

USING VIDEO TO EXAMINE TEACHER NOTICING AND THE ROLE OF TEACHING EXPERIENCE

USO DEI VIDEO PER ANALIZZARE LE CAPACITÀ OSSERVATIVE DEGLI INSEGNANTI E IL RUOLO DELL'ESPERIENZA DI INSEGNAMENTO

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HOW TO CITE Bonaiuti, G., Santagata, R., & Vivanet, G. (2020). Using video to examine teacher noticing and the role of teaching experience. *Italian Journal of Educational Technology*. doi: [10.17471/2499-4324/1163](https://doi.org/10.17471/2499-4324/1163)

ABSTRACT Video has been used extensively in teacher preparation to develop noticing skills. Experienced teachers generally detect, understand and interpret the multiplicity of events that take place in the classroom, whereas novice teachers tend to focus their attention on more superficial aspects that are often not strictly relevant to students' learning. This study presented video-recorded lessons both to a group of Italian novice teachers in training (without previous teaching experience) and to a group of more experienced teachers (with three or more years of service) with the aim of comparing the observation and interpretation skills of the two groups. Results confirmed prior findings: novices mostly described what they observed, focusing on the teacher's actions and without demonstrating a critical stance nor suggesting instructional improvements. Contrary to prior research, the majority of novice participants did not focus on issues of or classroom climate or management, and differences between novice and more experienced teachers were not statistically significant. The discussion suggests various hypotheses that might explain these findings and highlights the need for professional development experiences that centre the work of teaching specifically on close analysis of practice and of student thinking.

KEYWORDS Teacher Noticing; Video Observation; Teacher Training; Professional Vision.

SOMMARIO I video sono ampiamente utilizzati nella formazione degli insegnanti per sviluppare competenze di osservazione. Gli insegnanti più esperti rilevano, comprendono e hanno la capacità di dare un senso alla molteplicità degli eventi in classe, mentre i docenti principianti tendono a focalizzare la loro attenzione su aspetti più superficiali, non rilevanti per l'apprendimento degli studenti. Questo studio ha confrontato le capacità di osservazione e interpretazione di una lezione videoregistrata tra un gruppo di insegnanti italiani in formazione (senza precedenti esperienze di insegnamento) e un gruppo di insegnanti più esperti (con tre o più anni di servizio). I risultati hanno confermato che gli insegnanti privi di esperienza hanno per lo più descritto ciò che hanno osservato, concentrandosi sulle azioni dell'insegnante, senza assumere una posizione critica né suggerire ipotesi per il miglioramento della didattica. Contrariamente alle ricerche precedenti, la maggior parte dei partecipanti non si è concentrata su questioni di gestione della classe e le differenze tra gli insegnanti principianti e quelli più esperti non sono risultate statisticamente significative. La discussione suggerisce varie ipotesi che potrebbero spiegare questi risultati ed evidenzia la necessità di esperienze di sviluppo professionale che incentrino il lavoro di insegnamento specificamente sull'analisi approfondita della pratica e del pensiero degli studenti.

PAROLE CHIAVE Teacher Noticing; Video-Osservazione; Formazione Insegnanti; Visione Professionale.

1. INTRODUCTION

There is a robust literature on the correlation between instructional quality and student learning (Sanders & Rivers, 1996; Nye, Konstantopoulos, & Hedges, 2004; Hattie, 2009, 2012). Teachers play an important role in designing and enacting effective instruction (OECD, 2005). For these reasons, educational research and pedagogical debate has focused on examining how to best design teacher professional learning experiences. In recent years, a large body of scientific knowledge on the use of video-observation as an approach to teacher education has been produced (Wright, 2008; Hattie, 2009; Snoeyink, 2010). Since early studies on microteaching carried out at Stanford University (Allen, 1967) oriented to improve teaching skills by means of systematic observation of short teaching activities, influenced by research on imitation and social learning theory (Bandura & Walters, 1963), different models have been advanced. Among them, we remember, for instance and without claiming to be exhaustive, those proposed by Mottet (1997), Altet (1999), Tochon (1999), Lewis, Perry and Hurd (2004), Sherin and Han (2004), Pea (2006) and Santagata, Zannoni and Stigler (2007), van Es and Sherin (2008) that differ for theoretical frameworks and the focus on different processes (such as behavioural, social, cognitive and/or metacognitive).

Within this literature, an influential construct is "teacher noticing" (especially in the field of mathematics teaching), that is the ability to attend to and reason about important elements of instruction and classroom interactions in relation to student learning (Sherin, 2001). Research evidence demonstrates that often, at the beginning of their preparation, future teachers, unlike more experienced colleagues, are not able to direct attention to the key elements of teaching processes, revealing the inability to deal with the complexity of the context and dynamics present in the classroom (Blomberg, Stürmer, & Seidel, 2011). However, there is no unanimous consensus in the interpretation of such differences between more and less experienced teachers.

In this study, findings from a study carried out at the University of Cagliari (Italy), in collaboration with the University of California-Irvine are summarized. The study examines noticing skills of novice teachers¹ and of teachers with three or more years of service.

2. THEORETICAL FRAMEWORK

There is an established international literature on the use of video observation in teacher education (Brophy, 2004; Wang & Hartley, 2003; Santagata, Gallimore, & Stigler, 2005; Darling-Hammond, & Bransford, 2007; Blomberg, Sherin, Renkl, Glogger, & Seidel, 2014; Goldman, Pea, R., Barron, B., & Derry, 2014). Video observation has been used for decades for modelling teaching practices (Allen, 1967; Allen & Ryan, 1969; Wilkinson, 1996; Kpanja, 2001; Amobi, 2005; Bell, 2007; Sen, 2009) as well as developing observation and reflection skills (Tochon, 1999; Lewis et al., 2004; Sherin & Han, 2004).

Video offers access to classroom events characterized by a remarkable density of social, cognitive, emotional and affective dynamics without reducing authenticity of direct observations (Blomberg et al., 2014; Seidel, 2014; Gaudin & Chaliès, 2015; Pea, 2006; Spiro, Collins, & Ramchandran, 2007; Star & Strickland, 2008; Welsch & Devlin, 2007). It is particularly useful in reducing the gap between theory and practice in future teacher education (Plöger, Scholl, & Seifert, 2018). At the same time, productive video-based observations rely on teachers' selective attention and ability to make sense of what they notice by relating it to broader principles of effective teaching and learning. This notion is taken up by the construct of teacher noticing. Sherin defines noticing as (i) directing attention selectively to aspects and situations decisive for teaching and learning and (ii) reasoning about the meaning of what has been observed on the basis of one's own knowledge on teaching and learning (Sherin, 2007). Existing research evidence finds that differences in noticing skills between more and less experienced teachers (Berliner, 2001; Berthoff, 1987; Cochran-Smith, & Lytle, 1993, 1999; Schön, 1983). For example, experienced teachers are typically able to detect, understand and interpret the multiplicity of events that takes place simultaneously in the classroom with greater detail and more depth of analysis than beginners (Sabers, Cushing, & Berliner, 1991). Experienced teachers attend to classroom events of greatest impact for students' learning (Borko & Livingston, 1989). Less experienced teachers, on the other hand, tend to focus their attention on more superficial aspects, such as the sound of the voice and gestures (Fuller & Manning, 1973) and to behavioural aspect of classroom interaction, such as classroom management (Star & Strickland, 2008). Furthermore, while these latter prefer to follow their lesson plans rather rigidly, experienced teachers are more able to redefine their teaching choices according to their observation and interpretation of what happens in the classroom (Berliner, 2001). Taken together, these studies suggest that experienced teachers possess useful strategies for reflecting and reasoning on their teaching in ways that support improvement. Nevertheless, research on teacher noticing has also highlighted that even experienced teachers need opportunities to improve their noticing skills. As Hattie (2012) pointed out a distinction must be made between expert and experienced teachers. Expert teachers are not necessarily those with more seniority; rather they are those who have a greater ability to identify and enact teaching practices that have clear impact on student learning.

¹ Given the lack of a shared definition in the literature on the use of this term, for the sole purpose of this work, the term "novice teachers" will refer to teachers in training without previous teaching experience. In this regard, it is worth noticing that the lack of a consistent use in the literature of terms such as novice, experienced and expert teachers leads to difficulties in comparing the empirical results of different studies.

In this context, our research efforts aim to develop a framework of noticing skills' dimensions and indicators that can be used to examine noticing of teachers at different points of the professional continuum. While existing framework mostly focus on mathematics and science teacher noticing, our objective is to develop a framework independent of content areas as well school level. We draw from existing coding schemes and prior research, such as the "Classroom Video Analysis" coding scheme (Kersting, Givvin, Thompson, Santagata, & Stigler, 2012), the "Self-Regulated Learning-Professional Vision" project (Michalsky, 2014) and the "Observer" (Seidel & Stürmer, 2014). We also integrate the work of Steffensky, Gold, Holdynski and Möller (2015) who focused on non-content-specific aspects such as classroom management and learning support. Lastly we have considered research that has highlighted a gradual development of noticing skills, from description without interpretation or evaluation; to explanation of observed events based on professional knowledge; to a more mature level that includes predictive ability or the ability to reflect on and predict the consequences of teaching decisions on student learning (Berliner, 2001; Lee, 2005; Schäfer & Seidel, 2015; Sherin & van Es, 2009; van Es & Sherin 2002; van Es, 2009).

We applied this framework to the analysis of noticing skills of more and less experienced teachers in the context of a teacher education program at an Italian University. Most research on teacher noticing has been conducted in the US context; thus, this study also contributes to understanding teacher noticing in a variety of cultural contexts.

3. METHOD

3.1. Research questions

The following questions guided the data collection and analyses:

- 1) What characterizes noticing skills of novice teachers? To what degree can they attend to, interpret and critically reflect on important aspects of teaching-learning processes?
- 2) Are there differences between the noticing skills of novice teachers and those of teachers with three or more years of teaching experience?

3.2. Context and participants

In 2010, the Italian Ministry of Education, Universities and Research established the “Tirocinio Formativo Attivo” (TFA, in English, Active Training Internship), an annual program (1500 hours, 60 ECTS²), organized by universities in collaboration with school authorities at the regional level, that is required to obtain the qualification for teaching in the first and second level of the secondary school. This study was carried out in the academic year 2014/2015, during the second edition of the TFA.

Two groups were extracted with a simple random sampling from the total of 282 participants: (a) novice teachers without formal teaching experience (n=40, of which 13 males and 27 females, age range mode = 30-32) and (b) teachers with three or more years of service (n=40, of which 16 males and 24 females, age range mode = 39-41).

² The European Credit Transfer and Accumulation System (ECTS) is used across Europe to translate academic credit marks between higher educational institutions.

3.3. Procedure

All participants were asked to see a short video of a math lesson and to answer an online questionnaire. The questionnaire included questions about the teacher background and two open-ended questions designed to measure their noticing skills: (i) identify an episode in the video that struck your attention as particularly significant; (ii) explain the reasons why you attribute a particular significance to that episode³. These two questions were chosen to capture the two components of teacher noticing: directing attention selectively and reasoning about what was noticed based on one's knowledge (Sherin, 2007). These two questions were chosen to capture the two components of teacher noticing: directing attention selectively and reasoning about what was noticed on the basis of one's knowledge (2007). Open-ended questions best capture teacher noticing as they do not direct teachers' attention to any particular element of an instructional episode; rather they document what teachers spontaneously focus on. Similar open-ended questions have been used successfully in other studies (e.g., Santagata & Guarino, 2011; Santagata & Angelici, 2010; van Es & Sherin, 2008).

Responses were subsequently coded independently by two researchers using the scheme that will be introduced below, after a period of training aimed at finding an agreement on the meaning of the different dimensions and indicators. Reliability was evaluated by calculating the Cohen Kappa coefficient, whose mean was 0.667 in the first application of the coding scheme, to reach a complete consensus at the time of final coding. In case of a lack of agreement in coding between the two researchers, the attribution of coding was resolved by a third independent observer who had also taken part in the initial training.

3.4. Video description

Participants watched an edited recording of a math lesson videotaped in a junior high school first-year class (i.e., first year of middle-school or sixth grade)⁴. The video starts with the teacher asking the class to remember what had been discussed during the previous lesson (concepts of line, point and plane); then she introduces the lesson topic (point of origin of two straight lines) and invites a student to summarize the main concepts using the interactive whiteboard. The teacher then continues, always with the student's support, to illustrate an additional topic (angles as part of the plane between two straight lines).

This video was selected because it allows for the identification of various episodes and aspects of the teaching-learning process, even in a short period of time (4':32''): the subject matter concepts; teaching moves; students' contributions; the teacher-student interaction; and class management.

3.5. Coding scheme

In order to code participants' responses, a scheme developed by the researchers was adopted (Authors). The scheme included eight dimensions and the related indicators (see tab. X). The unit of analysis considered for coding was the teacher's overall response to questions (i) and (ii). It is important to notice that the coding scheme is not a

³ In addition to items aimed at defining the profile of participants and these open-ended questions, the questionnaire also included a set of closed-ended questions to collect quantitative data on what had been observed. These latter are not pertinent with the purpose of this study and will be analyzed and discussed in a different research. Therefore, here only the answers to the two open-ended questions indicated were analyzed, for their relevance with the above-mentioned research questions.

⁴ https://www.youtube.com/watch?v=3ATmFeFH_jk

checklist of expected content; rather its categories capture qualitative differences in the comments teachers provided (i.e., general versus specific; stance; critical reflection) and the focus of their attention (i.e., classroom management/climate; content; teaching; learning; improvement) so they are applicable to fairly short comments in response to video clips of short duration.

DIMENSIONS	DESCRIPTION	VALUES
A) General/Specific	Does the answer include comments related to the overall educational activity/instructional episode or does it focus on a clear and well determined specific episode?	0 - General impression 1 - Focused on event
B) Management/Climate	Does the answer include comments related to the classroom climate or management?	0 - There is no mention of classroom management or climate 1 - There is one or more comments on classroom management and/or climate
C) Content	Does the answer include comments related to specific elements of the lesson subject matter?	0 - There is no mention of lesson subject matter 1 - There is one or more comments on lesson subject matter.
D) Teaching	Does the answer include comments related to the teaching strategies?	0 - There is no mention of teaching decision 1 - There is one or more comments on teaching decision or methods
E) Learning	Does the answer include comments related to students' learning and, in this case, are they founded on theoretical assumptions or on video-evidence?	0 - There is no mention of student learning 1 - There is one or more comment on potential effect of teaching on learning 2 - There is one or more comment on visible effect of teaching on learning
F) Stance	Does the answer provide a mere description of the instructional episode or is it characterised by evaluative and/or interpretative comments?	1 - Provide descriptive and evaluative comments 2 - Provide primarily evaluative with some interpretative comments 3 - Provide interpretative comments
G) Improvement	Does the answer include suggestions aimed at improving students' learning?	0 - There is no (or vague) suggestion for improvement 1 - There are clear suggestions for improvement
H) Critical Reflection	Does the answer include critical comments on teaching?	0 - There is no critical comment on what observed in the video 1 - There is one or more critical comments on teaching

Table 1. The coding scheme: dimensions and values.

4. RESULTS

Question n. 1. What characterizes noticing skills of novice teachers (Figure 1)?

Most novice teachers in our sample (55%) focused on general aspects of the video observed, despite the question encouraged them to choose a particular episode that had attracted their attention.

Novice teachers commented more on the teaching strategies adopted by the teacher (62.50%) than on the learning process of the students (32.50%). Moreover, the majority of novice teachers limited their comments to a description of what they had observed (57.50%), rather than providing an evaluation (27.50%) or an interpretation (15%).

Finally, the vast majority of novice teachers did not suggest any change to improve the lesson (90%) and did not express any criticism of what they had observed (70%). One aspect that differs from findings of previous research is that related to focusing on classroom management and the climate of the class. Although the difference is not large, most (57.50%) of the novice teachers in our sample did not dwell on these aspects.

Question n. 2. Are there differences between the noticing skills of novice teachers and those of teachers with three or more years of teaching experience (Figure 1)?

Chi Square statistics was used to test for group differences. The analysis of the comments provided by the teachers with three or more years of experience did not reveal any significant difference between these and the comments provided by the novice teachers. In other words, noticing skills in our samples have proven similar in the two groups.

Specifically, as regards to the attention to general or specific aspects of the teaching/learning process, a greater percentage of experienced teachers noticed specific aspects (55%), but the difference between the two groups is not significant, $\chi^2 (1, N = 80) = .80, p = .37$. Regarding the attention to the classroom management and climate, a greater number of experienced teachers (57.5%) focused on these aspects than in the group of novices (42.5%), but again the difference between groups is not statistically significant, $\chi^2 (1, N = 80) = 1.80, p = .18$. Percentages are similar in terms of attention to the content of the lesson, with only 15% of novices and only 17.5% of experienced teachers commenting on the mathematics at the centre of the lesson, $\chi^2 (1, N = 80) = .09, p = .76$.

Percentages are similar between the two groups in terms of attention to the teacher and the students in the video with 60% of experienced teachers who have commented on the strategies used by teachers and 40% who have included comments focused on student learning. Attention to teaching, $\chi^2 (1, N = 80) = .05, p = .89$; attention to learning: $\chi^2 (1, N = 80) = 2.91, p = .23$.

Similar percentages of experienced teachers also described what they had observed (57.5%), rather than providing an evaluation (25%) or interpretation (17.5%), $\chi^2 (1, N = 80) = 1.15, p = .77$. Finally, percentages are even greater than those of the novice teacher group, but again not of significant relevance, among experienced teachers who did not suggest any improvement of the lesson (95%), $\chi^2 (1, N = 80) = .72, p = .34$, and made only positive comments (80%), $\chi^2 (1, N = 80) = 1.07, p = .30$.

Quantitative findings are summarized in the following tables 2 and 3 (frequency distribution) and figure 1. The subsequent table 4 reports sample comments for each coding category, thus providing concrete examples of the types of responses participants provided.

NOVICE TEACHERS								
	A	B	C	D	E	F	G	H
0	22 (55%)	23 (57,50%)	34 (85%)	15 (37,50%)	26 (65%)	0 (0%)	36 (90%)	28 (70%)
1	18 (45%)	17 (42,50%)	6 (15%)	25 (62,50%)	13 (32,50%)	23 (57,50%)	4 (10%)	12 (30%)
2	n/a	n/a	n/a	n/a	1 (2,50%)	11 (27,50%)	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a	6 (15,00%)	n/a	n/a
n.	40	40	40	40	40	40	40	40

Table 2. Frequency distribution (n =40) related to novice teachers.

TEACHERS WITH THREE OR MORE YEARS OF TEACHING EXPERIENCE								
	A	B	C	D	E	F	G	H
0	18 (45%)	17 (42.5%)	33 (82.5%)	16 (40%)	24 (60%)	1 (2.5%)	38 (95%)	32 (80%)
1	22 (55%)	123 (57.5%)	7 (17.5%)	24 (60%)	11 (27.5)	22 (55%)	2 (5%)	8 (20%)
2	n/a	n/a	n/a	n/a	5 (12.5%)	10 (25%)	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a	7 (17.5%)	n/a	n/a
n.	40	40	40	40	40	40	40	40

Table 3. Frequency distribution (n =40) related to teachers with three or more years of service.

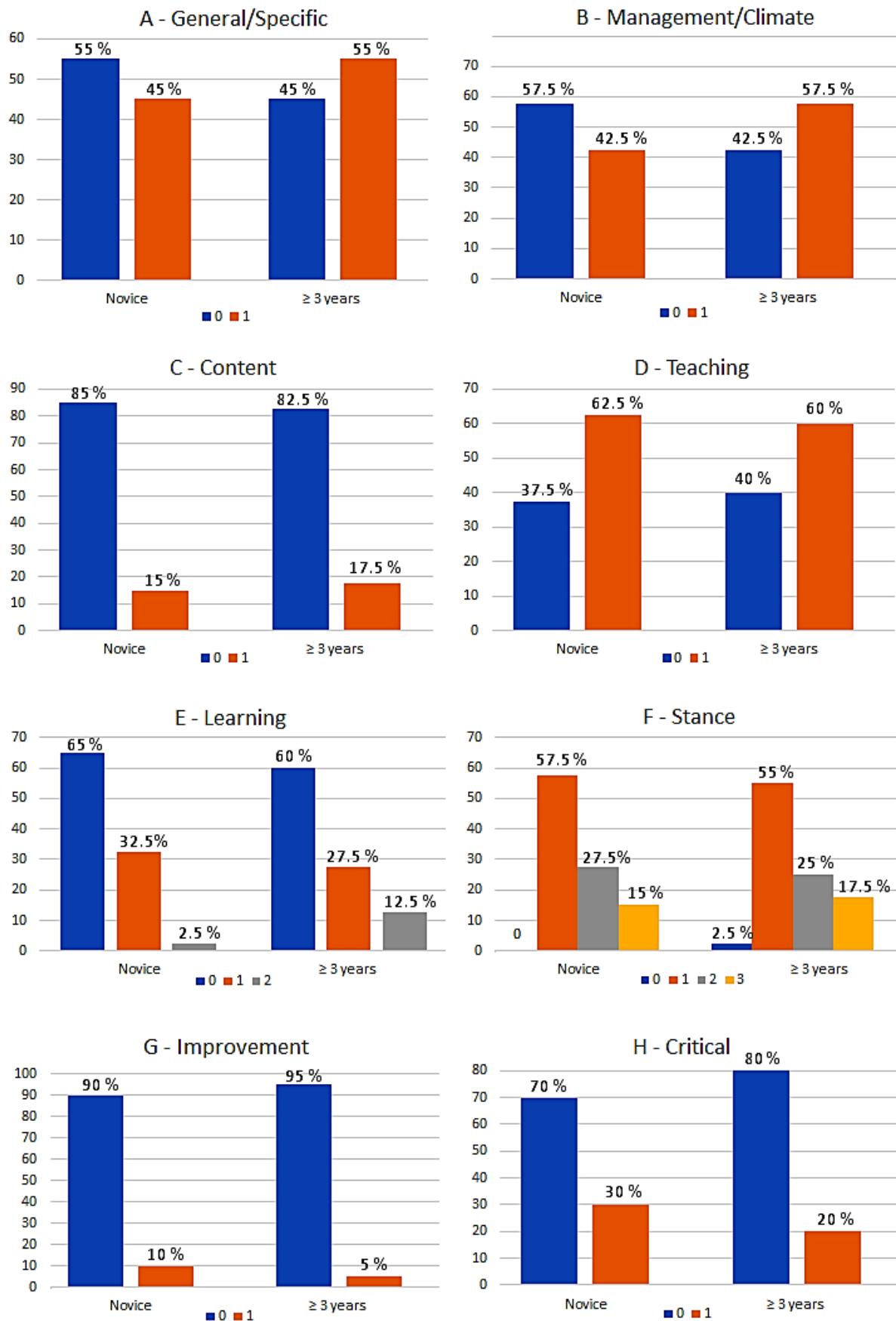


Figure 1. Data visualization (percentages of responses; n=40; 20 novices with three or more years of teaching experience).

DIMENSION	SAMPLE OF TEACHERS' COMMENTS
A) General/Specific	<p>0 - General impression The teacher explains the angle starting from the main concepts of straight line, point, plane, that is the fundamental geometric elements. The approached adopted is participatory: the learning process is constructed directly by the student at the board. The teacher work is that of guiding and completing.</p> <p>1 - Focused on event The moment in which the student Matteo is asked about the types of lines and he makes a mistake by defining them as parallel, instead of the two sides that form the angle.</p>
B) Management/climate	<p>0 - There is no mention of classroom management or climate The teacher invites the student to lead the summary of what students already know. This way, her role is that of eliciting answers and leading the student to draw conclusions through the elaboration of the topic main concepts.</p> <p>1 - There is one or more comments on classroom management and/or climate The child seemed to be very happy to be able to work on the board ...this seems to indicate a good rapport with the teacher and feeling comfortable with the group of classmates.</p>
C) Content	<p>0 - There is no mention of lesson subject matter The teacher formalizes a concept, but it is the learner, although guided by her questions, that constructs the concept.</p> <p>1 - There is one or more comments on lesson subject matter The teacher begins the lesson by asking a few questions to the class on topics from the prior lesson (the three fundamental geometric elements: the straight line, the point, and the plane) to talk about the straight line. Then she called a student to draw the straight line, then two half-lines with the same origin that do not belong to same straight line to explain the concept of angle.</p>
D) Teaching	<p>0 - There is no mention of teaching decision I was struck by the fact that the student was able to use the board autonomously.</p> <p>1 - There is one or more comments on teaching decision or methods I was struck by the fact that the teacher does not offer to the class any feedback when she receives answers. She does not thank students for participating, she doesn't say whether the answer is right or wrong, she doesn't say "good" when the answer is correct.</p>
E) Learning	<p>0 - There is no mention of student learning The teacher explains the new lesson starting from students' prior knowledge.</p> <p>1 - There is one or more comment on potential effect of teaching on learning This moment is particularly significant because it allows all students to remember what they had done previously thanks both to the teacher questions and to the explanation and graphic representation provided by the classmate and specifically because of the continuous interventions by the teacher who underlines the most important concepts giving the entire class the opportunity to handle the new topic.</p>

	<p>2 - There is one or more comment on visible effect of teaching on learning</p> <p>... the teacher could have investigated further the reason why one of the students thought the half-lines drawn by his classmate could be called “parallel” lines. The pupil's answer highlights, in my opinion, that not all the class, even though they have certainly already encountered the topic of reciprocal positions between straight lines, masters those concepts and their terminology. The teacher seems (for what little you see from the video) not to give much weight to the wrong answer of the student ...</p>
F) Stance	<p>1 - Provide descriptive and evaluative comments</p> <p>More than an episode I would talk about the absolutely calm and participatory general climate of the class. Thanks to the serene and participatory climate, students can learn more easily and experience the school as a welcoming and pleasant environment, and the teacher's work is certainly easier and more rewarding.</p> <p>2 - Provide primarily evaluative with some interpretative comments</p> <p>The lesson appears cold and detached from the first minutes, the teacher immediately asks a question to the students for feedback on previous lessons but it is clear that this is a model class not corresponding to reality. It is a one-way didactics (the teacher transfers her knowledge without any construction or partnership) the interactive multimedia board is not utilized for its potential, it only serves to waste electricity.</p> <p>3 - Provide interpretative comments</p> <p>The episode that struck my attention was the one in which the camera took over all the students. That moment I think is significant because the faces of the students highlight concentration in the subject but does not seem that everyone has understood the concepts illustrated by the teacher. In particular (taking into account the brevity of the video) I have the perception that the lesson revolves around only two students, Giulio and Lorenzo. The latter, and only him, seems to have understood the topic well. At one point, the teacher gives the floor to another student, Matteo, who does not seem to have understood a concept. The teacher corrects his mistake without understanding the reason why Matteo provided the wrong answer. The teacher, in my opinion, is too focused on carrying out her lesson without considering what is around her (the class) ...</p>
G) Improvement	<p>0 - There is no (or vague) suggestion for improvement</p> <p>Using the board distracts attention and prevents the teacher from noting what some students actually do.</p> <p>1 - There is clear suggestion for improvement that addressed</p> <p>I have been struck by the fact that when the child makes a mistake about two parallel lines the teacher does not pay particular attention to correcting the wrong concept, going on almost as if nothing had happened. The moment is particularly significant because it would have been possible to take advantage of the opportunity to review a concept that for that child (but I think for others) was obviously not clear. In her place, I would have avoided continuing with the lesson and I would have returned to the concept of parallel lines continuing with the lesson later.</p>
H) Critical	<p>0 - There is no critical comment on what observed in the video</p> <p>What struck my attention, apart from the excellent behavior of the students, unusual in today's classes, was the speed and precision with which the kid called at the blackboard responds to a topic not yet covered. Stimulated by the questions of the teacher, she defines precisely the angle not having yet faced the study of that geometric entity.</p> <p>1 - There is one or more critical comments on teaching</p> <p>The pupil who writes the definition without drawing the figure. In this case there is a real risk of memorizing the definition without associating it with a significant image, which will be useful in the continuation of the geometry program.</p>

Table 4. Sample of teachers' comments.

5. DISCUSSION AND CONCLUSIONS

This study aimed to examine the noticing skills of a sample of Italian novice teachers and to compare it to the noticing skills of a sample of Italian teachers with three or more years of service. Two research questions were considered: What characterizes novice teachers' noticing skills? And are there differences between noticing skills of novice teachers and of teachers with three or more years of teaching experience?

We discuss findings related to each question. Overall, the evidence we gathered on novice teachers' noticing skills confirms prior findings in the literature: this sample of novice Italian teachers mostly described what they observed in the videotaped lesson, did not focus on the mathematical content, focused on the teacher's actions, did not demonstrate a critical stance and did not suggest instructional improvements (Santagata et al., 2007). Contrary to other studies involving novice teachers (e.g., Star & Strickland, 2008), the majority of this study's novice participants did not focus on issues of climate or classroom management. The nature of the interaction between the teacher and the students in the video that participants watched might explain this discrepancy in findings. There were no instances of challenging behaviours on the part of students apparent in the video and overall the classroom climate was positive. It would be worth examining whether novice teachers tend to comment more on classroom management and climate when issues are evident and omit comments when instruction runs smoothly. This also highlights a study limitation: using only one clip as prompt for teacher noticing.

In regard to the second research question, this study did not find any statistically significant differences between the professional vision of novice and more experienced teachers. Percentages were similar between the two groups in terms of attending to the actions of the teacher in the video rather than focusing on student learning, comments centred on description of what was observed rather than evaluation or interpretation, and limited suggestions for improvement. These findings contrast with prior research that has concluded that teachers with more experience are better at aspects of noticing related to knowledge-based reasoning and, more broadly, are better at attending to the complexity of the teaching-learning process (Berliner, 2001; Berthoff, 1987; Cochran-Smith & Lytle, 1993, 1999; Sabers et al., 1991; Schön, 1983).

Although group differences were not significant, it is worth noting that contrary to novice teachers, the majority of teachers with three or more years of experience were able to identify specific episodes in the video and comment on them and also discussed classroom management and climate, mostly highlighting it in positive terms. It is plausible that their experience prompted them to notice a positive classroom climate because they better understand how student behaviour is directly related to teachers' ability to structure instruction in ways that minimize disruptions. Although we expected a significant difference between the two groups in the identification of specific episodes, this tendency is in accordance with prior research that finds that experience supports the development of teachers' ability to identify instructional episodes worth examining in depth (Borko & Livingston, 1989).

Overall, the lack of statistically significant differences between the two groups points to three considerations. First, these findings might be due to the specific dimensions on which we chose to focus our analyses of teacher comments. In other words, it is possible that in considering differences in noticing skills between novice and more experienced teachers, the categories on which researchers base their analyses lead to different results. More studies are necessary that describe in detail the dimensions of professional vision that are examined and replicate the same study design with samples of teachers from different contexts and different countries. A second hypothesis is that the group of experienced teachers we involved in the study had not developed enough expertise yet. One could argue that three or four years of experience, for example, only afford teachers to be more comfortable with their

instructional decisions but does not provide sufficient opportunities to develop a student-centred and critical lens. Alternatively, prior studies have suggested that experience in itself does not impact noticing skills. What supports teachers' ability to "see" more and in more complex ways is deliberate practice and systematic reflection (Blömeke, Suhl, & Kaiser, 2011; Kaiser et al. 2017; Santagata, Yeh, & Mercado, 2018). Thus, it is possible that the lack of significant differences among our two groups of teachers is due to limited opportunities participants in our sample of experienced teachers had to systematically analyse teaching and learning interactions and specifically centre reflections on student learning during instruction. Professional development experiences that centre the work of teaching specifically on close analysis of practice and of student thinking, such as Lesson Study (Lewis, Perry & Hurd, 2004), Video Clubs (van Es & Sherin, 2008), or Lesson Analysis (Santagata, Yeh, & Mercado, 2018) have proven that frameworks and highly-trained facilitators are necessary for teachers to significantly improve their noticing skills.

6. ACKNOWLEDGMENTS

This research has been partially supported by Regione Autonoma della Sardegna, project Visiting Scientists Programme 2015 (Regional Law n.7/2007 'Promotion of scientific research and technological innovation in Sardinia').

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