Giornale Italiano della Ricerca Educativa
Italian Journal of Educational Research

Video analysis as a learning tool to promote the quality of teaching: from school teachers' education to university teachers' professional development

La videoanalisi come dispositivo per promuovere la qualità della didattica: dalla formazione degli insegnanti allo sviluppo professionale dei docenti universitari

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Double blind peer review

Citation: Ciani, A., Rosa, A., Santagata, R., (2021). Video analysis as a learning tool to promote the quality of teaching: from school teachers' education to university teachers' professional development. *Italian Journal of Educational Research*, 27, 40-51.

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Received: September 30, 2021
Accepted: December 1, 2021
Published: December 23, 2021

Pensa MultiMedia / ISSN 2038-9744
https://doi10.7346/sird-022021-p40

Abstract
The use of video as a learning tool in initial and continuing teacher education has increasingly spread over the past decades and has changed over time in line with technological advancements and according to different purposes, from being a means to illustrate good teaching practices to a medium for promoting critical reflection on action and helping teachers develop their "professional vision". Based on these premises, the contribution presents theoretical and empirical perspectives on the use of video for teacher education in order to outline the conceptual framework underlying a research project aimed at investigating the potential of video analysis in contexts of professional development of university teachers. The first section of the paper therefore offers an overview of existing research on video-based teacher education, with a focus on developments in the approaches to the use of video for teacher learning purposes and on empirical evidence on effectiveness and impact of video-based training to promote teacher change processes. Building on this theoretical framework, the second part of the contribution outlines some directions for the use of video for the professional development of university teachers and presents the objectives and design of the *Video Analysis for quality teaching in Higher Education* (VAHE) project, a research path in progress aimed at developing and testing a system of methodologies, tools and procedures for video analysis to foster the improvement of teaching skills of university teachers.

Keywords: video analysis; teacher education; noticing; professional vision; university teachers' professional development.

Riassunto
L'uso del video nella formazione iniziale e continua degli insegnanti si è sempre più diffuso negli ultimi decenni ed è cambiato nel tempo in linea con gli sviluppi delle tecnologie digitali e con l'evoluzione delle finalità connesse al suo impiego, da mezzo per illustrare buone pratiche didattiche a dispositivo per promuovere processi di riflessione critica sull'azione e aiutare gli insegnanti a sviluppare la loro "visione professionale". A partire da tali premesse, il contributo presenta una ricognizione della letteratura sul tema al fine di delineare il quadro teorico alla base di un progetto di ricerca volto a indagare le potenzialità della videoanalisi in contesti di sviluppo professionale dei docenti universitari. La prima sezione dell'articolo offre dunque una panoramica della ricerca internazionale sulla formazione *video-based* degli insegnanti, con un focus sugli sviluppi negli approcci all'uso del video per sostenere l'apprendimento degli insegnanti e sulle evidenze empiriche relative alla sua efficacia nel promuovere processi di *teacher change*. In relazione al quadro delineato, nella seconda parte vengono proposti alcuni orientamenti per l'uso del video per lo sviluppo professionale dei docenti universitari e presentati gli obiettivi e il disegno del progetto *Video Analysis for quality teaching in Higher Education* (VAHE), un percorso di ricerca in corso di realizzazione finalizzato a mettere a punto e testare un sistema di metodologie, strumenti e procedure per la videoanalisi a supporto del miglioramento delle competenze didattiche dei docenti universitari.

Parole chiave: videoanalisi; formazione degli insegnanti; noticing; professional vision; sviluppo professionale dei docenti universitari.

Credit author statement

The overall structure of the contribution is the result of a shared reflection of the Authors. Paragraphs 4, 4.2 and 5 were written by Andrea Ciani; Paragraphs 1, 2, 2.1, 2.2 and 4.1 were written by Alessandra Rosa; Paragraph 3 were written by Rossella Santagata.

1. Introduction

Among the fields in which the use of video as a learning tool has increasingly spread over the past decades, teacher education appears to be characterized by a particularly rich landscape of studies and experiences. As evidenced by the breadth of international literature on the topic, the use of video in educational research to examine and improve teaching practice has intensified and taken different forms over time, and many video-based programs have been designed and implemented – according to different approaches, aims and strategies – both in pre-service teacher education and in-service professional development, but also in entry training for beginning teachers during the induction phase (Mangione & Rosa, 2017; West et al., 2009).

Alongside the formal paths and settings, the diffusion of interesting "informal" experiences of collaborative learning, in which groups of teachers choose to analyze and discuss together video-recorded teaching practices, should also be mentioned. These experiences, facilitated by the development of online platforms for video sharing (Calvani et al., 2014), have contributed in some cases to outiline specific models for teachers' professional development like *Video Club* or *Lesson Study* (van Es, 2014; Doig & Groves, 2011).

Based on these premises, this contribution presents theoretical and empirical perspectives on the use of video for initial and continuing teacher education in order to outline the conceptual framework underlying a research project aimed at investigating the potential of video analysis in contexts of professional development of university teachers.

The first section of the paper therefore offers an overview of existing research on video-based teacher education, with a focus on two thematic areas: the developments in the approaches to the use of video for teacher learning purposes and the empirical evidence on effectiveness and impact of video-based training to promote teacher change processes. Building on this theoretical framework and research conducted in school contexts, the second part of the contribution outlines some directions for the use of video for the professional development of university teachers and presents the objectives and design of the *Video Analysis for quality teaching in Higher Education* (VAHE) project, a research path in progress aimed at developing and testing a system of methodologies, tools and procedures for video analysis to foster the improvement of teaching skills of university teachers.

2. Video as a learning tool in initial and continuing teacher education

Beyond the differences in terms of approaches, procedures and tools, the use of video for teacher learning purposes presents some general advantages. First, in line with the experiential learning model proposed by Kolb (1984), the video offers the opportunity of an engagement with the experience, with the analysis of teaching in real contexts, fostering a process of recursive interaction between theory and practice (Balzaretti et al., 2018; Santagata, Zannoni & Stigler, 2007; Santagata & Yeh, 2014; Seidel, Blomberg & Renkl, 2013). In this regard, Sherin and van Es (2009) state that the growing popularity of video reflects in part the recent emphasis on *practice-based* professional development, in which teachers have the opportunity to learn from authentic representations of their own and others practice: video can be thought of as a "secondhand" experience of teaching, allowing one to be immersed in a classroom situation without the pressures, responsabilities and concerns related to immediate action (Blomberg et al., 2013; Blomberg et al., 2014). Secondly, in connection with the previous aspect, there are the advantages generally associated with video-based systematic observation procedures with respect to those of direct observation "in real time". In particular, video provides a permanent recording that captures the complexity of classroom interactions, allowing teachers to examine it with multiple objectives and from different perspectives; the observer can also stop the tape and review certain segments, focusing on the details of observed events; finally, video facilitates a shift from an individual dimension to a collective one in observation, since the same video can be shared by different observers in a perspective of intersubjective analysis (Hatch & Grossman, 2009; Stigler, Gallimore & Hiebert, 2000).

How these general benefits of using video for teacher learning have been exploited in the context of specific programs, as well as the type of results achieved, depends on the instructional approaches adopted. Although it is difficult to summarize a very broad and articulated debate, a brief discussion is proposed

here organized around two focuses: how the approaches to the use of video in teacher education have evolved in terms of theoretical perspectives and methodologies, and what empirical evidence emerges on effectiveness and impact of video-based teacher training.

2.1 Instructional approaches to the use of video in teacher education

In relation to the first theme, we can observe that, starting from the first and pioneering *microteaching* experiences at Stanford University in the 1960s (Allen & Clark, 1967; Johnson, 1967), the use of video in teacher education has been proposed over time based on very different aims and strategies, influenced by developments both in teaching and learning theories and in digital technologies.

From some classification attempts identified in the literature, two main macro-categories seem to emerge – differently named by the various scholars but similar in terms of meaning and content – in which to group together the different instructional approaches based on the learning objectives of video viewing and the underlying assumptions. For example, Seidel, Blomberg and Renkl (2013) present the distinction, also articulated by Gentile and Tacconi (2016), between *rule-example* and *example-rule* approaches. Gaudin and Chaliès (2015) distinguish between *normative* and *developmental* approaches, while Leblanc & Veyrunes (2011) between *appropriation* and *exploration* approaches. In the same vein, Blomberg et al. (2013, 2014) contrast *cognitive* and *situative/situated* approaches.

In all cases, the first category of each pair essentially identifies those approaches – mainly used in preservice teacher education – in which the intention supporting the use of video is to promote the acquisition of pedagogical knowledge and skills by providing teachers the opportunity of seeing them represented in videotaped classroom situations (according to a logic that proceeds from the rule to the example), applying them to the analysis of such situations, and try using them in their own teaching practice. As stated by Sherin and van Es (2009), in this prescriptive approach video is generally used to illustrate exemplary or good teaching practices: the objectives of video viewing focus on "learning to teach", on acquiring an adequate repertoire of effective teaching strategies and on the ability to reproduce them in one's own classroom.

This kind of perspective can be identified, for example, in the initial microteaching experiences consistent with the cultural frame of the time, oriented to behavioral modeling (Calvani, Bonaiuti & Andreocci, 2011). Leblanc & Veyrunes (2011) refer to this approach also training practices based on the study of video cases, intended as episodes or typical situations functional to exemplify key concepts and highlight causal relationships between certain strategies and their effects.

The second macro-category of each above-mentioned pair, which reflects the orientations of the most recent literature in line with the broader developments in teacher education approaches, proposes a different perspective on the role of video and its educational potential. Here the logic is reversed, proceeds from the example to the rule according to an inductive and participatory approach. Based on this perspective, particularly suitable for in-service teacher training but useful also in initial education (Gaudin & Chaliès, 2015), video becomes a medium for reflection on action: it is used not to show to the teachers "best practices" to be reproduced in their own classrooms, but as a springboard for analysis and discussion about examples of "ordinary" classroom situations in which they can identify themselves or even involving them personally in the observation of themselves. This possibility of direct or indirect mirroring, mediated by the video, aims to put teachers in a position to learn to critically examine the details of the teaching and learning processes, to interpret them in connection with pedagogical theories and principles and their own experience, to question themselves about their beliefs and practices and developing new perspectives of thought and action.

The construct currently most used to summarize the educational objectives associated with such approach is that of *professional vision*, first introduced by Goodwin (1994) to describe the distinctive ability shared by members of a professional group to see and understand events central to their work. It identifies a complex area of competence, recognized as an important element of teacher expertise that can be developed in teacher education, consisting of two main subprocesses (Gaudin & Chaliès, 2015; Gentile & Tacconi, 2016; Michalsky, 2014; Sherin & van Es, 2009): (a) the first, *noticing*, refers to the ability to discern and focus selectively attention on significant moments and aspects of complex classroom situations; (b) the second, *reasoning*, concerns the ability to interpret and reflect on what is noticed based on one's own professional knowledge and experience and can be articulated in the qualitatively different levels of

description, explanation and prediction (Seidel & Stürmer, 2014). These two sub-processes can favor a third process, linked to the first two in a system of recursive interactions (Barnhart & van Es, 2015), referred to the ability to use what has been learned through observation and analysis to making decisions about how to improve practice.

Video Clubs in the United States (Sherin & Han, 2004; van Es, 2014; van Es & Sherin, 2010) and the Japanese *Lesson Study* (Doig & Groves, 2011; Maltinti, 2014), previously cited in this paper, provide examples of professional development models based on this second type of approach, of which they emphasize a further distinctive dimension: the importance given to the comparison between different points of view in supporting and enriching reflection and promoting the change of assumptions and practices (Borko et al., 2008). In fact, both models aim to activate opportunities for shared analysis and discussion through peer to peer video observation, where in a reciprocal and alternating manner teachers hold the roles of both observed and observer (Ferretti & Vannini, 2017).

The use of video in teacher education programs has therefore progressed and broadened over time from being a means to expose teachers to specific behaviors to be emulated to a tool for the development of teachers' professional judgment (Santagata et al., 2007). Both approaches recognize the value of working with authentic scenarios such as provided by video; however, they use real world scenarios in different ways. Media such as video should be regarded as neutral in character until it is embedded in a specific instructional program (Blomberg et al., 2014); its potential as a resource for learning is defined by a clear definition of the learning objectives. In this regard, the distinction between the two approaches previously outlined should not be understood as a rigid alternative: in the same teacher education or professional development course it is possible to combine them, using an "hybrid approach" that integrates their potential in relation to different learning goals (Gaudin & Chaliès, 2015).

Making the learning objectives explicit is therefore the first and most important step for all the decisions to be taken later in order to embed video in a well-conceptualized learning environment. Based on frameworks and directions proposed over time in the literature (Blomberg et al., 2013; Roth et al., 2017; Santagata, 2012), the main instructional choices to be made for effective video-based training concern the following main dimensions.

Types of video. The choice of appropriate video material play a central role in the program design and involves two main questions: do we want to show videos in which the actors are the teachers participating in training or videos of unknown teachers? Do we want to show videos that illustrates exemplary teaching practices or more typical ones? As we have seen, the choice between these options should depend on the instructional approach and the learning goal at hand. Some comparative studies (Beisiegel, Mitchell & Hill, 2018; Gaudin & Chaliès, 2015; Seidel et al., 2011) show that each of them presents potential benefits and criticalities: for example, observing oneself and one's colleagues in authentic classroom situations is more suitable to motivate and actively engage teachers with video material and stimulates more substantive reflection on one's own practices and beliefs, but can create for participants some difficulties and resistance; on the other hand, using video of external teachers creates a distance that can inhibit identification and involvement, but foster more critical analysis and discussion and appears more suitable when teachers (e.g., at the beginning of a training course) are not familiar with video analysis of professional practices.

Support for teachers. Providing specific "guides" or "lenses" for video observation and analysis is essential to prevent teachers from feeling disoriented faced with a complex and often new task, focusing on general impressions and superficial aspects or just seeing what is most important to them. The *Lesson Analysis Framework* by Santagata and colleagues (e.g. Santagata & Guarino, 2011) is an example of scaffolding tool that structures noticing and reasoning processes around a series of questions intended to guide teachers when they work with video examples. The use of observation grids or coding schemes also can helps teachers directing attention to particular features of classroom interactions and focusing on specific teaching quality indicators (Schoenfeld, 2018; Seidel & Stürmer, 2014). The role of the trainer is another essential element to support and guide teacher analytical and reflective thinking and to create a good learning climate, encouraging the exchange of feedback within productive and engaging discussions. Depending on the teacher education approach and the learning objectives, it can take different forms: when the intention is to promote professional vision skills, participant teachers should be put at the center of the processes

and the expert/trainer takes on the role of facilitator, requiring more indirect guidance in terms of support for group thinking processes (Beisiegel et al., 2018; Tekkumru-Kisa & Stein, 2017; van Es et al., 2014; van Es & Sherin, 2017). Other types of support concern how video materials are presented: segmenting the video into smaller units and offering contextual background information (e.g., short notes concerning school, class, lesson plan and content) are two suggestions emerging from the literature (Blomberg et al., 2013; Gentile & Tacconi, 2016). Even the possibilities offered in recent years by video annotation software and tools can be understood as supports for analysis and reflection, allowing the integration in the video of textual or other notes usually anchored to precise moments of the observed sequence (Bonaiuti, 2012; Calvani et al., 2011; Pérez-Torregrosa et al., 2017; Picci, 2012; Rich & Hannafin, 2009a).

Forms of assessment. The need to develop appropriate assessment instruments aligned with the learning objectives of training was particularly emphasized with respect to this dimension. Especially within the programs aiming to promote teachers' observational, analytical and reflective skills, assessment methods should be video-based in order to provide more authentic and reliable measures. In this regard, innovative assessment tools using video in combination with specific tasks – such as those developed by Michalsky (2014), Seidel and colleagues (e.g. Seidel & Stürmer, 2014), and Bonaiuti, Santagata and Vivanet (2017) to measure teachers' professional vision – offer a promising approach to align assessment with training methodologies and intended learning outcomes.

2.2 Effectiveness and impact of video-based teacher education

The discussion on the assessment of teachers' learning outcomes is linked to the second theme that we proposed to take into consideration in this section, namely the empirical evidence emerging in the literature about the effectiveness and impact of video-based teacher education.

In relation to this issue, it is useful to refer to some recent literature reviews (Gaudin & Chaliès, 2015; Major & Watson, 2018; Marsh & Mitchell, 2014) that summarize findings from several studies carried out in different contexts and with different methodological approaches, although mainly qualitative. Overall, they suggest two main areas of benefit for teachers: (a) the development of *observational and analytical skills*: teachers learn to see better and deeper, to discern more substantive and significant aspects of classroom interactions, to pay attention to the details of specific events rather than to more general and surface-level features, to focus not only on the teacher actions but on the activities and thinking of the students as well (Santagata et al., 2007; Sherin & Han, 2004; Sherin & van Es, 2005; Tripp & Rich, 2012; van Es & Sherin, 2002); (b) the development of *interpretative and reflective skills*: video analysis enriches the capacity to examine the observed events shift from partial and descriptive analysis to more focused, specific, and interpretative one (e.g., interpretation of the reasons for and consequences of the decisions made by the videoed teacher), move the reflections of the trainee teachers from vague and general impressions towards a more critical analysis of classroom interactions, promote self-evaluation allowing them to critically examine their beliefs about teaching and learning and to think about improvements in their practice (Borko et al., 2008; Rich & Hannafin, 2009b; Rosaen et al., 2008, 2010; Santagata & Angelici, 2010; Santagata & Guarino, 2011; Sherin & van Es, 2005).

The impact of video-based training on *teaching practices* seems to be less explored in the literature. Some studies, however, found positive effects also in this area: teachers who participated in video-based professional development were able to transfer the observational and reflective skills they learned to their classroom and to the analysis of their own teaching, adopting an inquiry stance helping them to see their teaching as something that can be studied, questioned and continuously improved (Gaudin et al., 2014; Santagata & Yeh, 2014; Sherin & van Es, 2009).

Other effects observed by some scholars concern the motivational dimension, for example the improvement of self-efficacy beliefs (Ferretti & Vannini, 2017; Meyer, 2012), or that of theoretical and procedural knowledge, centered on the acquisition of pedagogical knowledge and skills (Plöger, Scholl & Seifert, 2018).

As stated by many scholars, measuring the effectiveness and impact of video-based teacher training is a complex issue which requires further investigation, including with research designs involving larger samples and adopting experimental and longitudinal approaches. Some studies carried out comparing different

groups of teachers reveal, for example, the differences in the effects on teachers linked to different approaches to the use of video (Blomberg et al., 2014; Gaudin et al., 2014; Seidel et al., 2013), highlighting how the choice of professional development strategies affects the type of learning outcomes that can be expected. In addition, the comparison between video-based and more traditional professional development methodologies is important to grasp the specific potential linked to the use of video, as shown for example by the experimental study carried out by Plöger and colleagues (2018).

Available evidence suggests, however, that the use of video in teacher education and professional development, as well as being motivating and engaging for teachers (Gaudin & Chaliès, 2015), can be effective as a means of promoting *teacher change* (Tripp & Rich, 2012).

From the literature examined it emerges that using video for teacher learning is a widespread practice and over the past decades a considerable amount of research has investigated this topic and found promising results in terms of promoting change in teachers' knowledge, beliefs, attitudes and practices.

In relation to the need to provide opportunities for professional growth also to university teachers – currently outlined as strategic objective in European and international policies on teaching quality assurance in higher education (EHEA Ministerial Conference, 2015, 2018; OECD, 2012) – we therefore consider the hypothesis that video analysis can also be used in professional development programs for university teachers as a valid and useful tool to foster the improvement of their teaching skills.

3. Directions for the use of video for the professional development of university teachers

As video is integrated as a tool for supporting the development of professional vision of university teachers, it will be productive to build on existing research conducted in school contexts (Santagata et al., 2021). As mentioned above, this research underlines the importance of making explicit the theoretical perspective that guides the professional development approach as well as the specific learning goals for university teachers. In addition, the inclusion of formative assessments to monitor university teacher experiences and learning as they unfold would allow to continously improve video-based professional development programs to address the specific needs of university teachers. Finally, two areas that are currently understudied in the professional development of school teachers could be examined in university contexts. These include the use of video annotation technologies that allow video viewers to ground their noticing and collaborative reflection on specific instances of instruction and attention to inclusive teaching practices that support equitable university teaching.

The process of teacher noticing, due to its peculiarities, helps teachers to get in touch with their own beliefs and, according to research in the field of mathematics teaching at school, teachers who use productive noticing improve the quality of their teaching (Kersting et al., 2021) and student learning (Berliner, 2001; Erickson, 2007; Franke et al., 2001; van Es & Sherin, 2008). Teacher noticing would therefore also involve the university context in a perspective of *responsive teaching* (Kang & Anderson, 2015): a teaching that is attentive and sensitive to students' learning as well as to their cognitive, emotional and motivational activation. Responsive teaching practice «is characterized by teachers using student thinking to guide instructional decisions. This type of teaching is seen as highly adaptive; the teacher shifts the direction an interaction, lesson, or unit over time based on teachers' in-process understanding of student thinking. This adaption is similar to the more general idea of teachers incorporating formative assessment practices […]» (Dyer & Sherin, 2016, p. 70). In this sense, the video annotation of formative assessment strategies within the professional development programs for university teachers can be strategic: it allows them to reflect on the operational aspects of their teaching, but also on the level of equity and inclusiveness of their teaching practices.

4. *Video Analysis for quality teaching in Higher Education*: a research project to promote video-based professional development of university teachers

Based on the theoretical framework and perspectives outlined, the *Video Analysis for quality teaching in Higher Education* (VAHE) project presented in this section was conceived with the aim of investigating the potential of video analysis in contexts of professional development of university teachers. Launched

in the academic year 2019-2020, it is promoted by the Department of Education[1] of the University of Bologna as part of the institutional strategy for teaching innovation and carried out with the collaboration of two partner institutions: the School of Education of the University of California, Irvine (UCI) and the School of Education of the University of South Australia (UniSA). The Media Education Laboratory (MELA) of the UNIBO Department of Education is also involved in the project for technical aspects.

The VAHE research project pursues the following objectives:

- develop an organic system of methodologies, tools and procedures for video analysis to foster the improvement of teaching skills of university teachers;
- test the system within a pilot training course aimed at UNIBO teachers;
- validate a video-based training model for the professional development of university teachers.

The general hypothesis underlying the research is that the use of video analysis, if supported by tools that identify specific dimensions and indicators of high-quality instruction and embedded in a well-conceptualized training setting designed to engage small groups of university teachers in collective analysis and reflection about concrete examples of teaching practices in higher education, can promote the development of noticing and reasoning skills and foster teacher change processes (Tripp & Rich, 2012).

The choice to present the project in this contribution stems from the desire to highlight:

- an example of international collaboration between universities interested in promoting the professional development of their teachers with innovative paths and an experience representative of new research perspectives on video analysis;
- the prominent role of videos and their analysis in supporting processes of change in teachers' beliefs and practices;
- the specific focus of attention in video analysis sessions, namely informal formative assessment practices. In this sense, university teachers are asked to observe assessment strategies integrated in everyday classroom activities and aimed at making teaching transparent and participatory;
- the main purpose of the project that aims to promote quality and equity in university teaching, trying to solicit teachers' critical thinking and an attitude open to revision;
- the implicit but substantial other purpose of the project that aims to solicit serious reflection on selective and authoritarian teaching styles that preclude learning opportunities for all students in the university.

4.1 Research phases and methodology

The VAHE research project was structured in three main phases briefly described below.

Theoretical elaboration and technological setting-up phase. In this first phase of the project the research group worked on three action lines:

- review and in-depth analysis of existing research on video analysis and teacher education, functional to the modeling of the pilot training course in terms of approach, methodologies and procedures;
- definition of the theoretical framework for video analysis, which led to identifying in the Informal Formative Assessment (IFA) strategies the specific dimensions of university teaching on which to focus the training intervention (O'Keeffe, Rosa, Vannini & White, 2020). The IFA construct defined within the project – articulated in four macro-dimensions (*Structuring*, *Eliciting*, *Reacting/Using*, *Learning Climate*) which in turn include specific sub-dimensions – was then operationalized through the development of an *IFA indicator system* for the observation and analysis of videos;

1 The project involves an interdisciplinary group of researchers from the UNIBO Department of Education – namely Andrea Ciani, Maurizio Fabbri, Consuelo Mameli, Licia Masoni, Elena Pacetti, Alessandra Rosa, Alessandro Soriani, Ira Vannini (Scientific Coordinator) - experts in the fields of educational research and evaluation, teaching methodologies and technologies, teacher education and professional development, educational and developmental psychology, and philosophy of education.

- implementation of the technological infrastructures necessary for the realization of the pilot course, namely: a web repository of videos of teaching practices in higher education, in which we have archived and integrated with specific metadata various video sequences cut from some lessons filmed at different UNIBO Departments and at the UCI School of Education; the platform for video analysis, developed through the adaptation of the UniSA OVAL platform. OVAL (*Online Video Annotation for Learning*) is a web-based application integrated with the Moodle learning platform that allows users to add shared or private annotations to specific points in the videos as well as general comments. Through the "Tag Management" function, it also allows the insertion of specific indicators to guide and structure the observation and analysis of the videos.

Exploratory research phase. This phase of the project, intended as preliminary or preparatory (Lumbelli, 2006) to the subsequent one relating to the implementation and monitoring of the pilot course, was aimed at validating the IFA indicator system through the administration of a semi-structured questionnaire to a Panel of Italian and international experts in educational research in the fields of teaching, assessment and teacher training (N. 21). The analysis of the quantitative and qualitative data collected showed good results with respect to the construct and content validity of the indicator system, allowing at the same time its revision and refinement before proceeding with its integration within the video analysis platform (Rosa, 2021).

Evaluation research phase. This research phase, contextual to the implementation of the pilot course, is aimed at evaluating the effectiveness of the training intervention through a single-group pretest-posttest design (Campbell & Stanley, 1963). Specifically, the evaluation research aims to test the hypothesis that the video-based training model defined within the project would promote in participating teachers: a shift in conceptions of the purpose of assessment in higher education toward a view more focused on improving teaching and learning processes; an increase in perceived knowledge and skills related to formative assessment; the development of noticing and reasoning skills with reference to IFA practices in university teaching. A specific focus is also placed on teachers' satisfaction with the course and their motivation/intention to apply the formative assessment strategies examined during the course in their own teaching practice.

Two semi-structured questionnaires (initial and final) and a specific video-based task were developed for the pre and post intervention collection of data relating to the variables considered.

As regards the training intervention model, in addition to the choice of focusing attention on specific teaching dimensions and indicators relating to IFA practices and intended as a "guide" or "lens" for video analysis, other relevant qualifying elements are the following:

- the use of video as a "springboard" to analyze and discuss authentic examples of ordinary classroom situations in which the videoed teachers are external to the group of training participants, a condition that facilitates the appropriation of a method for analyzing professional practices and favors greater involvement in peer discussions and critical reflection;
- the adoption of an active and collaborative approach in which the expert/trainer takes on the role of facilitator to support the analytical and reflective thinking of the teachers, for example by orienting them to specific noticing and reasoning tasks, sustaining an inquiry stance during discussion, soliciting the comparison between the observed and their own teaching practices.

4.2 The pilot training course

The pilot training course took place in June-July 2021 at the Department of Education of the University of Bologna. It was designed and conducted by the interdisciplinary research group of the Department of Education involved in the VAHE Project (see footnote 1), with the collaboration and supervision of the international partners. The course was attended by 13 university teachers[2] (researchers, associate and full professors) from the UNIBO Department of Civil, Chemical, Environmental and Materials Engineering (DICAM). The proposal for an involvement in the pilot course was positively received by this Department,

2 For reasons related to the nature and purpose of the training course, a maximum number of 15 participants was established.

which in the context of previous collaborations with the Department of Education had expressed great interest in training opportunities aimed at supporting the improvement and innovation of teaching.

The course was divided into three 3-hour meetings (the first in mid-June, the second in early July, the third in mid-July), with an additional 3-hour follow-up meeting in early October 2021. As already explained, it was based on the assumption that, through the video analysis methodology, the participating teachers could develop not only a good noticing ability related to IFA practices in university teaching, but above all a critical and reflective attitude on teaching and learning processes, especially on their own practices. For this reason, particular attention was paid to moments of sharing the teaching difficulties experienced by participants and to the subsequent discussion on possible improvement strategies. The theoretical framework of the IFA construct, in this sense, has particularly prompted reflection on the possibility of monitoring students' learning as well as promoting their involvement in university lessons.

Before the start of the course, participants were given the initial questionnaire online. The first meeting included the initial video-based task mentioned above, before moving into the systematic use of video analysis. The IFA construct was presented and examined, and the first dimension of this theoretical framework (Structuring) was analyzed with the support of video sequences previously selected by the research group and associated with specific individual and small group activities aimed at guiding teachers in the recognition, analysis and reflection on specific Structuring strategies. During the second and third meetings, the other three dimensions of the IFA construct (Eliciting, Reacting/Using and Learning Climate) were examined with the same approach and video analysis methodologies. In the third and last meeting, the video-based task carried out at the beginning of the course was also repeated, while the final questionnaire was administered in the following days.

The follow-up meeting was held more than two months after the end of the course, in a period corresponding to the start of the teaching activities at the University of Bologna and therefore for the participating teachers. In addition to reviewing the main aspects of the teaching strategies examined during the course, in this meeting it was possible to explore, with a focus group, not only the strengths and weaknesses of the course by deepening the feedback given by participants in the final questionnaire, but also the possible transfer of what was learned during the course into one's own teaching practices (changes implemented or hypotheses of changes to be implemented in their teaching).

Data analysis is currently underway in order to conclude the phase of evaluation of the pilot course and design new video-based training paths for university teachers taking into account the information and indications collected. However, some general elements that emerged clearly during the course are the following:

- the functionality of the video analysis methodology to create guided moments of dialogue and comparison;
- the progressive attitude of the participants to ask questions and make considerations about their own teaching;
- the need for a longer course, with more hours available to deepen reflection and discussion on the teaching strategies taken into consideration and their application in practice.

5. Conclusions

This contribution is the synthesis of years of dialogue and confrontation between researchers and universities from different countries on the issues of video analysis for teacher learning purposes, recently crowned with the collaboration within the VAHE project.

In line with the assumptions and objectives of the project, the research path outlined aims to produce useful suggestions and indications on the use of video analysis to improve the teaching skills of university teachers. Through the informations collected in relation to the pilot course, it can contribute to an initial validation of a video-based training model that is expected to be tested in further professional development paths for university teachers, also in collaboration with UCI and UniSA. At the University of Bologna, the possibility of activating specific training courses in collaboration with the UNIBO Learning and Teaching Center is currently being explored.

The use of video has potential yet to be investigated within educational contexts, especially with regard to continuing teacher education. The potential of video analysis can be even greater in the university context, where faculty have rarely been involved in processes of analysis and reflection on the quality of their teaching. In this sense, the activity of video analysis can act as an agent of democratization of teaching and learning processes, but also relational in contexts unaccustomed to research activities and self-assessment on "themselves".

The challenges and perspectives of video-based professional development programs for teachers interrogate, therefore, the issues of equity, inclusion and justice within teaching processes. From this perspective, the use of video powerfully makes visible educational back thoughts, beliefs, and misconceptions through behaviors, actions, verbal and nonverbal language. The possibility, through observation and reasoning, to recognize selective teaching actions and beliefs attributable to so-called *deficit thinking* (Valencia, 1997), can trigger interesting reflections for real and equitable changes.

Conflict of interests

The authors declare no conflict of interest.

References

Allen, D., & Clark, R. (1967). Microteaching: Its rationale. *High School Journal*, *51*(2), 75-79.

Balzaretti, N., Leonard, S.M., Lim, L., Unsworth, P., & Vannini, I. (2018). Innovating methodology through international collaboration: Expanding the use of video analysis for understanding learning designs. *Italian Journal of Educational Research*, 21, 11-30.

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*(2), 83-93.

Beisiegel, M., Mitchell, R., & Hill, H.C. (2018). The design of video-based professional development: An exploratory experiment intended to identify effective features. *Journal of Teacher Education*, *69*(1), 69-89.

Berliner, D. (2001). Learning about and learning from expert teachers. *International Journal of Educational Research*, 35, 463-482.

Blomberg, G., Sherin, M.G., Renkl, A., Glogger, I., & Seidel, T. (2014). Understanding video as a tool for teacher education: Investigating instructional strategies to promote reflection. *Instructional Science: An International Journal of the Learning Sciences*, *42*(3), 443-463.

Blomberg, G., Renkl, A., Sherin, M.G., Borko, H., & Seidel, T. (2013). Five research-based heuristics for using video in pre-service teacher education. *Journal for Educational Research Online*, *5*(1), 90-114.

Bonaiuti, G., Santagata, R., & Vivanet, G. (2017). Come rilevare la visione professionale degli insegnanti. Uno schema di codifica. *Italian Journal of Educational Research*, *Special Issue*, 401-417.

Bonaiuti, G. (2012). La video annotazione per osservare e riflettere. *Form@re - Open Journal per la formazione in rete*, *12*(79), 71-83.

Borko, H., Jacobs, J., Eiteljorg, E., & Pittman, M.E. (2008). Video as a tool for fostering productive discussions in mathematics professional development. *Teaching and Teacher Education*, *24*(2), 417-436.

Calvani, A., Menichetti, L., Micheletta, S., & Moricca, C. (2014). Innovare la formazione: il ruolo della videoeducazione per lo sviluppo dei nuovi educatori. *Italian Journal of Educational Research*, 13, 69-84.

Calvani, A., Bonaiuti, G., & Andreocci, B. (2011). Il microteaching rinascerà a nuova vita? Video annotazione e sviluppo della riflessività del docente. *Italian Journal of Educational Research*, 6, 29-42.

Campbell, D.T., & Stanley, J.C. (1963). Experimental and quasi-experimental designs for research on teaching. In N.L. Gage (Ed.), *Handbook of research on teaching* (pp. 171-246). Chicago, IL: Rand McNally.

Doig, B., & Groves, S. (2011). Japanese Lesson Study: Teacher professional development through communities of inquiry. *Mathematics Teacher Education and Development*, *13*(1), 77-93.

Dyer, E.B., & Sherin, M.G. (2016). Instructional reasoning about interpretations of student thinking that supports responsive teaching in secondary mathematics. *ZDM - Mathematics Education*, *48*(1-2), 69-82.

EHEA Ministerial Conference (2018). *Paris Communiqué*. EHEA Ministerial Conference, Paris, 24-25 May 2018.

EHEA Ministerial Conference (2015). *Yerevan Communiqué*. EHEA Ministerial Conference, Yerevan, 14-15 May 2015.

Ferretti, F., & Vannini, I. (2017). Videoanalisi e formazione degli insegnanti di matematica. Primi risultati di un corso pilota sul formative assessment. *Form@re - Open Journal per la formazione in rete*, 17, 99-119.

Franke, M., Carpenter, T., Levi, L., & Fennema, E. (2001). Capturing teachers' generative change: A follow-up study of professional development in mathematics. *American Educational Research Journal*, 38, 653-689.
Gaudin, C., & Chaliès, S. (2015). Video viewing in teacher education and professional development: A literature review. *Educational Research Review*, 16, 41-67.
Gaudin, C., Flandin, S., Ria, L., & Chaliès, S. (2014). An exploratory study of the influence of video viewing on preservice teachers' teaching activity: normative versus developmental approaches. *Form@re - Open Journal per la formazione in rete*, *14*(2), 21-50.
Gentile, M., & Tacconi, G. (2016). Visione professionale e video-riprese di azioni d'insegnamento: una rassegna sul costrutto e sugli approcci formativi. *Formazione & Insegnamento*, 3, 243-261.
Goodwin, C. (1994). Professional vision. *American Anthropologist*, 96, 606-633.
Hatch, T., & Grossman, P.L. (2009). Learning to look beyond the boundaries of representation: using technology to examine teaching. *Journal of Teacher Education*, *60*(1), 70-85.
Johnson, W.D. (1967). Microteaching. A medium in which to study teaching. *High School Journal*, *51*(2), 86-92.
Kang, H., & Anderson, C.W. (2015). Supporting preservice science teachers' ability to attend and respond to student thinking by design. *Science Education*, *99*(5), 863-895.
Kersting, N.B., Smith, J.E., & Vezino, B. (2021). Using authentic video clips of classroom instruction to capture teachers' moment-to-moment perceiving as knowledge-filtered noticing. *ZDM - Mathematics Education*, *53*(1), 109-118.
Kolb, D.A. (1984). *Experiential learning. Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.
Leblanc, S., & Veyrunes, P. (2011). «Vidéoscopie» et modélisation de l'activité enseignante. *Recherche & Formation*, 68, 139-152.
Lumbelli, L. (2006). Costruzione dell'ipotesi ed astrazione nella pedagogia sperimentale. In A. Bondioli (Ed.), *Fare ricerca in pedagogia* (pp. 25-60). Milano: FrancoAngeli.
Major, L., & Watson, S. (2018). Using video to support in-service teacher professional development: The state of the field, limitations and possibilities. *Technology, Pedagogy and Education*, *27*(1), 49-68.
Maltinti, C. (2014). Il Lesson Study giapponese: un efficace modello cross-cultural. *Form@re - Open Journal per la formazione in rete*, *14*(2), 87-97.
Mangione, G.R., & Rosa, A. (2017). Professional vision e il peer to peer nel percorso Neoassunti. L'uso del video per l'analisi della pratica del docente in classe. *Form@re - Open Journal per la formazione in rete,* 17, 120-143.
Marsh, B., & Mitchell, N. (2014). The role of video in teacher professional development. *Teacher Development*, *18*(3), 403-417.
Michalsky, T. (2014). Developing the SRL-PV assessment scheme: Preservice teachers' professional vision for teaching self-regulated learning. *Studies in Educational Evaluation*, 43, 214-229.
OECD (2012). *Fostering quality teaching in higher education: policies and practices*. Paris: OECD Publishing.
O'Keeffe L., Rosa A., Vannini I., & White B. (2020). Promote Informal Formative Assessment practices in Higher Education: the potential of video analysis as a training tool. *Form@re - Open Journal per la formazione in rete*, *20*(1), 43-61.
Pérez-Torregrosa, A.B., Díaz-Martín, C., & Ibáñez-Cubillas, P. (2017). The use of video annotation tools in teacher training. *Procedia - Social and Behavioral Sciences*, 237, 458-464.
Picci, P. (2012). Video annotazione per la formazione degli insegnanti. I risultati di due ricerche empiriche svolte in Italia. *Form@re - Open Journal per la formazione in rete*, *12*(79), 84-91.
Plöger, W., Scholl, D., & Seifert, A. (2018). Bridging the gap between theory and practice. The effective use of videos to assist the acquisition and application of pedagogical knowledge in preservice teacher education. *Studies in Educational Evaluation*, 58, 197-204.
Rich, P.J., & Hannafin, M. (2009a). Video annotation tools: Technologies to scaffold, structure, and transform teacher reflection. *Journal of Teacher Education*, *60*(1), 52-67.
Rich, P.J. & Hannafin, M. (2009b). Scaffolded video self-analysis: discrepancies between preservice teachers' perceived and actual instructional decisions. *Journal of Computing in Higher Education*, *21*(2), 128-145.
Rosa, A. (2021). Videoanalisi e formazione dei docenti universitari: un sistema per l'osservazione di pratiche di Informal Formative Assessment. In P. Lucisano (Ed.), *Ricerca e didattica per promuovere intelligenza, comprensione e partecipazione* (pp. 431-449). Lecce: Pensa MultiMedia.
Rosaen, C., Lundeberg, M., Terpstra, M., Cooper, M., Fu, J., & Niu, R. (2010). Seeing through a different lens: What do interns learn when they make video cases of their own teaching? *The Teacher Educator, 45*(1), 1-22.
Rosaen, C.L., Lundeberg, M., Cooper, M., Fritzen, A., & Terpstra, M. (2008). Noticing Noticing. How does investigation of video records change how teachers reflect on their experiences? *Journal of Teacher Education*, *59*(4), 347-360.
Roth, K.J., Bintz, J., Wickler, N.I.Z., Hvidsten, C., Taylor, J., Beardsley, P.M., Caine, A., & Wilson, C.D. (2017).

Design principles for effective video-based professional development. *International Journal of STEM Education*, *31*(4), 1-24.
Santagata, R. (2012). Un modello per l'utilizzo del video nella formazione professionale degli insegnanti. *Form@re - Open Journal per la Formazione in Rete, 12*(79), 58-63.
Santagata, R., König, J., Scheiner, T., Nguyen, H., Adleff, A.K., Yang, X., & Kaiser, G. (2021). Mathematics teacher learning to notice: A systematic review of studies of video-based programs. *ZDM - Mathematics Education*, *53*(1), 119-134.
Santagata, R., & Yeh, C. (2014). Learning to teach mathematics and to analyze teaching effectiveness: Evidence from a video- and practice-based approach. *Journal of Mathematics Teacher Education*, *17*(6), 491-514.
Santagata, R., & Guarino, J. (2011). Using video to teach future teachers to learn from teaching. *ZDM - Mathematics Education*, *43*(1), 133-145.
Santagata, R., & Angelici, G. (2010). Studying the impact of the lesson analysis framework on preservice teachers' abilities to reflect on videos of classroom teaching. *Journal of Teacher Education*, *61*(4), 339-349.
Santagata, R., Zannoni, C., & Stigler, J.W. (2007). The role of lesson analysis in pre-service teacher education: an empirical investigation of teacher learning from a virtual video-based field experience. *Journal of Mathematics Teacher Education*, *10*(2), 123-140.
Schoenfeld, A.H. (2018). Video analyses for research and professional development: The teaching for robust understanding (TRU) framework. *ZDM - Mathematics Education*, *50*(1), 491-506.
Seidel, T., & Stürmer, K. (2014). Modeling and measuring the structure of professional vision in preservice teachers. *American Educational Research Journal*, *51*(4), 739-771.
Seidel, T., Blomberg, G., & Renkl, A. (2013). Instructional strategies for using video in teacher education. *Teaching and Teacher Education*, *34*(1), 56-65.
Seidel, T., Stürmer, K., Blomberg, G., Kobarg, M., & Schwindt, K. (2011). Teacher learning from analysis of videotaped classroom situations: Does it make a difference whether teachers observe their own teaching or that of others? *Teaching and Teacher Education*, *27*(2), 259-267.
Sherin, M.G., & van Es, E.A. (2009). Effects of Video Club participation on teachers' professional vision. *Journal of Teacher Education*, *60*(1), 20-37.
Sherin, M.G., & van Es, E.A. (2005). Using video to support teachers' ability to notice classroom interactions. *Journal of Technology and Teacher Education*, *13*(3), 475-491.
Sherin, M.G., & Han, S.Y. (2004). Teacher learning in the context of a video club. *Teaching and Teacher Education*, *20*(2), 163-183.
Stigler, J.W., Gallimore, R., & Hiebert, J. (2000). Using video surveys to compare classrooms and teaching across cultures: Examples and lessons from the TIMSS video studies. *Educational Psychologist*, *35*(2), 87-100.
Tekkumru-Kisa, M., & Stein, M.K. (2017). A framework for planning and facilitating video-based professional development. *International Journal of STEM Education*, *4, 28*, 1-18.
Tripp, T.R., & Rich, P.J. (2012). The influence of video analysis on the process of teacher change. *Teaching and Teacher Education*, *28*(5), 728-739.
Valencia, R.R. (Ed.) (1997). *The evolution of deficit thinking. Educational thought and practice.* Bristol, PA: Falmer Press/Taylor & Francis.
van Es, E.A., & Sherin, M.G. (2017). Bringing facilitation into view. *International Journal of STEM Education*, *4:32*, 1-6.
van Es, E.A. (2014). Viewer discussion is advised. Video Clubs focus teacher discussion on student learning. *Form@re - Open Journal per la formazione in rete*, *14*(2), 98-103.
van Es, E.A., Tunney, J., Goldsmith, L.T., & Seago, N. (2014). A framework for the facilitation of teachers' analysis of video. *Journal of Teacher Education*, *65*(4), 340-356.
van Es, E.A., & Sherin, M.G. (2010). The influence of video clubs on teachers' thinking and practice. *Journal of Mathematics Teacher Education*, *13*(2), 155-176.
van Es, E.A., & Sherin, M.G. (2008). Mathematics teachers' "learning to notice" in the context of a Video Club. *Teaching and Teacher Education*, *24*(2), 244-276.
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.
West, R.E., Rich, P., Shepherd, C., Hannafin, M., & Recesso, A. (2009). Supporting induction teachers' development using performance-based video evidence: A case study. *Journal of Technology and Teacher Education*, *17*(3), 369-391.