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# A comparison of different teaching applications based on questioning in terms of their effects upon pre-service teachers' good questioning skills

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**Abstract**

The present study was conducted to comparatively determine the effects of different teaching applications based on questioning upon pre-service teachers' good questioning skills. The research is a qualitative study that employed a multi-group experimental design. Prior to and following a six-week teaching period involving different teaching applications based on questioning, the questions formulated by the students were comparatively examined and analyzed. As a result of the study, it was determined that the teaching application based on student questions contributed more to the pre-service teachers' questioning skills.


*Keywords:* Question; questioning; teacher training; quality question; teaching application.

## 1. Introduction

Questioning is an ability that can be acquired and improved through education, rather than an innate quality (Mucher, 2007; Açıkgöz, 2004; Filiz, 2002; Akbulut, 1999). Therefore, one of the objectives of education in general and education activities in particular is to improve individuals' questioning abilities. Teachers carry the greatest responsibility in helping students acquire questioning skills. As a matter of fact, an examination of the relevant literature reveals that the ability to ask high quality questions and use questions as an instructional instrument is mentioned among the qualities that a good teacher should possess (YÖK, 1999; Chowen, 2005; Morgan & Saxton, 1994). Rousmaniere (2001) argues that the universal and social image of school and teacher is associated with questioning. Yet, it should be noted that it is not simply the question asking skill that teachers should possess and thus teach their students. Arguably, an ability that teachers should possess is the ability to ask quality questions.

Açıkgöz's (2004, 263) statement that "asking questions is not a simple task" should be interpreted in this context. What is not simple is asking high quality questions, rather than simply asking questions. Berci & Griffith (2005, 407) suggest that "in large measure good teaching is good question asking. This is an art every teacher should master".

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High quality questions should have certain characteristics, including the following; (1) clarity, (2) purposefulness, (3) usefulness, (4) level customization, (5) sequence, (6) orientation to thinking (7) flexibility, and (8) well-constructedness (Good & Brophy, 2000; Kauchak & Eggen, 1998).

Since question asking is an intellectual skill, two basic ways to learn asking questions are arguably seeing/listening to favorable examples and performing studies to formulate questions. For observation and repetition are of considerable importance to learn these skills (Senemoğlu, 1997; Küçükahmet, 1997). In this context, instruction should be designed to allow students encounter high quality questions and study on formulating questions (Drake & Brown 2003; Hover, Hicks & Irwin 2007).

Students' questioning skills can be improved by teaching applications that reflect different approaches about the use of questions. These different teaching applications can be designated as (1) teaching based on teacher's questions; (2) teaching based on student questions, and (3) blended method. Berci & Griffith (2005) suggest focusing on having classes about question production and having students formulate their questions.

Entrusted with the task of having their students acquire good question asking skills, teachers should first acquire these skills in teacher training educational institutions. The fact that question asking is an intellectual skill and the idea that it can only be learned through experience or by observation-listening require using questions in teaching this skill. The main aim of this study is to comparatively examine different teaching applications based on questions in terms of having pre-service teachers acquire the skill to ask/formulate quality questions.

*Problem Statement:* How is students' acquisition/improvement of question asking skills affected by different teaching applications based on question asking?

### *1.1. Sub-Problems*

With regard to the following criteria which are used in evaluating the quality of questions: (a) order of thinking, (b) articulation, (c) clarity (explicitness) of the objective, (e) comprehensiveness and limitation of the answer, and (f) significance for the subject area,

1. How are students' question-asking skills affected by teaching applications based on student questions and teacher's questions, and blended teaching application?

2. Are the said teaching applications differ in terms of their level of contribution to students' good question-asking skills?

### *1.2. Methods*

This research is a qualitative study. A multiple-group experimental design was used. This experimental design is employed to determine the effects of multiple independent variables on the dependent variable, evaluated as a whole or separately. Such designs are considered as highly reliable unless the number of experiment groups does not exceed four (Erden, 1993).

The study group consists of a total of 71 junior students studying in department of Social Studies Teacher Training in the Faculty of Education at Ahi Evran University, who took the course Assessment and Evaluation. Studying in three different sections, 31 of these students were female and 40 were male. The experiment group was randomly assigned. Furthermore, the groups were not equalized to be ideal in order to avoid disrupting the natural course of education. In this context, the experimental design preferred in this study is considered as ideal for the studies conducted in school environment (Erden, 1993).

The study data is composed of the questions collected from the study groups as the pretest and posttest data. The analyses were performed on these data. Two kinds of comparisons were made during analysis. One of them is the comparison between the pretest-posttest data of each experiment group. This comparison aims to determine how much each teaching application based on asking questions contributes to the students' question formulation/asking skills (sub-problem 1). The other comparison involves comparing the differences brought about in the students' question-asking skills by each teaching application. Thus, it was aimed to identify which teaching application contributed more to the students' question formulation/asking skills in terms of which criteria (sub-problem 2).

### *1.3. Criteria used to analyze questions*

The pre-service teachers' questions were analyzed according to the following criteria identified as a result of literature review: (1) order of thinking, (2) articulation, (3) explicitness of the objective, (4) comprehensiveness and limitation, and (5) significance for the area.

### *1.4. Formation of the Study Groups and Carrying out of the Teaching Applications*

The formation of the study groups and the relevant process can be summarized as follows:

*Experiment Group I:* A group randomly selected from among the study groups was informed before the application about the instruction process to be followed. Throughout the application period (6 weeks), the students were told a week before which subjects would be taught during the next three hours and were asked to bring their questions to the class and the classes were simply taught by answering the students' questions without any further explanation.

*Experiment Group II:* The second group randomly selected from among the study groups was informed before the application about the instruction process to be followed. The instructor taught for 6 weeks on the basis of the questions he prepared.

*Experiment Group III:* The third group randomly selected from among the study groups received a 6-week instruction by answering both the questions formulated by the instructor and those prepared by the students in classroom.

The questions collected in the first and final weeks were analyzed as the pretest and posttest data.

## 2. Results

### *2.1. Characteristics of the Student Questions with regard to Question Levels*

Table 1 summarizes the distribution of the students' questions in terms of learning stages.

Table 1. Results of the Student Questions in terms of Question Levels

| Groups | Levels of Question | Pretest | | Posttest | | Difference | |
|---|---|---|---|---|---|---|---|
| | | f | % | f | % | f | % |
| *Experiment Group I* | Low level | 56 | 74,7 | 36 | 48 | 20 | 26,7 |
| | High Level | 19 | 25,3 | 39 | 52 | | |
| | **Total** | **75** | **100** | **75** | **100** | | |
| *Experiment Group II* | Low level | 56 | 81,2 | 44 | 63,8 | 12 | 17,4 |
| | High Level | 13 | 18,8 | 25 | 36,2 | | |
| | **Total** | **69** | **100** | **69** | **100** | | |
| *Experiment Group III* | Low level | 55 | 79,8 | 47 | 68,1 | 8 | 11,7 |
| | High Level | 14 | 20,2 | 22 | 31,9 | | |
| | **Total** | **69** | **100** | **69** | **100** | | |

Student questions formulated in the *"Lower Order"* question levels could be exemplified by "*What is natural unit called? Explain using examples."* and *"What does natural unit mean?"*. Examples for the student questions formulated in the *"Higher Order"* question levels include *"What kind of relationship exists between ideal difficulty level and reliability?"* and *"What kind of difficulties can be observed resulting from the structure of the assessed variable in educational assessments?"*. As seen in Table 1, after the application in the questions written by the students in terms of question levels, there was a 26.7% increase in experiment group I, a 17.4% increase in experiment group II, and an 11.7% increase in experiment group III in favor of higher order questions.

### *2.2. Characteristics of the Student Questions with regard to Articulation of the Question*

Table 2.1 and Table 2.2 summarize the results of the classification and analyses performed on the students' questions in terms of articulation of questions according the criteria of sentence construction and selection of appropriate words.

Table 2.1. The results of the Analysis on the Students' Questions with regard to the Goodness of Sentence Construction

| Groups | Question Statement | Pretest | | Posttest | | Difference | |
|---|---|---|---|---|---|---|---|
| | | f | % | f | % | f | % |
| *Experiment Group I* | Good | 32 | 42,7 | 66 | 88,0 | 34 | 45,3 |
| | Average | 22 | 29,3 | 6 | 8,0 | -16 | -21,3 |
| | Bad | 21 | 28,0 | 3 | 4,0 | -18 | -24 |
| | **Total** | **75** | **100** | **75** | **100** | - | - |
| *Experiment Group II* | Good | 55 | 79,7 | 62 | 89,9 | 7 | 10,2 |
| | Average | 6 | 8,7 | 6 | 8,7 | 0 | 0 |
| | Bad | 8 | 11,6 | 1 | 1,4 | -7 | -10,2 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |
| *Experiment Group III* | Good | 43 | 62,3 | 63 | 91,4 | 20 | 29,1 |
| | Average | 19 | 27,6 | 3 | 4,3 | -16 | -23,3 |
| | Bad | 7 | 10,1 | 3 | 4,3 | -4 | -5,8 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |

The students' questions considered as "good" in terms of sentence construction can be exemplified by *"What is the difference between direct and indirect assessment?"* and *"What is the difference between the assessor and the assessed?"*. Examples for the students' questions considered as "moderate" in terms of sentence construction include *"What is the integral part of assessments?"* and *"Arrange the scales in order of quality. What are their differences"*. Student questions regarded as "bad" could be exemplified by *"What kind of an assessment is the order of the best ten sportsmen in the world?"* and *"What are the elements of assessment? Why does assessment lose its value if it lacks one of the elements?"*. As shown by Table 2.1, the rate of the student questions considered as good in terms of sentence construction after the application increased by 45.3% in experiment group I, 10.2% in experiment group II, and 29.1% in experiment group III.

Table 2.2. The results of the Analysis on the Students' Questions with regard to the Selection of Appropriate Words in terms of Meaning

| Groups | Use of Appropriate Concepts | Pretest | | Posttest | | Difference | |
|---|---|---|---|---|---|---|---|
| | | f | % | f | % | f | % |
| *Experiment Group I* | Good | 44 | 58,7 | 66 | 88,0 | 22 | 29,3 |
| | Average | 16 | 21,3 | 7 | 9,3 | -9 | -12 |
| | Bad | 15 | 2,0 | 2 | 2,7 | -13 | 0,7 |
| | **Total** | **75** | **100** | **75** | **100** | - | - |
| *Experiment Group II* | Good | 56 | 81,2 | 59 | 85,4 | 3 | 4,2 |
| | Average | 6 | 8,7 | 5 | 7,3 | -1 | -1,4 |
| | Bad | 7 | 10,1 | 5 | 7,3 | -2 | -2,8 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |
| *Experiment Group III* | Good | 52 | 75,4 | 58 | 84,1 | 6 | 8,7 |
| | Average | 9 | 13,0 | 6 | 8,6 | -3 | -4,4 |
| | Bad | 8 | 11,6 | 5 | 7,3 | -3 | -4,3 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |

The students' questions considered as "good" in terms of the selection of appropriate words in meaning can be exemplified by *"Is assessment an important and necessary activity?"* and *"State the differences between indirect and direct assessment."*. Examples to "moderate" student questions include *"Which assessment type(s) should be used in education life? Why?"* and *"The distance between two parallels 111km, while there is an actual distance of 153 km. Which one is direct and which is indirect assessment?"*. Student questions considered as "bad" can be exemplified by *"How effective is observation among the assessment stages?"* and *"What is the scale type that performs the highest level of assessment in education? Explain."*. As seen in Table 2.2, the rate of the student questions considered as good in terms of the use of appropriate words increased after the teaching applications by 29.3% in experiment group I, 4.2% in experiment group II, and 8.7% in experiment group III.

### 2.3. Characteristics of the Student Questions with regard to Explicitness of the Objective in the Question

Table 3 summarizes the results of the classification and analysis of the students' questions with regard to the explicitness of the objective by following the levels in Bloom's (1995) cognitive domain taxonomy.

Table 3. The results of the Analysis on the Students' Questions with regard to the Explicitness of the Objective

| Groups | Clarity of purpose | Pretest | | Posttest | | Difference | |
|---|---|---|---|---|---|---|---|
| | | f | % | f | % | f | % |
| *Experiment Group I* | Good | 50 | 66,7 | 68 | 90,7 | 18 | 24 |
| | Average | 19 | 25,3 | 6 | 6,0 | -13 | -19,3 |
| | Bad | 6 | 8,0 | 1 | 1,3 | -5 | -6,7 |
| | **Total** | **75** | **100** | **75** | **100** | - | - |
| *Experiment Group II* | Good | 67 | 97,2 | 50 | 72,5 | -17 | -24,7 |
| | Average | 1 | 1,4 | 15 | 21,7 | 14 | 20,3 |
| | Bad | 1 | 1,4 | 4 | 5,8 | 3 | 4,4 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |
| *Experiment Group III* | Good | 65 | 94,2 | 63 | 91,4 | -2 | -2,8 |
| | Average | 2 | 2,9 | 3 | 4,3 | 1 | 1,4 |
| | Bad | 2 | 2,9 | 3 | 4,3 | 1 | 1,4 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |

The students' questions considered as "good" in terms of explicit objectives can be exemplified by *"How many types of assessment are there?"* and *"Is absolute 0 used in direct or indirect assessment?"*. Examples to "moderate" student questions include *"Do we have to perform an evaluation after each assessment? Or does each assessment require an evaluation?"* and *"How do we benefit from scale transitivity in assessment-evaluation?"*. Student questions considered as "bad" can be exemplified by *"Does an assessed entity vary with assessors?"* and *"Is assessment an important and necessary activity?"*. As seen in Table 3, the rate of the student questions considered as good in terms of the explicitness of the objectives increased after the teaching applications by 24% in experiment group I, while it decreased by 24.7% in experiment group II and -2.8% in experiment group III.

### 2.4. Characteristics of the Student Questions with regard to the Comprehensiveness and Limitation of the Answer to the Question

Table 4 summarizes the results of the analysis on the comprehensiveness and limitation of the answers to the students' questions.

Table 4. The results of the Analysis on the Students' Questions with regard to their Comprehensiveness and Limitation

| Groups | Scope and Limitation | Pretest | | Posttest | | Difference | |
|---|---|---|---|---|---|---|---|
| | | f | % | f | % | f | % |
| *Experiment Group I* | Good | 40 | 40 | 62 | 82,7 | 22 | 42,7 |
| | Average | 17 | 22,7 | 11 | 14,6 | -6 | -8,1 |
| | Bad | 18 | 37,3 | 2 | 2,7 | -16 | -34,6 |
| | **Total** | **75** | **100** | **75** | **100** | - | - |
| *Experiment Group II* | Good | 63 | 91,4 | 62 | 89,9 | -1 | -1,5 |
| | Average | 3 | 4,3 | 5 | 7,2 | 2 | 2,9 |
| | Bad | 3 | 4,3 | 2 | 2,9 | -1 | -1,4 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |
| *Experiment Group III* | Good | 59 | 85,6 | 61 | 88,4 | 2 | 2,8 |
| | Average | 7 | 10,1 | 4 | 5,8 | -3 | -4,3 |
| | Bad | 3 | 4,3 | 4 | 5,8 | 1 | 1,5 |
| | **Total** | **69** | **100** | **69** | **100** | 0 | 0 |

The students' questions considered as "good" in terms of the comprehensiveness and limitation of their answers can be exemplified by *"State the difference between the rule of assessment and criterion"* and *"Exemplify and*

*compare the examples to the types of 0 in assessment"*. Examples to "moderate"student questions include"How *we differentiate between a natural unit and a defined unit?"* and *"Explain the main function of the assessment procedure"*. "Bad" student questions can be exemplified by *"What do you think about the scale type that can be prepared and used in the field of education?"* and *"What is the type of assessment that is used most in education?"*. As is clear from Table 4, the rate of the student questions considered as good in terms of the explicitness of the objectives increased after the teaching applications by 42.7% in experiment group I, while no significant change was observed in the other two groups.

### *2.5. Characteristics of the Student Questions with regard to the Usefulness/Significance of the Question*

Table 5 summarizes the results of the analysis on the students' questions with regard to their level of testing a useful or significant information for the field (course).

Table 5. The results of the Analysis on the Students' Questions with regard to Usefulness/Significance

| Groups | Usefully/Importance | Pretest | | Posttest | | Difference | |
|---|---|---|---|---|---|---|---|
| | | f | % | f | % | f | % |
| *Experiment Group I* | Good | 20 | 26,7 | 43 | 57,3 | 23 | 30,6 |
| | Average | 29 | 38,7 | 20 | 26,7 | -9 | -12 |
| | Bad | 26 | 34,6 | 12 | 16,0 | -14 | -18,6 |
| | **Total** | **75** | **100** | **75** | **100** | - | - |
| *Experiment Group II* | Good | 21 | 30,4 | 18 | 26,1 | -3 | -4,3 |
| | Average | 16 | 23,2 | 21 | 30,4 | 5 | 7,2 |
| | Bad | 32 | 46,4 | 30 | 43,5 | -2 | -2,9 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |
| *Experiment Group III* | Good | 14 | 20,3 | 23 | 33,3 | 9 | 13 |
| | Average | 26 | 37,7 | 9 | 13,1 | -17 | -24,6 |
| | Bad | 29 | 42,0 | 37 | 53,6 | 8 | 11,6 |
| | **Total** | **69** | **100** | **69** | **100** | - | - |

The students' questions considered as "good" in terms of their level of testing a useful or significant information for the field (course) can be exemplified by "*While arithmetic mean, standard deviation and correlation tests are performed in assessments made on equal-interval scales, why can't we use these in other scales?"* and *"Write down and compare the differences between direct and indirect assessment"*. Examples to the student questions regarded as "moderate" include "*What does 0 mean as used in the assessment procedure? Does it matter if we do not differentiate between natural zero and relative zero?"* and *"How many types of 0 are used in assessment? What are their characteristics?"*. "Bad" student questions can be exemplified by "*How do we benefit from scale transitivity in assessment-evaluation?"* and *"What are the types of indirect assessment?"*. As seen in Table 5, the rate of the student questions considered as good in terms of usefulness and significance increased after the teaching applications by 30.6% in experiment group I and 13% in experiment group III, while it decreased by 4.3% in experiment group II.

## 3. Conclusion and Discussion

Below is a discussion of the results obtained at the end of this study, which aims to comparatively examine the effects of different teaching applications based on asking questions upon acquisition/improvement of the students' skills to ask quality questions:

1. Each of the teaching applications based on student questions and teacher questions and the blended method lead students to ask questions that require higher-order thinking. On the other hand, teaching application based on student questions makes the highest contribution to leading the pre-service teachers' to asking questions that require higher-order thinking. This is followed by the teaching application based on teacher questions and the blended teaching application, respectively.

2. All of the three teaching applications based on questions positively contribute to the students' question-asking skills with regard to the construction of and using appropriate words in questions. However, the teaching application based on students' questions makes the greatest contribution to the students' question-asking skills with regard to

the question construction. This is followed by the blended teaching application and the teaching application based on teacher questions, respectively.

3. The teaching application based on student questions positively contributes to the students' question-asking skills with regard to the explicitness of the objective in the question. On the other hand, teaching application based on teacher questions and the blended teaching approach negatively affect the students' question-asking skills with regard to the the explicitness of the objective in the question.

4. The teaching application based on student questions contributes more to the ability of students to ask questions that are balanced in terms of the comprehensiveness and limitation of their answers, when compared to the other applications. However, teaching application based on teacher questions and the blended teaching application do not significantly contribute to the ability of students to ask good questions in terms of comprehensiveness and limitation.

5. The greatest contribution to the students' question-asking skills with regard to their answers' usefulness in learning and significance in the relevant field is made by the teaching application based on student questions. This is followed by the contribution of the blended teaching application. Nevertheless, the teaching application based on teacher questions could be argued to make no contribution to the students' questioning skills in terms of the usefulness and significance of questions.

In brief, it could be argued that teaching application based on student questions contributes more considerably to pre-service teachers' good question-asking skills, when compared to teaching applications based on teacher questions and blended method. This could be interpreted to indicate that good question-asking skill can be better acquired through exercise. Nevertheless, it should not be overlooked that this result was obtained from pre-service teachers receiving teacher training education at higher education level. Therefore, it could be suggested to conduct similar studies with students in primary and secondary levels as well as with students in different colleges and faculties.

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