Investigating the Impact of Written Feedback on Preservice Teachers' Noticing*

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Abstract: This aim of the study is to investigate to what extent a teacher educator's feedback about the assessment of preservice teachers' teaching practices impacts on their noticing. It was conducted with preservice elementary mathematics teachers taking the Special Teaching Methods course, and a quasi-experimental post-test design was used. In order to measure preservice teachers' noticing, a video-based post-test was used at the end of term. A rubric was developed to find out the preservice teachers' noticing levels. Each preservice teacher was given scores for attending, interpreting, and suggestion-making, which added up to the total score for noticing. An independent t-test was conducted in order to see whether the difference between the experimental and control groups was statistically significant. Providing written feedback on the written assessment of preservice teachers' teaching practices was found to have a positive impact on their noticing.

Keywords: Written feedback, Noticing, Preservice teachers

1. Introduction

Amongst the 21st century skills, learning to learn stands out as one of the fundamentals of professional development. In view of the complexity of teaching, teachers need to continuously improve their vision to a large extent along their career paths (Beck & Kosnik, 2017). Therefore, one aim of teacher education is to prepare teachers to be lifelong learners (Ball, 2017). The acquisition of the relevant skills for such a vision should be central to teacher education. Lesson analysis, noticing, and reflecting are some of these skills (Feimen-Nemser, 2001; Toom, 2017). Lesson analysis involves analysing the effectiveness of the teaching based on the learners' learning and making suggestions to improve the teaching in light of this analysis (Barnhart & van Es, 2015; Santagata & Guarino, 2011). Through noticing, teachers can capture students' thoughts, engage in reasoning about these thoughts, and use what they have learnt in their own classes (Sun & van Es, 2015). Since a teacher with these skills will be able to observe their own teaching practices from a critical point of view, their own professional development will be permanent. It is therefore highly important that teacher educators should develop and implement pedagogies in their classes aiming to equip preservice teachers with such skills.

This study was conducted with preservice mathematics teachers on the Special Teaching Methods course. The first researcher was also the course lecturer who was teaching two different classes. The lecturer intervened in one class by providing written feedback on the assessment of preservice teachers' teaching practices in order to improve their analysis skills. Feedback is more efficient if given by an expert (Brinko, 1993). Asking leading questions and providing a framework prove effective in improving preservice teachers' noticing (van Es, Cashen, Barnhart, & Auger, 2017). For this reason, written feedback given by the lecturer included some leading so that the teachers could take certain points into consideration during their analysis. This involved the preservice teachers thinking about the positive and negative reflections of each teaching task on the learner, interpreting how and in what way it could be useful, and making suggestions on what needed improving. Giving feedback on the assessment of preservice teachers' teaching practices is thought to be effective in improving their noticing. Therefore, the main purpose of this study is to investigate to what extent a teacher educator's feedback about the assessment of preservice teachers' teaching practices impacts on their noticing.

1.1. Theoretical Framework

This study is structured around lesson analysis and noticing. The lesson analysis involve evaluating the effectiveness of a teaching process in terms of student learning. This analysis involves seeking answers to such questions as what is the student expected to learn? What have the students learnt? In what way did the teaching (not) help he students learn? How can the teaching be made more effective for the students to learn? (Hiebert, Morris, Berk, & Jansen ,2007; Santagata, Zannoni, & Stigler, 2007). Many researchers describe noticing by highlighting its three components: attending to significant situations during the teaching, interpreting these situations in an in-depth fashion, and making decisions based on the analysis of observations (Jacobs, Lamb, & Philipp, 2010; van Es & Sherin, 2002; van Es, Cashen, Barnhart, & Auger, 2017). These three components require not only explaining what is important during the teaching but also interpreting the reasons why things are

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important and what effects they may have on students' learning. Lesson analysis skills is based upon the noticing skill according to many researchers who assert that these two skills are quite identical (Santagata & Guorino, 2011; Sherin, Jacobs & Philipp, 2011). The development of this skills enables pre-service teachers to learn more from the teachers they have observed in their field experiences, to think in more detail about their own teaching, to make better pedagogical decisions when they start to work, and to provide higher quality teaching (Mitchell & Marin, 2015; Star & Strickland, 2008).

Recent studies have focused on how to improve preservice teachers' noticing and with what tools. Preservice teachers' noticing has been found to improve through analysis and discussion in video-based learning settings (Barnhardt & van Es, 2015), a guiding framework (van Es, Cashen, Barnhart, & Auger, 2017), and leading questions (Seidel, Blomberg, & Renkl, 2013). Kleinknecht and Gröschner (2016), on the other hand, compare video-based online feedback and journal writing in terms of their effects on preservice teachers' noticing. They conclude that video feedback is more beneficial for preservice teachers in making explanations and finding teaching alternatives. Unlike previous research, the present study examines the effects of written feedback given by an expert on the assessment of teaching practices and how it improves noticing. The study is therefore expected to contribute to the field in terms of what can be done to acquire the noticing skill in non-video-based settings.

2. Method

2.1. Participants and Study Context

The study was conducted with preservice elementary mathematics teachers taking the Special Teaching Methods course as part of their four-year teacher education degree programme. The preservice teachers had completed most of the mathematics content courses as well as the pedagogical courses. The Special Teaching Methods course is offered in the third year of the programme over two terms. The data was collected in the sixth semester. Following the Special Teaching Methods course, preservice teachers are expected to be ready for Teaching Practice in schools.

A quasi-experimental post-test design was used for this study. The first researcher / teacher educator taught the Special Teaching Methods course in two different classes. One of these classes was the control group (38 students) and the other the experimental group (37 students). The first four weeks of the course included theoretical studies and the last 10 weeks practical studies.

The general aim of this course is to support the development of pre-service teachers' knowledge and skills about teaching mathematics. Pre-service teachers also perform teaching practices in this course and evaluate their own and their classmate's teaching practices by analyzing them from different perspectives. Pre-service teachers fulfill these duties as both written and verbal evaluations during the course. Written evaluation was carried out by the control and experimental groups, but only the experimental group was given written feedback by the instructor. In particular, written feedback was given in a way to raise awareness of evaluation of teaching activities in terms of student learning. The purpose of the written feedback pedagogy is to enable pre-service teachers to analyze and think on their teaching practices in more detail. The purpose of giving written feedback to the experimental group is to go beyond what they can realize in the name of learning-teaching and to bring them to the stage of interpretation and making decission. During the implementation of the course, the control and experimental groups did the following common activities:

1. Theese classes are divided into groups of 2 or 3 each. Both groups were given the tasks of developing a lesson plan, doing the necessary preparations (materials development etc.), and teaching in the class as if in a real classroom setting (a 30-minute lesson). This involved role-playing by the preservice teachers as teachers, and by their classmates as students. Prior to their preparations, the pre-service teachers were given the guidelines to consider during the preparation and implementation for an effective teaching of mathematics.
2. Before the oral evaluation, the pre-service teachers who made presentations were expected to evaluate their teaching practices in written form by their classmates. During this written evaluation process, the teacher of the course explained to the pre-service teachers what they should consider. Teacher candidates were asked to think about the positive and negative effects of each teaching activity carried out during the teaching practice on learners, to interpret how it could be beneficial, and to make suggestions for eliminating inappropriate situations. Pre-service teachers made written evaluations 4 times during the course.
3. Following the presentations, discussions were held to evaluate the planning and the implementations of the group in terms of effective mathematics teaching.

The experimental group further did the following intervention activities:

1. The preservice teachers were asked to take short notes on what the activities contributed to the student, and for a written evaluation in terms of effective mathematics teaching, while watching their peers teaching.
2. Before moving on to the oral evaluation, the preservice teachers were expected to do a written assessment of the teaching practices of their classmate doing the presentation (they had been given specially designed papers with columns for written feedback). They had been told what to consider during this written assessment process. The preservice teachers were expected to think about the positive and negative reflections of each teaching task on the learner, interpret how and in what way it could be useful, and make suggestions on what needed improving. They did written assessments four times and received written feedback from the lecturer four times.
3. It was ensured that the written feedback on these assessment reports was read by the teachers before the next writing task.
4. The written feedback included the points to consider during the analysis, e.g. *What contribution can working on these examples make to the student?, Will it enable students to make mathematical connections?, Were the introductory activities and connections appropriate?, You should interpret the activity on the fractions – was the implementation process of this activity appropriate?,*

Below is the written evaluation of a pre-service teacher and the written feedback given by the instructor to this evaluation:

> *In the introduction, it was appropriate for our friends to ask the students what the fractions ½ and ¼ mean in general and to model these fractions in order to remind them in the introduction to the subject. Then it was good to give an example of daily life (if we take half of 2 bagels) and show that the result is equal to 4 using materials.(preservice teachers)*

In this analysis, the pre-service teacher only captured the existing situation and included a very general assessment in order to improve teaching. The instructor gave written feedback as follows:

> *Why was this example appropriate? What benefit does working on these examples bring to the student? Does it make it easier for students to make mathematical connections? Do you need any other prior knowledge? (Teacher educator)*

2.2. Data Collection

In order to measure preservice teachers' noticing, a video-based post-test was used at the end of the course. The video was selected based on three different expert opinions, and showed a teacher teaching sixth graders the height of a parallelogram. This video was selected because it involved the introduction, development, and conclusion parts of a lesson as well as a teaching process with student-teacher interaction. It also included positive and negative contexts that could be flagged by the preservice teachers. The 30-minute lesson was divided into four video parts and viewed by separate teachers, who were expected to take notes on significant points while watching each video part and then do a detailed analysis upon its conclusion. The preservice teachers were asked to consider the following point while watching the video:

Evaluate the teacher's teaching from its positive and negative aspects in terms of its contribution to the learner's learning.

2.3. Data Analysis

A rubric was developed to identify the preservice teachers' noticing levels. Each heading (attending, interpreting, decision-making) had four levels (0, 1, 2, 3). Previous work by van Es and Sherin (2002) and Barnhart and van Es (2015) was made use of while designing the rubric. Then the eventualities for each video part were determined. The first researcher analysed all the preservice teachers' assessments by this rubric and made amendments to it. This final version of the rubric is presented in Table 1. Afterwards, two other researchers separately did the analyses for a second time, and interrater reliability was found to be 78%. The two researchers then came together and discussed the contexts with discrepant scores, ultimately agreeing on a final score.

Table 1. Categories, levels, and explanations regarding noticing

Category	Levels	Explanations	Sample answers
attending	0	No statements about any noteworthy context	
	1	General statements about teacher's actions	The teacher asked students questions.
	2	Evidence-based explanations of teacher's actions	The teacher wanted the height of the parallelogram to be drawn on one side.
	3	Evidence-based statements about students' actions	One of the students explained the parallel requirement on a rhomb.
interpreting	0	No interpretations	
	1	General expressions of satisfaction	It was good for the students' understanding.
	2	Interpreting teacher's actions based on teaching principles and guidelines	She checked the students' previous knowledge by asking about the particulars of the parallelogram, which was very good.
	3	Evidence-based interpretation of teacher's and students' actions and making the necessary mathematical connections	It was good for students to draw these heights as they could see that heights could be drawn at different spots.
decision-making	0	No suggestions	
	1	Very general suggestions	It would be better if the teacher used materials.
	2	Suggestions for improving teacher's teaching practices	The teacher needs to elaborate on the concept of height.
	3	Suggestions for improving students' understanding based on teacher's actions, and making the necessary mathematical connections	A few more heights should have been drawn to highlight their equality.

The preservice teachers' answers in the four video exams were studied within the scope of noticing adequacy (attending, interpreting, decision-making), and their score for each component was obtained. Each preservice teacher was given scores for attending, interpreting, and decision-making, which added up to the total score for noticing. Based on these scores, the descriptive statistical values were calculated for the experimental and control groups. Following the descriptive analyses, further statistical analyses were conducted in order to reveal any statistically significant difference between the experimental and control groups in terms of their noticing, attending, interpreting, and decision-making scores. Prior to these analyses, the four-score distribution of the experimental and control groups was checked for consistency with normal distribution. The Kolmogorov-Smirnov test revealed that the score distribution of the experimental and control groups was consistent with normal distribution in all components. With the groups normally distributed, an independent t-test was conducted in order to see whether the difference between the experimental and control groups was statistically significant. Prior to obtaining the t-test results, the Levene test results were looked at to see whether the groups had equal variances.

3. Results

Descriptive statistics on the experimental and control groups' noticing scores are presented in Table 2.

Table 2. Preservice teacher's noticing scores

Group	N	Mean	Std. Deviation
Experimental	37	22.7838	4.13075
Control	38	18.6053	4.37770

Table 3. Noticing scores t-test value

	t	sd	sig
Experimental-Control	4.249	73	.000

The average noticing score for the experimental group is higher than the average score for the control group. The Levene test results revealed that the groups had equal variances (F=.108, p=.744>.05). The t-test results in Table 3 suggest that a statistically significant difference exists between the noticing levels of the experimental and control groups (t_{73}=4.249, p=.000). This difference is due to the experimental group scores being higher than the control group scores ($\bar{\bar{X}}_D = 22.7838$ and $\bar{\bar{X}}_K = 18.6053$).

Descriptive statistics on the experimental and control groups' attending scores are presented in Table 4.

Table 4. Attending scores

Group	N	Mean	Std. Deviation
Experimental	37	9.8919	1.72858
Control	38	8.5263	1.46558

Table 5. Attending t-test value

	t	sd	sig
Experimental-Control	3.694	73	.000

The average attending score for the experimental group is higher than the average score for the control group. The Levene test results revealed that the groups had equal variances (F=.468, p=.496>0.05). The t-test results in Table 5 suggest that a statistically significant difference exists between the attending levels of the experimental and control groups (t_{73}=3.694, p=.000). This difference is due to the experimental group scores being higher than the control group scores ($\bar{\bar{X}}_D = 9.8919$ and $\bar{\bar{X}}_K = 8.5263$).

Descriptive statistics on the experimental and control groups' interpreting scores are presented in Table 6.

Table 6. Interpreting scores

Group	N	Mean	Std. Deviation
Experimental	37	8.1622	1.69170
Control	38	6.8158	1.75307

Table 7. Interpreting t-test value

	t	sd	sig
Experimental-Control	3.383	73	.001

The average interpreting score for the experimental group is higher than the average score for the control group. The Levene test results revealed that the groups had equal variances (F=.018, p=.895>0.05). The t-test results in Table 7 suggest that a statistically significant difference exists between the interpreting levels of the experimental and control groups (t_{73}=3.383, p=.001). This difference is due to the experimental group scores being higher than the control group scores ($\bar{\bar{X}}_D = 8.1622$ and $\bar{\bar{X}}_K = 6.8158$).

Descriptive statistics on the experimental and control groups' decision-making scores are presented in Table 8.

Table 8. Decision-making scores

Group	N	Mean	Std. Deviation
Experimental	37	4.7297	2.38803
Control	38	3.2632	2.71815

Table 9. Decision-making t-test value

	t	sd	sig
Experimental-Control	2.480	73	.015

The average decision-making score for the experimental group is higher than the average score for the control group. The Levene test results revealed that the groups had equal variances (F=1.308, p=.256>0.05). The t-test results in Table 9 suggest that a statistically significant difference exists between the suggestion-making levels of the experimental and control groups (t_{73}=2.48, p=.015). This difference is due to the experimental group scores being higher than the control group scores ($\bar{\bar{X}}_D = 4.7297$ and $\bar{\bar{X}}_K = 3.2632$).

4. Discussion and Conclusion

This study is investigate to what extent a teacher educator's feedback about the assessment of preservice teachers' teaching practices impacts on their noticing .The findings suggest that the experimental group had higher average scores for noticing than the control group. Providing written feedback was thus found to make a positive contribution to preservice teachers' noticing. Kleinknecht and Gröschner (2016) conclude that video-based online feedback has a positive effect on preservice teachers' capturing and evaluating pedagogical explanations. The difference between the groups can be attributed to the expectation that preservice teachers should make evidence-based statements while assessing their peers' practices, think about the positive and negative effects of a given situation on students, and put forward suggestions for improvement. The present study differs from existing research in that it highlights the need to do written assessments of teaching practices and to provide written feedback on these, which could pave the way to improving noticing at a stage where theory meets practice in teacher education. Written feedback by experts could be used as a tool to improve teachers' noticing in teacher education.

The experimental group's noticing scores were found to be high in all components. While this may not suffice to claim that these preservice teachers had excellent noticing, it does show a differentiation in the experimental group. The component in which both groups come out at their weakest is decision-making. Most in the control group preferred not to put forward suggestions to improve teaching. Those in the experimental group, in turn, had difficulty formulating suggestions. It could be argued that this is a consequence of a lack of pedagogical content knowledge and teaching experience in preservice teachers.

References

Ball, L. D. (2017).Learning to the work teaching : ''Practice –based '' teacher education.2. International Kongeress Lernenin Der Praxis, Ruhr-Universitat, Bochum, Deutschland, 7 March, 2017. https://static1.squarespace.com/static/577fc4e2440243084a67dc49/t/58ff72c717bffcc1d333b585/1493136079697/030717_Bochum_Germany.pdf

Barnhart, T., & Van Es, E. (2015). Studying teacher noticing: Examining the relationship among pre-service science teachers' ability to attend, analyze and respond to student thinking. *Teaching and Teacher Education*, 45 , 83-93.

Beck, C.,& Kosnik, C.(2017). The continuum of preservice and inservice teacher education. In D. J. Clandinin & J. Husu (Eds.), *International handbook of research on teacher education* (pp. 107-122). Thousand Oaks, CA: Sage.

Brinko, K. T.(1993). The Practice giving feedback to improwe teaching: What is effective. *The Journal of Higher Education, 64*(5), 574-593.

Feimen-Nemser. S.(2001). From preparation to practice:Designing a continuun to strengthen and sustain teaching. *Teachers College Record* , 103,1013-1055.

Hiebert, J., Morris, A. K., Berk, D., & Jansen, A. (2007). Preparing teachers to learn from teaching. *Journal of Teacher Education, 58*(1), 47-61.

Jacobs, V. R., Lamb, L. L., & Philipp, R. A. (2010). Professional noticing of children's mathematical thinking. *Journal for Research in Mathematics Education, 41*(2), 169-202.

Kleinknecht. M., & Gröschner. A. (2016). Fostering preservice teachers's video feedback: Results of an online – and video- based intervention study.*Teaching and Teacher Education*, 59, 45-56.

Mitchell, R.N., & Marin, K.A.(2015). Examining the use of a structured analysis framework to support prospective teacher noticing. Journal of Mathematics Teacher Education,18(6),551-575.

Santagata, R. Zannoni, C., & Stigler, J. W. (2007). The Role lesson analysis in pre-service teacher education. An emprical investgitaion of teacher learning from a virtual video-based field expperience. *Journal of Mathematics Teacher Education, 10*, 123-140.

Santagata, R., & Guarino. J. (2011). Using video to teach future teachers to learn from teaching *ZDM. The International Journal of Mathematics Education*, 43(1), 133-145.

Seidel, T., Blomberg, G., & Renkl, A. (2013). Instructional strategies for using video in teacher education. *Teaching and Teacher Education*, 34(1), 56- 65.

Sherin, M. G., & Jacobs, V. R. (2011). Situating the study of teacher noticing. In Sherin, M. G., Jacobs, V. R. & Philipp, R. A. (Eds), *Mathematics teacher noticing* (pp. 33-44). Routledge.

Star, J. R. ve Strickland, S. K. (2008). Learning to observe: Using video to improve preservice mathematics teachers' ability to notice. *Journal of Mathematics Teacher Education, 11*, 107-125.

Sun, J., & Van ES, E. A. (2015) . An explotory study of the influence that analyzing teaching has on preservice teachers'classroom practice. *Journal of Teacher Education*, 66 (3), 201-214.

Toom, A.(2017). Teachers' professional and pedagogical competencies: A complex divide between teacher work, teacher Knowledge and teacher education. In D. J. Clandinin & J. Husu (Eds.), *International handbook of research on teacher education* (pp. 803-819). Thousand Oaks, CA: Sage.

van Es, E. A., & Sherin, M.G. (2002). Learning to notice: Scaffolding new teachers' interpretations of classroom interactions. *Journal of Technology and Teacher Education,* 10(4), 571-596.

van Es, E.A., Cashen, M., Barnhart, T., & Auger, A. (2017). Learning to notice mathemtatics insruction: Using video to develop preservice teachers'vision of ambitious pedagogy.*Cognition and Insruction, 35*(3),165-187.