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Design and implementation of a new mobile video analysis laboratory at the University of Salerno

Michele Domenico Todino [a], Maurizio Sibilio [b]

[a] *University of Salerno, Italy, mtodino@unisa.it*
[b] *University of Salerno, Italy, msibilio@unisa.it*

Abstract

Nowadays, in many Italian and European universities, teachers' training includes one or more examinations related to new didactic methodologies and practices. The topic of this paper is how it is possible to realize a new video analysis laboratory as a didactic and research "tool" for teachers' training at the University of Salerno that can support teaching–learning process for new teachers. The main idea of this project is to design and implement a mobile video analysis laboratory for video recording real or simulated didactic activities. In addition, the concept that drives this research is to develop a "plug-and-play" laboratory that can be installed everywhere in less than 15 minutes by everybody. This laboratory is already designed and tested and is composed of five cameras, a control room software and an open source video analysis software.

Keywords: *Teacher's Training, Video Analysis, Video Recorded, Didactic Methodologies.*

1. Research context and theoretical framework

The main theme of this paper is how to use video analysis as a suitable tool for teachers' training courses. This issue is deeply explored in many international researches by Bruni (2012), Corazza (2012), Santagata (2012), Felisatti and Tonegato (2012), Megliola et al. (2015) and Rossi et al. (2015), and this paper tries to give a contribution to this research field. Nowadays, video recording improved in the last years due to the fact that there is a technological hopeful trend about improving the quality of digital images, both fixed and in movement, i.e. pictures and video recording, that "made" possible to manipulated videos in a low-cost way using less memory resources. For this reason, the context of this study is based on the assumption that the evolution of the use of images – both static and dynamic – as a tool for teachers' training courses is a theme that has been addressed, in the Italian didactic and pedagogical research context, by a wide range of studies (Bruni, 2012, p. 4). However, this work points out how to design and implement a mobile video analysis laboratory at the University of Salerno that can record trial simulation lessons in many contexts ready to be analyzed in a second phase. An idea that drives this research is as follows: how to create a laboratory, ready to be used, in 15 minutes, that allows a large range of possible customizable settings offered by a professional video-recording system connected to five mobile cameras. This mobile laboratory can help researchers to 1) create "ad hoc" lessons by expert teachers to bring out standard and non-standard educational situations and settings; 2) record teachers' training to revise their "acting". It is important to remember that videotaped didactic "actions" highlight both "verbal" and "non-verbal" teacher's communication. These languages directly involve people's emotions, and when a teacher has an opportunity to watch on a screen her/his performance it can cause very different engaged reactions (Corazza, 2012, p. 19); therefore, video analysis becomes an opportunity to review one's non-verbal communication in the class context that is often forgotten.

2. Mobile video analysis laboratory: goals and technologies

People usually think that a laboratory is a space inside a building, a motionless room, where scientific researchers perform experiments and measurements. This idea is very far from this laboratory presented in this paper, and it is assumed that there is another type of mobile teaching laboratory that can be quickly transported and installed in a school classroom, a museum or any other place where a teaching–learning, outside university, didactic process takes place. A mobile "workroom" made according to this "philosophy" can extend empirical and statistical observations, enriching a research to scope new goals. The main uses of this laboratory can be as follows: 1) recording a simulation

performed by expert teachers during teaching lesson in schools to understand methodologies and strategies used and 2) watching lessons performed by non-expert teachers to understand common errors. This mobile laboratory is composed of the following components: 1) a high-performance laptop, to support video streaming in real time; 2) five HD Wi-Fi cameras, with brackets; 3) a director software for mixing and recording videos; 4) a video analysis and post-production software. During laboratory's design phase, it is considered to limit its price (less than 2000 euros), also its weight and size are small, i.e. laboratory is designed to be portable in a single bag. In this way, researchers can easily transport it easily. Besides, it is important to note that this laboratory uses minimally invasive devices, which can be easily camouflaged in a classroom setting.

Fig. 1 Use of mobile laboratory in a classroom at the University of Salerno, in evidence a camera with bracket.

This laboratory has five 360° rotating HD cameras, four of them mounted on brackets and one mounted on special glasses (the same is used as spy camera). Through this configuration of video cameras, it is possible to obtain an egocentric, allocentric and heterocentric perspective (Ate, Berthoz, Vidal, Roëll, Zaoui, Houdé, Borst, 2016; Berthoz, 2000, 2004, 2011, 2015, 2017) of teaching–learning process that takes place in classroom. Moreover, possibilities offered from video analysis allow researchers to perform a wide range of studies; it is emphasized in the scientific literature (Gola, 2018, 123-125) that an active didactic action "can be obtained if the teachers observe relevant events during teaching and interpret them appropriately. Teacher's awareness is both important and a necessary skill in didactic besides it allows to understand and reflect on teacher's actions and to manage the different events that occur in the classroom. [...] several studies have shown that ability to annotate and analyse the elements of teaching identifies the skills of an 'expert' teacher" (Ibid). Specifically, a video recording can be divided into micro-analysis and macro-analysis. An example of micro-analysis can be a recording used to recognize ocular tracking (eye tracking) to count, for example, "meeting moments" between teachers' and students' visual fields which are possible due to cameras "triangularization". An example of macro-analysis can be performed in a classroom to find a specific didactic methodology.

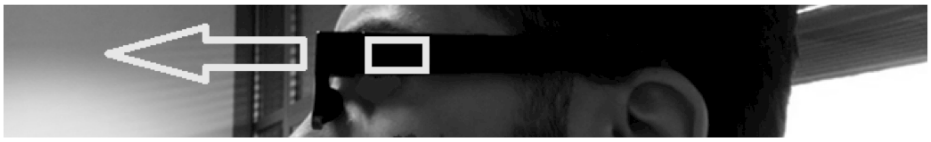

Fig. 2 Camera glasses used for video recording (egocentric point of view).

2.1 Directed control room software

Nowadays, video analysis software transfers audio and video through HTTP standard (Megliola, Sesana, Sanguini, 2015). HTTP means "Hypertext Transfer Protocol"; this protocol is a suitable "way" to work through interfaces to connect clients and servers. All PC users continuously use this protocol since 1990,1 because it is the main data transfer protocol used in the World Wide Web. In addition, the Hypertext Transfer Protocol is an application-level protocol for hypermedia information systems. In this horizon, it is possible to include vMix software, which is both a state-of-the-art product and a de facto standard in director's "world" based on HTTP web interface client–server directed control room software that allows a director to work online far from the installed setting.

For directors, a real-time video direction is an important factor; in fact, due to this software, it is possible to immediately change the main camera and make a first video editing. In this way, it is possible to configure an optimal view of setting, based on the needs of experiments.

[1] https://www.w3.org/Protocols/.

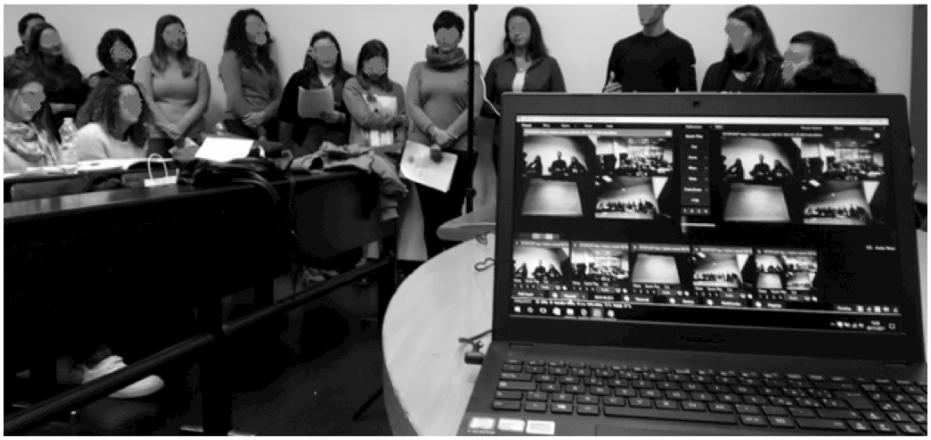

Fig. 3 vMix software, with real-time video streaming.

2.2. Open source video analysis software

Post-production video analysis is realized by Kinovea, a free open source software, which is used for 1) reproduction; 2) annotation and 3) processing. The main purpose of this software is to code XML tags (eXtensible Markup Language) to customize video annotations. In fact, Kinovea allows to integrate textual notes on videos.

Fig. 4 Workspace del open source software: 1) main menu; 2) file explorer; 3) video or photo; 4) playback controls.

In this software, notes are usually anchored to a precise moment of video's scrolling; in this way, each note is inserted in correspondence to a specific sequence of images (Bonaiuti, 2012, p.72), i.e. tags are combined with a specific event inside a recorded lesson. Table 1 summarizes the relationship between data type, for video annotation, and exportable file type to correlate Kinovea with other softwares such as SPSS or PSPP to generate statistical analysis and proceed with a mixed-method research.

Table 1 Information exported via possible file formats. Font: https://www.kinovea.org/help/en/125.html

Data type \ Format	Open Document	Microsoft Excel xml	XHTML	Simple text
Key images (time and title)	Yes	Yes	Yes	No
Lines (length)	Yes	Yes	Yes	No
Angles (value)	Yes	Yes	Yes	No
Cross markers (coordinates)	Yes	Yes	Yes	No
Path-tracking trajectories	Yes	Yes	Yes	Yes
Stopwatches (duration)	Yes	Yes	Yes	No

3. Instruments testing

This laboratory was tested as follows: first of all, as described in the previous paragraphs, researchers chose hardware and software to be included in this mobile research environment. Before using this laboratory, for the first time, there was a phase of initialization to make sure that everything is working in a proper way; this phase could be considered as a technical "debug", when it was possible to calibrate each camera in an testing environment, with enough light and no background noise, to support a proper video-recording activity; this phase was also useful to test vMix and Kinovea software graphic user interfaces. Next phase was a test to use this laboratory for teacher's training programmes, i.e. it was started as an experimentation testing phase which is follows: a teacher's activities in the classroom were recorded and then the teacher reviewed the video recording to bring out awareness of didactic dynamics. In future, lessons recorded to point out typical "factors" in terms of metacognitive analysis to improve teacher's training activity will be analyzed (Toci, Camizzi, Goracci, Borgi, De Santis, Coscia, Perrone, Cigognini, Pettenati, 2015). In addition, at the University of Salerno, metacognitive activities will be based on properties and principles of simplex didactics (Sibilio, 2014, 2015, 2017a, 2017b). These properties and principles will be presented through videos already recorded by expert teachers and then reproduced by learners in a real or simulated class. The first experimentation phase will be tried to verify whether didactic actions, of a teacher in the training period, will be simplex by itself without knowing simplexity, i.e. a teacher in the training period has an embodied ingenue simplex theory or practice; this could be possible because people are themselves adaptive simplex "systems" (Berthoz, 2011). In other words, people use simplexity such as a naïf theory, and a teacher's training course could be performed by improving personal awareness of simplex didactic and its properties and principles. Thus, in the next step of experimentation, simplexity and simplex didactics from an expert teacher will be illustrated and then tested by teachers in the training period (Sibilio, 2014; Zollo, 2017). More specifically, each properties and principles will be examined with a deconstruction method, focusing mainly on vicariance (Berthoz, 2011, 2017; Sibilio, 2014, 2015, 2017a, 2017b) through a recognition, in post-production video editing. In addition, this laboratory was realized and tested at the University of Salerno (building S1) during the final phase of the teaching education course called: "percorsi di formazione per il conseguimento della specializzazione per l'attività di sostegno didattico agli alunni con disabilità nella scuola dell'infanzia, nella scuola primaria, nella scuola secondaria di I e nella scuola secondaria di II grado, indetta, per l'a.a. 2016/2017, presso l'Università di Salerno ai sensi degli articoli 5 e 13 del DM del 10 settembre 2010, n. 249".

Fig. 5 Configuration of technological setting, at the University of Salerno (building S1).

4. A possible critical issue and other details

A critical issue of this mobile laboratory could be related to the maximum number of participants; this problem depends upon space and setting of the room used for video recording and it is advised to limit people in the room based on the fact that it is possible to see faces and bodies by at least one camera of the system. Besides, it is necessary to clarify that actually this laboratory was realized, i.e. it was designed, optimized, bought, installed and tested at the University of Salerno (building S1). In the test phase, some researchers who simulated lessons and about 20 people who took part in teacher education activities already described in the previous paragraph were involved. The main learning objective of this laboratory will be the testing of simplex didactic; however, each kind of class activity will be video recorded.

Conclusions

Video analysis, as described in this paper, which is related to the mobile video analysis laboratory, could be a significant tool for research activities, because it allows researchers to review, by watching them in real time or catching up with vMix, verbal and non-verbal communication in formal, non-formal or informal context (Pellerey, 2002, pp. 378-412). Therefore, this system aids researchers because, during recording phase, it will be possible to confirm or refute research hypotheses due to post-production studies and, in addition, due to Kinovea reproduction, annotation and video processing. Thus, post-production video analysis could be focussed to teach a specific didactic methodology such as simplex didactics. In addition, the main use of this mobile laboratory, at the University of Salerno, could be to support teachers' training courses, helping researchers to review their lessons and compare them with other video recordings already performed to understand what happened in the classroom to improve a retroactive cycle theory–praxis–theory studies (Sibilio, 2014) that allows a multi-level analysis of educational action from a simplex point of view.

References

Ate, A. Berthoz, A. Vidal, J. Roëll, M. Zaoui, M. Houdé, O. Borst, G. (2016). Taking a Third-Person Perspective Requires Inhibitory Control: Evidence from a Developmental Negative Priming Study. Child Dev. Nov;87(6). PP. 1825-1840.

Berthoz, A. (2000). The brain's sense of movement. Cambridge Massachusetts: Harvard University Press.

Berthoz, A. (2004). La scienza della decisione. Torino: Codice edizioni.

Berthoz, A. (2011). La semplessità. Torino: Codice Edizioni.

Berthoz, A. Zaoui, M. (2015). New paradigms and tests for evaluating and remediating visuospatial deficits in children. Dev Med Child Neurol. 2Apr; 57 (Suppl 2). PP. 15–20.

Berthoz, A. (2017). The Vicarious Brain, Creator of Worlds. Cambridge Massachusetts: Harvard University Press.

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

Bruni, F. (2012). Immagini dinamiche: appunti per un catalogo degli usi didattici. Form@ re-Open Journal per la formazione in rete, 12(79), 3-12.

Corazza, L. (2012). Il video, un mediatore per l'apprendimento. Form@ re-Open Journal per la formazione in rete, 12(79), 13-21.

Felisatti, E., Tonegato, P. (2012). Il laboratorio di Microteaching nel Tirocinio OnLine per la formazione iniziale degli insegnanti. Form@ re-Open Journal per la formazione in rete, 12(79), 64-70.

Gola, G. (2018). Migliorare la didattica attraverso la percezione visuale delle azioni in classe. Uno studio esplorativo tramite eye-tracking e video annotazione. In book of Abstract convegno SIREM "Linguaggi e anima-zione digitale. Scuola. Territorio. Università". pp. 123-125.

Megliola, M., Sesana, M., Sanguini, R. (2015). Adaptive video streaming for Technology-Enhanced Learning in workplaces. Journal of e-Learning and Knowledge Society, 11(2).

Pellerey, R. (2002). Didattiche dell'extrascolastico. In Gennari, M. (Ed.). (2002). Didattica generale. Milano: Bompiani.

Santagata, R. (2012). Un modello per l'utilizzo del video nella formazione professionale degli insegnanti. Form@ re-Open Journal per la formazione in rete, 12(79), 58-63.

Rossi, P., Fedeli, L., Biondi, S., Magnoler, P., Bramucci, A., & Lancioni, C. (2015). The use of video recorded classes to develop teacher professionalism: the experimentation of a curriculum. Journal of e-Learning and Knowledge Society, 11(2).

Sibilio, M. (2014). La didattica semplessa. Napoli: Liguori.

Sibilio M. (2015). Simplex didactics: a non-linear trajectoryfor research in education. Revue de synthèse : tome 136, 6e série, 2015, p. 477-493.

Sibilio, M. (2017a). Vicarianza e didattica. Corpo, cognizione e insegnamento. Brescia: La Scuola.

Zollo, I. (2017). Esercitare la semplessità. Tra didattica generale e didatti-ca delle discipline. Lecce: Pensa.