the role of the educator-researcher and to see the research as indispensable for the profession; in the cognitive dimension, the individual's competence as a teacher-educator, being knowledgeable both as a consumer and a producer of knowledge, having sufficient knowledge about the research and having the necessary competencies in the action plan; in the behavioral dimension, the sensitivity of the individual to be a teacher-educator, reading and using the existing studies in directing his/her practices, as well as conducting research and generating information to direct his/her own practices. However, in study of Lingard and Renshaw (2013), they propose that teachers have less responsibility compared to teacher-educators, and adopt the idea that teachers are passive recipients of research and they are only informed about the research conducted by others. In this case,

teachers remain as practitioners who apply only the results of research conducted by others in terms of researcher identity. In this study, the researcherly disposition of teachers is not kept within this narrow scope and it is argued that the individuals who are teaching or preparing themselves for this profession should have researcherly disposition in a holistic perspective, in other words establish a close relationship with the research and value research results in problem solving. Considering all these considerations, the researcherly disposition in this scale development is defined as "intentional affective, cognitive and operational tendency to follow existing research in specific contexts, engage in research production and share research, in order to strengthen the link between learning, research & teaching and to direct instruction".

According to Lingard and Gale (2010), policymakers and teachers – within context of researcherly disposition- have to read research-based information and conduct informative research. Relating to researcherly disposition, Dunn (2021) puts emphasis on teachers' inquiry disposition. In study of Dunn (2021), it is indicated that teachers who displayed an inquiry disposition exhibited a deep engagement with the professional learning experience on a cognitive, affective and behavioural level. An inquiry disposition involves teachers continually critically evaluating and refining their practice. With regards to teacher education and research, Vu and Sandström (2019) point out that latest studies from different countries have indicated the challenges faced by teacher educators, particularly with regard to the curriculum and links between faculty and school, while accepting a more research-based approach to teacher education. Bain and Gray (2018) make a study on researcherly disposition and tensions in Scotland. It comes out that the desire for professional learning, willingness to engage with research and professional learning benefits of being in networks with others are highly emphasized. However, some tensions exist such as different facets of the role due to competing demands between teaching, administration and research/scholarly activity.

Related to researcherly disposition, Smith and Flores (2019) give attention to two main components, namely teaching and research, and the rather strong tension between the two experienced by many teacher educators. They claim that teacher educators in most settings are two-faced due to the competing demands of excellence in both research and teaching. They argue that the quality of teaching should not be inferior to research and publications and it should be assured the quality of both teaching and research. In study of Czerniawski, Guberman and MacPhail (2017), it is emphasized that teacher educators, as both teachers and researchers, ask for being part of a collaborative community where they can feel supported, listened to, and share their practices and experiences. Regardless of whether teacher educators came from a school-teaching or academic background, teacher educators expressed a strong preference for professional learning opportunities that are continuous and based around experiential learning (e.g. working collaboratively with, and observing colleagues/experienced researchers; being mentored; being part of a team).

As one of the few studies in literature conducted directly on researcherly dispositions of pre-service teachers, Roche (2014) investigated developing researcherly disposition in initial teacher Education context. This study has remarkable findings as it is found out that valuing and conducting research helps pre-service teachers to be more transformative in learning. After attemps to develop researecherly dispositions of pre-service teachers, they get used to generating a theory of practice that is valid for them and knowledge that is generated through research. After research practices, pre-service teachers willingly attempt to take the responsibility of being the best and the most inclusive teacher they could be. Oada, Hashmib and Khanc (2021) draw attention that there is a growing publication which highlights a teacher educators' role in performing research and becoming a teacher as a researcher is an essential part of education. They show the complete role of a teacher educator as a researcher in the basis of their daily teaching. However, not all teachers do possess all competency concerning all dimensions of researcherly disposition. Some teacher education institutions stand out as research-intensive teacher education institutions while others stand out as teaching intensive teacher education institution. For teacher educators and teachers' professional development, those institutions should arrange programs and train them for research activities such as conducting research, valuing research, doing research, and being a smart consumer of research work (Oada, Hashmib, & Khanc, 2021). Also, research findings in study of Tack and Vanderlinde (2019) indicate that development of supportive and safe research communities stand out in order to positively affect the extent to which teacher educators value their role as a researcher. Then, teacher educators should be supported to engage in research activities related to their practice, involve in reading research literature (smart consumer of research), data analysis (being able to conduct research) or attending a conference (smart consumer of research). Eventually, they can start to conduct research themselves (conduct research) in community with others (Tack & Vanderlinde, 2019).

As a result, it is important for individuals in teaching profession to view teaching profession as a process of developing researcherly disposition. There is a demand from the various stakeholders in the education sector for teachers to acquire researcher identity. In addition, the development of knowledge and competences in teaching profession is directly related to the value of the research. For teacher education, it is important to value research and to be directly involved in the research to sustain professional development and improve instructional practices. Within teacher education context, teachers can either develop this disposition with in-service training, or this competence can be a selective course in teacher training institutions.

Significance of Study

In literature, it is observed that there are generally studies for researcherly dispositions of teacher educators but not in initial teacher training. As researcherly disposition is relatively a new construct, so few studies attempt to deal with pre-service teachers' researcherly dispositions and the current situation has not been analysed in Turkey. Therefore, literature review has been made systematically in a variety of database in Turkey and international databases such as YÖK Thesis Database, ProQuest, Google Scholar, SpringerLink in order to find dimensions related to researcherly disposition. After systematical review of literature, there are found core studies and one scale study for assessing teacher educators' researcherly dispositions; however, there is found one study in Turkey related to researcherly dispositions of pre-service teachers. It is thought that the results of this research will be a preliminary study for the future studies on pre-service teachers' researcherly dispositions.

Research Aim and Research Questions

It is evident that there is an expectancy over teachers or pre-service teachers about making, following or at least valuing research to improve teaching quality; however, there is a need in literature for more studies to address the issue of researcherly dispositions of teachers or pre-servicers. This study focuses on development of a valid and reliable measurement scale which aims to identify researcherly disposition of pre-service teachers and then to determine which factors affect pre-service teachers' researcherly dispositions. Considering the objectives of the study, research questions include:

Research question 1- How to develop a valid and reliable measurement scale to assess researcherly dispositions of pre-service teachers?

Research question 2- What is the researcherly disposition levels of pre-service teachers in Turkey?

Research question 3- How do pre-service teachers' researcherly dispositions vary depending on certain variables such as gender, participating a congress, following a journal and their departments?

Methodology

This is a descriptive study which includes scale development and then assessment of the current situation in Turkey. This research is more concerned with what rather than how or why something has happened (Gall, Gall, & Borg, 2007). The first part includes information about development stages of "Researcherly Disposition Scale", the validity and reliability of this instrument and then second part includes assessing the current situation of participants in Turkey. Pre-service teachers are asked to answer the scale considering their current actual practices in research.

Study Group and Population

This scale development study has been conducted with the first and second study group (n=675 pre-service teachers at total) studying in 6 different programs in education faculty of a public university in the Mediterranean Region in Turkey. After the scale is developed, final form has been applied to the third group (n=338 pre-service teachers) from different universities in Turkey. The first and second study group in scale development process includes 273 males and 402 females. They have been divided into two groups. Exploratory Factor Analysis (EFA) was performed with the first 350 participants and Confirmatory Factor Analysis (CFA) with the remaining 325 participants. Pre-service teachers' ages range between 17 and 27 years. Table 1 includes descriptive statistics about pre-service teachers in study group:

Table 1
Demographical Statistics of Study Group in Scale Development

Variable	Group	N	%
Gender	Female	402	59
	Male	273	41
Department	Primary School Teaching	270	40
	Pre-school Education	145	21
	Science and Technology Education	130	19.5
	Guidance and Psychological Counselling	130	19.5
Class Level	Freshmen	115	17
	Sophomores	153	23
	Juniors	200	29.5
	Seniors	207	30.5
Age	16-19	107	15
	20-23	508	75
	24-27	60	e10
Total		675	100

In the first phase of the scale development, the indicators that constitute the structure of the researcherly disposition concept were attempted to be identified by literatüre review. In this context, in order to reach the studies carried out in Turkey and abroad, various data bases such as YÖK Thesis Center, ProQuest, Google Scholar, SpringerLink etc. were scanned. These databases have been searched periodically. In these databases, the key concepts have been searched such as "researcher identity", "researcherly disposition", "teacher's role as a researcher", "researcherly dispositions in teaching profession" and "researcherly dispositions of teachers". After systematical review of literature, there has been found no studies in Turkey related to researcherly

disposition; however several basic studies have been found in international literature (there are generally studies for teacher educators' researcherly dispositions but not for the teachers or pre-service teachers). These studies have been analyzed and scale items that could be used in the scale have been noted. Researcherly disposition scale in this study has been developed based on studies of Gale (2010); Gale and Lingard (2010); Roche (2014); Tack and Vanderline (2014); Tack and Vanderline (2016) and Forss, Kiukas, Rosengren & Silius-Ahonen (2016). The theoretical structure related to the measurement tool has been established. Then, a discussion has been made with 10 pre-service teachers about what are their feelings and thoughts about researcherly disposition in the teaching profession. The indicators have been attempted to be reached about this concept based on participants' views. Expressions that are remarkable and frequently stressed have been identified and turned into expressions (scale items). In item writing phase of scale development, it is desired that the number of items should be three or four times more than intended to be used in the scale (Tezbaşaran, 1996). In this study, 42 items at total -8 negative scale items and 34 positive scale items- have been written. As a result, a pool of 42 items has been created in order to measure researcherly disposition which means "the habit of mind to engage with research in order to improve educational practices and increase the level of knowledge" (Tack and Vanderline, 2016). Expert views have been taken for the 42-item trial form. The trial form has been evaluated by 2 experts in Computer Education and Instructional Technology Education, 2 experts in Curriculum and Instruction, 1 expert in Measurement and Evaluation and 1 expert in Turkish Language Education. These experts have knowledge in the field of educational research and carried out various studies with pre-service teachers. They have experience in teaching for more than twenty years. A seven-point rating has been used to assess whether there is a consensus among expert views. They commented that items have a strong face validity. Kappa values have been calcualted for items to be included in the scale. Lastly, a linguist reviews scale items in terms of simplicity, clarity, clarity and compliance with academic language and the items in the interview form have taken their final form.

Identifying Content Validity Index

Content validity is a relevant concept to what extent each test item represents the structure it intends to measure (Cronbach & Meehl, 1955). In order to assess the content validity of a measurement tool, (1) the power of each item to represent the content and (2) expert views about the power of all items to represent the content have been obtained (Thorndike & Haggen, 1977). It is very important in terms of construct validity that the items to be included in the scale should have a high representation power. The content validity of the items have been determined by taking expert views and the content validity index has been calculated and the compatibility of each item with the whole structure has been

determined and some items have been corrected or disposed. For expert view, 6 experts have used a 7-point rating scale (totally appropriate (7), quite appropriate (6), partly appropriate (5), undecided (4), partly inappropriate (3), not appropriate (2), definitely should be removed (1). It is possible to assert that this process of item disposal or corrections based on expert views will increase the power of items to represent construct validity. In some studies published in literature, it is not clearly stated which index type is used in process of identifying content validity. In some other studies where the content validity index is specified, there is missing information about whether it belongs to items or the overall scale. In this study, the content validity index for the items is not explicitly stated. For the whole index, the term I-CVI has been used for content validity index of each item and S-CVI for content validity of scale. There are many indexes in the literatüre and in this study, "adapted kappa" has been preferred for reasons such as ease of calculation, ease of interpretation, giving statistics for both each item and overall scale, focusing on expert agreement rather than consistency and reliability, and eliminating chance-dependent agreements.

Sum of item content indexes/number of items suggested by Waltz, Strcikland and Lenz (2005) have been used for calculation of S-CVI. Adapted kappa has been used for calculation of I-CVI (Polit, Beck & Owen, 2007) and items less than 0.78 have been removed. Finally, the values obtained from these calculations have been evaluated considering the standards developed by Cicchetti and Sparrow (1981). The way to assess the content validity index is as follows:

Stage 1: Developing 42 pilot scale items

Stage 2: Expert reviews (n=6)

KGIm<0.78 (Removing 10 items with content validity index less than 0.78)

Stage 3: Making a discussion again with experts (Revising 2 items)

Step 4: Deciding the final form of the pilot form (34 items)

As a result, Content Validity Index of Scale (S-CVI) = 0.93

Item with the lowest validity index in scale (I-CVI) = 0.81

The calculation for each item and overall scale is given in Table 2:

Table 2

Calculating the Content Validity of Items in the Scale

	Expert1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number of experts	Number of experts who rate 6 or 7	I-CVI (item-level content validity)	p_c	K*	Evaluation
Item 1	6	6	7	7	6	6	6	6	1.00	.016	1.00	Excellent
Item 2	7	6	6	6	7	6	6	6	1.00	.016	1.00	Excellent
Item 3	7	6	7	4	6	6	6	5	0.83	.094	.81	Good
Item 4	7	6	6	7	6	6	6	5	1.00	.016	1.00	Excellent
Item 5	7	6	7	6	6	5	6	5	0.83	.094	.81	Good
Item k	7	6	6	6	6	6	6	6	1.00	.016	1.00	Excellent
S-CVI Item content index sum/ number of items												5.62/6=0.93

Adapted kappa (k*) = (KGİ^m- p_c)/ (1-p_c)

P_c (probability of a chance occurence)= [N! / A! (N-A)!] * 0.5^N

N= number of experts, A= number agreeing on relevance

Items with a minimum kappa value of 0.78 have been included in the scale for item content validity index (I-CVI). According to Cicchetti and Sparow (1981), this value (0.78) is excellent and good. The content validity coefficient (CGI) of the overall scale has been found to be 0.93. The content validity of overall scale is quite high. As a result, this is a 7-point likert scale with 34 items [fully agree (7), quite agree (6), partially agree (5), undecided (4), partially disagree (3), mostly disagree (2), totally disagree (1)]. This indicates that experts agree this study, which aims to measure the researcherly dispositions, is valid in terms of content.

Checking Assumptions for Factor Analysis

In this scale development study, 675 observations obtained from the study group have been divided into two groups. Exploratory factor analysis (n = 350) has been performed on the first study group and confirmatory factor analysis (n = 325) on the second group. The assumptions have been checked before factor analysis is performed on the data collected from the study group. Factor analysis of the observations in the first group and the assumptions necessary for the preparation of ungrouped data were controlled. For this purpose, loss values, sample size, unidirectional endvalue, univariate normality, multidirectional endvalue, multivariate normality / linearity and multivariate assumptions were examined.

Sample Size

As a first criterion, it is checked whether the sample size is sufficient to perform factor analysis. In order to get meaningful and reliable results during the scale development process, there are suggested different criteria related to the number of individuals who form the study group. Kline (1994) states that the sample size should be 10 times more than the number of items in the scale; Comrey and Lee (1992) state that the sample size is good when n=300 and very good when n=500 and excellent if more than 1000. For determining sample size for research activities, Krejcie and Morgan also consider 350 sample enough when population size is 4000. In this study, it is seen that the sample size is more than 10 times the number of items and more than 300 (n=350).

Missing Values

Before the factor analysis, the data have been checked for missing values and there are incomplete data by the participants. The frequency of the missing data in the total observation has been checked and it is found out that only 9 percent of data is missing out of all data. Since missing data is between 5-15 percent, the average of the series has been assigned in substitution of lost data (Çokluk, Şekercioğlu & Büyüköztürk, 2016). Therefore, there is not rejected any responses.

Normality

For the assumption of univariate normality related to the data, skewness and kurtosis coefficients and box plot have been examined and excessive values have been identified. The kurtosis indicates thedegree of steepness of the normal distribution curve. If the kurtosis coefficient is positive, the curve is steeper than normal; if negative, it is more skewed. The statistical value of skewness obtained from the analysis is divided by the standard error value and it comes out that the value is between +1.5 and -1.5 at 5% significance level. Therefore, the normality of the distribution of the data is ensured (Tabachnick & Fidell, 2013). In addition, Mahalanobis distance has been tested for the analysis of multivariate outliers, and Mahalonobis distance values have been compared with the values in the x^2 table. As a result of analysis of Mahalonobis distance values, it is observed that there are 30 observations which have p<.001 significance level and these data have been excluded from the analysis and factor analysis has been performed with 320 observations.

Linearity

The assumption of linearity requires that the relationships between variables and factors be linear. In order to test the linearity assumption, the residual graphs in the regression analysis have been analyzed. When the graphs are examined, it is seen that the points are clustered around the zero line. For multivariate normality and linearity, the linearity test between variable pairs has also been evaluated with the scatter graph. The scatterplot is given in Figure 1:
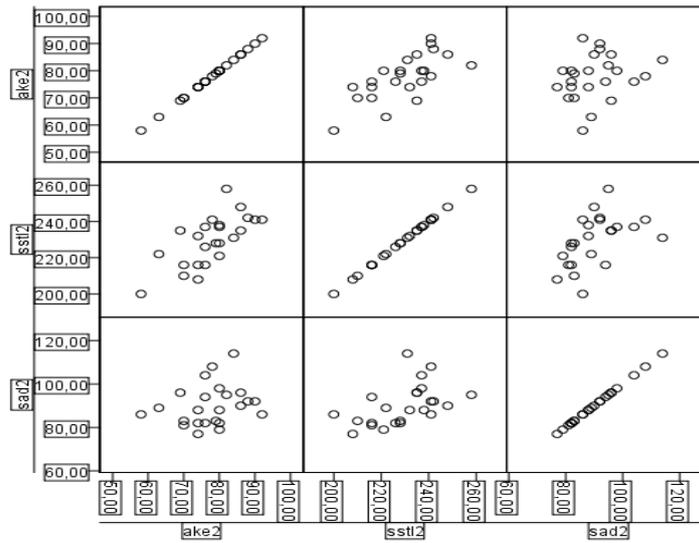

Figure 1. *Scatter-graph for checking linearity*

The scatter plot of the values with strong positive skew and strong negative skew is checked for linearity and it is observed that an elliptical form has been obtained. Residual graphs indicate that the assumptions including the scattergraph, multivariate normality and linearity are met.

Multiple Connectivity and Singularity

The assumption of multicollinearity and absence of singularity have been checked. Multi-collinearity is the situation where the test items are highly correlated in pairs. It indicates whether one variable is similar enough to replace another. Singularity is the situation of correlation coefficient being equal to 1.00 (Şencan, 2005). As a result of the analysis, it is observed that there is no .80 or higher correlation with another variable or zero correlation with each other. Finally, the Kaiser-Meyer Olkin [KMO] coefficient and the Barlett Sphericity test have been evaluated whether the observations in the EFA group are appropriate for factor analysis within the scope of the study (the assumption of R's factorisability). The KMO and Barlett Sphericity Test of the Researcherly Disposition Scale are shown in Table 3:

Table 3
Researcherly Disposition Scale KMO and Bartlett Sphericity Test

Kaiser-Meyer-Olkin Sampling Adequacy		.845
	Chi-square value	4294.519
Bartlett Sphericity Test	Degree of freedom	561
	p	.000

The KMO test measures the adequacy of the sample size and it tests whether the distribution is sufficient for factor analysis or not. The value becomes perfect as it gets close to 1. In general, KMO value is excellent when it is 0.90, very good between 0.80-0.70, moderate between 0.70 and 0.60, bad when lower than 0.50 (Çokluk et al., 2016). KMO value in this study appears to be very good (KMO = 0.84). The chi-square value of Bartlett sphericity test is found to be 4294,519 (p <.001). The Bartlett's significance value is significant which indicates that the data come from a multivariate normal distribution (Thompson, 2004).

Exploratory Factor Analysis and Naming the Factors

After testing the assumptions for factor analysis, factor subtraction method has been used to identify construct validity of researcherly disposition. Although there are different techniques that can be used for identifying factor structures, Principal Component Analysis is the most frequently used method in the literature (Carmines and Zeller, 1978; Klainbaum, Kupper and Muller, 1987). In this study, the principal components analysis together with varimax rotation is performed as a factor rotation method based on the hypothesis that the factors are unrelated to each other (Akbulut, 2010). The number of factors are not limited by the researcher. Table 4 presents the factor structure and factor load values obtained by exploratory factor analysis of Researcherly Disposition Scale.

Table 4
Rotated Component Matrix of Researcherly Disposition Scale

	Components									
	1	2	3	4	5	6	7	8	9	10
A14	.742									
A15	.662									
A32	.626									
A34	.521									.417	
A31	.518				.432					
A18	.445									
A2		.659								
A29		.638								
A13		.554								
A5		.513								
A28		.496				.486				

Item								
A16	.425							
A7		.802						
A6		.748						
A8		.619						
A3	.421	.463						.409
A21		.455			.430			
A26			.813					
A24			.665					
A11			.634					
A1			.561					
A30				.727				
A9				-.661				
A25				.563				
A27				.462				
A22	.427				.634			
A10					.507	.419		
A17						.657		
A4						.607		
A20							.827	
A19							.801	
A12							-.647	
A23					.441		.518	
A33								.834

Extraction Method: Principle Components Analysis
Rotation Method: Varimax

As seen in Table 4, as a result of factor analysis, 34 items are grouped under ten factors with eigen values higher than 1 related to researcherly disposition. The total variance of ten factors explains 64.39 percent of overall structure of the researcherly disposition. When items of the scale are rotated byVarimax vertical rotation method, it is seen that the factor loads vary between 0.40 and 0.81. The loadvalue refers to the critical value used for whether an item can be included in any sub-dimension, load value also shows the strength of an item's relationship with that factor. It is generally stated that the loadvalue of an item is acceptabledownto 0.30 (Çokluk et al., 2016). Factor load cut-off point in this study is accepted as 0.40. In addition, when grouping items, it should be taken into consideration that one item should not be grouped under more than one factor. The difference between factorloads should be at least 0,10; because the items with loadvalue difference less than this critical value are called overlapping items in the literature (Bütüner and Gür, 2007). The items with factor load value less than 0.40 and the overlapping items (3,10,21,23,28 and 31) have been discarded and factor analysis has been performed again. This procedure is repeated more than twice. As a result, 18 items with eigenvalues greater than 1 have been grouped under 4 factors. These 4 factors explain 55,60% of the variance of the scale. Table 5 presents the rotated component matrix for these 18 items:

Table 5

Rotated Component Matrix 2 for Researcherly Disposition Scale

	Components			
	1	2	3	4
A14	.751			
A15	.712			
A32	.640			
A22	.630			
A34	.577			
A18	.468			
A7		.818		
A6		.792		
A8		.683		
A5			.698	
A4			.639	
A2			.590	
A16			.551	
A13			.540	
A26				.826
A11				.688
A24				.682
A1				.542

It comes out that a 4-factor structure appears in the rotated component matrix. This 4-factor structure, which comes as a result of the rotated component matrix, is also observed from screeplot of the eigenvalues in Figure 2.
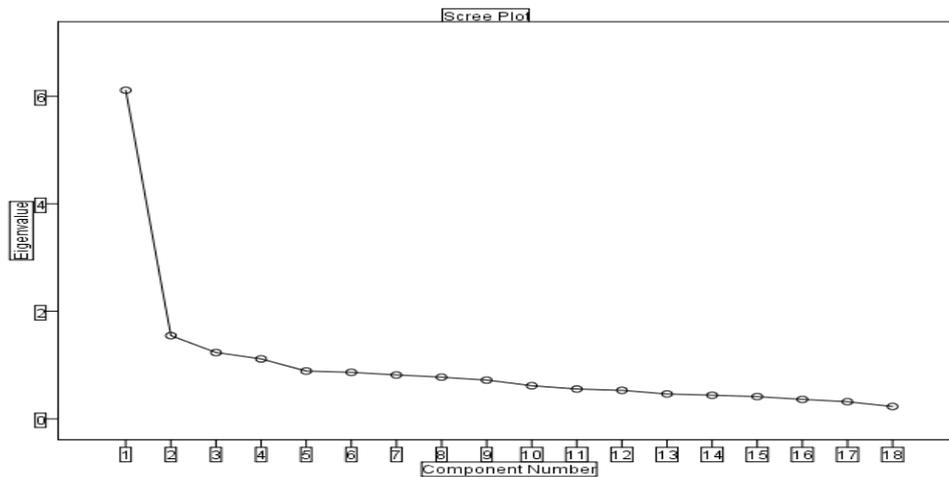

Figure 2. *Scree plot related to Researcherly Disposition Scale*

When the graph in Figure 2 is examined, it is observed that after the fourth factor, the general direction of the graph becomes plateau and does not show a significant downward skew. When the rotated component matrix and screeplot results are examined, it is reliable to propose that the scale has a four-factor structure.

The four factors in the final form of the Researcherly Disposition Scale explain 55.60% of the variance of the scale. Factor 1 explains 33.96% of researcherly disposition structure, factor 2 explains 8.69%, factor 3 explains 6.80%, factor 4 explains 6.18%. As such, there are no overlapping substances in the scale because the difference between the factors is greater than 0.10. Factor loadvalues of the items in the scale range from 0.40 to 0.81. The 18-item scale form is given in Appendix 1. After the items within the factors are analyzed; the naming is performed: factor 1 is named "valueing research", factor 2 named "research competences", factor 3 named "resistance to research"; factor 4 named "perceived usefulness". Cronbach's alpha coefficient is calculated for the reliability of the scale. Reliability refers to the consistency of the items in a measurement instrument and to what extent the scale reflects the focused problem. In this study, a commonly preferred method -Cronbach alpha internal consistency coefficient- is calculated to identify the consistency of the items. In order to affirm a scale's reliability, there are studies indicating that the calculated internal consistency coefficient should be at least 0.70 (Nunnally, as cited in Tavşancıl, 2002; Liu, 2003). In this study, Cronbach's alpha reliability coefficient for the overall Researcherly Disposition Scale is calculated in Table 6 and subscales in Table 7:

Table 6
Overall Reliability Coefficient of Researcherly Disposition Scale

Cronbach Alpha	Number of items	Standard Deviation
0,88	18	,352

Table 6 indicates that Researcherly Disposition Scale has high level of coefficient of reliability score α = 0,88. Table 7 presents reliability coefficients for subscales of RDS:

Table 7
The Reliability Coefficient of Subscales in Researcherly Disposition Scale

Cronbach Alpha		Number of items	Standard Deviation
Valueing research	.821	4	0.42
Research competences	.801	5	0.49
Resistance to research	.731	3	0.81
Perceived usefulness	.728	6	0.24

Table 7 indicates that realiability α coefficients of subscales in the scale range from 0.728 to 0.821. The Researcherly Disposition Scale, which has been developed in this study, has a sufficient level of statistical reliability in general scale and sub-dimensions.

Confirmatory Factor Analysis

Confirmatory Factor Analysis is used to test the suitability of the factor structure as a result of exploratory factor analysis related to the researcherly disposition. Confirmatory factor analysis aims to explore factor or subfactors based on relationships between variables (Tabachnick & Fidell, 2013). In order to see whether the model in the research will be verified or not, fit indices have been examined. Confirmatory factor analysis is used to test and / or verify theoretical knowledge (Şencan, 2005). Multiple fit indices are used to evaluate the results of confirmatory factor analysis (Kline, 2011; Sümer, 2000; Tabachnick and Fidell, 2013). There are different goodness of fit indices and statistical functions that are used in the evaluation of model suitability (Gizir, 2005). The results of confirmatory factor analysis have been evaluated considering the Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Root Mean Square Residual (RMR) and Root Mean Square Error of Approximation (RMSEA) and Comparative Fit Index (CFI). Lisrel 8.70 is used in this study for confirmatory factor analysis.

As a result of the analysis, PATH diagram has been created in order to analyze the variables of model, t values, factor loads and goodness of fit indices. When t value exceeds 1.96, it is expected to be significant at the level of 0.05 (Schumacker & Lomax 2010). As the t values of all items in thecurrent model is significant, it indicates that the model is acceptable. As a result of confirmatory factor analysis, t values and standardized solution values have been reviewed. As a result of factor analysis, path diagram of t values is given in Figure 3.
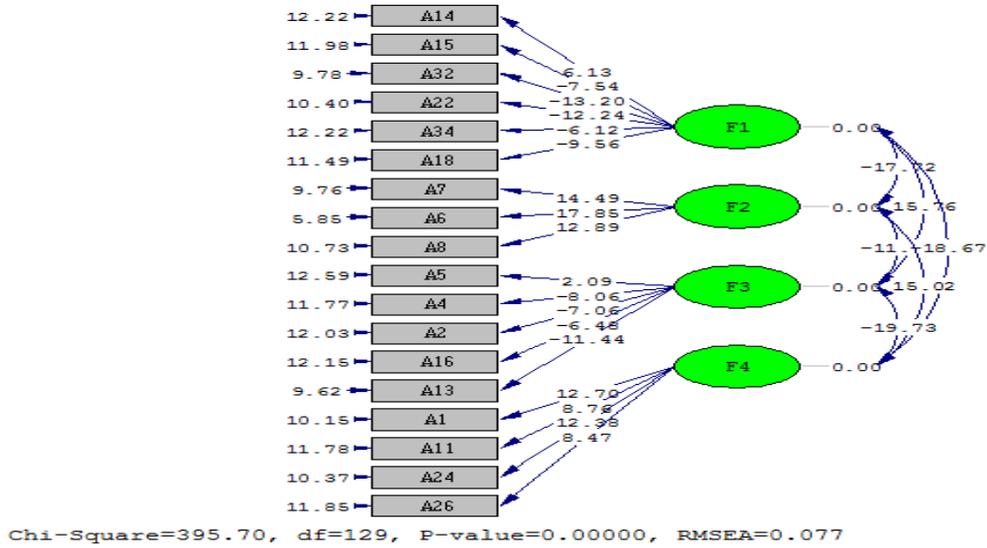
Figure 3. *Path diagram related to t value of Researcherly Disposition Scale*

In addition, standardized solution values are examined in the path diagram and all values are found out to be less than 1. The path diagram for standardized solution values is given in Figure 4.
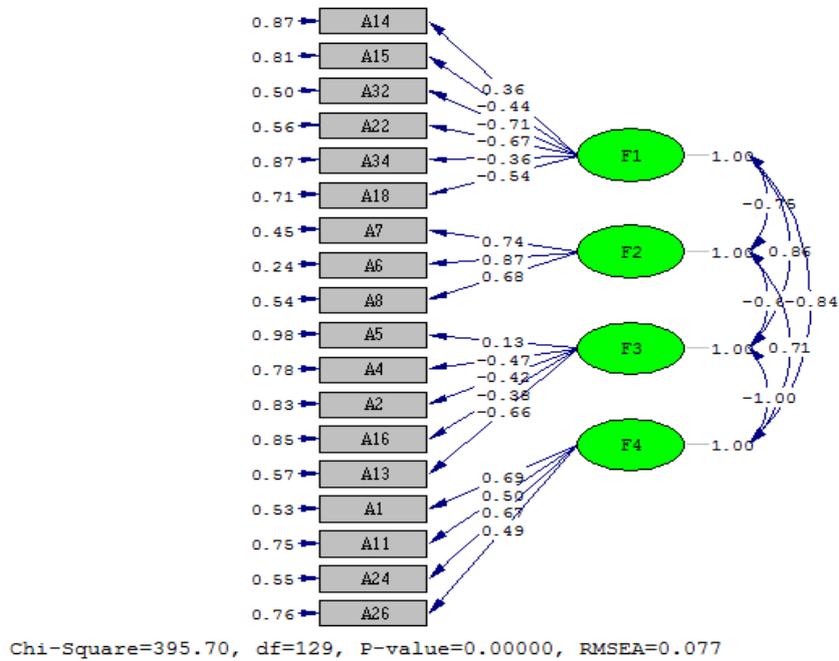

Figure 4. *Standardized solution values of Researcherly Disposition Scale*

As a result of factor analysis, it is also necessary to analyze the path diagram as well as considering other fit indices. Firstly, as chi-square statistics are affected more by the sample size, the $\chi 2$ / sd ratio has been used instead, which is less affected by the sample (Waltz, Strcikland and Lenz 2010). Chi-square value is obtained by dividing $\chi 2$ by the degree of freedom and it is acceptable if the result is five or less (Hooper and Mullen, 2008). As a result of the Confirmatory Factor Analysis, χ^2/sd ratio -one of the fit indices of the model- has been calculated as 2.89 (χ^2/sd=395.70/129) and it is found out that it is a near perfect fit. In addition, GFI and AGFI indices, which are used in the model, have been examined. The GFI and AGFI values which get closer to 1 mean the better fit. If the GFI and AGFI indices appear as 1, the model shows that the data fit is excellent (Çokluk et al., 2016; Tabachnick and Fidell, 2013). In this study, it is found out that GFI=0.92 and AGFI=0.90. Additionally, RMSEA value has been calculated and appeared to be 0.077. Sumer (2000) states that the RMSEA value ≤0.08 corresponds to good fit; therefore, this value can be described as a good fit. The RMR value –if the value is ≤ 0.05, it corresponds to perfect fit- has also been examined (Çokluk et al., 2016) and RMR appears to be 0.026, which is a perfect fit indicator. Again, if the SRMR value is ≤ 0.10 -which is one of the criteria used when examining the suitability of the model-, it refers to sufficiency for accepting the model (Worthington and Whittaker, 2006). In this study, SRMR is found out to be 0.049 and it is a good fit indicator. Sumer (2000) states that CFI, NFI and NNFI values which are ≥0.95 can be accepted as an indicator of perfect fit among the criteria used to evaluate the suitability of a model. In this study, it appears that CFI=0.98, NFI=0.96, NNFI=0.98 and they are found to be excellent. According to Sumer, one of the criteria which should be used when evaluating the model is PGFI value, and if PGFI value gets close to 1, it means good fit. In this study, PGFI is found to be 0.67 and evaluated as adequate. The findings obtained from the confirmatory factor analysis indicate that not all of the fit indices used have perfect fit values when testing the model, but they are sufficient for the acceptance of the model. Since the model revealed by the confirmatory factor analysis has been verified, Researcherly Disposition Scale consists of 4 subscales with 18 items. It is approved that this scale is a valid and reliable measurement tool for measuring researcherly disposition.

Findings

Analysing the Current Analysis in Turkey

Table 8 presents findings about the current situations of pre-service teachers related to researcherly disposition in teacher education context in Turkey.

Table 8
The Mean Scores of Pre-Service Teachers in Researcherly Disposition Scale and Subscales

| | The statistics | | | | |
	Valueing Research	Research Competences	Research Resistance	Perceived Usefullness	Total
Valid	338	338	338	338	338
Mean	30,0525	20.2133	20.6945	12.4518	83.4121
Median	30,9402	20.1015	20.0000	12.0000	85.0000

When Table 8 is analyzed, it is seen that pre-service teachers have high scores in subscales of valueing research (x̄=30,05) and research competences (x̄=20,21); however they have medium scores in subscales of research resistance (x̄=20,69) and perceived usefullness (x̄=12,45). In terms of total scores, it is evident that they have moderate levels of researcherly disposition.

In order to see whether researcherly disposition differs depending on gender, Table 9 presents findings of t-test results related to this variable:

Table 9
The T-Test Result Showing Gender Differences in Researcherly Dispositions

	Valueing Research	Research Competences	Resistance to Research	Perceived Usefulness	Total
Male	27.29	18.41	19.01	12.64	82.98
Female	33.11	22.21	22.56	12.23	99.27
T	-11.40	-11.57	-5.46	1.13	-14.26
Sig. (2-tailed)	.00*	.00*	.00*	.259	.00*

Table 9 indicates that the researcherly disposition scores differ significantly by gender [t=-14.26, p<.05]. Female participants (x̄=82.98) have higher researcherly dispositions compared to male participants (x̄=99.27). When looked in detail, the results point out that female pre-service teachers value research more (t=-11.40, p<.05), have higher competences about making research (t=-11.57, p<.05) and they show lower level of resistance behaviors towards research (t=-5.46, p<.05). However, perceived usefulness does not differ by gender (t=1.13, p>.05).

In order to see whether researcherly disposition differs depending on "participating a congress", Table 10 presents findings of ANOVA results related to this variable:

Table 10
The ANOVA Results Whether Researcherly Disposition Differs by Participating A Congress

		N	Mean		df	F	Sig.	Sig. Differences
Researcherly Disposition	None	119	80,32	Between groups	2	22,02	,71	Two or more congress>none, Two or more congress>one congress
	One congress	133	81,64	Within Groups	335		,00*	
	Two or More congress	86	90,40				,00*	

Table 10 indicates that there is a statistically significant difference between groups as determined by one-way ANOVA [F(2,335)=22,02; p<.05]. Participating congress affects the researcherly dispositions of pre-service teachers at the p<.05 level for two conditions. When analzyed in detail, pre-service teachers who attented to two or more congress have significantly higher levels of researcherly disposition compared to those who attented one congress or never did. There is no difference between pre-service teachers who never attended a congress and those who attented a congress only once.

In order to see whether researcherly disposition differs depending on "following a journal", Table 11 presents findings of ANOVA results related to this variable:

Table 11
The ANOVA Results Whether Researcherly Disposition Differs by Following A Journal

		N	Mean		df	F	Sig.	Sig. Differences
Researcherly Disposition	None	117	79,86	Between groups	2	34,06	,94	One journal>none; Two or more journals>none
	One journal	123	85,54	Within groups	335		,00*	
	Twoor more journals	97	86,23				,00*	

Table 11 indicates that there is a statistically significant difference between groups as determined by one-way ANOVA [F(2,335)=34,06, p<.05]. Following a journal affects the researcherly dispositions of pre-service teachers at the p<.05 level for two conditions. When analzyed in detail, pre-service teachers who follow one journal and two or more journals have significantly higher levels of researcherly disposition compared to those who never do. There is no difference between pre-service teachers who follow one journal and those who follow two or more journals.

In order to see whether researcherly disposition differs depending on "department", Table 12 presents findings of ANOVA results related to this variable:

Table 12
The ANOVA Results Whether Researcherly Disposition Differs by Department

	N	Mean		df	F	Sig.	Sig. Differences
Science Teaching	103	84,43					
Primary Education	67	79,07	Between groups	5	38,71	,002*	Science Teaching> Primary Education; Maths Teaching> Primary Education;Guidance and Counselling> Primary Education, Pre-school Education
Pre-school Education	44	80,83				,003*	
Guidance & Counselling Department	20	88,31					
Maths Teaching	58	86,57	Within groups	332			
Social Studies Education	46	83,78					
Total	338	83,41					

When Table 12 is analyzed, it is observed that pre-service teachers' departments affect their researcherly dispositions at the p<.05 level for four conditions. When analzyed in detail, pre-service teachers who study in Science Teaching Department, Maths Teaching Department, Guidance and Psychological Counselling Department have significantly higher levels of researcherly disposition compared to those who study in Primary Education. Additionally, pre-service teachers who study in Guidance and Psychological Counselling Department have higher levels of researcherly dispositions compared to those who study in Pre-school Education. However, there is no difference between pre-service teachers who study in Social Studies Education and in other departments.

To summarize, the results indicate that female pre-service teachers in this group value research, tend to follow research about their profession and believe the usefulness of research more than the male pre-service teachers. Moreover, participating two or more congresses and following one or more journals increase their researcherly dispositions at a significant level, and also those who study in Science Teaching, Maths Teaching, Guidance and Psychological Counselling are willing to engage in reseach more than those in other departments.

Discussion

It is indicated in this research that pre-service teachers in Turkey utilize the results of relevant research in order to solve problems, recommend others to read research which seems valuable, accept the validity of knowledge proved by research. They also make efforts to share the results of my own research in diferent activities (conferece, seminar, social networks). In literature, Lingard and Gale (2010) emphasize that not just teachers but all educators and policy-makers should have tendency for researcher identity. According to them, all of these actors have to deal with research, contribute to the production of knowledge and see themselves as active participants in the field –which is defined as educational research. They should be open to research findings and to the understanding and enlightenment resulting from the critical reading of educational research. They also emphasize that enlightenment arising from the critical reading of educational research can be an important starting point in addition to developing tendency for researcher identity. According to Edwards (2001), when the relationship between scientific knowledge-research-teacher education is examined from a socio cultural perspective, it becomes so efficient to use the model of practice communities in schools. In practice communities, there is an expectation that teachers and pre-service teachers will be closely interested in research. These expectations shape the discourse of schools, teachers' researcher identities and the impact of the research on the practice. Practice communities also recommend that teachers should produce knowledge that can falsify assumptions.

It is indicated in this research that pre-service teachers in Turkey prefer following research related to my profession, instead of acting in accordance with others' suggestions. They also prefer reading related research, instead of acting with their own instincts to solve a problem. This finding is supported by study of Roche (2014) who states that conducting research on a topic related to working in sector after primary education may produce propositional information about why some students drop out of school. At the end of research process, it is concluded that the change should begin with teachers and via research, teachers can ask themselves how to change their instruction in order not to marginalize and exclude a child. In study of Hughes (2019), there is a focus on developing student research capability for a 'post-truth' world. It is suggested in this study to create an accessible research community for a good supervisor/student relationship, and for supplying endorsement in threshold crossing. Also, students in developing research identity can utilize self-monitoring, recording their research development and motivation. Research capacity is not a one-off issue; therefore it should be developed over a progressive programme.

It is indicated in this research that pre-service teachers in Turkey can distinguish inadequate research from a good one which is conducted in accordance with research steps. They have enough experience in making research and enough methodological knowledge to make research on their own (finding research problem, data collection, reporting). Munn (2008) emphasizes that there is a critical relationship between teaching profession and research; and this relationship can be interpreted in at least two different ways. First of all, researcher identity becomes important for novice teachers to understand the findings of a research on a subject, identifying the strengths and weaknesses of the research, and learning how to use the findings of the research for teaching practices. Here, the relationship between research and practice is linear, and the direction of impact is from research to practice. The second critical relationship implies the development of a researcher identity disposition among novice teachers. Researcher identity disposition refers to the mental habit of routinely interrogating issues such as how schools should be organized and functioning in a qualified context, how education programs should be given, and how issues such as gender/race differences should be solved. Cochran-Smith and Lytle (2005) point out that there is an ambiguous situation about educators and researchers because the role of the researcher and educator (practitioner) in research is sometimes blurred, and studies should "neither prioritize research nor make practice privileged; instead, there is a need to establish a dialectic between these two".

It is indicated in this research that pre-service teachers in Turkey prefer dealing with research as I consider it as not a waste of time. They think that the research has a practical value for classroom teaching. Loughran (2014) claims that teacher educators should be able to conduct research on their own practices. According to him, teacher educators should be smart consumers for research (using existing research and critically evaluating them); they should realize the necessity of the research in terms of their profession and value the research. In study of Byman et al. (2009), research-based teacher education is stressed with importance and it is claimed that all teaching should be based on research in this form of teacher education and students should acquire formal research competences during their professional development. This creates an advantage as research-based teachers' instruction originates from well-articulated knowledge of up-to-date research. Research-based teacher training motivates students to learn research methods including qualitative, quantitative and mixed methods, and then conduct research with small tasks. Research-based teacher training is closely associated with being inquiry-oriented. In study of Dunn (2021), it is found out that collaborative inquiry initiative emboldened teachers to embrace a calculated risk-taking mindset. However, taking reasonable risks become more plausible via research and evidence which should be at the hearth of any instructional decision.

Van der Linden et al. (2012) conducted a research about pre-service teachers' development of a positive attitude towards research and research knowledge. Pre-service teachers claimed that such an introductory course aiming at research contributed to the development of both positive attitude towards research and research knowledge and skills. Pre-service teachers found the following activities very useful in terms of developing reserarcherly disposition in teacher education context: research examples from primary teaching practice, authentic learning assignments and working in pairs. They also expected a connection with the rest of curriculum. In views of Lingard and Renshaw (2013), evidence-based knowledge should be applied to teaching professional practice, including the work of teachers in classrooms and the work of school heads/principals. According to them, evidence-based knowledge or informed-based is more preferable than pure research-based for meeting the educational need. Research evidence is only one factor that informs teacher classroom practices supporting to the production of generalizable knowledge and professional practice in the specifics of particular classes, which implies pragmatically the significance of practice-based or applied research. Likewise, in study of Vu and Sandström (2019), teaching is viewed not only an apprenticeship of observation but also an interplay between policy, theory, research and practical wisdom. They based their theoretical framework on the view that teacher education involves relationships with factors beyond classroom confines such as authoritative policies, practical wisdom, and teaching professionalism. They prefer being informed by contemporary research in general.

As a result, developing researcherly disposition is a crucial part of professional development. 21st century teachers from different cultural backgrounds and teaching experience are expected to acquire researcher identity. In addition, teachers' professional development is directly related to the valueing research, making research and utilizing the results of scientific studies related to teaching area. For the teaching profession, it is important to value research and to be directly involved in the research in order to sustain professional development and improve instructional practices. The teachers' professional development should not only focus on teaching, but also on research. The purpose of teacher education system should be more research-oriented and informed by evidence just like in many European countries. This highlights the need for a new strategy to promote pre-service teachers' professional teacher identity from perspective of researcherly dipositions in teacher education system of Turkey.

Conclusion

On the bases of the results and discussion, it is concluded that researcherly disposition is closely related to valuing research, research competences, resistance to research, perceived usefulness. Researcherly Disposition Scale was piloted in this study with principal components analysis revealing the presence of four components and this 18-item scale is proved to be a valid and reliable instrument for related studies involving researcherly disposition.

When it comes to situation in Turkey, it is concluded that pre-service teachers have high scores in subscales of valueing research and research competences; however, they have medium scores in subscales of research resistance and perceived usefullness. Female pre-service teachers value research more, have higher competences about making research and they show lower level of resistance behaviors towards research. They also show lower levels of perceived usefulness about research. Pre-service teachers who attented to two or more congress have significantly higher levels of researcherly disposition compared to those who attented one congress or never did. Pre-service teachers who follow one journal and two or more journals have significantly higher levels of researcherly disposition compared to those who never did.

Lastly, those who study in Science Teaching, Maths Teaching, Guidance and Psychological Counselling are willing to engage in reseach more than those in other departments. The study reflects how researcherly disposition can be assessed within the framework of teacher training and how it depends on certain variables of pre-service teachers who are expected to promote research behaviors at the development of school-based practices and adopt research action for a better school culture.

Recommendations

Considering the results of this study, it is recommended that developing reseaercherly disposition should be dealt with as a curricular issue. Curriculum development in initial teacher training should itself be research and evidence based. Afterwards, all pre-service teachers from any subject should involve in research practices for knowledge generation in order to test their theory of practice. Teacher training institutions should discourse the gap between research and classroom teaching. Then, the educational research opportunities at campus and out-of-university should be increased. Pre-service teachers should meet up with research-oriented professionals who elaborate on teaching. To develop researcherly disposition, pre-service teachers should be encouraged to follow educational research journals and academic congresses from the very first year of initial teacher education.

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