



Investigation of Science Teachers Beliefs about Teaching Science

Ayberk Bostan Sariođlan¹

Abstract

Many studies take part in science education show that teachers are one of the most effective element at instruction. Teachers are shown as one of the reasons for the ideas that students have as a result of teaching. While teachers are so important in the learning process, it is also of great importance that teachers' ideas, beliefs and attitudes are explored. With this study, it is aimed to investigate the science teachers' beliefs about teaching science. This study has been carried out with ten science teachers who work in different regions of Turkey and have different demographic knowledge. Teacher belief interview developed by Luft and Roehring (2007) was used as data collection tool and revised for this research. A total of four open-ended questions were asked to the teachers. Content analysis was used in the analysis of the obtained data and similar responses were collected under same categories. The most common results of this study are that the roles of science teachers are to guide students during the instruction process, students learn best in science lessons through experiments and teachers said that students' understanding were met through the questions directed to the students. As a result of this study, more studies can be undertaken to investigate the beliefs of science teachers with more in number and more diverse demographic characteristics.

1. Introduction

The most efficient factor on learning is teachers. They can either provide students to construct correct knowledge or cause incorrect knowledge to be built. As one of the sources encountered in the misconceptions of children, teachers are indicated. [1; 2; 3]. Since teachers are so efficient on education like this, the belief which they have got about education affects their teaching, too. The beliefs of teachers about education process has an important role for determining their aims in the classroom and directly effects their duties such as preparing lesson plan, assessment and evaluation. [in cited by 4]. The beliefs of teachers can display change and improve over time.

1.1 Aim of the Research

In this study, it is aimed to detect the beliefs of Science teachers who have demographic information in Science education .There is a vital and direct effect of the beliefs that teachers have got related to education on classroom implications. [6]. Determining teachers' beliefs is important in terms of figuring out their effect on education.

2. Methodology

In the research, case study from qualitative research designs is used. In the case study, observations are fulfilled in real contexts and content is an indicative factor on results. [7].

2.1 Research Group

The study group of this study includes 10 science teachers who have got different demographic information. The information of teachers is displayed in Table 1.

Table 1. Demographic information of the teachers in the study group

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Gender	F	F	F	F	F	M	M	F	M	M
Experience	5-10 year	5-10 year	10-15 year	More 25 year	15-20 year	20-25 year	20-25 year	10-15 year	10-15 year	10-15 year
Graduated section	Science	Science	Science	Science	Chemistry	Physics	Chemistry	Science	Science	Science
Graduate level	Undergraduate	Postgraduate	Undergraduate	Undergraduate	Undergraduate	Undergraduate	Undergraduate	Undergraduate	Undergraduate	Undergraduate

¹ Balıkesir University Faculty of Education Science Education Department, Turkey



2.2 Data Collecting and Analyses

As a data collection tool, Teacher Belief Interview developed by Luft and Roehring (2007) is utilized in this study and its 4 questions are included. Questions are open-ended and sufficient time is given for teacher to express their opinions.

In data analysis, content analysis method is used. Teachers are given T1-T10 codes one by one. The answers that teachers give are analyzed and categories related to the questions are determined. Frequency distribution related to categories obtained is carried out.

3. Results

In this section, the answers that teachers have given to Teachers Belief Interview are included.

Table 2. Findings obtained from analysis of “How do you maximize student learning?” question

Response Category	Teacher	Frequency (f)
Providing students' active participation	T5, T6, T7, T8, T9	5
Supporting them to use the new learned things	T1, T2	2
Giving homework which provide repetition and practice	T3	1
Helping them enjoy the lesson	T4	1
Helping them enjoy the lesson	T10	1

Five teachers indicate that learning occurs best when teachers provide students' participation. These teachers consider that students learn better when they are active and included in education process. One of these teachers gives this answer:

T9: It is very important for students to prepare themselves for the lesson and participate into the lesson. First of all, I provide this. I try to make them face the cases which can appear in their daily life and the examples which take their attention and interest.

Two teachers express that students' learning are at the top level when they use the information which they have learnt newly in different areas. The other answers such as giving homework which provide repetition and practice, helping students enjoy the lesson and relating the content with the real life maximize the learning and each answer is given by one teacher.

Table 3. Findings obtained from analysis of “How do you describe your role as a teacher?” question

Response category	Teacher	Frequency (f)
Guiding / Instructing	T1, T2, T5, T6, T7, T8, T9, T10	8
Making the learning reluctant	T3, T4	2

Teachers consider that they at the most guide students with their roles in the class and eight teachers share this opinion. A teachers' answer in this category is like this:

T10: My role in the class is to help learning not to teach. To help students figure out how they can reach and use correct knowledge and then help them learn meaningfully.

Two teachers indicate that their role in the class is to make the student reluctant to learn and they are the ones who organize classroom environment for this.

Table 4. Findings obtained from analysis of “How do you know when your students understand?” question

Response Category	Teacher	Frequency (f)
When they apply it in new situations	T1, T2, T6, T8, T10	5
By checking their exam results	T3, T5, T7	3
When they share their opinion in the class	T4, T9	2

Five teachers give this answer “ I understand that students learn the concept when they apply this concept in new situations and are able to transfer it. A part of the answer of the teacher who gives this answer is like this:



T10: If they can use the concept in different areas correctly and determine the variables affecting the concept, I understand that they learn.

Three teachers indicate that they evaluate their students' learning through exams, questions and alternative evaluation methods. Two teachers point out that one of the ways in which we notice the learning is to check whether they share their opinions in the classroom.

Table 5. Findings obtained from analysis of "How do your students learn best?" question

Response Category	Teacher	Frequency (f)
With the active participation into learning process	T2, T3, T4, T7, T8, T9, T10	7
When the lesson is supported with the materials	T1, T5	2
If they come to the lesson with preparations	T6	1

Seven teachers give the answer that students learn Science best when they attend learning process actively. One of these teachers express like this:

T8: When they carry out the experiments by themselves though living and doing. When they comprehend that Science is nested with life and when they predicate with their own words.

Two teachers give the answer that students learn best when the lesson is supported with the materials. And one teacher thinks that best learning occur if the students come to the class with preparation.

4. Discussion and Conclusion

As a result of this study, some different opinions are included whereas some similar opinions are encountered among the answers given for the questions included in Teachers Beliefs Interview for Science Education. The gender, the department which teachers graduated and education background of the teachers do not affect answers related to their beliefs in Science teaching. Teachers with different gender, different department or different education background give similar answers to the questions in teachers' belief questionnaire. The answer of teacher T2 who is the only one with post-graduate education resembles the answers of other teachers. Only the teacher who has been a teacher for more than 25 years gives some different answers for the questions. When teachers' answers about the beliefs related to education are revised, it is viewed that the best learning occurs when students are active, show interest in the lesson and interact with materials. In this process, teachers have guiding role. Similarly, Fenstermacher and Soltis (1992) indicate that the opinions of teachers about education should be the facilitation of students' learning. In different studies, some implementations can be fulfilled in order to improve teachers' beliefs in Science teaching.

References

- [1] Heller, P., & Finley, F. (1992). Variable uses of alternative conceptions: A case study in current electricity. *Journal of Research in Science Teaching*, 29, 259-275.
- [2] Helm, H. (1980). Misconceptions in physics amongst South African students. *Physics Education*, 15, 92-98.
- [3] Ivowi, U. (1984). Misconceptions in physics amongst Nigerian secondary school students. *Physics Education*, 19, 279-285.
- [4] Bryan, L.A., & Atwater, M.M. (2002). Teacher beliefs and cultural models: A challenge for science teacher preparation programs. *Science Education*, 86(6), 821-839.
- [5] Yerrick, R., Parke, H., & Nugent, J. (1997). Struggling to promote deeply rooted change: The 'filtering effect' of teachers' beliefs on understanding transformational views of teaching science. *Science Education*, 81, 137-159.
- [6] Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research*, 38, 47-65.
- [7] Cohen, L., Manion, L., & Morrison, K. (2005). *Research Methods in Education*. (5 th ed.) British Library Cataloguing in Publication Data.
- [8] Luft, J.A. & Roehring, G.H. (2007). Capturing science teachers' epistemological beliefs: The development of the teachers beliefs interview. *Journal of Science Education*, 11(2), 38-63.
- [9] Fenstermacher, G.D. & Soltis, J.F. (1992). *Approaches to teaching*. New York: Teachers College Press.