VIDEO PEDAGOGY FOR VOCATIONAL EDUCATION AND TRAINING

AN OVERVIEW OF VIDEO-BASED TEACHING AND LEARNING FOR TEACHER PROFESSIONAL DEVELOPMENT, VOCATIONAL EDUCATION AND CORPORATE TRAINING.

This paper was written by Alberto Cattaneo, Alessia Evi-Colombo and Maria Ruberto from the Swiss Federal Institute for Vocational Education and Training SFIVET, Switzerland, with revisions by Julian Stanley, ETF expert. It was developed in the framework of a wider project ETF commissioned to Oulu University of Applied Science, Finland (ref. Blair Stevenson and Janne Länsitie) and SFIVET (ref. Alberto Cattaneo and Alessia Evi-Colombo).

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Contents

INTRODUCTION

More of us are spending more time consuming and producing audio-visual content. Video has become, in the last few years, the main media experience for our free time. (Feierabend & Rathgeb, 2009), in part, perhaps, because of the rise in the importance of smartphones as the tool with which we make and communicate experience (Waller, Willemse, Genner, Suter, & Süss, 2016).

According to the latest available statistics, YouTube is the third most visited website all over the world (after Google and Facebook), and video is first in terms of length of time spent per visit (19:56 minutes on average) (WeAreSocial, 2018). YouTube statistics are astonishing: users watch an average of five billion videos every day on their computers, while mobile views are at 500 million a day. There are 1.9 billion monthly active users and over 30 million daily active users. Millennials prefer YouTube two to one over traditional television (YouTube, 2018). YouTube has recently launched “YouTube Learning” and is investing in educational creators and resources for the so-called “EduTubers”.

Video Pedagogy[1] should be understood as one strand within the larger domain of Digital and On-line Learning (DOL) (Brolpito, 2018). Video is particularly endemic within open DOL, for example, commercial screen-capture training programmes and MOOCs – Massive Open Online Courses (e.g., Giannakos, Jaccheri, & Krogstie, 2014). In the light of our increased exposure to video and the growing importance of DOL generally, this research paper examines the relevance of video for lifelong vocational education and training.

This report aims to provide a research-grounded and, at the same time, practice-oriented overview of how video can contribute in three contexts of vocational education: teacher training and professional development, school-based learning, and corporate training. These three contexts will be treated in separate chapters, after having provided in the first chapter an overview of the research which aims to explain what is distinctive and effective about teaching and learning through and with video. A final chapter aims to bring together some examples of video pedagogy from ETF’s partner countries.

Both academic and grey literature have been considered, reporting from both scientific experiences and relevant projects concerning the video pedagogy (this latter kind of information placed in green boxes to facilitate its identification). Short excerpts from interviews with experts and master-practitioners supplement and enrich the text.

This research is, for the most part, limited to opportunities to learn and teach with video in formal education and training. However, it seems that more and more often video is becoming a medium of learning in informal and non-formal contexts. For example, there are many on-line videos that support learning of practical skills and language skills in an open and non-formal way (chinesepod.com is a characteristic example). Unfortunately, there is relatively little rigorous published research on how video contributes to informal learning and consequently this issue is missing from this report.

Despite this omission, it may be that the use of video in open and informal learning will be of enormous importance, for vocational educational learning in a lifelong perspective. The fact that video pedagogy enables and engages learners to be both consumers and producers of experiences and information make video a perfect candidate to become a “disruptive innovation” (Kirkwood & Price, 2013). Moreover, the manner in which video empowers learners to control multiple aspects of their

[1] Giving a complete and univocal definition of "video pedagogy" is not a simple task and has not been attempted in this publication. For practical purposes we use the term in this publication refer to the different didactic and instructional modalities of using video-based content for teaching and learning purposes, in formal, informal and non-formal contexts.

learning has led some researchers to identify video as a “disruptive pedagogy” (Kinash et al., 2015). Video pedagogy can and does operate across formal, non-formal, and informal learning contexts. Video can make connections between learning contexts, for example, work-based and school-based or school-based and home-based. Video can also blur the boundary between formal, informal and non-formal contexts by letting teachers and learners create ‘informal’ learning within ‘formal’ learning experiences and *vice versa*. Increasingly video is part of the experience within more learner-driven approaches (Cross, 2007) and more social approaches where learners form a community (Dabbagh & Kitsantas, 2012) or support each other through observation, trial and error and through peer coaching (e.g. in Khan Academy).

THEORETICAL BACKGROUND

In this opening chapter, we briefly summarise the main theoretical accounts of use of video for learning, starting from an overview of the concept of professional vision (and teacher noticing), proceeding to the analysis of professional practices and observational learning, to end with learning from errors and writing-to-learn approaches.

Professional Vision and Teacher Noticing

Grounded in the notion of *professional vision* coined by Goodwin (1994), when referring to teachers this specific professional skill has been more often referred to under the label of *teacher noticing* (Erickson, 2007; Jacobs et al., 2010; Kersting, 2008; Mason, 2002; Seidel & Stürmer, 2014; Sherin, 2007; Sherin, Jacobs, & Philipp, 2011; Stürmer, Könings, & Seidel, 2013; van Es, Cashen, Barnhart, & Auger, 2017). Noticing can be defined as the teacher's "ability to attend to noteworthy features of instruction, to reason about what is observed in meaningful ways, and to decide how to respond […] Noticing involves coming to see the details of observed phenomena and taking on different perspectives to gain deeper insight into what is observed […]. Finally, noticing entails drawing connections between observed phenomena to develop a more robust and elaborate vision of instruction" (van Es et al., 2017, p. 167). In a broader view, we can refer to professional vision as a more composite competence that *includes* noticing. In fact, noticing also requires the capability to apply a piece of knowledge – in the case of teachers, knowledge about effective teaching – to authentic classroom (or any other professional) situations. One can then distinguish two main elements in the process of professional vision:

- The capacity to *notice* (identify and discern), which refers to directing and focusing one's attention towards relevant elements and specific details, and
- The *knowledge-based reasoning* behind this: the professional's cognitive processing of events; in the case of teachers, the processing of instructional events based on prior knowledge about pedagogy (Stürmer et al., 2013).

To a certain extent, then, noticing can also be thought of as dependent upon the already-existing knowledge base, which could explain why pre-service teachers have more difficulty in identifying relevant events looking at classroom videos (van den Bogert et al., 2014).

Knowledge-based reasoning can be further broken up to distinguish the interdependent elements of *description, explanation,* and *prediction.* It is knowledge-based reasoning that allows the professional to apply and re-apply in a competent way in concrete professional situations.

Key idea: Videos can be used to train professional vision through progressive steps, passing from supporting identification and noticing, to connect and make the knowledge-based reasoning behind it explicit.

'Analyse des Activités' and Reflection on Action

This dialectical dynamic between perception and reasoning, action and prescription, doing and knowing, practice and theory, is also embedded in the very strong French tradition of the activity analysis (*analyse des activités*; see Barbier & Durand, 2017). Without entering too much into the theoretical debate (see, e.g., Ria, Leblanc, Serres, & Durand, 2006) identifying and differentiating the

variety of roots in which diverse but related approaches (such as, e.g., the *analyse de travail*) are grounded, we refer here to the *analysis of professional practices* (e.g., Altet, 1994; Blanchard-Laville & Fablet, 2000; Guigue, 2002) as an approach widely used with professionals and in particular in teacher training. Grounded on a *situated* perspective of action and cognition and more specifically in cognitive ergonomics (Theureau, 2004), the distinctive characteristic of this French tradition is the interplay between research and training, which also leads to identifying training scenarios and training (as well as intervention) devices aiming at analysing – and consequently developing – the trainees' professional practices.

These approaches reference the idea of *reflection on action* (Schön, 1983) as a preliminary to sustain reflection – and consequent informed decisions – in action. Reflecting on professional practice is not only an attitude all professionals should cultivate, but in the case of teachers it is also the gateway to change (in teaching behaviour), according to Rich and Tripp (2011): the authors contend that critical viewing of teachers' (own) video-recorded practices can foster their reflective skills in a way that promotes pedagogical change.

In this approach, video is used as a capturing tool: you capture your experience so as to be able to look back at it, analyse it, and finally improve your expertise in the domain.

Key idea: Videos can be used to support the analysis of one's practice which in turn supports capacity to operate as a reflective professional.

Observational Learning

The use of video for learning is often referred to *observational learning* and to its theoretical rationale in Bandura's (1986) social cognitive theory. Observational learning, often also referred to with the alternative label of *demonstration-based training* (DBT), "is the process of acquiring knowledge, skills, and attitudes (KSAs) through viewing examples of performance. Consequently, demonstration-based training is a strategy of training development and delivery involving the systematic design and use of observational stimuli intended to develop specific KSAs in the learner" (Rosen et al., 2010, p. 597). Demonstration-based learning is mostly used in those situations where people have to learn *procedures* that involve *skills* (the typical example being learning to use software; see, e.g., Brar & van der Meij, 2017; van der Meij & van der Meij, 2016). Rosen et al. (2010), for example, cite studies of DBL with respect to technical skills, interpersonal skills, group orientation, and supervisory skills, such as employee coaching, conflict management, and effective communication. However, the application of demonstration-based learning in teacher training is not rare. For example, Dymond and Bentz (2006) report about the creation of a digital video library to augment instruction in a special education methods course. The collected videos illustrated effective teaching strategies for students with disabilities. The authors claim that observing videos of teaching practices in the special education context resulted in improved student outcomes in the areas of knowledge, skill acquisition, and the application of knowledge and skills to novel situations.

This approach is also connected to *modelling:* showing a video means, in this case, showing an example of how to perform in a given situation. The video becomes the reference to be imitated in practice. For this reason, it is important to underline that the video alone may not be enough to support performance in novices: for example, if the demonstration content exceeds the observer's capacity to perform, the resulting model of task performance and self-evaluation is ineffective. This gap may be filled by a coach – a teacher that mediates the modelling.

Key idea: Videos can be used to provide demonstrations of specific performances and thus to train others to carry out procedures and support the acquisition of physical skills.

Learning from Errors

An alternative and complementary approach is the one which posits that errors can be beneficial for learning and have an educational value (e.g., Wuttke & Seifried, 2012). Comparing for example one's current practice to the reference norm can be formative in order to identify which are the gaps to be filled with regard to one's competence and professional development. This has been effectively used in initial vocational education as well (Cattaneo & Boldrini, 2016a, 2017), in simulated practice (or role-playing activities) and in authentic situations.

In this case also, video serves to analyse own or peers' practice and to train professional vision. . Teaching from errors, beside requiring ad hoc ethical conditions, is a structured process consisting of: (a) supporting error identification, (b) providing some form of feedback, (c) sustaining error analysis and reflection through adequate guidance and scaffolding, and (d) providing the possibility to practice the task again). Authentic experiences can motivate learning and assist learners to use more information, for example, nonverbal information like facial expressions, voice intonations, proxemics, etc. Possible risks are information overload and an overdependence on one or a few authentic experiences to the exclusion of many other possible situations.

Key idea: Videos can be used to capture and analyse specific professional situations and to analyse one's errors in order to to improve one's performance.

Writing-to-Learn

Writing may be coupled with video to aid reflection. The writing-to-learn approach (Bereiter & Scardamalia, 1987; Galbraith, 1999; Hayes, 1996), argues that writing about professional procedures and experiences results in a strong potential to develop reflective competences and then deep learning. According to its sustainers, writing results in both knowledge acquisition and knowledge building, and fosters reflection (e.g., Boscolo & Mason, 2001; Kember, 2001; Kember et al., 1996; Rosaen, 1989; Schumacher & Gradwohl Nash, 1991; Tynjälä, Välimaa, & Boulton Lewis, 2006). Reflective writing, however, needs instructional triggers to be stimulated, especially in vocational education (Cattaneo & Boldrini, 2016b). Such triggers or stimuli in the professional or academic environment can assume the form of questioning, discussion, journal writing, and learning contracts (Kember, 2001).

When it comes to coupling video and writing, video annotation is a very interesting keyword. "Video annotation tools are online or offline programs that allow a user to mark portions of video and reflect on it by adding written, spoken or visual comments to that section of video. These 'clips' can then be used to identify patterns in a teacher's instructional practice" (Rich & Tripp, 2011, p. 16). Video annotation has been widely tested in the framework of teacher education, and the effectiveness of video annotation to promote reflective skills has been shown in several contributions (e.g., Colasante, 2011; Colasante, Kimpton, & Hallam, 2014; Fadde & Sullivan, 2013; Rich & Hannafin, 2009; Sherin & van Es, 2005; Tripp & Rich, 2012),

Key idea: Videos can be used in combination with writing, especially video annotation tools, to foster reflective processes on the analysis of professional practices.

TEACHERS' TRAINING AND PROFESSIONAL DEVELOPMENT

In this chapter we examine the specific context of teacher education, conceived in both its main dimension of initial training and ongoing professional development. We will start by sketching different uses and then explore that specific one aiming at developing teachers' observation skills.

How Is Video Used? Different Uses of Video Pedagogy

Generally speaking,the literature reports three main uses of video for teacher training and professional development. The first is referred to *means of instruction*, i.e., as a means to deliver content. We will not treat this first use extensively here: there is relatively little research on this topic.

A second use, which has gained attention more recently within teacher education (TE) is about using videos as a *narration tool* (video-based digital *storytelling*). Video-based digital storytelling is often used within teacher education with an *assessment* goal (as a teacher, one keeps a portfolio to show that one has completed some professional experiences) or even to cultivate a *social dimension*, to communicate with other professionals and to help them to confront each other on specific practices within a community of practice.

But all in all, the main objective for which video is used in TE is to *train observation* – and consequently to develop *reflective skills*. This is generally true both for basic and further training, and both for pre-service (PST) and in-service (IST) teachers. For this reason, we will dedicate particular attention to this third use of video pedagogy.

Different Types of Video for Supporting Observation

Within teacher education we can distinguish different types of observation. Following the theoretical discussion above, they can be placed on the continuum between *observation of model behaviour* and of *limited and perfectible teaching practices* (Gaudin & Chaliès, 2012, 2015; Meyer, Lampron, & Gazé, 2014). In the former case, video will be used

- to illustrate good examples of classroom practice,
- to illustrate how theoretical principles are operationalised, or
- to support the understanding of pedagogical techniques in order to prepare teachers to transfer them into their practice.

The last use is not restricted to, but is more commonly used for initial teachers training than for further professional development. By contrast, perfectible teaching practices, the other end of the continuum, are less intended to show "how to behave" or "what to do", but rather to allow the development of a reflexive attitude towards practice. Of course, the two approaches are not alternatives, and can be mixed within and along the path of a teacher education program.

The previous distinction also allows us to identify three different types of video, depending on whether they propose *classroom practice performed*

- by an (expert) unknown teacher,

- by a peer, or
- by oneself.

Showing a video of an *unknown teacher* can have the advantage of reducing some psycho-social implications: "criticising" an unknown teacher is socially easier than criticising a known person. On the other hand, analysing oneself requires some training and is more difficult than analysing somebody else, especially at the beginning. This means that observing unknown teachers may also help to develop the capacity for the analysis of ones' own professional practices (Gaudin & Chaliès, 2015).

Video platforms for teacher training

The platform Neopass@ction promoted by the French Institute for Education offers teachers numerous video resources for their personal training.

The unterrichsvideos.ch promoted by the Institute for Educational Science (IfE) of the University of Zurich and the Institute for Media and School (IMS) of the University of Education Schwyz offers a great deal of instructional material for the training of the teacher.

Teaching channel is a video-based platform addressed to teachers where teachers can watch, share, and learn new techniques.

The Project Observe – Pre-service Teacher's Professional Vision within university-based teacher education is interesting in the relation between pre-service teachers' professional vision and their teaching performance.

My Mooc is a platform which offers different trainings for teachers and trainers, for example: https://www.my-mooc.com/fr/mooc/Se-former-pour-enseigner-dans-le-sup%C3%A9rieur/

@VEOEuropa – Video Enhanced Lesson Observation is an Erasmus+ funded project which ran from September 2015 to September 2017. It aimed to improve the quality of teaching and learning through using an innovative technological approach developed at Newcastle University – the VEO App.

At the University of Geneva there is a teaching system for teachers who self-assess by observing their own teaching or that of a teacher in the same domain.

The *observation of a peer* teacher is often appreciated by pre-service and in-service teachers because it is easier to identify oneself with a peer than with an expert. "Through this 'mimetic experience' (Durand, 2008), they [pre-service and in-service teachers] are able to 'see the other as oneself' (Leblanc, 2012) and understand that they face similar problems (Borko et al., 2008), which ultimately makes it easier to change classroom practices after successfully identifying, interpreting and discussing with others new ways of doing things" (Gaudin & Chaliès, 2015, p. 50–51). However, not all teachers are willing to share videos of their own teaching practice.

In his 2014 conference Gaudin speaks about peer analysis of videos between teachers as a mimetic and empathic activity allowing the realisation that other teachers have the same difficulties and the development of a comparative and critical reflection. However criticising a peer can be

difficult too: teachers are often reticent to critically analyse a colleague's activity.

Similarly, Harford, MacRuairc, and McCartan (2010) show that peer video viewing and analysis foster pre-service teachers' reflection and self-assessment, helping them to shift their focus from the technical aspects of their practice to a critical analysis of the theoretical concepts that support it in the classroom. Flandin and Ria (2012), on their side, show that peer analysis can motivate teachers to change their perspectives and adopt new or different ways of teaching.

In this ideal progression from using video for illustrating classroom practice and developing teachers' thinking to guiding teachers' teaching (Janík et al., 2009), *self-observation* constitutes the third and last step, while the first two usually concern looking at somebody else. Self-observation is a powerful tool to promote teacher change (Rich & Tripp, 2011). However, effective self-observation may depend on the ability to receive and give feedback. *Receiving feedback from supervisors and peers can be then considered preliminary for the tutee to develop – and to be able to apply to oneself – a critical self-awareness* (Avsar et al., 2015). For this reason, Hattie and Timperley (2007) consider providing feedback and providing instruction as two elements on the same continuum, which can be intertwined with each other. At the same time, *the same progression can be applied to learn to provide feedback, first providing feedback on peers' practices, then sharing feedback with peers, and finally applying it to oneself* (Gaudin & Chaliès, 2015). To train oneself to formulate effective feedback is therefore a way to support the development of reflective skills. It is used progressively: training teachers first on how to conduct peer observation is an intermediate step to train them in self-evaluation and monitoring. Moreover, when this activity happens in groups, self-observation is enriched by the feedback received by peers and instructors. In this way, through collaborative reflection on actual practices, the possibility of transforming practices becomes even more tangible (Juzwik, Sherry, Caughlan, Heintz, & Borsheim-Black, 2012). It is generally acknowledged that using video in teacher education can empower teachers through linking theory to practice, and through the development of pedagogical language and collaborative learning with peers. Evidence of impact in terms of gains in codified subject knowledge is less convincing (Marsh & Mitchell, 2014).

Given the availability of a pedagogically-oriented training as a precondition to work on the development of teachers' professional vision and observation skills, *the analysis of the teacher's practice* is usually the easier focus to start with. However, progressively, the teacher's gaze has to broaden to consider *the students' behaviours and interactions*.

Conditions to Support Video-Based Observation

There are important preconditions to take into consideration to support effective video-based observation:

- Contextual frame: as a consequence of the situated approach underlying the use of video for observation, many authors underline the importance of *giving information about the context* where the video has been recorded, including information about the school culture, the pedagogical *objectives* of the recorded lesson, its *planning*, and similar items (e.g., Brophy, 2004; Gaudin, 2014; Miller & Zhou, 2007).
- Pedagogical frame: it is of utmost importance to provide learners with an adequate pedagogical frame. This should include a clarification on the *objectives of the activity*, giving clear and complete *tasks and instructions*, and proposing a progressive focalisation of the observation (Bates, Phalen, & Moran, 2016; Borko, Jacobs, Eiteljorg, & Pittman, 2008; van Es, 2010). In fact, many teachers are reluctant to record themselves to be viewed by a colleague – this also means

that special attention and care have to be given to *build the necessary trust and climate* conditions with the participants, setting up a specific pedagogical contract.

- Guidance: Ellis, McFadden, Anwar, and Roehrig (2015) underline the *need of guidelines and supports* to increase the reflective commentary of beginning teachers, as without explicit direction concerning the nature of the commentary, the effectiveness of observations (in their study taking the form of annotations) sharply decreases. The importance of guidance and scaffolding is well documented (see *inter alia* Baecher & Connor, 2010; Erickson, 2007; Santagata & Angelici, 2010; van Es, Tunney, Goldsmith, & Seago, 2014). Guidance may take the form of *prompts, rubrics, and guiding questions* (e.g., Berthold, Nückles, & Renkl, 2007; Brouwer, Besselink, & Oosterheert, 2017; Hübner, Nückles, & Renkl, 2010). Namely, Brouwer and colleagues designed an intervention for primary school teachers that combined video feedback on teaching behaviour with structured viewing guides (SVGs). SVGs are lists of "viewing points," such as observation items describing domain-specific teaching behaviours and student reactions. Teachers who were exposed to SVG video feedback practiced significantly more of the targeted teaching behaviours than the teachers in control groups.

Methods

In this section we briefly present four well-acknowledged methods and tools that exploit the value of video within a teacher education setting.

Self-Confrontation (Auto-confrontation et auto-confrontation croisée)

A video-recording of one's practice provides a very rich and useful source of information, as well as an important set of traces related to one's specific past (*veçu* in French). This preliminary remark has been exploited especially in the French tradition (e.g., Clot, 1999; Theureau & Jeffroy, 1994) and has led to a very strong and established method of using video as a support to observation: the so-called "self-confrontation," with its two main variances – simple and crossed (Boubée, 2010). In the former case, the individual is in front of a video of her own practice and confronts herself with her activity, commenting on it and explaining it, as well as letting her cognitive processes emerge (for example, about her thoughts while acting, her attentional focus, her decision-making, and similar actions that are not immediately available through the video itself). In the latter case, the participant is confronted with the comments a colleague makes on her activity, thereby allowing her to access the critical view of another professional. These two methods and their variants are widely used in France and in the French-speaking part of Switzerland within teacher education and beyond (e.g., Seppänen, Kloetzer, & Riikonen, 2017), as their effectiveness is proven in practice (cfr. Clot et al., 2000; Mollo & Falzon, 2004; Theureau, 2010).

Video Clubs and Video Study Groups

Video clubs can be defined as a series of regular meetings where teachers – usually in-service teachers – collectively visualise, analyse, and comment on videos of their classroom practice (e.g., Sherin & van Es, 2008). Video clubs have a social and collaborative character. They represent an innovative way of promoting professional development, allowing for the establishment of a connection between pedagogy and student thinking. Tochon (2001) explains that video study groups contain both a communicative and reflective dimension, where the goal is to reflect on shared practice. Video viewings in these contexts are also guided by a pedagogical support aiming at helping participants to gather the most information from the recording, without over-structuring the group.

There are many studies that demonstrate the effectiveness of video clubs. Recently, Luna and Sherin (2017) showed how video clubs were effective with science teachers to foster their noticing and discussing students' thinking in sustained and meaningful ways.

Video-supported collaborative learning: two cases

Video clubs and video study groups emphasise the importance of analysing videos together in a collaborative way. With respect to this, in February 2018 an Erasmus+ KA project started under the name of **ViSuAl - Video-Supported Education Alliance**. The aim of the project is to co-create an evidence-based pedagogical model for *video-supported collaborative learning.*

IRIS Connect is a video-based collaborative professional learning platform that enables teachers to capture, reflect on, analyse and share practice. The objective is to improve pupil outcomes by improving teaching through effective and evidence-based professional development.
Born out of, and continually informed by research, IRIS Connect's innovative system radically improves professional development by enabling the types of learning that research has shown to support teachers and improve outcomes. This includes experiential learning, peer-to-peer collaboration regardless of geographical location, collaborative learning communities, research and action research. Uniquely, IRIS Connect have developed a structured, interactive professional learning programme - The IRIS Connect Film Club - to support effective implementation and adoption of innovation at schools and HEIs, and develop a culture of trust and support.

Micro-Teaching

An interesting in-between possibility is constituted by micro-teaching. First developed by Dwight Allen and Kevin Ryan at Stanford University in 1963, this method is distinguished from the previous one and characterises itself with the "micro" label because

1. the video is limited in time (usually 5–10 minutes) and in its content (usually, it is limited to recording one specific teaching skill), and

2. the group of participants is also limited (from 5 to 10).

A very recent study, confirms that the affordances of having videos for micro-teaching counterbalance the possible constraints: participants acknowledged that video helped them recall their lessons, notice their actions, engage in critical reflection, and map their progression (Serdar & Çeçen, 2018). Similarly, in the African context, Sentumbwe (2018) showed that micro-teaching helped economics teacher students to improve their skills in lesson planning, communication, content knowledge, use of teaching aids, and classroom organisation and management.

Video Annotation

If the use of a visual support already constitutes a noticeable added value, the possibility to use an annotation tool to directly comment on the video provides a further opportunity. Video annotation allows the taking of notes directly within the video player interface. This opportunity has been widely tested in the framework of teacher education, and the effectiveness of video annotation to promote reflective skills has been shown in several contributions as mentioned in Chapter 1. Colasante (2011) shows critical reflection and evaluation on teaching practice as the main learning outcomes of using video annotation; similarly, Calvani, Bonaiuti, and Andreocci (2011) illustrate how video annotation represents a mechanism able to better focus teachers' reflective attention and to increase the

productivity and analyticity of self-analysis. Tripp and Rich (2012) report the effects of involving peers' annotations on the ability to notice details concerning one's own practice (similar results have also been found by Bonaiuti, Calvani, & Picci, 2012).

Since Rich and Hannafin's (2009) contribution presenting different annotation tools and their affordances to scaffold teachers' reflection, many other tools have been developed. We will refer to some of them directly in the next chapter, when discussing the potentialities of hypervideo. In addition to the ivideo.education software (see p.21), there are other software solutions developed in the framework of research projects (e.g. Diver/WebDiver, VFR, MediaNotes, VAST, CLAS) and other annotation tools including annoto, VideoAnt, and SwitchCast.

Effects: Summary

Gaudin and Chaliès (2015) provide an important summary of the effects of using video in TE. The authors provide a synthesis, saying that "among the most significant benefits are heightened *motivation*, optimized *selective attention* and *knowledge-based reasoning*, and *improved classroom practice*" (p. 53). Meyer and colleagues (2014) – citing Yung et al. (2010) – also speak about four levels of positive effects on the development of teachers' professional skills: video would allow learning at the *emotional, social, cognitive, and psychomotor levels*. For pre-service teachers, video may help to activate, acquire, and apply knowledge in a meaningful way (Abell & Cennamo, 2004; Blomberg, Renkl, Sherin, Borko, & Seidel, 2013; Brophy, 2004; Goldman et al., 2007). For in-service teachers, video is also an effective way to practice the skills acquired during the pre-service training (Borko et al., 2008; Gaudin & Chaliès, 2012; Seidel et al., 2011).

In his 2014 conference, Gaudin argues that video viewing allows a variety of *cognitive processes* to take place, concerning *selective attention* (which recalls the importance of noticing), *reasoning*, and *reflection.* He also states that video allows teachers *familiarise* themselves with their work contexts and circumstances, showing novice teachers *authentic examples* of teaching practices and how to concretely incorporate them into their own teaching.

However, there is also evidence that looking at experts could increase novices' anxiety because they feel overchallenged. Peer video may work better for novices because they share the same issues and difficulties as the video-recorded teachers (Gaudin, 2014). If watching videos of others' teaching might be more useful for developing a critical stance toward instruction (Blomberg, Renkl, Sherin, Borko, & Seidel, 2013), viewing one's own videos fosters critical reflection and allows teachers to see which elements are in need of improvement for their own professional development.

Obstacles and Issues

If the benefits of using videos in instructional environments are well-established, it is recommended to keep in mind that videos are not free from limitations and shortcomings if used incorrectly. In this section we will summarise some of these issues, first on an individual and then on a macro level.

The individual level

It is always important to underline that videos are seen through the filter of the viewer's cultural background, educational philosophy, and his or her idea of the task of watching video. This inevitable

subjective approach to video-watching needs to be taken into consideration, since video is often used to present an objective view of a classroom (Miller & Zhou, 2007).

A common issue for video-watchers in the area of teacher training is the tendency to *focus on their own peculiarities*, as well as on the problems of their management of the classroom, thus losing focus on the overall effectiveness of their lesson (Gaudin & Chaliès, 2012). Therefore, it is important to set goals in relation to observation: for example, novice trainees may watch videos of best-practice examples so that they can analyse and compare them to their own practice; by contrast, more experienced teachers could formulate objectives that are practice-adapted and practice-specific.

Another issue is that, according to some users, videos do not give *access to the emotions and intentions* of the teacher. This concern, together with the tenet that professional vision is individual and depends on the teacher's characteristics, may be addressed through the process of sharing the practice and giving teachers the opportunity to express how they feel about what they are watching. It is important to obtain It may help to collect written comments from the filmed teachers, so that their intentions, emotions, and worries are known by the novices and can help them to better understand what they are witnessing.

One of the most important individual obstacles for using videos in teacher education is the reluctance of teachers to film themselves, and to accept that their practice can be viewed by peers or colleagues. Ethical rules (e.g. the assurance of effective confidentiality, of abstain from judgement, of respectful acceptance of the other,…) have to be agreed within the group of teachers working on video-based analysis of teaching practice. These rules should safe guard individuals professionally and reassure them personally.

Watching video is unproductive if it has no specific purpose. Reflective practice through video viewing is effective if anchored to authentic and concrete solutions. When novices view their video-recorded practices, they expect to receive objective-specific guidelines to improve their teaching.

The macro level

Issues and obstacles at the macro level concern both the higher education institutions and the training centres where instructional videos are employed. It is often the case that there are not enough cameras and microphones to video-record all the trainees, and university budgets don't allow for the purchase of higher-quality, more expensive video cameras), to the quality and accessibility of the Wi-Fi connection. Another technical problem concerns the storage and archiving of all the video material.

Video recording in school also raises the issue of *consent and legal agreements* for filming, as well as all the related *ethical implications*. In order to film a lesson, authorisations are needed, and this type of bureaucracy is often time-consuming and encounters additional resistances, sometimes making it impossible or at least very difficult to proceed. It is important to always prepare and distribute to all the involved persons accurate descriptions, which explicitly explain the aims of the recording and confirm the correctness and compliance of the activity with the national privacy regulations.

Sharing of video material raises ethical rather than practical issues. Advance planning is vital in order to decide what permissions are requested and what use and copyright are established.

General Recommendations

Research demonstrates that videos have the potential of facilitating the analysis of practices and becoming a critical learning tool for teachers if certain recommendations are taken into consideration. The literature suggests the following guidelines for practitioners:

- **Choose the appropriate video material; be aware of video strengths and weaknesses.** On one side, instructors should weigh-up the strengths and weaknesses of any video (e.g., cognitive overload, the "keyhole effect" i.e. the fact that video portrays only one aspect of classroom reality). On the other side, the video should be aligned to match trainee teachers' capacity to identify and interpret classroom events (Christ, Arya, & Ming Chiu, 2014; Gaudin & Chaliès, 2015).

- **Choose specific videos to produce specific effects.** Not all teaching skills require video use to be developed; hence, video use should be chosen wisely and accurately to produce specific effects in trainees. *Identify and make learning goals explicit*: video should be embedded in appropriate instructional designs, where learning tasks need to be clearly set. In other words, teacher trainers need to embed their videos in structured didactic scenarios and clear learning objectives (Tochon, 1999). Also *align assessment to instruction/goals*: it is also important, when using video, to align the mode of assessment to the instructional mode and to the environment (Bates, Phalen, & Moran, 2016; Brunvand, 2010; Gaudin & Chaliès, 2015).

- **Provide guidance**. It is crucial to keep in mind that *scaffolding and support are needed* for both in-service and pre-service teachers to be guided during video-viewing. Facilitators, namely those who select the videos that teachers will watch, should ensure that teachers focus on the most relevant classroom events (and on the students, besides their own teaching) while watching a video. Facilitators can help trainees by providing them with guidance tools (rubrics, prompts, guiding questions); by their commentaries (Richardson & Kile, 1999); and finally, by guiding teacher students in making sense of what is seen (Andrist, Chepp, Dean, & Miller, 2014; Brunvard, 2010; Gaudin & Chaliès, 2015; Leblanc, 2018; Meyer, Lampron, & Gazé, 2014).

- **Ensure collective training and a progressive shift from analysing others to analysing oneself**. During teacher training with videos, it is important to have moments where teachers collectively watch their peers' practices, so that they can share the same issues and understand how to face them (Brunvard, 2010; Leblanc, 2018; Ria, Serres, & Leblanc, 2010). From analysis of peers and unknown teachers, novices can progress to analysing themselves.

- **Establish and provide alternate perspectives**. A single classroom event can be analysed according to different perspectives (Bransford, Kinzer, Risko, Rowe, & Vye, 1989), and such a variety of interpretations is to be encouraged by instructors.

VIDEO IN SCHOOL-BASED LEARNING

There is an extensive literature on the use of video within school, however, much of this refers to high schools and universities (see, for example, the recent review by Carmichael, Reid, & Karpicke, 2018). However, the main focus of this chapter is the use of video within vocational education and training (VET) providers, where video is less developed and less investigated by the academic world. This implies an overlap with the focus of the next chapter, devoted to the use of video in corporate training, at least for those VET systems that include work-based learning.

We will start by highlighting the main objectives for which video is used in schools, and then present possible methods to support video-based teaching and learning, its effects and obstacles. Finally we propose some recommendations for use.

What Can Video Be Used For?

A simple answer to this complex question can be inspired by a famous contribution by Daniel Schwartz and Kevin Hartman (2007). Following their contribution, we can identify four main and different reasons to use video for learning:

1. The first is *seeing*, which is analysed as a continuum from recognition to notice and then discernment of fine-grained details. In this case, one can use a video to show dynamic processes that would otherwise not be observable in real life (e.g., because they are difficult to reproduce or are dangerous, costly, etc.) or that would be difficult to describe using words (see also Chambel, Zahn, & Finke, 2006). Often, this first use is aimed at developing a professional way of looking at a scene, or in other words to develop novices' professional vision (see Chapter 1). This is the reason why scaffolding of a reflection process is coupled with the act of viewing.

2. A second possibility is to look at a video to support *doing*: through a video, one can look at how a skill has to be performed and then imitate it to reproduce and progressively master it. This second use resembles *observational learning* as described in Chapter 1. The video in this case constitutes the model to follow and a means to help learners learn a specific behaviour. When an activity is particularly complex, video features such as slowing the motion, segmenting the activity in smaller chunks, or zooming in can help the learner. This second possibility has a wide application within VET, as it is very close to the apprenticeship model.

3. Video can also be used to support declarative knowledge acquisition, i.e., *saying* outcomes; or the acquisition of declarative knowledge, adding, e.g., authority, evidence, or reasons. In this case, video can help especially when the presentation of facts is combined with their explanation, also providing the whys and hows, e.g., by means of showing direct and authentic testimonials of a fact or phenomenon.

4. Finally, video is *engaging*, and therefore it can be used to raise interest. Engagement is important, as it "creates the mental context that prepares people to learn" (Schwartz & Hartman, 2007, p. 339), for example re-activating prior knowledge on the topic, rising an emotional disposition, or producing affective arousal, and finally preparing the understanding of subsequent instructions.

These four modalities are not mutually exclusive. On the contrary, depending on the instructional scenario and its design, they can be addressed in parallel, combined successively in the pedagogical script, or used selectively. Video can serve both procedural and conceptual learning (Anderson et al., 2001). As Mireille Bétrancourt has pointed out video is particularly useful as a tool to address

professional-specific knowledge which has relevance or origin in a particular and not so accessible work situation, social interaction, practice or environment but which demands reflection and codification as well as direct experience. We address these vocational-specific usages in the following.

One issue in professional and VET education is to be able to display and review authentic practice situations, while at the same time to reflect, explain, and abstract; video allows that. (Mireille Bétrancourt)

What Kind of Video Can Be Used?

Videos and animations

In this text we will use the term video as a general term also including animations. The term "animation" generally identifies those types of dynamic visualisation used to represent a product that is the result of artificial processing, mostly made possible by using a computer. In this sense, there are three characteristics of an animation (Mayer & Moreno, 2002). Animation

1. is a type of figurative representation (picture),
2. represents manifest, visible movements (motion), and
3. consists of artificially-created objects (simulated).

Video may be said to represent reality more directly, as it presents itself to the human eye. Types of video include, for example, films, documentaries, commentaries, narratives, interviews, advertisements, lecture captures and talking heads, screen captures, simulations, demonstrations, etc. (For typologies see Andrist, Chepp, Dean, & Miller, 2014; Ploetzner & Lowe, 2012; Schraw & Paik, 2013).

In general, distinguishing between videos and animations is important for teaching and learning because of the *difference in terms of authenticity* and the way that this may serve pedagogical purpose. It is argued that video or visual display can be used "to increase cognitive efficiency by reducing information processing load, distributing load over multiple channels, and to highlight salient information" (Schraw, McCrudden, & Robinson, 2013, p. 4; see also Hoffman & Schraw, 2010). Following this basic principle, Schraw and Paik (2013) detail five main functions of instructional visual displays with regard to information processing. Visual displays:

1. *Reduce the information flow* and make it manageable, thus promoting cognitive economy;
2. *Organise information* and summarise it;
3. *Focus learners' attention* by pointing to the most important and salient aspects of the information;
4. *Encourage inferences* through highlighting meaningful relations among the elements composing the displays; and
5. *Provide an explicit visual model* that can be exploited to build one's internalised mental model.

Considering these points, then, we could conclude that using an animation can be useful to simplify the quantity of information contained, while still providing a dynamic visual model that can be internalised (cfr. Butcher, 2006; Scheiter, Gerjets, Vollmann, & Catrambone, 2009). By contrast , the authenticity of a film or documentary could help learners to identify with professionals in the workplace.

Hypervideo

Apart from the distinction between videos and animations, still considering the visual materials as stand-alone objects,[2] it is also useful to distinguish between *raw videos* and *interactive videos* (or *hypervideos (HV)*), the latter being an elaboration of the former.

The concept of interactive video is not very new. It dates back to the 1980s. Nevertheless, only recently has it gained a renewed interest, in part due to technological progress (for a brief analysis of this phenomenon, see Cattaneo, van der Meij, Aprea, Sauli, & Zahn, 2018). In a recent review, Sauli and colleagues provide an extended definition of HV: "A hypervideo can be defined as a non-linear video that presents both classical (e.g., play, pause, stop and rewind/forward buttons) and more complex (e.g., table of contents and index) functions to control the navigation of the video stream (corresponding respectively to micro- and macro-level activities), and it is enriched with hyperlinks giving access to additional material (e.g., documents, audio files, images etc.) through specific markers or hotspots. A hypervideo can also be provided with a variety of exchange options which include the possibility to be directly annotated within the interface showing the video, both individually or collaboratively; in the latter case, each user can interact and exchange ideas and points of view with other users with a shared-comments (weblog-like) functionality. Finally, hypervideos allow the users to receive feedback through the above-mentioned communication tools or automatically from the system (e.g., through a quiz feature)" (Sauli, Cattaneo, & van der Meij, 2017).

According to this definition, HV offers three main and distinct affordances for interactivity: *control features, hyperlinks,* and *communication facilities* (see Cattaneo, van der Meij, Aprea, Sauli, & Zahn, 2018; Cattaneo, van der Meij, & Sauli, 2018).

1. The first enables users to *interact with the HV in a self-regulated way* that best suits their cognitive capacities and needs, allowing *pacing* and direct *moderation* of the information load, and then reducing the risks of cognitive overload due to the complexity and transience of dynamic visualisations. To give the control to users proved to be effective for learning (e.g., Hasler, Kersten, & Sweller, 2007; Schwan & Riempp, 2004; Wetzel, Radtke, & Stern, 1994; Wouters, Paas, & van Merriënboer, 2010). This effectiveness is even more likely to happen with HV, as it usually includes advanced control features that go beyond the classic toolbar functions and offers support supplying the learner with flexible ways for navigating within video, e.g. through thumbnails, an index, or a table of contents. This further allows the learner to select a non-linear *trajectory* while consulting the video material.

2. HV includes hyperlinks that *connect the video to existing, supplementary instructional materials* (other videos, text documents, images, webpages, etc.) through the use of hotspots or markers (Stahl, Finke, & Zahn, 2006). This can be important in VET to support the *building of links* between practice and theory, between concrete and abstract elements, between a specific experience and the general procedure, and finally to help connect different sources of information (e.g., Schwan & Riempp, 2004; van der Meij & de Jong, 2006; Zhang, Zhou, Briggs, & Nunamaker, 2006). Moreover, when such markers are also spatially defined, they perform the additional function of *focusing the learners' attention* on content-relevant areas of the video, helping viewers to optimise the cognitive load (Merkt & Sochatzy, 2015; Ozcelik, Arslan-Ari, & Cagiltay, 2010).

3. HV includes *communication facilities* of different kinds. Here we mainly point out two of them: on one side, the possibility to *integrate video annotation*, a commonly used HV option *for enhancing*

[2] As we will see in the following section, it is of utmost importance to see how the visual material is integrated in a learning scenario and a wider pedagogical activity.

reflection or receiving feedback (e.g., Colasante, 2011; Hulsman & van der Vloodt, 2015; Rich & Hannafin, 2009; Tripp & Rich, 2012). Williams, Farmer, and Manwaring (2008), for example, investigated the use of digital video recordings and annotation software to improve negotiation skills among law students. Students used webcams to video-record their negotiation exercises and then reviewed these recordings and commented on their performances in a journal. The instructor then reviewed the journals and specific portions of the videos, and provided individual written feedback. The combination of the videos and annotations allowed students to improve their negotiation skills and to receive immediate feedback from the instructor and/or fellow students on their performances. Similarly, in their 2015 study with medical students, Hulsman and van der Vloodt video-recorded consultations with a simulated patient, which were uploaded to a Web-based platform where students marked and annotated positive and negative events to analyse their communication skills. Videos and self-evaluation were then analysed by a peer who provided feedback.

4. The possibility to *embed quizzes and questions, and receive automatically generated feedback* (e.g., see Midtiby, Noergaard, & Kjaer, 2017; Stigler, Geller, & Givvin, 2015; Tweissi, 2016; Vural, 2013) also proved to be effective to sustain learning.

Zhang, Zhou, Briggs, and Nunamaker (2006) show how interactive video can be integrated into an e-learning system to allow proactive and random access to video content. Results of their experiment indicate that the value of video for learning was, in particular, attributable to interactivity: students who were provided with interactive video in an e-learning setting achieved significantly better learning performance as well as a higher level of satisfaction.

Using hypervideo in vocational education

IV4VET (Interactive Video for Vocational Education and Training) is a project which investigated the conditions under which the use of hypervideo is effective to sustain teaching and learning processes in (initial and upper) vocational education. The final report of the project (Cattaneo & Sauli, 2017) also includes a set of concrete cases and drafts a model to design learning scenarios integrating HV (for the presentation of the model, see Cattaneo, van der Meij, Aprea, Sauli, & Zhan, 2018). An empirical test of different instantiations of the HV in a clothing designer curriculum is also presented in Cattaneo, van der Meij, & Sauli, 2018. The project makes use of the ivideo.education system (www.ivideo.education).

How Can Video Be Used?

So far, we have focused on distinguishing different kinds of videos based on their character. However, when it comes to teaching and learning, it is really important to keep in mind *the importance of the pedagogical context.* Renkl and Scheiter (2015) make a similar distinction between *procedures addressing materials design* and *procedures centred on learners*.

In brief, procedures addressing *materials design* address decisions about complexity and the use of multiple representations and about video style, e.g. realism and abstraction (including cueing, e.g., in radiology and when learning concerns processes).

Procedures centred on learners, may address

- *training* (including for visuospatial skills, convention-of-diagrams, and inferences);
- *pre-training* (including eye movement modelling examples, oculomotor pre-training, and instructions for use), and

- *prompting* (although we have mixed evidence on its effectiveness so far).

The two categories together remind us of the importance of the learning activity design (see also Cattaneo, et al., 2018 for a hypervideo-specific design model).

Building on the concept of a continuum between *supportive and generative instructional strategies* (see Smith & Ragan, 1999), allows us to identify four main and general instructional modalities of using video for learning (within each, many variations exist):

1. **Using video as a teacher's instructional support.** Video can be simply used to support the teachers' talk. Here, the teacher does not control the pace of viewing but they can interrupt and comment. For example, in those situations where the video showed in class comes from the direct experience of the apprentice at the workplace (see Schwendimann et al., 2015), giving them the possibility to comment on their experience in front of the class under the teacher's guidance can be an effective way to teach and to learn (Hämäläinen & Cattaneo, 2015; Motta, Cattaneo, & Gurtner, 2014).

Vocational oriented video resources

VIVET - Video Supported Vocational Education and Training: The VIVET Web portal facilitates access to free training resources not only for students and teachers, but also for the general public. For the latter, it provides career orientation and skills in career self-management, as well as delivering new methods and approaches in vocational training and lifelong learning for better employment opportunities. The portal contains many short videos treating specific professional subjects. A filter allows the visualisation of such resources by profession, language, level, and kind of resource.

2. **Using video as an individual learning material.** Learners use videos independently to learn declarative and procedural knowledge. In this case, it is very important to give the control of the video directly to the learners, so that they can view it at their own pace, regulate the information intake, and also have the possibility to view difficult scenes again.
   This instructional model is commonly found within VET in the form of **Demonstration-Based Training** (DBT), i.e., replicating a model performance shown in a video (see also Chapter 1 for further details). Grossman and colleagues (2013) identified a set of 17 guidelines to enhance DBT. We report them in a box below.

This instructional model further supports learning, for example, through the analysis of a non-perfect performance and on the *identification of errors* (for concrete examples, see Cattaneo & Boldrini, 2016a, 2017). In this case, video is often used first to "capture" the professional situation to be analysed, and then to activate an instructional approach based on *simulation* or *role-playing*.

Claire Peltier, lecturer and scientific assistant in the MOOC cell at the University of Geneva, believes that there are two important aspects improved by the use of the video:

- "The ability to give the learner the autonomy to become familiar with the content. The advantage of video is that one can modify the temporality of a teaching sequence: it could be reiterated, and one can watch it as many times as one wants and when one wants. This is linked to several organisational benefits, because students are not tied to time and place.
- Learning through video allows the evocation of symbolic recordings, to diversify contents with sounds, animated images, etc. It is complicated from a cognitive point of view because

articulating several records can be a source of cognitive overload. It allows one to activate different things cognitively, but it always depends on how the video is designed".

3. **Using video in a learning-by-design approach.** A third, very promising way of using video is to integrate it into a design activity. In this mode, it is the learner – or more often, a group of learners – who is given the task to design and produce a video (Cavanagh & Peté, 2017) or an hypervideo (Zahn, 2006). Promoters of this approach emphasise that such a task not only develops knowledge and know-how with respect to the targeted content but also develops transversal skills related to negotiation, organisation, division of labour, and decision-making (e.g., Zahn, Pea, Hesse, & Rosen, 2010; Zahn et al., 2005).

4. **Using videos to organize and communicate one's experience or expertise.** This is the case when, for example, videos are used to make one's own (professional) portfolio, or when they are used in a digital storytelling approach (for example, in the case of a video curriculum vitae). Software like Flowbox (www.flowbox.fi) provides solutions that facilitate the development of video-based digital storytelling.

Using video to promote one's profile

The CUVID – Curriculum Video is a European project with the goal to support young people to develop video-based, interactive online CVs; it also offers a platform for them to directly link the video CVs to potential employers.

IN PLACE - Innovative Video Presentations for Learning Creative Entrepreneurship is a project composed of seven organisations from six European countries, aiming to establish sustainable and mutually beneficial relations and cooperation between vocational schools and small and medium enterprises (SMEs). In particular, the subject of the project is using video in the marketing of an SME. Concretely, teams of students will create video podcasts to promote local businesses.

Guidelines to enhance demonstration-based training (DBT):

Grossman, Salas, Pavlas, and Rosen (2013, p. 224–225) describe 17 guidelines indicating how educators can best incorporate instructional features into their DBT curricula. Although not exhaustive, these guidelines are very useful to those who want to efficiently adopt DBT:

1. **Observational learning training**. Incorporate activities that teach trainees how to learn from the demonstration (i.e., observational learning training) before the demonstration begins.
2. **Pre-demonstration discussion**. Initiate discussion before a demonstration takes place.
3. **Organisers and summaries**. Provide organisers and summaries that are explicit and complete.
4. **Attentional cueing**. Incorporate attentional cueing through verbal or written indicators of key information.
5. **Instructional narratives**. Provide instructional narratives that describe the reasoning behind demonstrated behaviours.
6. **Note-taking**. Discourage unguided note-taking while facilitating guided note-taking.
7. **Group discussion**. Initiate a group discussion following the demonstration period to further emphasise learning objectives and to provide feedback on in-training performance.

8. **Perspective-taking**. Incorporate perspective-taking activities into DBT through activities such as playing the roles of others, verbalising how another might feel, or describing a task from an actor's perspective.
9. **Trainer-provided rule codes**. Provide rule codes, descriptions of specific rules to be followed, for demonstrated scenarios that have clear-cut solutions or appropriate actions.
10. **Learner-generated rule codes**. Following the demonstration period, incorporate activities that require trainees to generate their own rule codes in relation to the demonstrated behaviours.
11. **Imagery exercises**. Prompt trainees to engage in imagery exercises after the demonstration has taken place, to ensure that they do so with an accurate mental model of demonstrated behaviours.
12. **Imitation**. During DBT, prompt trainees to engage in mental or physical imitation of the target behaviours.
13. **Practice**. Ensure that trainees have opportunities to practice newly acquired KSAs (knowledge, skills, and abilities) following the demonstration period.
14. **Practice scenario creation**. Allow trainees to generate their own practice scenarios on the basis of the demonstrated material.
15. **Passive motivation inducement**. Incorporate passive motivation inducement activities (e.g., explanation of training utility) into DBT through brief lectures, activities, or discussions.
16. **Active motivation inducement.** Induce motivation in trainees through activities that emphasise the value of target KSAs, highlight trainees' deficits, or enable trainees to perform an active role in the determination of learning objectives.
17. **Goal setting**. Incorporate goal-setting activities after the demonstration has taken place.

Delivery modalities

When designing a video-based learning scenario, we can also distinguish instructional modalities with reference to the continuum from distance learning, through blended learning, to face-to-face learning. Having already approached the use of video in face-to-face contexts above, we now consider: the flipped classroom and the wider mobile learning approach.

The flipped classroom.

A flipped classroom is a pedagogical-didactic model that reverses the activity cycle and the teaching/learning roles typically found in a conventional classroom setting by delivering instructional content, often online, outside of the classroom. In a flipped classroom scheme the learner prepares herself at home before attending "class," for example studying assigned multimedia content, very often in the form of video (e.g., Awad, Brouilette, Cormier, & Turcotte, 2017) prepared for the students by the teacher. When well-designed, video has the value of combining visual and audio messages complementarily and therefore more effectively (according to multimedia learning theory, e.g., Mayer, 2009), and – in the case of distance use – to also convey a sense of social presence. In a second phase in the classroom, emphasis is placed primarily on problem solving, exercises, and discussions, as well as questions/answers and interaction with the teacher and fellow classmates on the studied material.

Pappas (2013), the Founder of eLearning Industry's Network, points out what are in his opinion the main benefits of a flipped classroom: it promotes student collaboration and concept mastery exercises; creates a student-centred environment; and provides flexibility, in that everyone works at their own pace. In addition, video lectures are short – typically under 10 minutes – thus keeping students engaged; teachers are available for more one-on-one interaction with students; and students take on the responsibility for their learning.

Flipped classroom VET projects

The FLIP – Flipped Learning in Praxis project is supported by the Erasmus+ Programme of the European Commission. The purpose of the project is to develop guidelines for the implementation of blended learning environments in which information and communication technologies (ICTs) are used to enhance students' learning environments. A set of resources is available on the website to support teachers with planning and implementing video-based flipped classroom experiences.

Flip IT! Flipped Classroom in the European Vocational Education is an Erasmus+ project involving 10 partners from five European countries dedicated to the flipped classroom.

The Flipped Classroom Project (OLT) offers resources, ideas, tip sheets, design templates, and teaching stories to help academics plan flipping for specific teaching and learning contexts.

Mobile learning

Mobile learning means "learning across multiple contexts, through social and content interactions, using personal electronic devices" (Crompton, 2013, p.4) such as a smartphone or a tablet. Such mobile devices easily allow to access and view videos: in 2018, 52% of the worldwide web traffic passed through mobile phones, and an additional 4% through tablets, with YouTube as the third most visited website after google and facebook (WeAreSocial, 2018). Apart from viewing, and especially in VET, learners can use video to capture their own professional and work-based experiences, which become raw materials ready to be transformed into learning materials by means of reflective activities (Schwendimann et al., 2015). Several experiences showed the effectiveness of such an approach in initial VET, for example in professions such as baking (Chan, 2011), cooking (Cattaneo, Motta, & Gurtner, 2015), or auto repair (Motta et al., 2014).

Distance learning and MOOCs

Without doubt, the most popular and significant use of video in recent years is within *Massive Open Online Courses (MOOCs)*. According to the Class Central report, in 2018 the MOOC movement reached a total of 101 million learners; in the year 2018 alone, 20 million new learners signed up for at least one MOOC (Class Central, 2018). As Educause (2013) defines it, a MOOC is "a model of educational delivery that is, to varying degrees, *massive*, with theoretically no limit to enrollment; *open*, allowing anyone to participate, usually at no cost; *online*, with learning activities typically taking place over the Web; and a *course*, structured around a set of learning goals in a defined area of study." MOOCs resemble hypervideo in so far as they integrate interactivity. MOOCs commonly consist of short videos; what is new with respect to previous experiences of video-based learning is the integration of automated or peer/self–assessment, forums, and open content from some of the world's leading higher educational institutions (Glance, Forsey, & Riley, 2013).

Most MOOCs address general education and target well-educated learners (typically graduates), however, increasingly MOOCs address vocational and professional learning. The vocational school of Yverdon, for example, collaborated with the Federal Technical University of Lausanne (EPFL), one of the big MOOCs players in a worldwide setting, to prepare a MOOC on mathematics for apprentices.

Two examples of free MOOC platforms

EMMA – providing multilingual access to European MOOCs: EMMA provides a system for the delivery of free, open, online courses in multiple languages from different European universities to help preserve Europe's rich cultural, educational, and linguistic heritage and to promote real cross-cultural and multilingual learning.

Europe MOOCs and Free Online Courses: On this page, you can see a list of the upcoming

classes (for the next 30 days) and the last inserted or updated MOOCs and free online courses.

If distance is a factor, but the video content is not recorded but experienced synchronously, then other Web-conferencing systems are used, often in the form of *webinars* – i.e., short conferences facilitated by experts, followed by the possibility to interact live with them via chat and/or via audiovisual interaction.

It is not uncommon for institutions to combine synchronous and asynchronous distant learning: the lecture is first streamed live and then left online in a repository for asynchronous viewing. A model like this was adopted by the vocational sport school in Tenero, where professional sportsmen and artists attend a commercial school. To make it compliant with their sport engagement, or simply to make the lessons accessible to those students who have signed a contract abroad, the school began years ago to propose a distance learning possibility. Therefore, some subjects are delivered both in person and at the same time broadcasted online. For those who are engaged in training with their teams, the lessons are also streamable afterwards from the school platform. The effectiveness of the approach is confirmed both by the students and the teachers (see, e.g., Papa, 2018).

Integration of the video in the overall learning scenario

A combination of the possibilities and modailities of video can be achieved within a learning scenario (Cattaneo et al., 2018). Therefore,

1. videos can be used in different ways and with different aims multiple times within the same scenario, and

2. the instructional function of the video can vary, e.g. to introduce a subject, to exploit the content, to support the execution of a procedure, to consolidate learning, or to assess learning (Gagné, 1972; Smith & Ragan, 1999).

Effects: Summary

The effects of using videos in learning are not easily summarised and are contested by researchers (e.g., Merkt, Weigand, Heier, & Schwan, 2011). In terms of an overview, however, we can say that several studies showed video to be more effective than printed materials for young learners and for simple content (e.g., Furnham, de Siena, & Gunter, 2002; Walma van der Molen & van der Voort, 1997, 2000). This advantage is not always evidenced for adult viewers and complex matters. However, we know that video is preferable – with respect to the expected learning outcomes – when *process and procedural knowledge* need to be acquired (e.g., Höffler & Leutner, 2007; Höffler, Schmeck, & Opfermann, 2013; Müntzer, Seufert, & Brünken, 2009).

The positive effect of video is enhanced in specific instructional contexts. For example, a considerable body of knowledge, starting from the review provided by Wetzel, Radtke, and Stern (1994), concluded that giving the control or feedback to learners, or providing other kinds of interactivity like integrating questioning were associated with higher levels of achievement (cfr. the Recommendations section for further details).

In the case of college classrooms, authors like Berk (2009) have demonstrated the potential of video clips to: grab students' attention; focus students' concentration; generate interest in class; create a sense of anticipation; energise or relax students for the learning exercise; draw on students'

imagination; improve attitudes towards content and learning; build a connection with other students and the instructor; increase memory of content; increase understanding; foster creativity; stimulate the flow of ideas; foster deeper learning; provide an opportunity for freedom of expression; serve as a vehicle for collaboration; inspire and motivate students; make learning fun; set an appropriate mood or tone; decrease anxiety and tension on scary topics; and create memorable visual images.

Shifting to higher education, Woolfitt (2015) cites several studies to show that the use of video in teaching *can improve learning outcomes as well as learning satisfaction*. Similar results can also be claimed in the vocational education sector (Cattaneo et al., 2018), especially when the learners can work on their own – simulated or real – authentic experiences.

Obstacles and Issues

The individual level

At the individual level, we distinguish between issues concerning teachers and issues concerning learners. In the former case, sometimes teachers fear or resist change and experiment with new teaching methods and do not want to get out of their comfort zone. It is not unusual that some teachers do not feel comfortable being filmed, are shy, and cannot convey enthusiasm in front of a camera (Woolfitt, 2015). In the latter case, surely two important issues related to cognitive activation are, on one side, the risk replicating a "TV attitude," i.e., to develop a passive behaviour in front of a camera; and on the other side, on the contrary, the risk to be overloaded by too high of an information flow, resulting from the dynamic and transient nature of video-based materials.

> Teachers often make the mistake of using video to reproduce a transmissive teaching situation, most often in video in which the teacher is explaining a concept. In so doing, we just transpose a classic teaching situation under-exploiting the potential of video. Often videos focus on content rather than activating learners. In general, it is the teacher who has control, and learners are rarely seen in production situations. The fact of having a new instrument does not necessarily mean that it changes practices; one can very well reproduce old practices with a new instrument. It offers the possibility of changing practices, but not automatically. Often, they will do the same thing as they do with the blackboard (Claire Peltier, 2018).

The institutional and systemic level

Well-known issues at the institutional level concern *the costs of producing* video materials, especially in the case of MOOCs (see the OCDE report by Gaebel et al., 2014). Costs depend on whether institutions produce in-house, low-cost video material or outsource production to external providers, with possible economies of scale depending on how many students are reached, and the initial and ongoing staff and technological costs required to maintain and upgrade the materials produced. Also, in blended and distance learning scenarios, whether *teaching assistance or tutoring* is provided to students is a key cost factor.

On top of that, we always have to remember that *accessibility* is a key issue: technical difficulties in accessing the content of videoed lectures generate relevant frustration and also result in students wasting time trying to solve these issues (e.g., Woolfitt, 2015).

General Recommendations

In this section we try to sum up some operational recommendations for teachers and educators who want to promote learning from video. Many of the recommendations suggested in the framework of teacher education are also valid here. However, here we will put a stronger emphasis on the use of video as an instructional tool, thus also insisting on the very important aspects related to video design.

Recommendations concerning the video material design

When using video in training activities, there are two main choices an educator has at her disposal: to select an existing video, or to produce it herself.

Selecting a video

According to Berk (2009), there are three sets of criteria that must be considered when selecting a video for teaching purposes:
(a) The students' characteristics: age or grade level, gender, ethnicity, and languages have to be explicitly considered by instructors for choosing the right video.
(b) The offensiveness of the video: clear standards for acceptable content should be delineated with respect to the target group. The video is being used to facilitate learning, not to impede it, and the initial level of expertise of students can make a difference in exposure to the same learning material.
(c) The video structure: the structure of the video must be appropriate for instructional use. In this respect, some guidelines are suggested concerning *length* (as short as possible to make the point), *context* (if possible authentic, everyday language use), *actions/visual cues* (action should relate directly to purpose), and *number of characters* (limit number to only those few needed to make the point).

Designing a video

When it comes to properly designing a video, a general and very well-acknowledged framework is provided by the cognitive theory of multimedia learning (e.g., Mayer, 2005) and its 12 main principles. Jack Koumi has criticised this framework for being too general, and proposed operational and concrete rules of thumb concerning video-based learning. Koumi (2005, 2006, 2013, 2015) proposes as a complementary possibility his *Design Framework*. We summarise his contribution here, distinguishing three main steps:

1. Teachers have to keep in mind the learning tasks and aims that could gain advantage from a multimedia package, the learning outcomes that guide the pedagogical design, the learning environment, and the characteristics of the audience. Additionally, designers should ask themselves if video is necessary, and make informed decisions on the use of graphics and animations.

2. When it comes to the production, with respect to a general indication in designing a storyboard, Koumi suggests recording a draft of the audio guide-track and editing the visuals so that they appear on the screen when prompted by specific words, and to progressively refine and calibrate the images to the final audio-track.

3. Finally, the author gives a series of *pedagogic guidelines for screen/audio design* of multimedia, dividing them into various categories. Please refer to the box below to view the details.

Reduce cognitive load through segmenting and signaling

In general, when it comes to designing a video for learning – though these principles are also valid to guide the selection or adaptation of an already-existing video – a number of recommendations have been proposed by several scholars concerning *managing the cognitive load* (e.g. Zhang, Zhou, Briggs,

& Nunamaker, 2006). We must not forget that according to some scholars, static pictures are, in general, preferable to videos because videos are too complex and full of information for our brain to process. Minimising possible sources of extraneous cognitive load is therefore imperative, as well as optimising germane cognitive load and managing intrinsic cognitive load. This means concretely:

- To reduce the information load, focus on *organising* the content as much as possible
- To segment content into smaller units. *Segmenting* allows some time between successive segments of the presentation by breaking down the presentation into small bits.
- To draw and focus the learner's attention on the most important pieces of information displayed on the screen at a given moment, use *signalling and cueing*. Similarly, when using hypervideos, this translates into inserting few and well-defined hyperlinks (and related materials).
- To eliminate interesting but extraneous information from the video – that is, information that does not contribute to the learning goal – through *weeding*.

Video per se is as deficient as any other tool; one of the pitfalls is to think that watching is enough. Another set of errors is in the design, such as to simply record oneself for 45 minutes and think this is better than a regular lecture. The design of a video takes time and research. (Patrick Jermann)

Koumi's pedagogical guidelines for screen and audio design are the following:

- **Navigational guidance**. Create a "content page," which should work as a "map" of the video and be the starting point, also giving the option to skip to any segment needed to view.
- **Use of language**. Avoid long sentences and use a conversational style of audio commentary.
- **Layout of the screen**. Employ 25% of normal print density, as students have difficulties processing heavy visual layout while also listening to a commentary.
- **Relationship of screen text to audio commentary**. Only use keywords on screen and make sure that your audio commentary matches them.
- **Interactive elements**. Students should be able to keep track of their activity through a notepad type of tool embedded in the video.
- **Wisely balance teachers' *effective exposition*, and students' *independent exploration***, through the following guidelines.
  Provide signposts. Signal where the chapter is going, what is to be expected next, and why.
  Facilitate focus. Allow, for example, time for reflection on the given material.
  Foster constructive learning. Activate students' previous knowledge, guide students' knowledge construction, and show worked-out examples.
  Elucidate. Minimise the load while maximising clarity.
  Reinforce. Provide a variety of examples to explain a concept, compare and contrast, and guarantee synergy between images and audio commentary.
  Consolidate learning. Provide quizzes & self-assessment opportunities throughout the video.

Recommendations Concerning the Instructional Choices

Prepare the viewing and announce its objectives

A good study by Hobbs (2006) highlighted how *misuses* of video for learning are still very well-diffused. To avoid such misuses, it can be useful for a teacher to have a question-guide for integrating video into a training course. The answers to these questions will guide the overall instructional choices

to be made and will guarantee the success of a project. Among these are the following (cfr. University of Sherbrooke, 2012):

- What objectives do you want to achieve with the video?
- What will the video bring to your course or teaching?
- Who is your video for? Who is the target audience?
- What is the subject matter and what kind of video do you want to produce?
- To which medium or media is your video intended?

Once the overall pedagogical system is clear, the most important thing to always keep in mind is to *orient the viewing*. It is important to *announce the aims of looking at a video* from the beginning, making the learning objectives clear and explicit to the learners. Why they are looking at a video should always be clear to the students. To strengthen this aspect, and to focus the learners' attention, the teacher can also *prepare specific guidelines* for students or discussion questions so that learners have directions on what to see, hear, and look for (Berk, 2009).

The viewing also needs to be prepared in advance, for example with an *introductory and focused lecture* (e.g., Michel, Roebers, & Schneider, 2007); in this way, reactivation of prior knowledge is facilitated.

In her interview, Peltier, explains that it is important to have convergence between the objectives we are aiming for and the techno-pedagogical choices we make. For example, the use of video must be justified according to the objectives we are aiming for. Peltier affirms that "video should have a special status." The use of video has symbolic specificities to take into account, and teachers should be aware that video is a language. Consistency is very important. Videos generate cognitive processes, and we need to move away from the idea that we use them just to motivate students. This is a positive aspect, but it is not the only one. Speaking about the language, Vygotsky says that it is not only a vehicle to transport information; it is part of a whole that articulates a learner's source of knowledge. Language is the medium. In the background, the video is also a medium; therefore, it plays an essential role in learning. To accept this, we must accept that this instrument has a special status.

Give the control to student to allow pacing

If the previous recommendation concerned the phase prior to viewing the video, when it comes to the viewing itself many scholars agree on the fact that it is of utmost importance to consent to the user interacting with the video and controlling it (e.g., Merkt & Schwan, 2014; Wouters Tabbers , & Paas, 2007). Teachers should *give the control to students* so that they can regulate their information intake and select what to look at; they must have the possibility of *pacing*, and then pausing, continuing, or going back and forth, thereby allowing them to adapt viewing according to their cognitive needs. However, sometimes the teacher could retain control to better manage the pace of learning; in such cases, she should monitor that all students can keep up with the pace.

Favour interactivity and reflection

To give the control to the student is only one of the ways to make a learner active and interactive with the video material, increasing the chance of schema construction. This is the reason why interactive video and hypervideo seem to have additional affordances to support learning with respect to raw video. Independently from the use of hypervideo, however, educators should promote active learning

and favour *relating, prediction, personalised task selection, scaffolded self-assessment*, and finally *reflection* (e.g., Brame, 2015; Wouters et al., 2007).

The use of guiding questions and reflection *prompts* can be used to provoke learners' reflection on the way they performed a task and compare it with other strategies to perform it (Butler, 1998; Seale & Cann, 2000; Winne & Stockley, 1998), and more generally to favour reflective activities through *analytical tasks* (about the content, the languages, the codes, the behaviours, etc.) that are often coupled with writing (stopping the video and taking notes), or *video annotation* (e.g., Colasante, 2011; Hulsman & Van der Vloodt, 2015; Rich & Hannafin, 2009; Tripp & Rich, 2012).

The general principle is, however, to *set a time for reflection* on what the scene showed in the video. This also serves as a reminder that reflection requires a certain, adequate time to happen. This can also be structured in a dedicated learning activity to interact about specific questions, issues, or concepts, as well as in a discussion around those questions in a small and/or large group format.

Favour design activities

As presented above, giving the learners the task to design themselves a video is another very good way to make them active learners and to develop both content-specific and transversal skills, especially when learning-by-design is proposed in groups (Zahn, 2006; Zahn, et al., 2010). A very recent study by Hoogerheide, Renkl, Fiorella, Paas, and van Gog (2018) provides additional evidence that teaching through video by peers is an effective learning strategy. Students that learnt content by making a video obtained better test results than a control group who learnt by conventional study methods.

Resources and tips for teachers on video-based learning

The online lecture toolkit: This project was developed to support the needs of educators who want to create effective online video content. The resources here are designed to make the application of evidence-based strategies accessible for educators and instructional designers at every level of technological fluency.

Media & Learning: Video in Higher Education Media & Learning 2018 reports the latest pedagogical and technical developments in the field of video-supported and video-enhanced learning.

Vidumath: The project equips users with content and methods that are attractive and suitable in format and didactics. Good pedagogical frameworks, best practice examples, and realistic classroom tasks are crucial to get teachers interested, build support, and achieve results with students.

VIDEO IN CORPORATE TRAINING

In this new chapter, we will deal with video used to support corporate training. Corporate training includes both continuing professional development and work-based learning. Corporate training is somehow owned by companies, in the sense that it:

- takes place to support employees' ongoing skills development, and
- is promoted, requested, or sustained by companies.

It is generally recognised that the majority of life-long learning takes place in companies, and that enterprises are key providers, customers, and stakeholders for learning and skills development. Unfortunately there is not an extensive scientific literature on the use of video in corporate training, so in this chapter we have relied upon a limited grey literature This literature confirms that video is a hot topic as well as an important trend. For example, Neo (2016) affirms that a video platform is *the* way of the future because, apart from supporting next-generation corporate training and communication, it saves money, offers employees and customers an effective and enjoyable learning experience, and provides in-depth security, customisation, analytics, and seamless integration into existing systems. Likewise, Baskin (2016) argues that there are more and more companies using video in different ways, claiming that an effective video helps companies to improve the work/life balance of their employees (excessive business trips can stress employees), to engage and inspire workers (video makes it easier for teams in different locations to stay connected), to share knowledge and insights (on-demand video is an ideal solution to ensure that company-wide communications are consistent and engaging), to unlock productivity potential (gathering dispersed teams to share knowledge and experience allows them to leverage their combined talents, and to make more informed and quicker decisions), and last but not least to save money (e.g., on travel costs and productivity). Finally, the Kaltura (2014, 2017) surveys on the use of video within enterprises, drawing on 650 responses, – Kaltura being a market-leading video platforms provider – confirm that enterprises believe that video will grow in importance as a tool of internal communication, particularly live streaming.

Even without accurate figures about the actual proportion and growth of using video in corporate training, it seems that there is an emerging consensus that using video to support corporate training is an effective and efficient way to develop the professional competence of employees and to support their well-being in general.

Different Uses for Different Purposes

Nederveld and Berge (2015) highlight the usefulness of different kinds of video in the corporate context: video lecture, interactive video with knowledge checks, and TED-ed-like pre-made video lessons. Whatever the kind of video, however, such resources can be used in different ways and with different target groups, including internal (employee) and external (customer and retailer) audiences.

One can distinguish between video trainings offered to the whole staff for updating on new general issues, those targeting a particular division or department and those targeting new staff or individual staff members that need to develop professional competence. In this last case, individual learning may be complemented through open learning that includes video content, for example, MOOCs or informal learning.

Sometimes the same or slightly adapted video materials used to update internal staff are offered to retailers and customers, as well as final users, for example to present new products.

Non-formal video training platform

INDVT- Inclusive Digital Video Training in Youth Work: a European project that aims at increasing the skills of youth workers and trainers in the areas of inclusive digital video training. The latter is suitable for non-formal youth education via the development of training materials and organising exchange of work-based activities.

Synchronous vs. Asynchronous: A General Distinction

The literature on the corporate use of video includes both synchronous and asynchronous use of video. In the former case, the attention is more on the use of videoconferencing systems – for example, to run meetings at a distance, which is generally more a management than a training issue. In the latter, the focus is more on allowing an e-learning or m-learning approach, taking advantage of the independence from time and place.

In the following, we will focus mainly on the latter case, introducing possible uses of video that vary along the continuum from full distance learning to blended learning, as in the previous chapter. We will refer here to four main modalities: distance learning, MOOCs, mobile learning, and the flipped classroom.

Distance e-learning

Statistics demonstrate that companies that continue to innovate in corporate e-learning settings are considered market leaders (Beinicke & Bipp, 2018). For example, 41.7% of global Fortune 500 companies were already using technology for employee learning, according to a worldwide survey conducted by Ibis Capital (2013). “The global e-learning market reached revenues of $35.6 billion in 2011, and experts predicted that the U.S. e-learning market would grow to $51.5 billion by 2016” (Beinicke & Bipp, 2018, p. 503; Docebo, 2014). In an exploratory study involving 954 mostly veteran workplace learning professionals, Rossett and Marshall (2010) showed that e-learning facilities were judged to be more effective than other training methods not only for providing information about products, fulfilling compliance requirements, and securing standardisation; also, respondents offered one surprising conclusion, considering that e-learning is useful to capture and share best practices. Many companies indeed include e-learning training because it is an effective way to train and save money (Fry, 2001; Kimiloglu, Ozturan, & Kutlu, 2017). Pang (2009) also explains that the mode and method for training in corporate learning are often dictated by on-demand learning, cost, and loss of revenue from travel and instruction. Pang investigated the use of a video-driven multimedia, Web-based professional development program in the corporate environment to determine if the quality of the learning experience and the knowledge gained from that video instruction were the same as that obtained with traditional methods. Results of this study show that knowledge gains are slightly higher among video-based subjects.

Video is not the only medium one can use to deliver training *at a distance*; in practice video is likely to be one ingredient of a blended approach when it comes to the learners’ satisfaction. For example, at the US-based technology company Neustar, Gail Griswold, manager of learning and development, introduced a blended modality of learning that allowed the company to shift from hours of PowerPoint training for the new recruits, to getting workplace knowledge through a program combining e-learning segments with short videos in a reality TV format. Here, four different actors representing four working personas followed different scripted scenarios. New recruits benefited from the engaging learning format and fulfilled the learning expectations of their employers.

An interesting although exceptional case is the use at a distance of *virtual reality (VR) videos*. VR is not a video-based technology in the strict sense of the word, but Skiles and Shafer (2015) from Samsung Electronics America speak about a 360-degree video technology able to transport their employees to Samsung Electronics Co. Ltd.'s headquarters in South Korea without the costs of the trip. VR 360 is called "total empathy machine" because it allows users to empathise with the content of the video that is eliciting an immersive experience. This technology can make the user feel as if he or she is actually in the filmed location. It is reported that 96% of participants agreed that using the VR equipment enhanced their learning, and that 73% of the employees noted that their role effectiveness was also increased by the employment of the VR tools.

Corporate-oriented video platforms

Vimp: ViMP Corporate Enterprise – Your Intranet Video Platform. ViMP is a technical platform offered to companies to deliver their video-based corporate training. It is like a YouTube platform for companies, although it offers more possibilities and customisations.

https://www.laformationpourtous.com/ offers a catalogue of 1,300 training courses recorded on video by 380 experts, accessible on computers, tablets, and smartphones. It differentiates courses with certificates and courses for self-learning, with the possibility to follow a profession-based or a personalised curriculum.

La webtv de la formation professionnelle is a platform that provides video training for various professions and several procedures and operations within each profession.

MOOCs

MOOCs constitute a very interesting opportunity for corporate training (Cobb, 2014; Dodson, Kitburi, & Berge, 2015; Karnouskos, 2017). Lhommeau and Bourgade, in their e-book sponsored by 360learning, specifically address COOCs, which is "a MOOC created, offered, produced and distributed by a private company." COOCs help organisations improve their brand image and enhance their attractiveness to potential employees. They can expand corporate training options, but also offer new recruiting techniques and provide innovative marketing channels (Dodson et al., 2015).

Normally, the characteristics of corporate MOOCs are their short formats, popularity, social validation (a collective experience of the corporate community); high-quality learning at scale; an active learning experience for learners; and finally, professional improvement in real-time. A recent case involving more than 850 Microsoft sellers (Fourrage, 2015) showed that corporate MOOCs can have quite high results in terms of completion rate (in this case 85%) and especially satisfaction (95%). This is the more likely to happen, the more the course is "well-tailored to company objectives, tightly embedded in the corporate context, and designed with learner engagement and motivation specifically in mind" (Fourrage, 2015). Without these elements, in fact, it can be that the acceptance among relevant stakeholders is still low (Egloffstein & Ifenthaler, 2017).

Companies do not have to develop their own MOOCs. Bogdan and colleagues report cases of companies supporting their employees' development through encouraging them to enroll in public MOOCs. Companies such Delloitte and Yahoo, recommend their consultants and engineers to apply for Coursera MOOCs, while Datalogix encourages its staff to take relevant courses on Udemy. Similarly, Google enrolled 80,000 employees in Udacity's HTML5 MOOC. Boeing was able to connect 1,500 engineers with MIT instructors through MOOCs on Advanced Design developed on the edX platform (Bogdan, Holotescu, Andone, & Grosseck, 2017). Companies such as Deutsche Bahn, L'Oréal, Hermes, Valiant and Nationale-Nederlanden also have developed MOOCs for their workforce on the German platform Iversity (http://business.iversity.org/en/). Companies also create MOOCs to train their partners and customers: SAP, for example, authored openSAP MOOCs, while the World

Bank provides specific MOOCs on Coursera to partners and experts in emerging markets. MOOCs are used to offer job-oriented courses to future employees, as AT&T and Google successfully demonstrate.

Corporate MOOCs

At the University of Geneva, the department of MOOC had a partnership with a big bank to design four MOOCs in the field of finance with the support and monitoring of finance professionals. Another MOOC is used in professional training on clinical supervision: clinical reasoning was filmed during an interaction between a trainee and a doctor. They recreated situations of trainees' supervision, which were fictitious but based on their own experiences. This allows trainees to identify situations, to think, to see how the supervisor proceeds, etc. (Peltier, 2018).

Magenta MOOC is the MOOC-based project led by Deutsche Telekom to support cooperation among employees across departmental and international boundaries. Thanks to this workplace-learning initiatives, employees can connect group-wide with each other and create and share content using social media and other collaborative tools. Started in 2014, thanks to its great success, the project has been re-launched for the third time in 2018.

Mobile learning

Mobile learning means learning through a mobile device such as a smartphone or tablet. There is evidence to suggest that mobile learning is gaining in popularity as a form of work-based learning. According to the 2017 Kaltura report already cited, 90% of the respondents agreed that "mobile devices will become the primary device for creation and consumption of enterprise video." There are already many cases of the applications and effectiveness of this approach. Just to cite an example, Bauters, Purma, and Leinonen (2014) investigated the use of a mobile video recording device to support learning in physical practices and situations at work through short video clips that are related to the physical environment and tasks performed *in situ* to foster learning. Stemming from the belief that learning and reflection are more likely to occur when they are engendered close (physically and temporally) to the practice itself, the authors present a smartphone application designed to create and annotate short videos as potential solution for informal workplace learning. According to the authors, the mobile learning application has to be able to show contextual and situated practical skills and knowledge, and be easily available without breaking the execution of the work practices. Other cases concern the medical sector (e.g., Konings et al., 2016), in-service teacher assistants (Stone, 2011), and bakers (Chan, 2011), as well as production, service, and other domains. A wide overview of such experiences is given by Pachler, Pimmer, and Seipold (2011) in their book devoted to work-based mobile learning, where a complete section focuses on present cases from work contexts (see also Pimmer & Pachler, 2014).

The flipped classroom

Flipped classroom videos are more and more used in corporate training as pre-work assignments. This allows compensation for restricted learning time in the classroom or workplace, increasing efficiency and impact (Cobb, 2014). Authors like Zarom (2015) show that the application of the flipped classroom principles to the world of business can sustain corporate training leaders to "transform their current training programs into an engaging, flexible, and effective learning experience for employees." Although it is not so easy to find good examples of how the flipped classroom is being adopted by companies, G-Cube – a provider of technical solutions for corporations – created a flipped classroom learning solution for leading training organisations that had, until then, relied mainly on classroom

training. The case is interesting for mobile learning solutions as well, and the company website is rich with other cases from many professional domains.

Effects

Some important actors within the field of corporate training (e.g., Greenberg & De Nault, 2018; Honore, 2016; Kaltura, 2014, 2017; Pandey, 2017) emphasise that video has an important impact on a wide range of goals for organisations. The overall perception is that video has a positive impact, particularly for internal use, from training employees faster and more cost-effectively to improving communication, collaboration, and productivity of geographically-dispersed teams. In sum:

- Video can be more efficient and effective than formal learning and can help in *saving costs*; producing a training video is a convenient way to disseminate information to large groups of people. It saves a great deal of time, money, and effort compared to live training sessions that have to be repeated annually or even multiple times a year in different locations.
- Video learning enables companies to develop *tailor-made and contextualised training*.
- Video guarantees *access to and interaction with leaders and experts* who otherwise would be harder to recruit for lecturing. Also, subject matter experts value the opportunity to place their knowledge into a shared repository.
- Incorporating video into learning programs supports learners and organisations across the spectrum of *formal and informal learning* (the same learning materials can be re-used in different learning situations).
- Video supports *consistency* in training materials and experiences.
- On-demand video gives employees the possibility to *access the information they need when they need it* and train when and how much they want. On-demand video is helps organisations to shift to *micro-learning*. Best practice and step-by-step videos provide employees with an *immediate support*.
- Video *meets the required cognition level*: interaction cues allow control to align or to adjust cognition levels according to need and thus to sustain high learner engagement; varied interactions and personalisation promote learning.
- *Video generates engagement* and attracts and retains employees. More and more organisations encourage more of their employees to explore careers and take related training.

Obstacles

In addition to what has already been mentioned in the previous chapters, we focus here on other aspects companies should consider when training employees through videos.

1. Beinicke and Bipp (2018) underline that the implementation of a full e-learning program can involve high investment costs and can also be a source of current elevated operating costs for administration and information technology. However, in the long run, the return on investment may be high, and costs are scalable.

2. Securing digital training content, especially when it is being shared outside the company, is a huge concern for most companies. It is crucial for any enterprise to control who can view, share, and download their video content (Neo, 2017).

3. Video is not exempt from the main challenges concerning learning in working environments, such as (a) tight schedules (no time for dedicated learning or practising); (b) short lead time for the generation of guidance or support for changing practices or learning new usages of tools and materials; and (c) harsh conditions where it is not easy to use devices that require fine motor control (e.g., touch-controlled smart phones; Bauters, Purma, & Leinonen, 2014).

Recommendations

Designing and developing a video for work-based learning requires specific skills and know-how. In particular, the following recommendations can be highlighted from an analysis of the literature.

1. *Answer macro-questions* like: How will this platform be used? Who will use this platform? What kind of budget do we allocate? What resources do we need to create these videos? Do we need security?

2. Gather the necessary equipment, *be realistic about the budget and capabilities*, and make a summative evaluation about the costs before starting to plan a new video strategy. It can be expensive to hire external video producers to create content. It may be more affordable to develop an internal staff with the skill and capacity to manage and produce video content. At the same time, consider whether to produce videos internally or benefit from the large partner network of specialists, who can produce high-quality educational content (Honore, 2016; Kaltura, 2014; Neo, 2017). Engage different departments to help refine the strategy.

3. *Check for security and governance*. Enterprises have to check that security, access control, and entitlement systems cover varying levels of access, digital rights management, different methods of user authentication, and appropriate moderation of uploaded content and publishing.

4. Be sure to *know the employees and their needs for engagement*. Have contact with them and make video easily discoverable, because people learn in different ways and at different speeds. It is necessary to design and develop adaptive learning strategies to better engage the learner, as viewers need to connect information that is being presented in order to commit it to long-term memory. (Ferland et al., 2011; Neo, 2017; Schiemo, 2018).

A huge mistake concerns inattentiveness to audience characteristics, and that reflects in poor video design. (Hand van der Meij)

5. Enterprises must *consider the style of the video* (Schiemo, 2018) and *the tools/communication design*. There are many different styles of corporate training video (e.g., the explainer video, the talking-head interview, the interactive video, the stock footage montage, the culture video; see Schiemo, 2018), and once messaging has been identified, the proper style must be selected and consistently applied. Authoring tools need to be simple, intuitive, and accessible on a wide range of devices so as to encourage employees to generate, edit, and share content (e.g., Kaltura, 2014; Swarts, 2012).
   Carefully *prepare and rehearse the script* and link it to establish specific training objectives. Whether appearing on camera, providing a voiceover, or hiring acting talent, the creator will need to write an engaging script for the training video. Make sure as well to take time to

rehearse the script: this step is important for having confidence and speak fluently, because this inspires trust and motivation (Ferland, Goyer, Lebel, & Brussières, 2011; Neo, 2017; Swarts, 2012). If designing a complete course, such as in the case of corporate MOOCs, put attention into design, structure the overall course content in advance (including chapters or key concepts), and determine what information needs to be delivered when and in what context. In addition, remember that if re-using the same materials for different scopes and/or contexts, the largest and less binding script should be applied.

6. Whenever possible, *limit the length of videos* to a few minutes each; this enables learners to stay engaged and better retain information. The ideal length of a training video is between two and seven minutes; with longer videos there is a risk of losing the viewers' attention. Consider the amount of information to concentrate on in a video: too much may overwhelm the viewer. Splitting up the training into multiple sessions can be a solution if there is a need to provide more information on the topics. *Identify key messages that are realistic and concise*: ask, "what exactly do we want our audience to know by the end of this video?" *Start with an overall structure, a goal, and a set of objectives* that have to be communicated clearly.

Swarts (2012), in his article, explains *the characteristics that communication design* in a video needs to have:
For the *physical design* of the video, the access, visibility, and timing are important. Based on the Carliner model, issues such as access (e.g., titles), viewability (e.g., video resolution, audio quality), and timing (e.g., video speed, storytelling rhythm) are important elements to take into account. Titles, for example, can help someone moving the progress bar to use the title frames as entry points. In addition, it is important to reduce the amount of irrelevant visual information; viewers can more easily tune in to the information that matters.
For the *cognitive design*, the author explains the need to include accuracy (whether the video contained any errors of fact or execution), completeness (whether the video appears to cover all expected topics), and pertinence (whether the video is edited to include only relevant information). A good video establishes an organisational superstructure, as an effective manual would do. For example, the audio and video offer slightly different but complementary details about the content.

Finally, *affective design* includes comfort, engagement, encouragement, and motivation. It is important that the video has qualities such as confidence (the narrator inspires confidence in the outcome of the lesson), self-efficacy (the narrator or content encourages users to believe in their ability to succeed), and engagement (an attempt is made to capture and hold attention). The video should be effortless to watch, and the moving images are enough to hold attention for at least a short amount of time. The video, with the help of text annotations, transitions, and sharp technical qualities, looks stylish, professionally assembled, and credible, which lends confidence that the content is good. The author gives some suggestions about the rhetorical structure of instructional video; the introduction includes the goals of instruction as desired states and prerequisite states, or conditions that needed to be met prior to following the rest of the video. A good video devotes approximately the same amount of time to introductory framing, steps, and conclusions. It is important to have more explanation, more demonstrating, and less doing. When demonstrating, the narrators of good videos explain what they are doing and why. The explanations are important, as well, for contextualising the procedures in larger tasks in which users might be engaged.

7. An important element is also to *include an interactive component*. Ask learners to provide their feedback on the video content and include *questions* that quiz them about the content they have viewed. This interactivity could help to adapt content based on employee feedback. In this

direction, it is also helpful to *combine the video with social media tools*, and with a social video policy that lets employees be creative and inspires creativity and consumption.

"Instead of passively sitting and watching video, setting goals and questions for contemplation before and during the viewing can foster active learning. It is equally useful to create activities that happen throughout the video and after the video viewing". (Meg Colasante)

8. *Evaluate the video's success*: If the video aims at teaching a specific job-related task, trainers should be able to evaluate employees' performance by repeating that task over time. This will allow them to see if the video had an impact on the employees' learning gains. If the video is more general or covers multiple job-related tasks, it is useful to invite employees to participate in a survey where they can convey how effective they found the video. Testing the employees' skills and analysing their feedback will help trainers utilise the full productivity of videos and will guide the creation of future video training materials.

9. It is very important that trainings and their theoretical framework should be designed taking into account the type of learning content (declarative or procedural knowledge). It is important to design the learning platform by *considering transfer-supportive measures* when training and development professionals want to build a video-based e-learning program. One possibility is to *provide immediate feedback* during training from a (virtual) trainer and/or other trainees; another way is to *support* more frequent usage of *self-regulated learning strategies*, as trainees are better at decoding and recoding knowledge and skills learned in e-learning (Gravill & Compeau, 2008). Feedback on the results can guide the learner to understand how to continue with the learning process and if there is anything to improve. For fostering the self-efficacy of trainees and to coordinate the individual learning process, the support of the development professionals is important.

VIDEO-BASED LEARNING IN ETF'S PARTNER COUNTRIES

ETF's Partner countries are developing and implementing policies to address a number of interrelated issues: fighting unemployment, investment in infrastructure, improving access to and participation in education, better alignment between education and the labour market.(e.g. ETF, 2018a, 2018b, 2018c, 2018d, 2018e, 2018f). Against this background, we aim to shed light on some of the experiences in these countries in relation to the development of information and communications technology (ICT) in education, and especially in relation to their employment of video-based education and training. In this chapter we will consider six countries, Israel, Kazakhstan, Morocco, Serbia, Tunisia and Turkey, which through their geographical locations and educational policies together provide some insights into this topic.

In the following paragraphs, we will briefly present some of the initiatives taken in the partner countries to illustrate the use of video-related educational projects. The country that hopes to establish effective video-based learning must first invest in ensuring that its information technology (IT) infrastructure is performing well (today, this often depends on the quality of the telephone network). Simultaneously, there must be appropriate pedagogical preparation of the country's teachers.

A good example is **Morocco**: In an attempt to make technology accessible to education, the INJAZ project (INJAZ Al-Maghrib) facilitates the acquisition of laptops and modems at lower prices and provides free broadband connection for the academic year. With a similar aim, the MARWAN (Morocco Wide Area Network) project connects all Moroccan universities and educational institutions through broadband internet connections. In 2013, the Licence, Master, Doctorate (LMD) educational reform was launched and the higher education system in Morocco invested heavily in the integration and fostering of ICT in order to improve the continuing education of teachers. The goals of the reform were to introduce innovative teaching practices through the use of ICT-based training and to foster distance education. With strong support from the government, several projects were launched to motivate teachers to introduce the new methods into their teaching (see also: Riyami, Mansouri, & Poirier, 2017).

According to an Organisation for Economic Co-operation and Development (OECD) report on school resources, **Kazakhstan** has placed great emphasis on equipping schools with technological resources and connecting them to the internet. Under the country's e-learning program, since 2013, 99% of all schools have had access to the internet and 75% have had broadband access. (This drops to 52% in the rural areas). However, the smaller schools, especially those located in rural areas, still tend to suffer from a lower standard of education, which is partly due to a lack of qualified teachers operating in those areas. In Kazakhstan investment in innovation and in the provision of the technological resources is seen as necessary to reduce the country's educational inequalities. With the ambitious goal of enabling all learners and educators to have equal access to the most up-to-date learning resources, in 2011, the government started a large-scale E-Learning project. This forms part of the National Program for Education Development in the Republic of Kazakhstan, and will continue until 2020.

During 2017, **Serbia** piloted the European self-assessment tool for schools' progress towards digital age learning (SELFIE) based on the European framework for digitally competent organisations and published its own 'Digital Competence Framework – Teacher for a Digital Age'. The Serbian Moodle Network is a bottom up network of teachers that collaborate and share resources and practice (ETF, 2018h).
Serbia also provides good examples of initiatives that focus on primary education. In 2018–2019, Serbia partnered with Italy in a project entitled 'Let's flip our classroom'. The goal of the project was to

integrate ICT into the flipped classroom in an attempt to improve elementary students' communication, creativity, critical thinking, problem solving and digital skills. The hope was that this regional project would become a national one. Another study was conducted recently in a Serbian primary school with the aim of determining the efficiency of students' involvement in a flipped biology classroom, as compared to the traditional classroom approach. The results showed that, in the primary school situation, the flipped classroom model provides an efficient and engaging approach to biology (Županec, Radulović, Pribićević, Miljanović, and Zdravković, 2018).
Finally, Serbia is currently offering national, blended CPD to all of its secondary school teachers to support the introduction of new curricula.

Targeting young children is an **Israeli** video-based education project: Visrael is a commercial product offering a video-based learning program that creates positive connections with Israeli culture and traditions for children aged five to ten through a variety of educational videos.

Although, generally, Israel has a highly-skilled labour force, and the statistics show that educational attainment levels in secondary and tertiary education are higher than the EU average, Israel has also been addressing issues around adult participation in learning. To this end, Israel has been upgrading its educational infrastructure and resources and providing more comprehensive support to its learners, regardless of their geographical location, through massive open online courses (MOOCs). Israel introduced this learning modality through its How2Mooc Model. This project, led by Education Cities in collaboration with the Israeli Ministry of Education, was instituted during the school year 2013–2014. It combines online and offline strategies, as well as social media-powered and in-presence learning groups where both teachers and students study together. In this model, each student teaches and supports the other learners. The role of the teacher is to define a common goal, to help each student find their own strengths and to increase and improve collaboration. The model includes the use of video-based learning, MOOCs, the flipped classroom model and the use of social media tools. The students are required to research the basic knowledge at home via the internet and then to engage in in-depth learning in the classroom.

Many of **Turkey's** higher education institutions are committed to the development of education, both locally and globally. Andalou University is recognized internationally as a pioneer, having provided distance and open learning for 30 years. The Faculty of Open Learning at the University of Andalou has 2,200,000 graduates and currently offers higher education to about 1,400,000 students both in Turkey and outside of Turkey using face-to-face, blended and e-learning modes. However, many Turkish universities now offer MOOCs and blending learning. For example, Yasar University developed a MOOCs platform where open courses are offered free of charge, and students can get a certificate upon successful completion of the course(s) they choose to do. The Yasar University Open and Distance Learning Centre, producing courses in both Turkish and English, is committed to providing wide access to high quality education by using a variety of open and distance learning methods. The Learn Turkish/Türkçe Öğreniyorum delivered by Yasar University, is a MOOC designed to teach Turkish as a foreign language. It is the product of the Differentiated Distance Education of Turkish as a Foreign Language project, supported by TUBİTAK (The Scientific and Technological Research Council of Turkey).
Turkey also invested in the flipped classroom approach through a 2007–2013 Turkish pilot study called Ad-FLIPPED, which targeted trainers in the lifelong learning context. It aimed to develop professional and pedagogic competence among trainers by using ICT tools to improve the quality and efficiency of both the trainers and their training materials. Ad-FLIPPED identified, elaborated, shared and exchanged experiences, thereby making training more attractive to adults. The Ad-FLIPPED YouTube page offers a collection of videos of flipped classrooms.
Finally, the FATIH programme was launched in 2010 designed to provide every student in Turkey with up-to-date educational technology, content and connectivity. Within this project, the Educational Information Network has supported teachers and students to create and share digital content and to

have access to digital tools. Moreover, the Ministry of Education's Directorate of Teacher Training is now providing CPD for teachers in the form of on-line distant learning on a large scale (ETF, 2018g)

Tunisia has also implemented a multi-dimensional strategy based on modernising its instructional infrastructure. A major restructuring took place in 2002 through a school reform that aimed to introduce new pedagogical methods and modern high-tech equipment, with an emphasis on ICT. The training and professional development of teachers and instructors were considered to be key elements in the successful implementation of ICT at all stages of the teaching-learning process. In the Tunisian context, distance education is viewed as an opportunity to open new horizons. The government policy towards the integration of ICT into the Tunisian educational system was stated in their 2002–2007 policy, 'Reconstruction of the Tunisian Educational System', in which mastery of ICT is considered crucial to the support of innovative and informed educators and learners. This policy also stresses the importance of providing learning centres with appropriate technologies and introducing ICT as a subject in which teachers will be trained. In support of this policy, the Tunisian Virtual School and the Virtual University of Tunis were launched as government initiatives, confirming the commitment of policy makers to modernise the educational system through ICT. The Tunisian Virtual School (TVS) is pioneering educational activities in North Africa. It provides free interactive courses, revision modules, ICT assistance and training. It is a space where instructors can work collaboratively, share resources and engage in networking activities. The Virtual University of Tunis (UVT) was established as a government initiative in 2003, and since 2005 it has provided 20% of its courses through e-learning. Created with the aim of offering distance learning programs, it has increasingly become the major online higher education provider across the French-speaking regions of North Africa. UVT provides interactive tutored courses, training and development of content. It awards diplomas and certificates upon course completion. UVT has a *Digital Production Laboratory* dedicated to the production of courses where expert lab technicians assist teachers in digitising their courses. With the goal of increasing video-based learning opportunities, UVT has recently installed a professional shooting/editing studio where teachers can record videos and edit their teaching materials. UVT also provides learners with a *Video conferencing system*: a real-time service providing bidirectional transfer of sound and moving pictures that allows a group of users to interact from separate locations. UVT also offers teacher training courses on the use of ICT and, specifically, on the creation of MOOCs and other online class modalities. MOOCs are an educational trend that is not only embraced by UVT: Sousse University is engaged with the FunMOOCs project, a French-speaking platform that works as a depository where French schools and academic partners can publish their online courses. The modernization of education in Tunisia is, however, not limited to the scholastic realm: it is worth noting how this partner country invested in the e-training of its postal employees through a virtual school program called Trainpost. Based on a modular training system, the Trainpost program comprises a series of online video courses with the goal of developing and enhancing the administrative skills of postal workers.

CONCLUSION

In this report, we have focused on how video can be used for learning purposes in different contexts. We analysed the possible pedagogies that use videos for teacher education and professional development, for school-based learning (with particular attention to vocational education) and for corporate learning, with a final glance at how some of ETF's partner countries are currently approaching and investing in video and its possible applications.

The traditional way of using videos as an instructional tool for the *delivery of information* remains important. Indeed the 'flipped classroom' approach often makes use of video to deliver content, outside of the classroom. Indeed, the provision of pertinent information through video is increasingly diffused within an open learning context where there are no formal constraints or restrictions and where the initiative is given to the learner. Increasingly learners may access video from portals such as YouTube and Vimeo or learning packages, as in MOOCs, or participate in other kinds of video-mediated on-line learning, such as lecture streaming. The range, relevance and volume of video material is significantly increasing the richness and character of the resource base for learning. In other words, the current potential and value of video pedagogy is a consequence of the omnipresence of video on the internet and through mobile devices and the ease with which video can be incorporated and linked to other DOL experiences.

MOOCs provide structured packages of video, instruction and interaction, endorsed by an educational institution. They promise every on-line citizen the opportunity to up-skill themselves and to acquire new competencies through continuous and self-driven education. In a 2016 report, the OECD stressed the importance of the growth of MOOCs, particularly in the developing countries (OECD, 2016, p.24). However, participants in MOOCs are free to complete them, to use them selectively, to combine them with other learning experiences, to purchase certification or to give up. Potentially, MOOCs offer a blending of pedagogies - video, text, open learning, social, work-based – and also a blurring of the divisions between formal, informal and non-formal learning (Cross, 2007).

What is common to many video pedagogies, across formal and informal contexts, is *the active participation of the learner*. Using videos can help to increase the effectiveness of the learning process because the learner is actively engaged and interacts with the video materials. This can happen in a variety of ways from *controlling the pace* of the viewing, to *answering embedded questions* and quizzes, to *adding reflective layers of information* to the video, to *directly manipulating or even creating video material* from scratch.

Learning through video making exemplifiesthe *learning-by-design approach*: learners individually or collaboratively learn through the process of video making. Learning-by-design constitutes an approach to video pedagogy with potential for very wide application. It can be implemented in different ways, but it is particularly effective if *coupled with an experiential learning approach.* In other words, the power of the video starts from the fact that it helps to capture *the experiences of the learners*, regardless of who they are. Vocational learners, as well as teachers and other professionals, can video-record their experiences and then actively learn from the video recording in a number of different ways. This mode of learning is powerful cognitively but also with respect to motivation. We may say that video pedagogy facilitates experiential learning since the video recording initiates, extends and invites reflective processes.

Video pedagogy is particularly well suited to the development of professional knowledge and practice because professionals need to learn how to acquire knowledge and practice in one situation and apply it to another. Novice and early-stage learners cannot draw on a wealth of work experience in different contexts and situations. Video helps learners, accompanied by teachers, peers or work-colleagues, to

practice and simulate ‘transfer’ or ‘application’ and thus to develop a capacity to exercise ‘non-routine’ competences. Video pedagogy helps learners to connect theoretical and practical knowledge and thereby promotes deep learning and awareness not only of the ‘how’ but also of the ‘whys’ behind a professional activity.

In terms of impact, the final word remains to be said, and evidence is still being collected about the conditions under which video is preferable to other pedagogies. However, the existing research does permit the conclusion that we have a reasonable understanding of how and when video can be used for instructional purposes (for example *to support procedural knowledge acquisition in vocational education*) and of how and what it can contribute to for teaching and learning.

This review of video pedagogy has drawn attention to the way that video pedagogy combines technical and instructional strategies. Video offers an additional medium for teaching and learning that can complement traditional media such as talk and text or be blended with traditional or digital pedagogies. Indeed, video pedagogy turns out to offer pedagogical choices to learners and to teachers about which modalities, which techniques, which objectives and which forms of learning they wish to pursue and how they may like to combine and organize these experiences. Video pedagogy, we may conclude, can be adapted to all kinds of needs, contexts, goals and norms. It is this adaptability, together with its appropriateness for vocational and technical learning, which gives it such enormous potency in an age of life-long, across contexts learning.

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