

Translation and validation of the reformed teaching observation protocol into Turkish

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ABSTRACT. The purposes of this study were to adapt the Reformed Teaching Observation Protocol (RTOP) into Turkish context, to examine the validity and the reliability of the scores obtained from this form and to address preservice science and mathematics teachers' (PSMT) constructivist-based instruction quality. A total number of 114 PSMT from a university in Turkey participated in this study. The construct validity of them was estimated by exploratory and confirmatory factor analysis. The results of confirmatory factor analysis verified that the scale with 25 items consists of four subscales as proposed. Each dimension derived from factor analysis had a satisfactory reliability value. As a result, this study provided the Turkish adaptation of the RTOP observation form, providing evidences for reliability, to the field. Moreover, it could be explained that PSMT could instruct their lessons appropriate for constructivist-based teaching method effectively with respect to the results of this study.

Keywords: Adaptation of observation protocol, reformed teaching observation protocol, constructivist-based teaching, preservice science and mathematics teachers.

INTRODUCTION

Recently, across developed countries the rapid changes in the society, technology and culture have led to the school curricula changes from elementary schools to colleges. Similarly, in Turkey, starting from 1990s, school curriculum revolution has been initiated by the agency of the Turkish National Education Development Project supported by the Ministry of National Education. In 1993, new elementary science and mathematics curricula were adopted across the country. Individual content areas of these curricula were revised between 1993 and 2003. While the elementary school mathematics curricula were revised in 1998, the elementary school science curricula were revised in 2000. The recent Turkish elementary school science and mathematics curricula have been developed and initiated starting from 2004. Overall, the main reason for development of these curriculum reforms was a widely-accepted learning philosophy throughout the world called “constructivism” (Koc, Isiksal & Bulut, 2007). Constructivism is a philosophical and theoretical rationale underlying the reform movement in education (Sawada, Piburn, Turley, Falconer, Benford, Bloom, & Judson, 2000). Driver, Asako, Leach, Mortimer, and Scott (1994) identified the main feature of constructivist approach as “knowledge is not transmitted directly from one knower to another, but is actively built up by the learner” (Sawada et al., 2000: 3). The main purpose in constructivist approach is that learners actively construct their own understandings instead of passively absorbing or copying the understandings of others. With this regard, the last reformed elementary school science and mathematics curricula have different characteristics from the previous elementary school curricula in Turkey.

Changing the curriculum from a subject-centered to a learner-centered one and pedagogies from behaviorism to constructivism are the main aims of this last reform (Bulut, 2007). Successful implementation of reformed curricula depending on constructivism approach stands on teachers since teachers are facilitators in classrooms, and support the environment in which students involve actively in teaching and learning process (Koc et al., 2007). Shulman (1986) reported that content knowledge, general pedagogical knowledge, curriculum knowledge, and pedagogical content knowledge form teacher knowledge. In this respect, a teacher is responsible for acquiring these kinds of knowledge successfully and penetrating them into instruction according to constructivism. In order to provide a better understanding how successfully teachers fulfill their responsibility about a recent reformed teaching and curricula, it is necessary to use an observation form assessing teachers' instruction quality in line with constructivist approach. With the aim of assessing whether reformed teaching (constructivist-based teaching) was being implemented by teachers in the classes, evaluation team of the Arizona Collaborative for Excellence in the Preparation of Teachers (ACEPT) at Arizona State University developed a classroom observation protocol. It was called the Reformed Teaching Observation Protocol (RTOP), measuring and defining operationally constructivist-based teaching

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(MacIsaac & Falconer, 2002). In other words, the RTOP gives information about the major principles of constructivist-based instruction and exhibits them. Therefore, in the present study, the RTOP was used since this observation form has important properties for measuring and defining constructivist-based teaching and it is an appropriate observation form to assess teachers' constructivist-based teachings in a Turkish teacher education context.

Rationale of the Study

In Turkey, while the curriculum reforms depending on constructivist-based approach have been made, there are not sufficient observation forms assessing quality of the constructivist-based teaching. Therefore, translation of the RTOP into Turkish and adding our literature an observation protocol providing reliable values in order to assess quality of constructivist-based teaching methods in the science and mathematics lessons were necessary. Both researchers and teachers can use this form to understand how pre-service or in-service teachers can successfully implement constructivist-based instruction in their lessons.

The RTOP is an easy and practically useful observation form in order to assess quality of mathematics and science lessons from kindergarten to college levels in terms of constructivist approach. This observation form includes items explaining necessary qualifications in order to exhibit constructivist-based instruction. Preservice teachers can use the RTOP to help them develop themselves in this respect and become ready to instruct in real classrooms in the future. Therefore, the present study was conducted to provide preservice teachers an informative observation form about the major principles of reform oriented instruction and to exhibit constructivist-based teaching successfully in their classrooms in Turkey.

Purpose of the Study

The purposes of this study were to adapt the Reformed Teaching Observation Protocol (RTOP) into Turkish context and to address preservice science and mathematics teachers' (PSMT) constructivist-based instruction quality in a Turkish context. In this respect, this study seeks whether the Turkish form of the RTOP provide reliable and appropriate values to examine the quality of constructivist-based teaching practice of PSMT and whether there are significant difference between PSMT's constructivist-based teaching practices based on their major.

METHODS

The main aims of this quantitative study were to adapt the protocol into Turkish and to explore quality of PSMT's constructivist-based teaching. With this regard, lessons were observed several times in order, and participants were scored according to each statement on a five-point observation form.

Participants

The sample of the study consisted of 114 senior preservice elementary science and mathematics teachers from science or mathematics teacher education departments at an Eastern public university in Turkey. All of them enrolled in the course of "Teaching Methods" were invited to participate in the present study. These participants were selected since they were enrolled in the course including micro-teaching methods. Then, PSMT who were volunteer to participate in the present study composed of the sample of the study. Of these preservice teachers, 49% were from the department of elementary science education and 51% were from the department of elementary mathematics education. Also, 36.8% of the participants were male and 63.2% of them were female. The ages of the participants were changing between the range of twenty two and twenty five. After graduating, these PSMT is going to be teachers of sixth, seventh and eighth grade level of elementary students. PSMT were chosen because recent constructivist-based changes has been made on Turkish elementary science and mathematics programs and PSMT were ideal candidates to determine how successfully they design and implement a constructivist-based instruction. Therefore, it is important to determine how much they are ready to instruct according to these changes in a classroom.

Instruments

The RTOP is an observation form which is formed by the ACEPT in order to assess constructivist-based teaching. In previous studies (e.g., Sawada et al., 2000), the RTOP was used to guide the classroom observations and to provide a reliable method for determining the level of implemented reform methods by mathematics and science teachers (Smeal, 2008). The RTOP measures major principles of constructivist-based instruction focusing on lesson design and implementation, propositional and procedural knowledge, communicative interactions and relationships with students. The RTOP has three main categories: *lesson design and implementation*, *content* and *classroom culture*. The first dimension which is lesson design and implementation has five statements (e.g. This lesson encouraged students to seek and value alternative modes of investigation or of problem solving). Also, the content category with 10 items has two subcategories: *propositional* and *procedural knowledge*. The first subcategory, propositional knowledge has five items (e.g. The teacher had a solid grasp of the subject matter content inherent in the lesson). The second subcategory which is procedural knowledge has five statements (e.g. Students were actively engaged in thought-provoking activity that often involved theoretical assessment of procedures). Furthermore, classroom culture with ten items has two subcategories: *communicative interactions* and *student-teacher relationships*. The first subcategory which is communicative interactions has five statements (e.g. There was a high proportion of student talk and a significant amount of it occurred between and among students). The second subcategory, student-teacher relationships, has five statements (e.g. Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence). Totally, the observation form has 25 items. The items are rated on a 5-point Likert scale where a score of “1” was assigned if the particular behavior was not observed. A score of “5” was assigned if the particular behavior was very descriptive of the individual being observed. Scores ranged 25-125 points for the observation form. Getting higher score from the observation form means that more constructivist-based teaching practice is observed in the instruction (Sawada et al., 2000).

Data Collection

The data were collected from volunteer PSMT enrolled in the undergraduate course named “Science and Mathematics Teaching Methods” in the fall term of 2010 and the spring term of 2011. The data were collected in this course by observing students’ microteachings. Observations for collecting the RTOP data took place throughout two semesters, and the dates of the observations were based on the schedule of the undergraduate course program. Each observation was conducted by the two researchers of this study and total data collection period took approximately twenty-one weeks. The Turkish translation of the RTOP were validated and used to determine to what extent PSTM’s instruction is consistent with constructivist approach during their microteachings. Moreover, training guide of the RTOP developed by the team of ACEPT was reviewed and its each explanation related to the each item of the observation form was considered carefully. The researchers followed up with doing practical activities in which they independently coded actual observations.

While observing the lessons, the researchers paid attention to what was done by PSMT in the lessons consistent with constructivist approach. They also looked for specific actions including lesson design and implementation, content and classroom culture since Sawada et al. (2000) accepted them as the characteristics of reformed teaching (i.e. constructivist teaching). In other words, the science and mathematics micro-teachings were observed and every effort was recorded by the researchers to assess to what extent each PSMT implemented reformed teaching through lessons. While evaluating the observations, three dimensions of the RTOP were considered. In the first category, lesson design and implementation, it was required to assess whether the lesson was designed and implemented consistently with constructivist approach. In the second category, content, it was important to evaluate what type of content knowledge characterized the lesson. In the last category, classroom culture, it was important to assess the culture of the classroom environment, the student-teacher relationships and the events taking place during the lessons (Sawada et al., 2000).

Data Analysis

Alpha reliability coefficient values of each dimension of the RTOP and the total dimension were calculated. In order to examine the face validity of the statements of Turkish form of the RTOP, Turkish Ministry of National Education elementary school curricula were used (MEB, 2005). In order to examine the content validity of the statements, expert opinions from science and mathematics education departments were benefited from. Instructors from English and Turkish language departments checked the language (translation) of the observation form. Turkish translation and back translation were conducted separately by two bilingual experts in the area. After that, the process was continued for the exploration for construct validity. An exploratory factor analysis was conducted in order for construct validity evidences for the statements of Turkish adaptation form of the RTOP. A factor analysis was computed to determine the dimensions and the factor structure of it. According to the factor analysis results, factors were named in consideration of the original version of the RTOP. Also, mean and standard deviation scores for each factor and total scores were calculated. Then, in order to identify the difference between the scores of PSMT's constructivist-based teaching practices with respect to their major, independent samples t-test was performed. These analyses were conducted by using SPSS 13 software program. Also, a confirmatory factor analysis was conducted by using the program of Lisrel 8.7 in the process of examination of construct validity.

Limitations of the Study

There might be some limitations because of the sample of the present study. The sample was not randomly selected. The participants should have prepared their lessons consistent with constructivist approach and then they should have performed their instructions in the course of "Science and Mathematics Teaching Methods". Therefore, this course shaped the border of the study, and volunteer participants from this course consisted of the sample of the present study. Moreover, the difference between the scores of PSMT was examined based on just their major.

RESULTS

Translation of the RTOP into Turkish

"Translating psychological observation forms for use in other cultural and linguistic groups is more involved than simply translating text into another language. Various sources of bias can threaten the adequacy of translations" (van de Vijer & Hambleton, 1996: 97). There are three kinds of bias: construct, method and item bias (van de Vijer & Hambleton, 1996). In order to prevent these biases, some precautions should be considered. First, in order to avoid construct bias, a team including two English language instructors, two assistant professors having science and mathematics education background and a Turkish language teacher worked together. Also, these English language instructors and assistant professors had sufficient information about teacher education system in America and Turkey. Therefore, the items and translated form of the items on the observation form was assessed with respect to teacher education systems in both countries. Moreover, the behaviors explained by the items in the observation protocol were compared with the studies explaining the behaviors of teachers instructing with respect to constructivism. About this comparison, expert opinions were befitted from. Second, "method bias can be examined by administering the observation form in a nonstandard way, soliciting all kinds of responses from a respondent about the interpretation of instructions, items, response alternatives, and motivations for answers" (van de Vijer & Hambleton, 1996: 91). In this respect, the observation form was administered in a nonstandard way and standard way as it was explained in the guideline of the RTOP and the findings obtained by these ways were compared in order to avoid method bias. Van de Vijer and Hambleton (1996: 97) suggested "simple translation--back-translation procedures are meaningful only when construct and method bias do not play a role". In light of this suggestion, simple translation--back-translation procedures were also made in the present study.

Original form of the RTOP is in English. The 5 point Likert format of the original version was retained but 0-4 scale has been changed to the 1-5 scheme. Backward translation of the Turkish

translation of the RTOP into English was made by two English language instructors who are bilingual. Independent ratings of the equivalence of the backward translations to the original English version were made. Then, in order to provide agreement about problematic items, iterative retranslations were also made during the meetings. Moreover, inconsistencies about items translated into Turkish were solved by discussions occurred among the translators in these meetings. Additionally, a Turkish language teacher checked the grammar of the Turkish form of the RTOP. On the other hand, in order to support content validity, the researchers of the present study discussed and two assistant professors having education background and studying in the department of elementary science and mathematics education compared both English and Turkish version of the observation form and discussed the items in order to support content validity of the observation form.

Validity Studies on the RTOP

Face and Content Validity of the RTOP

With the aim of examining face validity, the consistency of the items to the title of the observation protocol was examined. In this respect, the items were examined respectively with the experts having knowledge about science education, mathematics education and the philosophy of constructivism.

In order to provide content validity of the original form of the RTOP, following sources were used:

- “National Council Teachers of Mathematics. Curriculum and Evaluation Standards (1989), Professional Teaching Standards (1991), Assessment Standards (1995), and Principles and Standards (2000).
- National Academy of Science, National Research Council. National Science Education Standards (1995) and Inquiry and the National Science Education Standards (2000).
- American Association for the Advancement of Science, Project 2061. Science for All Americans (1990), Benchmarks for Scientific Literacy (1993).” (Sawada et al., 2000: 11).

To support content validity of the Turkish version of the RTOP, the major sources such as current Turkish Elementary School Mathematics Curriculum (2004) and Turkish Elementary School Science and Technology Curriculum (2004) were reviewed. In light of these sources, the items of Turkish and English versions of the RTOP were examined and compared. As a result of this assessment, the researchers decided to keep all items of original RTOP for the Turkish translation version of the RTOP.

Construct Validity of the RTOP

1. Exploratory Factor Analysis of RTOP

Exploratory factor analysis was made in order to obtain evidence for construct validity of the observation protocol. Factor analysis helped us while identifying the number and the characteristics of factors. Orthogonal varimax rotation was selected for rotation in order to examine the items in the factors clearly separately. With orthogonal varimax rotation and selection, principal component factor extraction method generated three factors that account for 68.07 % of the variance as presented in Table 2. Factor 1 explained 53.64 % of the total variance, Factor 2 explained 7.57 % of the total variance, and Factor 3 explained 6.87 % of the total variance.

Items which were main loadings of each factor and pattern of loadings that was not consistent with the hypothesized reformed teaching dimensions were presented in the Table 1. According to Table 1, the items of 1, 4, 10, 5, 2, 18, 17, 3 and 13 loaded in Factor 1. Based on the assessment of Table 1, 10th, 18th, 17th and 13th items loaded on the first factor of the RTOP. However, 10th and 13th items were supposed to load on the second factor and 18th and 17th items were supposed to load on the third factor of the observation form. The main loadings on Factor 2 were items of 14, 16, 11, 6, 15, 9, 7 and 8. Although 16th item was included by the second factor, it was supposed to be in the third factor of the observation form. The main loadings of Factor 3 were items of 25, 20, 19, 24, 12, 22, 21 and 23. However, 12th item was supposed to be in the second factor. There were items loading on the factors in

a way that were not consistent with the hypothesized reformed teaching dimensions as excluding items. The situation of this excluding items could be ignored since these excluding items were similar to the excluding items found in the study related to original form of the observation form (Sawada et al., 2000).

While labeling and identification of the three factors, the magnitudes of loadings of items and the RTOP reference manual were used by the researchers. The first factor drew heavily on items which were related to lesson design and implementation, the second factor drew heavily on items related to content, and the third factor drew heavily on items related to classroom culture. Therefore, the first factor was labeled as lesson design and implementation, the second factor was labeled as content, and the third factor was labeled as classroom culture consistent with original version of the RTOP.

Table 1. Factor loadings from principal component factor analysis

Subset	Factor loading		
	1	2	3
1.	.779	.233	.193
4.	.769	.339	.254
10.	.737*		.352
5.	.733	.225	.165
2.	.698	.537	
18.	.692*	.349	.491
17.	.659*	.175	.314
3.	.580	.449	.261
13.	.540*	.534	.262
14.	.325	.812	
16.	.307	.701*	.451
11.	.178	.665	.444
6.	.163	.642	.169
15.	.233	.617	.333
9.	.368	.615	
7.		.613	.333
8.		.467	.420
25.	.376		.877
20.	.233	.234	.745
19	.556	.230	.667
24	.158	.531	.659
12	.199	.329	.630*
22	.475	.319	.604
21	.456	.328	.534
23	.310	.323	.508

* Pattern of loadings that is not consistent with the hypothesized reformed teaching dimensions

In order to examine the effects of excluding items, it was decided to carry out confirmatory factor analysis.

2. Confirmatory Factor Analysis of RTOP

Confirmatory factor analysis was carried out after determining the factors and the observed variables by exploratory factor analysis. With respect to the results of the confirmatory factor analysis, it can be claimed that the RTOP translated into Turkish can also be examined with three factors; *lesson design and implementation*, *content* and *classroom culture*. The factor of lesson design and implementation comprises five items and each of the factors of content and classroom culture comprise ten items. All of the observed variables are significantly and positively loaded on the factors. The loading values were observed changing between the values of 0.69 and 0.93 as illustrated in Figure 1. The test correlation values for

the factor of lesson design and implementation change between the values of 0.79 and 0.93. The variables of the factor of content have test correlation values changing between the values of 0.69 and 0.88. The test correlation values for the last factor, classroom culture, change between the values of 0.79 and 0.93.

In the study, multiple goodness-of-fit tests were used to examine the fit between the hypothesized model and the data by the NFI, the CFI, and the RMSEA. The results from the CFA showed that the three-factor structure fits to the sample data with fit indices ($\chi^2(300) = 14958.62$, $CFI = 0.95$, $NNFI = 0.95$, $RMSEA = 0.14$). Based on the values of CFI and NFI indicate a good fit to the data since they are greater than 0.90 according to the expression of Kline (1998). Also, all factor loadings were significant and each item significantly contributed to the matching dimension.

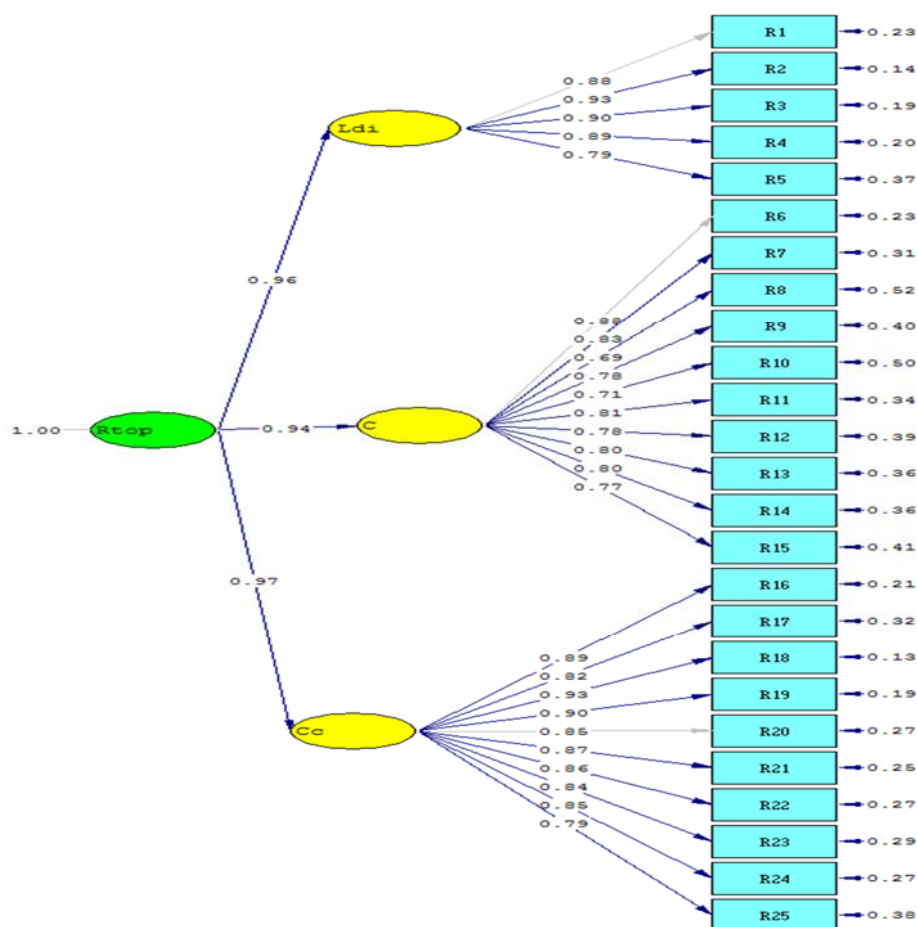


Figure 1. Confirmatory Factor Analysis for Turkish form of RTOP

Reliability Studies on the RTOP

Reliability of the items about assessing the constructivist-based teaching practices in Turkish version of the RTOP was examined by internal consistency. The internal consistency of an observation form is a procedure of estimation of the level to which its constituent items are interrelated (Cronbach, 1951). In order to estimate internal consistency of Turkish form of the RTOP and its three underlying

dimensions, Cronbach alpha (α) values were utilized. In the present study, the alpha reliability was found as $\alpha=0.90$ for factor 1 (5 items), $\alpha=0.87$ for factor 2 (7 items) and $\alpha=0.92$ for factor 3 (7 items). It is clear that these Cronbach alpha (α) values suggested satisfactory reliability. In other words, the internal consistency of the Turkish version of the RTOP was good, with Cronbach's alpha values of 0.90, 0.87, and 0.92. Further, examining total reliability statistics, Cronbach α coefficient was found 0.956 as a satisfactory reliability. In the original form of the RTOP, the Cronbach's alpha value of first dimension which is lesson design and dimension was found between 0.73 and 0.92. Also, the Cronbach's alpha value of the second dimension, content, was estimated between 0.67 and 0.95. The Cronbach's alpha value of the last dimension, classroom culture, was also calculated between 0.91 and 0.87. In addition, the reliability value of total observation form was found 0.95 (Sawada et al., 2000). The similar reliability values for the original and Turkish forms of the observation form were found.

Turkish Preservice Science and Mathematics Teachers' Quality of Constructivist-Based Instruction

Concerning the lesson design and implementation category of the observation form, it was found that PSMT designed and instructed their lessons consistent with constructivist approach ($M = 21.07$, $SD = 4.00$). Related to the content category of the observation form, it was found that PSMT instructed their lessons with the help of propositional and procedural knowledge ($M = 41.99$, $SD = 6.78$). Regarding the classroom culture category, it was stated that PSMT taught their lessons consistent with constructivist approach regarding communicative interactions and student-teacher relationships ($M = 42.35$, $SD = 8.15$). Totally, the level of PSMT's constructivist-based teaching quality in classrooms ($M = 105.42$, $SD = 18.19$) were in significantly high. Therefore, it can be claimed that levels of PSMT's constructivist-based instruction quality in terms of lesson design and implementation, content, classroom culture, and total scores were in a satisfactory level.

The Difference Between Turkish Preservice Science and Mathematics Teachers' Quality of Constructivist-Based Instruction Based on Major

Independent samples t-test was used for each factor and total factor of the RTOP to examine differences in and to compare the level of constructivist-based teachings of two groups. For the lesson design and implementation factor, there was not a statistically significant difference between preservice mathematics teachers and science teachers [$M_{Math} = 4.03$, $SD_{Math} = 0.86$; $M_{Sc} = 3.70$, $SD_{Sc} = 0.71$, $t(112) = 1.478$, $p > .146$]. For the content factor, there was a statistically significant difference in constructivist-based teachings of preservice mathematics and science teachers [$t(112) = 2.132$, $p = .038$]. Instructions of preservice mathematics teachers in terms of content presentation ($M = 4.16$, $SD = 0.64$) were more appropriate for constructivist-based teaching than science teachers ($M = 3.79$, $SD = 0.60$). For the classroom culture factor, there was a statistically significant difference in constructivist-based teachings of PSMT [$t(112) = 3.283$, $p = .002$]. With respect to the classroom culture factor, preservice mathematics teachers ($M = 4.17$, $SD = 0.78$) provided a classroom culture more consistent with constructivist-based teaching than science teachers ($M = 3.50$, $SD = 0.70$) did. For the mean value of total factor of the RTOP, there was a statistically significant differences between two groups in constructivist-based teachings of PSMT [$t(112) = 2.682$, $p = .010$]. Overall, it can be claimed that preservice mathematics teachers' instructions ($M = 4.14$, $SD = 0.72$) could instruct more appropriate for constructivist approach than science teachers' instructions ($M = 3.66$, $SD = 0.56$).

Table 2. *Independent samples t-test for the subsets of the RTOP based on educational areas*

	t	df	p
Lesson design and implementation	1.478	112	.146
Content	2.132	112	.038
Classroom culture	3.283	112	.002
RTOP	2.682	112	.010

DISCUSSION and IMPLICATIONS

The purposes of this study were to adapt the original version of the Reformed Teaching Observation Protocol (RTOP) by examining the validity and the reliability of the items based on the protocol and to address preservice science and mathematics teachers' (PSMT) constructivist-based instruction quality in a Turkish context. This study has provided an observation protocol in Turkish context to assess PSMT's constructivist-based instructions by obtaining scores with a satisfactory degree of reliability and validity indicators in Turkish literature by adapting an observation protocol into Turkish context. The reliability values were calculated as satisfactory ones. Also, the content and face validity were examined. Exploratory factor analyses suggested that the RTOP was a multidimensional observation form and consisted of three dimensions; *lesson design and implementation*, *content*, and *classroom culture*. Confirmatory factor analyses results showed that most pattern coefficients were rather high, suggesting a significant contribution of each item to the matching subcategory. These findings provide a piece of evidence for the construct validity of the RTOP scores with this sample of undergraduate students. Factor analyses suggested the RTOP was a multidimensional construct consisting of three dimensions. To sum up, Cronbach alpha values and validity studies suggested that Turkish version of the RTOP was a reliable, valid, and multidimensional observation form consisting of three dimensions. These results are consistent with the results of the previous studies related to original version of the RTOP as used in the studies of Lawson, Benford, Bloom, Carlson, Falconer, Hestenes, Judson, Piburn, Sawada, Turley, and Wyckoff (2002), MacIsaac and Falconer (2001) and Sawada et al. (2000). Previous studies and the present study had a consensus on the claim that the RTOP provides valid and reliable scores as an observation form to assess teachers' constructivist-based instruction quality.

MacIsaac and Falconer (2001: 482) stated that any RTOP score greater than 50 means the existence of reformed teaching with a considerable degree in a lesson. In the present study, it can be claimed that constructivist approach was placed efficiently in PSMT's instructions. Considering the RTOP scores, it can be concluded that PSMT were good at constructivist-based teaching.

In the present study, the preservice teachers' difference on their constructivist-based teaching levels with respect to their major was also examined for each factor and total factors of the RTOP. Results revealed no significant difference between the constructivist-based teaching of PSMT based on their major with respect to the lesson design and implementation factor of the observation form. It could be concluded that PSMT cared major properties of constructivist-based teaching regardless of their departmental differences while designing and implementing their lessons. On the other hand, PSMT's constructivist-based instructions differed significantly in the categories of content, classroom culture and total factor. According to the results obtained from the statistics, preservice mathematics teachers' instructions were more consistent with constructivist approach than science teachers' instructions with respect to the content, classroom culture categories and total RTOP scores. Preservice mathematics teachers were more careful about major features of constructivist-based teaching while helping students to gain propositional and procedural knowledge than science teachers. Also, preservice mathematics teachers organized communicative interactions between students and student-teacher relationships that were more consistent with constructivism. Totally, preservice mathematics teachers' instructions were more consistent with constructivism. Despite of these differences, the scores based on the RTOP observation form were high for both groups.

CONCLUSION

According to the results of the present study, the Turkish version of the RTOP provided satisfactory values for reliability and validity. In Turkey, as a country having reformed curricula, it is important to determine how successfully the new curricula have been implemented. In this respect, university instructors responsible for programs about teacher education can use the RTOP to obtain a general knowledge about the application of constructivism in the classrooms of preservice teachers in micro-teaching trainings. Obtaining this general knowledge would allow instructors to reconsider the current college education programs, especially teacher education programs, and methods of instruction in universities in Turkey. Also, providing opportunities to preservice teachers that make use of such observation form could be an effective way for increasing their success of constructivist-based instructions. Understanding preservice teachers' constructivist-based instruction levels while they are students is beneficial to ensure that future teachers would be successful in their constructivist-based practices. In this process, preservice teachers can learn the major properties of reformed teaching so that they can develop themselves according to these properties to be a beneficial teacher in future. As a last note, the influences of potential variables on in-service teachers' constructivist-based instruction quality can be investigated. For example, to what extent teaching experience or gender could affect constructivist-based instruction quality can be investigated in future research.

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Yenilenen Öğretim (Programı) Gözlem Protokolünün Geçerlik ve Türkçeye Adaptasyon Çalışması

ÖZ. Bu çalışmanın amacı Yenilenen Öğretim (Programı) Gözlem Protokolünün Türkçe'ye adaptasyonunu yapmak, oluşturulan bu formdan elde edilen puanların geçerlik ve güvenilirliğini araştırmak ve fen ve matematik öğretmeni adaylarının (FMÖA) öğretimlerinin niteliklerini incelemektir. Çalışmaya Türkiye'deki bir üniversitede okuyan toplam 114 FMÖA katılmıştır. Yapı geçerliği, doğrulayıcı ve açıklayıcı faktör analizleri ile sağlanmıştır. Doğrulayıcı faktör analizi sonuçları oluşturulan formun da orijinal halinde olduğu gibi 25 madde ve 4 boyuttan oluştuğunu göstermektedir. Faktör analizleri sonucunda elde edilen boyutların güvenilirlik puanlarının yeterli olduğu bulunmuştur. Sonuç olarak, bu çalışma RTOP gözlem formunun Türkçe adaptasyonunu literatüre kazandırmıştır. Ayrıca, çalışma sonuçlarına bakıldığında, FMÖA'nın yapılandırmacı yaklaşıma uygun bir şekilde öğretim yapabildikleri söylenebilir.

Anahtar Sözcükler: Gözlem formunun adaptasyonu, yenilenen öğretimi (programı) gözlem protokolü, yapılandırmacı yaklaşım temelli öğretim, fen ve matematik öğretmen adayları.

ÖZET

Amaç ve Önem: Yenilenen öğretim programlarında, öğretmenlerin öğretimlerindeki eksiklerini tespit etmek, onları bu eksiklikleri konusunda bilgilendirmek ve gidermelerinde yardımcı olmak için yapılandırmacı yaklaşım temelli öğretimlerinin değerlendirmesini sağlayacak geçerli ve güvenilir bir gözlem protokolüne ihtiyaç duyulmaktadır. Bu durumda "Reformed Teaching Observation Protocol" protokolünün Türk öğretmenler için uyarılma çalışmasının yapıp eğitim sistemimize kazandırılması bu ihtiyacı oldukça karşılayacaktır. Bu protokol sayesinde öğretmenlerin yapılandırmacı yaklaşım temelli öğretimleri değerlendirilebilir ve bu konudaki eksikleri giderilebilir Öğretmenler kendi kendilerini de değerlendirebilirler ve eksikliklerini belirleyebilirler. Böylece derslerine daha bilinçli bir şekilde hazırlanabilir ve derslerini daha verimli bir şekilde uygulayabilirler. Bütün bu düşünceler çerçevesinde çalışmanın amacı, orijinal formu İngilizce olan RTOP'un Türkiye'ye uyarılmasının yapıp güvenilirlik ve geçerliğinin sağlanması olarak belirlenmiştir. Ayrıca, fen ve teknoloji ile ilköğretim matematik öğretmeni adaylarının yaptıkları mikro-öğretimlerinin yapılandırmacı yaklaşım temelli öğretim programına ne seviyede uygun olduğu bu protokol aracılığıyla incelemektir. Daha sonra, katılımcıların yaptıkları mikro-öğretimlerin, yenilenen öğretimin her bir boyutu için fen ve matematik branşları açısından anlamlı bir farklılık gösterip göstermediği araştırılmıştır.

Yöntem: Çalışmada veriler, 2010 güz ve 2011 bahar dönemleri "Fen ve Matematik Öğretim Metotları" lisans dersi kapsamında toplanmıştır ve verilerin toplanması yaklaşık yirmi bir hafta sürmüştür. Protokolden elde edilen ölçümlerin güvenilirliğiyle ilgili kanıtlar elde edildikten sonra geçerlilikleriyle ilgili kanıtlar elde etmek amacıyla çalışmalar yapılmıştır. Görünüş ve kapsam geçerliliğine kanıtlar elde etmek için Milli Eğitim Bakanlığı tarafından hazırlanan ilköğretim fen ve teknoloji ve matematik dersleri öğretim programları incelenmiştir. Ayrıca, protokol maddelerinin bu öğretim programlarına uygun olup olmadığı araştırılmıştır. Yapı geçerliğine dair kanıtları sağlamak amacıyla açıklayıcı ve doğrulayıcı faktör analizleri yapılmıştır. Ayrıca, fen ve matematik öğretmen adaylarının seviyelerine belirlemek amacıyla betimsel analizler kullanılmıştır.

Bulgular: Ölçme aracında yer alan her bir alt ölçekten elde edilen ölçümlerin geçerlilik düzeyine ilişkin faktör analizleri sonucunda tatmin edici değerler elde edilmiştir. Açıklayıcı ve doğrulayıcı faktör analizi sonucunda, 25 maddeden oluşan ölçeğin önerildiği gibi üç boyuttan oluştuğu bulunmuştur. Ayrıca, güvenilirlik düzeylerine ilişkin kanıt elde etmek üzere Cronbach α katsayısı kullanılmıştır. Bu doğrultuda güvenilirlik katsayıları birinci alt ölçekten elde edilen ölçümlere ilişkin olarak 0.90, ikinci alt ölçek için 0.87 ve üçüncü alt ölçek için 0.92 olarak hesaplanmıştır. Ölçme aracının bütününden elde edilen ölçümlere ilişkin olarak α değeri 0.96 olarak hesaplanmıştır. Bu değerler, söz konusu alt ölçeklerin ve ölçme aracının, ilgili grup için yenilenen öğretim için güvenilir veriler elde edilebildiğini göstermektedir. Katılımcıların protokolden elde ettikleri mikro-öğretim puanları arasındaki farklılıklar branşları kapsamında incelendiğinde, ders tasarımı ve uygulama boyutunda anlamlı bir farklılık elde edilmemiştir. Diğer taraftan, içerik ve sınıf atmosferi boyutlarında katılımcıların elde ettikleri puanlar

arasında branşlar göz önünde bulundurulduğunda anlamlı farklılıklar belirlenmiştir. Ayrıca, toplam puanlar katılımcıların branşları açısından anlamlı farklılık göstermiştir.

Tartışma, Sonuçlar ve Öneriler: Türkiye'ye uyarlaması yapılan ölçeğin geçerli ve güvenilir veriler sağladığına dair kanıtlar elde edilmiştir. Bu sayede RTOP öğretmen adayları açısından faydalı bir protokol olarak kullanılabilir. Bunun aracılığıyla öğretmen adayları hem kendileri hem de profesyoneller tarafından değerlendirilebilirler. Ayrıca, öğretmen eğitimlerinin yapıldığı eğitim fakültelerindeki akademisyenler tarafından da bu protokol derse entegre edilerek kullanılabilir. Böylece öğretmen adayları mikro-öğretim uygulamalarını daha başarılı bir şekilde gerçekleştirebilirler.