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▶ **To cite this version:**

Lionel Roche, Cathy Rolland. Scaffolding professional learning with 360° video for pre-service teachers. Proceedings of the 31th annual conference of the society for information Technology and Teacher Education, Oct 2020, SITE Interactive Online Conference, United States. hal-03092206

HAL Id: hal-03092206
https://uca.hal.science/hal-03092206

Submitted on 1 Jan 2021

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Scaffolding professional learning with 360° video for pre-service teachers

Lionel Roche
Cathy Rolland
Université Clermont Auvergne, UFR STAPS, Laboratoire ACTé, F-63000 Clermont-Ferrand. France
lionel.roche@uca.fr
cathy.rolland@uca.fr

Abstract: The context of the COVID-19 pandemic has brutally disrupted education modalities worldwide. During this period, news ways to make use of 360° video should be developed in order to scaffold professional learning in teacher education. This study allows us two main results : 1) pre-service teachers live the viewing situation like a substitutive immersion experience and 2) we can identify different kinds of uses according to the focus of observation. Our results showed that 360° video can be a powerful tool to be used online during workshops for reducing the gap created by losing face-to-face field experiences. These « virtual » experiences are important moments to stimulate and encourage reflection on professional practices, with the facilitator's support. 360° video seems to us to be a tool of choice for facilitators to scaffold professional learning in teacher education.
Keywords: video,professional learning,pre-service teacher,teacher education,internship,video 360°

Introduction

The context of the COVID-19 pandemic has brutally changed education modalities worldwide. With more than 70% of the world's student population unable to physically attend schools and universities (according to UNESCO, 2020), educational modalities have been disrupted. The prescription to switch to eLearning (Alonso Vilches, Detroz, Hausman & Verpoorten, 2020) has led to a forced march towards distance education, supported by the use of various digital tools. In the context of a generalised confinement, pre-service teachers are unable undertake their internships, access workplaces and live personal experiences in their actual work settings. These experiences are key moments in the development and learning of professional gestures and practices. They are exploited by facilitators as experiences who are precious for developing a reflective activity about teaching and professional gestures.
The constraints of the COVID-19 pandemic has led the trainers to face a double challenge : provide distance learning courses, allow the continuity of the professional education and learning of future teachers, linked to experiences in actual professional situations (experiences of in situ observation, intervention). In this context, we have opted, as facilitators, for the use of 360° videos of real classroom situations. Since September 2018, within the University Clermont Auvergne (France), a design project of a course based on immersive video-enhancement has been developed (funding IDEX-ISITE 16-IDEX-0001, CAP 20-25) for Physical Education Teacher Education (PETE) : the *Form@tion360* project (Roche, 2020). The project operates in line with a previous work on the use of 360° video in PETE (Roche & Gal-Petitfaux, 2017). The aim of this course is to support pre-service teachers' professional learning (development and learning of professional gestures) by using video resources including 360° video (Figure 1). The pandemic context has led us to accelerate the use of this type of video online.



Figure 1: 360° video issued from *Form@tion360* platform (Roche, 2020)

360° video in teacher education

Over the past five years, we can observe important developments of 360° video uses in teacher education (*e.g.,* Roche & Gal-Petitfaux, 2017 ; Reyna, 2018 ; Balzaretti, Ciani, Cutting, O'Keeffe & White, 2019 ; Theelen, van den Beemt & den Brok, 2019). With the use of this new generation of video tool, we can identify a large range of uses. 360° video can be use with smartphone (with or without head-mounted display, Theelen, van den Beemt & den Brok, 2019), only on laptop (Roche & Gal-Petitfaux, 2017) or online for self-training (Zolfaghari, Austin, Kosko & Ferdig, 2020). 360° videos are actually used for teacher education in multiple disciplines like Physical Education (PE), mathematics (Kosko, 2019), sciences (Joglar & Rojas-Rojas, 2019) or History, Geography, Economy, Dutch language, German language and English language (Theelen, van den Beemt & den Brok, 2019). In addition, these uses can breed different objectives such as preparing internships (Sato & Kageto, 2020), developing professional vision or reflective activity (Theelen, van den Beemt & den Brok, 2019 ; Walshe & Driver, 2019) or supporting professional learning (Roche & Rolland, 2020).

Pre-service teacher education in France

In France, initial teacher education in PE is based on two main domains : 1) theoretical courses (*e.g.,* pedagogy, motor control and learning) and 2) professional learning based on internships and course in which pre-service teachers analyze their own teaching and develop a reflection about professional gestures. Usually, pre-service teachers must produce video clips of their own teaching in order to use them during University workshops. Due to the pandemic context, this option was not been possible for all the pre-service teachers. As such, we decided to organize online workshops to reflect about professional gestures but not by using 2D video. We decided to use 360° video to offer them the possibility to explore the video and to be really active during viewing situations. The objective is to trigger an activity of reflection about difficulties they may have experienced, or observe situations that have given rise to professional questioning. During online workshops, pre-service teachers (guided

by the facilitator) can share their own screen and comment what they perceive, observe, and understand in the 360° video used during the online workshop.

Research question

The study's objective is to describe pre-service teachers' activity of using 360° videos and characterize formative potential of this activity on the understanding of professional gestures to teach PE.

Theoretical Framework

We adopted a framework using "Course of Action" theory (Theureau, 2002) in cognitive anthropology, based on the hypothesis of situated action (Suchman, 1987) and situated cognition (Hutchins, 1995). Using this theory, we analyzed action in context (based on an ethnographic description) and the cognition in context (based on the explanation of Concerns, Perceptions, Emotions, Knowledges). In this approach, resources used are considered like artifacts (Norman, 1993) and they are important tools for constucting action and meaning (help to construct perception and comprehension). Our approach is part of a research program that focuses on the analysis of real work activity and thus « focuses on real work with human activity in work as its object » (Poizat, Durand, Theureau, 2016, p. 235). In our approach, the analysis of the activity is envisaged in a training aim : analyzed the activity deployed in training in order to design in return (design in use, Folcher, 2003) professional training environment (Poizat, Durand , Theureau, 2016) according to an iterative process.

Research methodology

The study is based on the analysis of multiple cases in PETE during one online workshop. The ambition is jointly to describe the singular conditions of viewing student activity and, based on the diversity of cases, to enter into a process of theoretical generalisation. Here, we present the study of two cases which we have sought to understand in depth. The use of cases can be a way to « illuminate key locations » which can then be further explored through quantitative data (Stecher & Borko, 2002, p. 567). Our approach is part of a first phase of mixed method, so-called sequential research (Tashakkori & Newman, 2010, p. 516). The aim of this type of approach is to envisage a more quantitative collection based on initial qualitative data and ultimately to obtain a higher degree of generality in the results.
Design research is based on several steps. Stage 1 : sending instructions and a link to all pre-service teachers in order to access a 360° video (video of expert teachers in PE) from *Form@tion360* for using during the workshop. Pre-service teachers have received two different kinds of instructions for the workshop : 1) watch the 360° video and observe the whole situation and 2) watch the video and focus their observations on the students' activity. Stage 2 make a recording (with a videoconferencing software) of the work and comments made by pre-service teachers during online workshop (with a groupe of 20). Stage 3 is a self-confrontation interview (Theureau, 2002) based on the activity deployed by students during the online meeting. Self-confrontation interview is conceived as an indirect means to document actor's experience or immediate understanding of his activity at every instant, and to study human activity. Self-confrontation interview is based on the video recording of the actor's behaviour in a work or training situation. In our study, a recording of pre-service teachers' activity during an online workshop (Figure 2). This method differs from reflection methods, a self-confrontation interview does not focus on the "Self" but on the activity deployed by the individual during the situation being viewed. Self-confrontation interview is a method of documenting an individual's cognitive activity through the researcher's questions. During the self-confrontation interview, pre-service teachers were asked by the researcher to

describe their concerns ("What are you trying to do at that moment ?"), perceptions ("What do you pay attention to ? What do you notice ?"), emotions ("What do you feel ?") and knowledges used ("What are you thinking about at that moment, what do you tell yourself ?").



Figure 2 : Self-confrontation interview with one pre-service teacher

Stage 4 is coding all the data issued of the self-confrontation interview based on four criteria : Concerns (C), Perceptions (P), Emotions (E) and Knowledges (K) (Theureau, 2006) of the actors in the situation. The (C) concern the pre-service teachers' involvement in the situation (what they are trying to do) : they translate their intentions at the moment t, which emerge from their interactions with the video-training situation and which is depending of their perceptions. The (P) refer to what is signifiant for them at instant t: what they focus their attention on, what they take into account in order to act and which guides their future commitment. They can be perceptive (visual, auditive, kinesthetic) and mnemonic (memory of past experiences). The (K) refer to the knowledge they mobilise in action, taking into account their concerns at the moment t, to interpret what is significant for them. Following the interview, the two researchers then coded (on the basis of the four criteria) the data from the verbatims in order to describe the teachers' activity during the workshop and to report on the formative potential of the use of 360° video. The data analysis of pre-service teachers' activity when they explore 360° video and their reflexive verbalisations about their own activity has made it possible to highlight the types of interaction with the video.

Results

This study allows us two main results : 1) pre-service teachers live the viewing situation like a substitutive immersion experience and 2) we can identify different kinds of uses according to the focus of observation.

A substitutive immersion experience

At the first viewing instruction, pre-service teachers feel immersed in the situation, as if they were reallly in the classroom. They don't place themselves and experience the situation not as

an outside observer but like if they were in the real teaching situation they viewed. Pre-service teachers reflect on professional questions and gestures such as concentrating on supervising one student or managing the whole class. Pre-service teachers want to see everything, manage all students' behaviour. This experience leads them to live a real dilemma, i.e. observe one student or the whole class. Indeed, they wish to observe each group individually while observing the whole class. They don't know how to organize their observation between the whole class and small groups. This dilemma is characterised by the fact that pre-service teachers frequently change their orientation in the 360° video. This type of dilemma experienced in the viewing situation is similar to dilemmas that pre-service teachers experience during their internships. In addition, they organise their viewing activity as if they had to really manage the class, like if they are really in internship.
Pre-service teachers try to check whether all the students are active and whether they perform the requested exercise correctly. The pre-service teachers try to perceive the classroom atmosphere, the working climate and they pay particular attention to the sound which is an important indication of the students' work activity. However, they feel some frustration at not being able to really correct inappropriate or even dangerous students' behaviours. They are invested as if they were really teaching in the classroom. Pre-service teachers forget that a teacher is present in the video they viewed and developed an activity to try substitute themselves to the teacher. They act and think as if they are teaching and not watching a 360° video.

Different kinds of uses according to the focus of observation

The different instructions given in order to view the video led pre-service teachers to use 360° video differently and help them to develop new knowledges about teaching situations and professional gestures. Indeed, during instruction 1 (watch the 360° video and observe the whole situation), the viewing activity was done by commenting on remarkable elements identified in the whole teaching situation. Pre-service teachers used the mouse pointer to navigate through the 360° video instead of using the dedicated button at the top left of the screen (Figure 3).

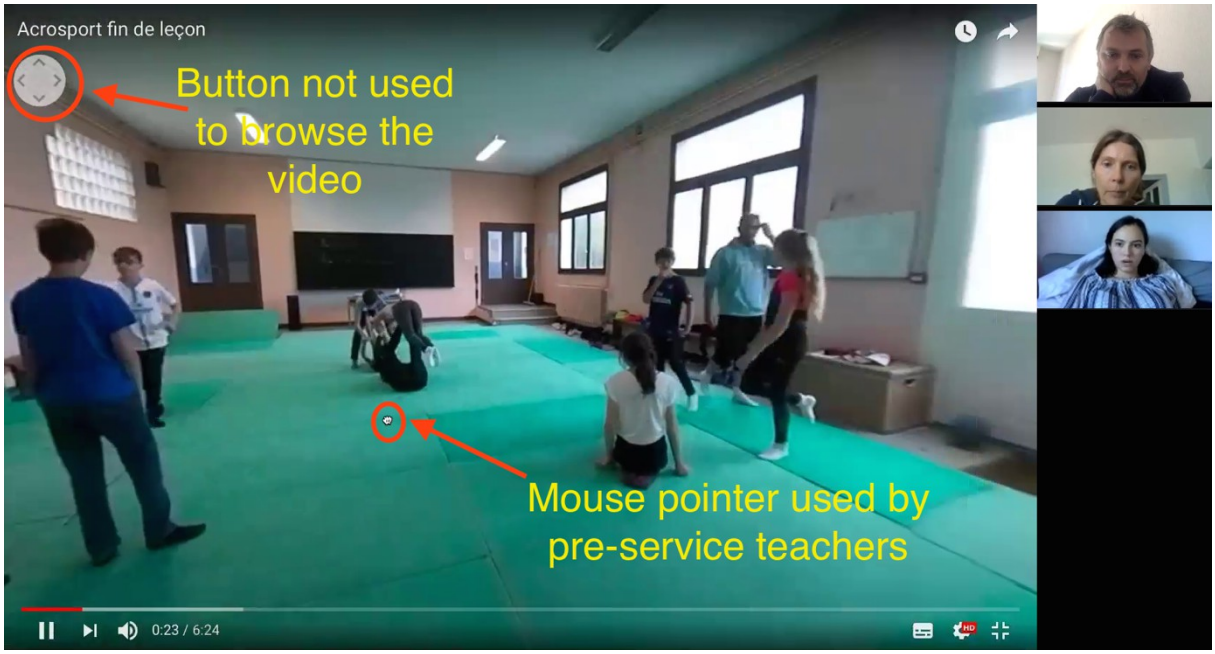


Figure 3 : Pre-service teachers uses of 360° video

In this way, they were able to quickly turn through the video and quickly change direction to explore the whole classroom situation and feel the classroom atmosphere. The instruction given and the viewing activity associated with this instruction led them to try to explore the whole classroom situation. They made a global exploration but they never focus on students' motor performance, even when the facilitator questioned them about what they observed of students' motor skills.
During instruction 2 (watch the video and focus their observations on the students' activity), when pre-service teachers were asked to focus on observing students' activity, their use of the 360° video changed, leading them to build new knowledges. In particular, they used the video's zoom function to try to hear and see in details the work organization within each group as well as social relationships between students. In addition, they used the zoom to be able to observe in details students' motor skills and observe students' body positioning as well as the safety aspects linked to the students' performance. Their attention was focused on these aspects in order to try to identify difficulties and learning problems encountered by the students in order to help them and give them corrections and instructions (Figure 4).

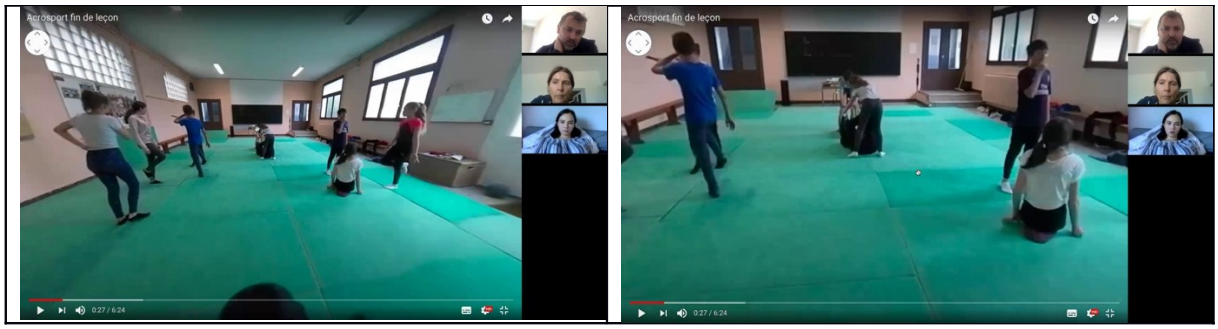


Figure 4 : Pre-service teachers' use of zoom function offered by 360° video

By observing in detail students' physical activity, pre-service teachers try to build up a categorization of typical students' errors in motor skills learning. By doing this, pre-service teachers try to project themselves in the anticipation of solutions and corrections to be delivered to students. They particularly appreciate this possibility to prepare themselves for real teaching situations.

Discussion

Our results are in line with the results of Zolfaghari, Austin, Kosko, & Ferdig, (2020) who showed that 360° video use online can be a way to provide virtual field experiences and that these can be close to real classroom experiences. These experiences immerse pre-service teachers into the heart of teaching-learning situations, immersing them in the sound and visual environment of a classroom, close to the one they could live in a real classroom situation during their intership. Moreover, their study suggests that these immersive virtual experiences can be a useful supplement of classical course. Zolfaghari & *al.* (2020) study provided early evidence that 360° video can offer pre-service teachers the possibility to observe and explore teaching situations in a new way. Our study corroborate their results but our study does report the use of 360° video during online workshop and show the formative potential of this tool for pre-service teachers professional learning online. This use can be a very interesting way to explore for supplementing internships.
Finally, in both studies the sample was relatively small (Zolfaghari & *al.* (2020), n= 54 ; our study, n= 20) and it would be interesting to consider a more quantitative study in the future. Another area of exploration should be to study the use of 360° video in a large range of topic (not only mathematics or PE).

Conclusion

360° video is currently a new tool that is beginning to be used more and more in teacher education. While face-to-face uses during workshop are the most widespread, some online uses are beginning to develop (e.g., Zolfaghari, Austin, Kosko, & Ferdig, 2020) and specifically during pandemic period. We believe this avenue is particularly fruitful to explore because, as we have shown, even when used online, 360° videos can enable students to live experiences similar to those they have had in a real classroom. These « virtual » experiences are important moments to stimulate and encourage reflection on professional practices, with the facilitator's support. 360° video seems to be a tool of choice for facilitators to scaffold professional learning in teacher education.

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