

Turkish Online Journal of Educational Technology

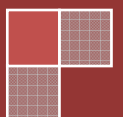
*Special Issue for INTE 2017
October 2017*

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ISSN: 2146 - 7242

Indexed by
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Development of a Student Evaluation form Toward Peer Instruction

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ABSTRACT

Peer instruction is an interactive student-centered teaching method. Ensuring student interaction during the lesson and concentrating the attention of the students on the basic concepts are main aims of the peer instruction. A typical peer instruction sequence is similar to a strategy of learning a “Think-Pair-Share”, which students should think individually on questions before sharing their ideas and solutions with classmates in either in pairs or on groups of different sizes. In order to determine students’ views on peer instruction method, which is quite popular today and which has been studied much over the last 20 years, different data collection tools have been developed by different researchers under different names. When these data collection tools developed by different researchers are examined in detail, it is seen that it is needed that general evaluation form which can be used to determine views for all stages of the peer instruction method. For this reason, it was aimed to develop a student evaluation form toward peer instruction method within the scope of this research. Student assessments toward peer instruction method in the developed form were examined as 'student evaluation toward peer instruction', 'student evaluation toward questions asked' and 'student evaluation toward discussions made' in three sub-dimensions and 25 items.

INTRODUCTION

Peer instruction is an interactive student-centered teaching method developed by Eric Mazur (Mazur, 1997), engages students during class through structured, frequent questioning and is often facilitated by classroom response systems (Miller, Schell, Ho, Lukoff, & Mazur, 2015). To provide a positive role for interaction among peers in the knowledge construction, this method has been extensively supported by a socio-constructivist approach to learning (Morice, Michinov, Delaval, Sideridou, & Ferrières, 2015). Ensuring student interaction during the lesson and concentrating the attention of the students on the basic concepts are main aims of the peer instruction (Mazur, 1997). In this context, it was indicated that the general format that each ConcepTest used in peer instruction by (Mazur, 1997) should have; 1) Question posed, 2) Students given time to think, 3) Students record individual answers (optional), 4) Students convince their neighbors (peer instruction), 5) Students record revised answers (optional), 6) Feedback to teacher: Tally of answers and 7) Explanation of correct answer. However, the PI method can be different for different learning scenarios because it is a flexible and student-centered approach (Chou & Lin, 2015; Crouch, Watkins, Fagen, & Mazur, 2007; Morice et al., 2015). In the study conducted by Dancy and Henderson (2010), it was revealed that less than 12.8% of the teachers using peer instruction do so as it was originally designed to be implemented (As cited in Michinov, Morice, & Ferrières, 2015). More generally, a typical peer instruction sequence is similar to a strategy of learning a "Think-Pair-Share" (e.g., Watkins & Mazur, 2010), which students should think individually on questions before sharing their ideas and solutions with classmates in either in pairs or on groups of different sizes (Michinov et al., 2015).

When the literature is examined, it is seen that the PI method has been developed in Physics to improve student understanding of deep conceptual concepts and has been used in other sciences such as biology (e.g., Perez et al., 2010) and computer science (e.g., Lee, Garcia, & Porter, 2013) have also been used successfully. In this context, in order to determine students' views on peer instruction method, which is quite popular today and which has been studied much over the last 20 years, different data collection tools have been developed by different researchers under different names. Within this scope; some scales such as "attitude toward peer instruction method survey" by Şekercioğlu Çirkinoğlu (2011), "student evaluation of peer instruction questionnaire" by Cortright, Collins, and DiCarlo (2005), "a survey to get students' impressions of the PI" by Lee et al., (2013) and a "peer Instruction self-efficacy instrument" by Miller et al. (2015) were developed. When these data collection tools developed by different researchers are examined in detail, it is seen that it is needed that general evaluation form which can be used to determine views for all stages of the peer instruction method. For this reason, it was aimed to develop a student evaluation form toward peer instruction method within the scope of this research.

METHOD

In this section, research design, the participants, the data collection tool and the information about the analysis of the data are given.

Research Design and Participants

Within the scope of the research, survey model was used to examine the views of pre-service teachers on the method of peer instruction. Participants of the study were 179 pre-service teachers who attended at least one course in which peer instruction method was used in the faculty of education in a state university during the 2016-2017 academic year. Pre-service teachers who attend the research study at the department of mathematics and science education and in department of computer and instructional technology education. When the distributions of pre-service teachers in terms of their gender characteristics are examined; it is seen that 65.3% (n = 117) were female and 34.7% (n = 62) were male.

Data Collection Tools

The data in this study were obtained from a student evaluation form developed by the researchers. In the first stage of the student evaluation form development process, the problem situation is determined and appropriate themes were determined for this problem situation by reviewing the literature. These sub-themes are determined as 'student evaluation toward peer instruction', 'student evaluation toward questions asked' and 'student evaluation toward discussions made'. Following the determination of the sub-themes, an item pool including 55 items was established in line with the information obtained from the reviewing of the literature. 35 items which are suitable for inclusion in the draft of the student feedback form were selected from the item pool, and a pre-application form with Likert type rating was constituted. A Turkish language expert and three experts in educational technology who work in the field of computer and instructional technologies were consulted regarding the prepared pre-application form. The linguist examined the written materials in terms of clarity, language and expression. Educational technology field experts evaluated form in terms of content, criterion, construct and face validity. The necessary arrangements were made on the student evaluation form in line with the feedback obtained from the experts. Then, the pilot application of the student evaluation form was carried out on 65 pre-service teachers who are out of the sample and it was reevaluated in terms of language validity, comprehensibility, level of eligibility and was put into final form. Thus, the final form of student evaluation form toward peer instruction is structured as a five-point Likert type with three parts and 25 items.

Data Analysis

Factor load values for the developed data collection tool, KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) coefficient for determining the suitability of the sample for measurements, Bartlett test for determining consistency between items and Cronbach α reliability coefficient for reliability are examined. Factor loadings of 25 items range from .90 to .93. The value of KMO was found as .86. When values of KMO close to 1, factor analysis becomes more meaningful. If the average level of KMO is between .50 and .70, it is the medium-level, if it is between .71 and .80, it is the good level and if it is between .81 and .90, it is very good level and it will be the

excellent level if it is .91 and above (Field, 2005). From this point of view, it can be said that the sample is sufficient for data analysis. The Bartlett test showed that the results of the analyzes were significant (chi-square = 2329.147, $p < 0.01$). When the reliability of the student assessment form for the peer instruction method was examined, it was determined that the reliability coefficient of Cronbach α was .92. These results indicate that the data collection tool is reliable. In the analysis of collected data, frequency and percentage values are used.

FINDINGS

In the process of preparing the data collection tool, certain themes have been set out. These include 'student evaluation toward peer instruction', 'student evaluation toward questions asked' and 'student evaluation toward discussions made'. The analysis results of the first theme which is student evaluation toward peer instruction are given in Table 1.

Table 1. Student Evaluation Toward Peer Instruction Items		Strongly Disagree →---← Strongly Agree					Total
			2	3	4	5	
	f	3	7	21	69	79	179
	%	1.7	3.9	11.7	38.5	44.1	100.0
Peer instruction method was clear.	f	3	5	35	72	64	179
	%	1.7	2.8	19.6	40.2	35.8	100.0
Peer instruction method was easy to follow.	f	7	13	40	63	56	179
	%	3.9	7.3	22.3	35.2	31.3	100.0
Peer instruction method was interesting.	f	2	12	37	58	70	179
	%	1.1	6.7	20.7	32.4	39.1	100.0
Peer instruction method helped to better understand the course topics.	f	7	14	31	65	62	179
	%	3.9	7.8	17.3	36.3	34.6	100.0
Peer instruction method helped me to move beyond my previous level of knowledge.	f	7	13	42	64	53	179
	%	3.9	7.3	23.5	35.8	29.6	100.0
Peer instruction method helped to assess the level of knowledge regarding course subject.	f	4	7	24	80	64	179
	%	2.2	3.9	13.4	44.7	35.8	100.0
Immediate feedback with the peer instruction method helped me to complete my shortcomings.	f	5	12	40	58	64	179
	%	2.8	6.7	22.3	32.4	35.8	100.0
Peer instruction method has increased my confidence in the ability to do courses.	f	4	11	42	77	45	179
	%	2.2	6.1	23.5	43.0	25.1	100.0
10. Peer instruction method increased participation in class.	f	5	7	39	56	71	1
	%	2.8	3.9	21.8	31.3	39.7	.6
11. Peer instruction method increased my motivation towards the course.	f	4	8	32	72	63	179
	%	2.2	4.5	17.9	40.2	35.2	100.0
12. When I consider all the activities in the course, I think that the allocated time for the peer instruction method is sufficient.	f	11	22	49	58	39	179
	%	6.1	12.3	27.4	32.4	21.8	100.0
13. I think it is difficult to apply the peer instruction method.	f	34	63	36	28	18	179
	%	19.0	35.2	20.1	15.6	10.1	100.0
14. I think peer instruction method is useful.	f	5	3	29	64	78	179
	%	2.8	1.7	16.2	35.8	43.6	100.0
15. I think peer instruction method should be used in other courses as well.	f	11	10	50	57	51	179
	%	6.1	5.6	27.9	31.8	28.5	100.0
16. I think peer instruction method is educationally attractive.	f	5	6	31	76	61	179
	%	2.8	3.4	17.3	42.5	34.1	100.0

When Table 1 is examined, the majority of the students stated that peer instruction method is clear (f = 148, 82.6%) and follow-up is easy (f = 136, 76%). In addition, more than half of the students found peer instruction method as interesting (f = 119, 66.5%) and enjoyable (f = 128, 71.5%). When the student responses are examined in detail, it is seen that many of them believe that the peer instruction method helps to get better understanding of the course subjects (f = 127, 70.9%) and to go beyond previous knowledge levels (f = 117, 65.4%). In addition, they stated that this method helped to complete the deficiencies (f = 126, 68.2%) and evaluate the level of knowledge about the subjects (f = 144, 80.5%) by receiving immediate feedback. Nevertheless, they also stated that their confidence (f = 122, 68.1%), their participation (f = 127, 71%) and their motivation (f = 135, 75.4%) increased. Almost half of the students think that allocated time is enough for this method (f = 97, 54.2%) and that this method is not difficult to apply (f = 97, 54.2%). The majority of the students stated that this method is useful (f = 142, 79.4%) and that it can be used in other courses as well (f = 108, 60.3%) and educationally attractive (f = 137, 76.6%). The analysis results of the student evaluation toward questions asked which is second theme are given in Table 2.

Table 2. Student Evaluation Toward Questions Asked

Items		Strongly Disagree ←---→ Strongly Agree					Total
		1	2	3	4	5	
17. The questions posed in the question-and-answer process of the peer instruction method generated my interest.	f	7	10	47	72	43	179
	%	3.9	5.6	26.3	40.2	24.0	100.0
18. The questions posed in the question-and-answer process of the peer instruction method made it easier to understand the important points about the topic.	f	2	12	28	92	45	179
	%	1.1	6.7	15.6	51.4	25.1	100.0
19. The time allocated for the questions posed in the question-and-answer process of the peer instruction method was sufficient.	F	20	33	48	38	40	179
	%	11.2	18.4	26.8	21.2	22.3	100.0
20. The level of difficulty of the questions posed in the question-and-answer process of the peer instruction method was appropriate for my level.	F	7	15	43	83	31	179
	%	3.9	8.4	24.0	46.4	17.3	100.0

When Table 2 was examined, it was determined that the questions asked in the peer instruction method were interesting (f = 115, 64.2%) and facilitated to understand important points (f = 137, 76.6%). Furthermore, about half of the students stated that the time for the questions asked was satisfactory (f = 78, 43.5%) and more than half of them stated that questions were appropriate for the difficulty levels of the questions (f = 114, 63.7%). The point to note here is that the time allocated for the questions posed in the question-and-answer process is not sufficient for more than half of the students. As long as the given time is too long, students may be tempted to try to find answers using different sources, and in a very short period of time they may be answered without thinking. For this reason, while the period to be set aside for the questions asked in the process are determined; it is important to consider various variables such as the subject studied, the difficulty level of the question being asked, and the learning levels of the students. Table 3 shows the results of the analysis of student evaluation toward discussions made on the third theme.

Tablo 3. Student Evaluation Toward Discussions Made

Items		Strongly Disagree ←---→ Strongly Agree					Total
		1	2	3	4	5	
21. The discussion level in the process of peer instruction method was high.	f	9	19	36	71	44	179
	%	5.0	10.6	20.1	39.7	24.6	100.0
22. I participated actively in discussions in the process of peer instruction method.	f	3	14	28	67	67	179
	%	1.7	7.8	15.6	37.4	37.4	100.0
23. I liked expressing my ideas during discussions in the process of peer instruction method.	f	4	12	27	63	73	179
	%	2.2	6.7	15.1	35.2	40.8	100.0
24. The peer instruction method enabled me to be aware of the ideas of my classmates.	f	9	8	31	67	64	179
	%	5.0	4.5	17.3	37.4	35.8	100.0
25. I liked to see different perspectives with the peer instruction method.	f	3	11	34	71	60	179
	%	1.7	6.1	19.0	39.7	33.5	100.0

When Table 3 was examined, students reported that the level of discussion in the process of peer instruction method was high ($f = 115$, 64.2%) and they participated effectively in discussions ($f = 134$, 74.8%). Furthermore, they expressed that they liked to express their opinions ($f = 136$, 76%), they were aware of their friends' opinions ($f = 131$, 73.2%) and liked to see different views ($f = 131$, 73.2%).

CONCLUSIONS

In this study, a student evaluation form toward peer instruction method was developed to determine the evaluation of university students toward peer instruction method and the evaluations of students who use peer instruction method were examined. Student evaluations toward peer instruction method in the developed form were examined as 'student evaluation toward peer instruction', 'student evaluation toward questions asked' and 'student evaluation toward discussions made' in three sub-dimensions.

When the student evaluations for the use of the peer instruction method are examined, the majority of the students stated that peer instruction method is clear and follow-up is easy. More than half of the students stated peer instruction method as interesting and enjoyable. Students stated that the peer instruction method helps to get better understanding of the course subjects and to go beyond previous knowledge levels. They stated that this method helped to complete the deficiencies about the subjects by receiving immediate feedback. It is seen that they also stated that using peer instruction method increased their confidences, their participations and their motivations. When the literature is examined it is seen that similar research results which support these results are obtained. For example, in the study conducted by Gok (2015), it was seen that peer instruction method has developed students problem solving strategies, academic achievements and homework performance, and students stated positive opinions toward peer instruction method. In a research conducted by Simon and Cutts (2012), it was seen that peer instruction method developed deep learning. Schmidt (2011) concluded that peer instruction method is effective to increase student satisfaction.

When students' evaluations are examined, it is seen that the questions asked were interesting and facilitated to understand important points. Furthermore, about half of the students stated that the time for the questions asked was satisfactory and more than half of them stated that difficulty levels of the questions were appropriate for their levels. When student evaluations toward discussions made are examined, it is seen that students reported that the level of discussion in the process of peer instruction method was high and they participated effectively in discussions. Furthermore, they expressed that they liked to express their opinions, they were aware of their classmates' opinions and liked to see different views. When the literature is examined it is seen that similar research results which support these results are obtained. For example, in the study conducted by Trottier, Kamp and Miranda (2011), it was revealed that the discussion process in peer instruction developed social interaction among students.

Some suggestions can be made about peer instruction practices that will be designed by taking into account student evaluations. Firstly; at the beginning of the teaching period, students can understand and follow the method by explaining them what peer instruction method is, how to apply it and what to watch out for. In the peer instruction process, it is important that the feedback provided to students is well structured. Through feedback, students must be aware of the deficiencies and mistakes in learning, and these deficiencies and mistakes should be removed. Strategies such as scaffolding and metacognitive support can be used in this process. Another point to note is the process of structuring and managing the discussion used in peer instruction. In this process, it should be encouraged to express students' opinions and ideas clearly. In the process of managing student discussions, different discussion methods such as individual and group discussion can be tried. Student discussions can also be conducted through virtual environments, such as social networking environments. Thus, it can be provided that discussions in the classroom are not applied only at classroom and it is also possible to reach discussion records in the desired place and time. Finally, in the future research; it is important that new studies considering different individual differences of students at different levels of education (primary school, secondary school, associate degree, post graduate, etc.) will provide information about more variables related to peer instruction method.

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