MENTORING THE TEACHING-LEARNING ACTIVITY OF GYMNASTICS WITH VIDEO FEEDBACK TO REDUCE THE RISK OF INJURY: A CULTURAL -HISTORICAL ACTIVITY THEORY CONTRIBUTION

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Abstract

This study focuses on preservice teacher's mentoring in a French University Graduate Schools of Teacher Education. It focuses on physical education and sport and learning activities of middle school pupils. Photographs and videos are mobilised during mentoring interaction with a video feedback to help the preservice teacher (PT) to reduce the risk of injury. The data from a case study are made up of extracts from mentoring interviews and self-confrontation interviews analysed from a cultural-historical activity theory perspective (C.H.A.T). Results highlights the potential relevance of using 1) traces of learning activity during mentoring interactions and video feedback to optimise the pedagogical design of PT's 2) and to prevent the risks of pupils' physical integrity. The theoretical model contributes to a global understanding of the problems arising in the collective activity system and about modalities and mediations contributing to the joint mentoring activity independently of the disciplinary field.

Keywords: mentoring; physical education and sport; digital tablet; video feedback; mediations; cultural-historical activity theory

Résumé

Cette étude porte sur le tutorat d'enseignants en formation initiale dans une université française. Elle concerne l'enseignement de l'éducation physique et sportive et les activités d'apprentissage des élèves au sein d'un collège. Des photographies et des vidéos sont mobilisées pendant les entretiens de tutorat à l'aide d'une tablette numérique permettant un retour vidéo aidant l'enseignant en formation initiale à réduire le risque de blessure chez ses élèves. Les données issues d'une étude de cas sont constituées d'extraits d'entretiens de tutorat et d'entretiens d'autoconfrontation vidéo analysés depuis les postulats de la 2nd génération des théories de l'activité (C.H.A.T). Les résultats soulignent la pertinence de l'utilisation 1) des traces de l'activité d'apprentissage pendant les interactions de tutorat et du retour vidéo sur tablette numérique pour optimiser la conception pédagogique de l'enseignant en formation initiale et prévenir les risques d'atteinte à l'intégrité physique des élèves. Le modèle théorique contribue à une compréhension globale des problèmes survenant dans le système d'activité collective (enseignant- élèves) et des modalités et médiations contribuant à l'activité conjointe de tutorat indépendamment du champ disciplinaire.

Mots-clés : tutorat, éducation physique et sportive, tablette numérique, retour vidéo, médiation, C.H.A.T

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Teacher's education has become more professional over the past several years and more oriented towards meeting the expectations of a future employer (Brouwer, 2011), developing a reflexive approach, and acquiring greater efficiency of preservice teachers (PTs) in the classroom with pupils. Literature confirms the value of using video for the professional development of PTs especially when it adequately takes into account the teaching context (e.g. schools in disadvantaged areas, mainstream or highly innovative schools) and pupils needs (e.g. pupils falling behind, violent or disabled). Several authors (Gaudin & Chaliès, 2015; Gaudin, Flandin, et al., 2018; Major & Watson, 2018) have shown that PTs who have benefitted from video training were able to better anticipate the profession's complex nature, were more efficient in face-to-face teaching, and included more learning time for pupils in their lesson designs. Some of the major benefits identified include: (a) increasing the attractiveness and effectiveness of training situations, (b) observing diverse and authentic teaching situations, (c) connecting theory and practice, (d) seeing and reviewing professional situations, (e) critical sharing and challenging ideas, (f) better preparing to teach. These studies show that using video and video-stimulated recall, by exposing PTs to many different potential situations (and all their complexities) and engaging them in a collective analysis of these situations, can help promote deeper reflection, if trainers or mentors (CTs) offer their support during the process (Ajayi, 2016; Ceven McNally, 2016; Endacott, 2016; Hamel et al., 2019).

Actual physical education has opened itself for using various technologies have found its way into regular classes, especially mobile devices such as (digital) cameras, smartphones laptops and digital tablet. The use of digital tablet for video feedback has become more widespread in recent years and the deployment of video analysis allows to stimulate teaching and assessment in physical education and sport (Laughlin et al., 2019). In teacher training, the use of digital technology and the video feedback must be well thought out, as it is not a question of adapting lessons to introduce it, but rather of choosing the appropriate technology according to the needs of pupils in the lesson as in gymnastics or swimming (Ciavaldini-Cartaut, 2016c; Gaudin, Chaliès, et al., 2018; Kretschmann, 2017; Laughlin et al., 2019). Generally speaking, these are innovative modalities in teacher's training at master's level. It is a means of professionalisation that has proved its worth in physical education and sport, although it is not yet widely used in the context of mentoring in France (Gaudin & Chaliès, 2015). Video feedback can be defined as the playback to a learner (PT or pupil) of his/her own (static and dynamic) image in action. Video feedback has the potential to engage PT in self-assessment including mentor mediated feedback conditions. According to Hamlin (2005, p. 8) using video technology for feedback purposes can help PT to "step outside themselves to become actively involved in a process of adjusting. Skills adjustments occur immediately after viewing video and photographs which help to better visualize and reflect on errors, strengths, and weaknesses". Video feedback in gymnastic activity can be used to guide the actions of pupils who find it difficult who have less stable movement patterns (Potdevin et al., 2018). In teacher training and especially during observation visits of PTs by their mentor, the use of a digital tablet to provide video feedback on teaching actions and pupils' gymnastic practice can be very useful to improve lesson design and prevent injury risks. More specifically, gymnastic is an activity where any risk of physical harm to the pupils is unacceptable. This may constitute grounds for failing the year of practical training for PTs.

This is precisely the purpose of this text which focuses on the mentor's use of video and photograph of classroom teaching to create sufficiently rich and objective feedback for help the PT to integrate the safety measures required for the gymnastics workshops proposed to pupils

(Ciavaldini-Cartaut, 2016a; Kaneko-Marques, 2015). We postulate that the mentor's varied feedbacks from classroom events helps the PT to progress around safety and in the analysis of classroom incidents. This text based on a case study in physical education and sport examines 1) the collective activity of teacher and pupils and 2) the mentor mediated feedback using photographs and videos with a digital tablet. Using concepts from activity theories, we will analyse the effects of this mediation on the PT's new more secure conception of the lesson and the adjustment of his situated actions (i.e. the development of his activity). The use and adaptation of this technical arrangement to other disciplines will be discussed.

Theoretical Framework

In this text, teacher education and mentoring are examined through cultural-historical activity theory (C.H.A.T) (Engeström, 1987, 1999, 2000b; Leontyev, 1981b, 1984; Vygotsky, 1934/1997, 1978a, 1978b). This theoretical perspective focuses on collective social practices and can be used 1) to analyse actions and interactions in teaching and mentoring (Edwards & Protheroe, 2004; Ellis et al., 2010; Wilson, 2014) and 2) to consider the tensions and contradictions that may occur within an activity system or joint activity (Helgevold et al., 2015a). It beyond sharing some postulates from Vygotsky and Leontyev's activity theory aim to better understand the processes by which a "community" or a group operates or encounters problems.

Mediations, intersubjectivity and joint activity

Vygotsky's analyse of relationship between human thought and action showed the importance of mediation by signs and cultural tools or artefacts. In this perspective, he distinguishes between "psychological and technical instruments". Psychological instruments are directed towards a transformation of the subject of the activity such as language, but also social influences. Technical instruments or tools are oriented towards the objects of the activity and therefore transform the relationships between the subject, others, and his environment. In our study, the digital tablet is a technical instrument that allows to introduce a mediation between the mentor and the PT with the help of video feedback and photographs during interactions. They allow the latter to analyse and understand his action with pupils in a different way. For Leontyev, psychology must also focus on the concrete activities that take place in a work situation that can be collective, i.e. carried out jointly with others. Without mediation, a collective activity is not necessarily a joint activity. Conditions of intersubjectivity must be met for the joint construction of a shared object in the collective activity. During the mentoring session the intersubjectivity requires mutual intelligibility and mediation (Roth, 2007) to reach agreement between a PT and a CT who initially do not share the same understanding of a situation, the object of the activity that brings them together, or the events addressed (Ciavaldini-Cartaut, 2016a; Helgevold et al., 2015b). This mediation can be completed by teaching support material (student observation sheets, a record of motor performance, organization of a workshop) for building the teaching advice. Finally, short video excerpts (between 30 seconds and two minutes) of PT activity (self-confrontation) and pupils' activity (video-confrontation) can be used to help him/her to understand the evolution and necessary regulation of the lesson.

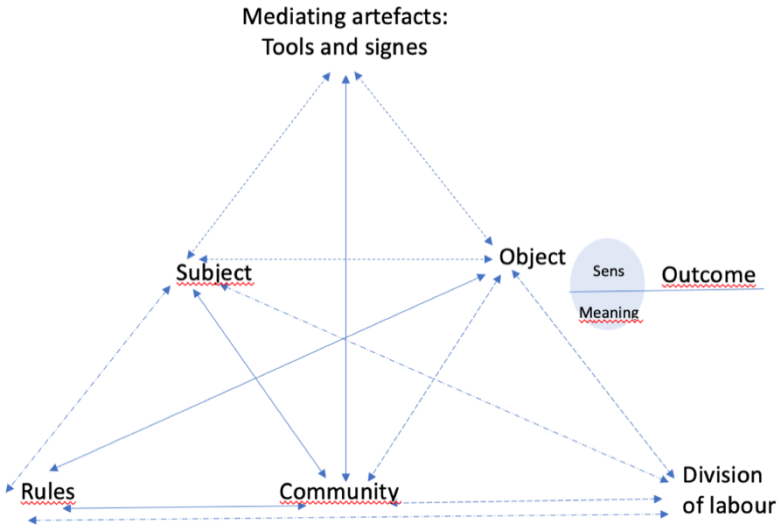
Theoretical assumption 1: In our study, the scaffolding and video feedback process is based on the joint selection by the mentor (CT) and the PT of "significant" events relating to professional learning in progress or to be acquired. In such circumstances, during the mentoring interaction the

use of video excerpts of the gymnastic collective activity and photographs facilitates the joint construction of professional rules and actions to prevent the risks of pupils' physical integrity.

Collective activity and activity system

Each collective activity constitutes a distinct system (Engeström, 1987, 1999, 2000a) (Fig.1) (Table.1) where actions are directed towards an object, through tools and mediations. When subjects (pupils, PT, trainers) share the same object they form what is called a "community" and create the conditions for joint activity. So, for example, a teacher (subject) wishing to improve pupils' achievement (object) within a particular school (community) might want to introduce a new strategy for learning (tool). Depending on the management structure within the school (division of labour), the teacher may be constrained on the basis that the new idea is seen as deviating from implicit norms (rules) or encouraged if the attitude within the school is to support innovation - also an implicit rule.

Figure 1. The structure of a human activity system (Engeström, 1987, p. 78)



Let's take another example. The subject (e.g. pupil or PT) is linked to the community by rules that refer to "the explicit and implicit norms and conventions that limit actions and interactions within the system of activity" (e.g. the teaching-learning activity) (Engeström, 1999, p.79). The relationship between the community and the object is mediated by the division of labour (distribution of tasks and level of responsibility, work instructions, pedagogical design of activities etc.) which mediates between the community and the object. The activity of each subject is oriented towards a result linked to the object of the system, which becomes the lever of his or her intentionality to act (outcome). Within the activity system there are contradictions (op.cit, p.10) which are "the main sources of movement and change". The development of activity system takes the form of cycles of transformation based on the resolution of these contradictions at the global level or at the level of the sub-triangles of activity. Douglas (2010) considered the different mentoring approaches of PTs used within the same secondary school. With a C.H.A.T framework he shows the effect of mentors' conceptions of the object of mentoring activity on the PT involved,

and how this was displayed in the conceptual tools utilised by the mentors. This analysis provided further insight into limitations in some aspects of the PTs' professional learning.

Table 1.

Poles of the activity system according to Engeström (1999)

Poles	**Definition**
Subject	An individual or group of individuals engaged in an activity and giving it meaning.
Tools or instruments	A material artefact or psychological or conceptual instrument that enables the subject to achieve its objectives.
Rules	Norms and habits that regulate actions and operations in the activity system.
Division of labour	Division of roles and tasks to achieve the intended transformation.
Community	An individual or group of individuals, apart from the subject, involved in the activity.
Objet	The main component that underlies the activity and gives it direction. The reason given by the subject to emancipate him/herself from a need that the activity meets.

The materialisation of these tensions in the form of a diagram (Fig.1.) makes it possible to illustrate the poles that make up the activity system and even to understand the opposing forces at the level of the 17 possible sub-triangles (explained in section 3.5) as well as the changes necessary for their resolution and the pursuit of the object of the activity (Miettinen, 2009).

Theoretical assumption 2: The digital tablet use by the mentor (CT) (technical instrument, tools) and video feedback are a mediation for supporting the didactic and pedagogical levers to be worked with the PT. This mediation makes it possible to describe and identify the tensions and contradictions of collective teaching-learning activity and to establish which problematic components explain the difficulties encountered by the pupils. It contribute to a joint activity and transform the PT's activity in accordance with the institutional expectations (rules, division of labour, community) on the gymnastic safe learning environment of the pupils.

Method

Participants

A PT in Physical Education completing his internship in a middle school and his mentor (CT) agreed to participate in this study. The PT was 24 years old and teaching a series of

gymnastics lessons to 12-year-olds. The CT was adept at using a tablet as he observed classroom practices and was experienced in using the data in post-lesson mentoring conferences.

Data collection

The mentoring follow-up consists of three phases. The mentor regularly advises the PT by coming to observe him/her in class and working with him/her on his/her lesson. He may also welcome the PT in his own class. Then, after each observation, the mentor organise a pedagogical advice interview (mentoring session) lasting an average of 60 minutes, during which he analyses moments of the lesson and tries to involve the PT in a reflective approach to improving his didactic and pedagogical choices. Two types of data were collected and transcribed verbatim[1] to assess the dynamics of the discursive exchanges (Balslev & Ciavaldini-Cartaut, 2014; Bronckart et al., 2004). Data on activity in the first person (documenting the actor's lived experience from his or her own point of view) and in the third person (objectifying the external, public dimensions of conduct) are articulated with a view to accessing a more global and complex vision of actions (Quidu & Favier-Ambrosini, 2014).

(1) **Data on activity in the third person**: The mentoring session was recorded with two digital video cameras equipped with omnidirectional microphones positioned such as to record the use of the tablet while advice was being given. The CT had also collected various data (video excerpts and photographs), lesson designs and pupil handouts during his prior observation of the PT's teaching.
(2) **Data on activity in the first person**: additional data were collected from the recording of the self-confrontation interview conducted by the researcher (R) with the PT after the mentoring session. This interview documented joint activity and the dialogue as the PT observed his recorded activity. The researcher's goal was to help the PT verbalise what he had gained professionally, the new meaning he attributed to the problems encountered, and the reorganisation of his pedagogical design.

Data processing

To break down the verbalisation units, the CT/PT interactions were considered as activity exchanges around learning and/or training issues related to "shared focuses of attention". Whenever the same object was mentioned, even at different moments in the interaction, it was grouped with the same verbalisation unit in the tables and was numbered. We then identified the verbalisation units that had occurred in both the mentoring session and the self-confrontation interviews. The units common to both (i.e. mentoring and self-confrontation) were retained for analysis.

Interactions during the mentoring session according to the objects of PT activity, mentoring activity or collective teaching-learning activity, were associated with some poles of Engeström's activity triangle (Table 1) or sub-triangles among the seventeen possible ones (Miettinen, 2009) for anchoring part of the analysis:

[1] Conventions: /// corresponds to pauses of variable length; the transcriber's comments are in brackets; strong intonation is indicated with bold letters; overlapping speech is underlined; and arrows ↑↓ indicate rising or falling intonation.

- 1: Subject-Tools (or Instruments)-Object (Production)
- 2: Subject-Community-Rules (Exchange)
- 3: Subject-Community-Object
- 4: Community-Object-Division of Work (Distribution)
- 5: Subject-Tools (or Instruments)-Community
- 6: Tools (or Instruments)-Community-Object
- 7: Rules-Object-Community
- 8: Subject-Community-Division of Work
- 9: Tools (or Instruments)-Rules-Community
- 10: Tools (or Instruments)-Community-Division of work
- 11: Subject-Rules-Division of Labour
- 12: Rule-Division of Work-Object
- 13: Tools or Instruments-Rules-Object
- 14: Subject-Rules-Division of Work
- 15: Subject-Rules-Object
- 16: Subject-Tools (or Instruments)-Division of work
- 17: Ruler-Tools (or Instruments)-Division of Work

Results

This study focused on safety issues that arose during a gymnastics lesson. The results are presented in two sections that deal successively with (1) the joint mentoring activity, including the discussion of videos and photos that allowed the PT to understand the impact of his didactic and pedagogical choices on the pupils' ineffective motor practices and the risk of injury when using equipment and (2) the influence of these discussions on the PT's use of the CT's advice to resolve tensions and contradictions in the collective activity system.

Teaching and learning gymnastic activity without risk of injury for pupils

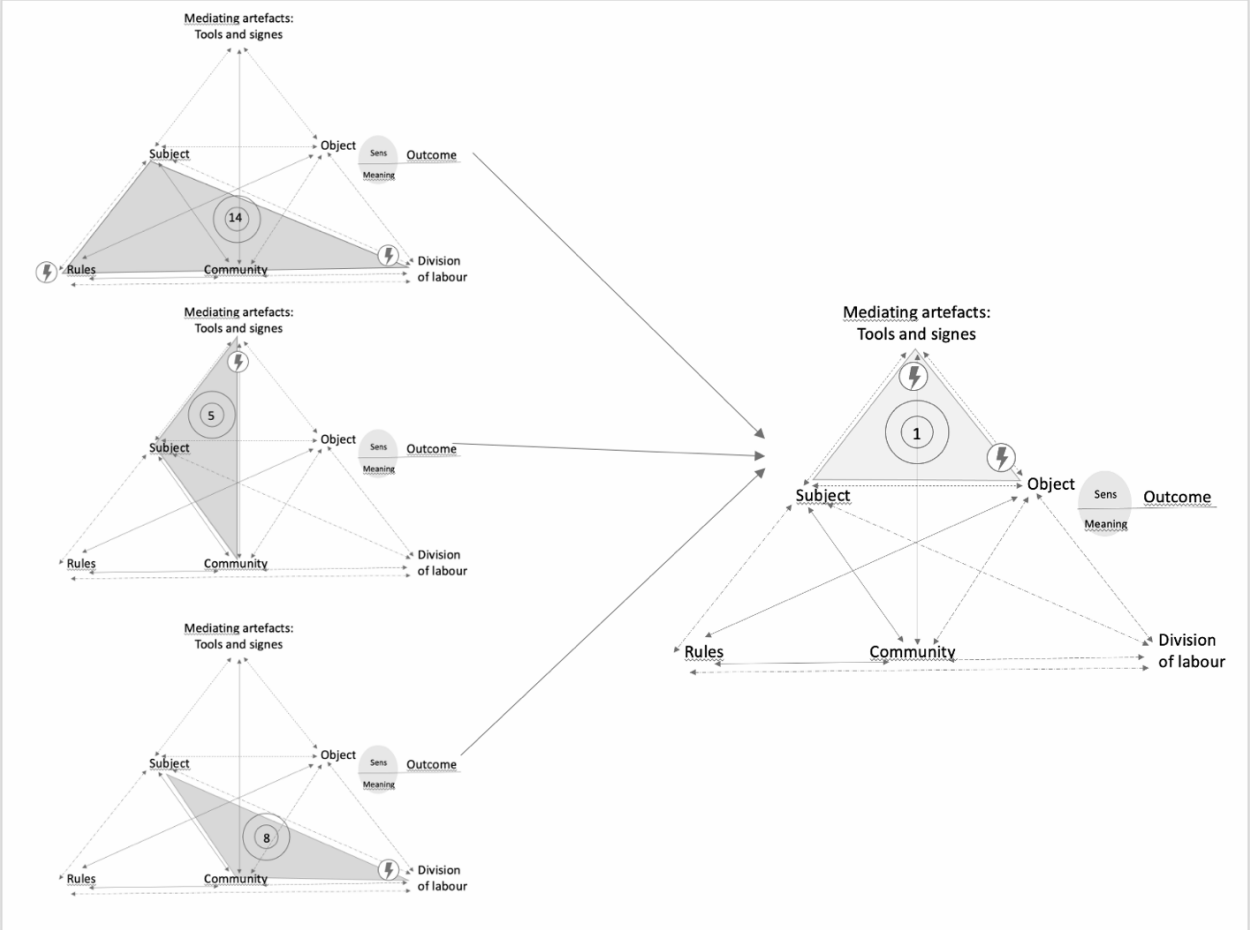
Theoretical assumption 1: we hypothesize that the mobilisation of photographs and videos with the help of the digital tablet allows the PT to establish a different relationship to his or her actions and/or concerns.

During a gymnastics lesson, the CT observed that the equipment had not been prepared (division of labour) under optimal safety conditions (rules) and that it put pupils at risk of injury (sub-triangle 14: Subject-Rules-Division of Work). For the handstand for example, the PT left a paper for them near the mat illustrating the handstand (mediation) (sub-triangle 5: Subject-Tools (or Instruments)-Community). Then, caught up in organizing the other work groups (division of labour), he only stopped twice to check on this group of girls with very different skill levels (sub-triangle 8: Subject-Community-Division of Work). Without adequate assistance and feedbacks (mediations), pupils were failing in their task (object) despite their efforts (sub-triangle1: Subject-Tools (or Instruments)-Object). They adopted an inappropriate and unsecured posture. No one was around the gymnast to prevent possible falls (sub-triangle 9: Tools (or Instruments)-Rules-Community). Without adequate assistance and feedbacks (mediations), pupils were failing in their task (object) despite their efforts (sub-triangle1: Subject-Tools (or Instruments)-Object). They adopted an inappropriate and unsecured posture. No one was around the gymnast to prevent

possible falls. Correlatively to the failure of the organisational and pedagogical components of the teaching activity, the learning activity of the pupils in this gymnastics workshop is negative.

Figure 2.

Failure of the organisational and pedagogical components of the PT's teaching activity and effects on the pupils' gymnastics activity



The CT chose to focus on issues during the mentoring session which cause tensions and difficulties in the teaching-learning activity system (Engeström, 1987) (Fig.2). First, the professional learning target was to understand the relationship between the didactic design of the learning situation, the pedagogical materials and the presence of factors that put the physical safety of pupils at risk. It was also an opportunity to explain the rules that apply to installing equipment and storing it at the end of the lesson.

Excerpt 1: mentoring session (storage and use of gymnastics equipment).

1. CT: can you choose two photos/I mean, can you choose the most salient moments that you'd like to come back to↑
2. PT: uh, well, first it would be the set-up

3. CT: [looking at the tablet] these photos here↑
4. PT: yes, and that one there//I should have taken out the bars and put them up↑
5. CT: OK we'll come back to it/so what's the sequence to be changed↑
6. PT: I should have arrived a bit earlier to get out the equipment/not necessarily to set it up, but at least to get out the mats/the uneven bars//in fact the equipment for the three types of activities/here they can't see it very clearly
7. CT: that's the solution but
8. PT: take it out with them/show it to them
9. CT: yes, setting up the equipment is also part of the session↑you can do it in the first session to save time but not in 10 sessions//at one moment or another, the children have to help set up the equipment//and you have to be skilled in setting it up
10. PT: from that moment on, I wasn't thinking clearly [he rubs his face] deep down I knew that there was no point because they couldn't see anything//but I continued anyway because I had to start the class↑/
11. CT: well that was maybe a safety issue, the most representative of your class/well//we also have the video ↑[the CT looks for the video on the tablet and shows the PT an excerpt]//right there/here's what's happening↑
12. PT: there I think that to stop the horsing around I have to bring them closer to each work area and show them: "this is how we set it up"/then make a general presentation//there, well it's going every which way ↓
13. CT: but look here↑[he pauses on an image] you've got 4 or 5 pupils who didn't hear the instructions and on top of that the mat falls on them↑/after that there could have been an accident moving a piece of equipment like this one that's heavy because of the mechanical parts [forwards image by image]//there you have to anticipate better and empty out an area of the storage space between classes/you shouldn't take out more than you need for them and help them set up the equipment at least once//then you have to prepare to put everything back/this is done in a certain order with detailed instructions that you have to master//

The training situation begins in which the CT asks the PT to select mediations (photographs) likely to "resonate" with his concerns; this is done to ensure he is invested in the analysis (1; 3). The PT admits that it was wrong to set up the equipment in the storage space (rule) (4; 6) and agrees with the CT that in the future he needs to better anticipate this phase of the lesson (division of labour). The CT confirms that this alternative is good, although it is still linked to a time management concern. He reminds the PT of the educational challenge of involving the student in this phase of the lesson (9) (community). While remaining focused on the pupils not listening to him and the issue of time management, the PT acknowledges a lack of clarity in his own actions and about collective engagement in activity (10). The photographs at this point are not enough to prompt him to address anything more than the division of pupils into groups and the conditions in which instructions were given; he is unable to analyse the safety issues. The CT thus shifts the object of joint activity to the pupils' learning activity. He uses another mediation: a video feedback with an excerpt (11) to identify two factors that increase the risk of injury: the gym mats that fell and the heavy and dangerous equipment to be moved. Then, he presents the succession of tasks that the PT must learn to carry out. These tasks relate to the socio-professional genre (Clot & Faïta, 2000) and are characterized by operational modalities (know-how) (Leontyev, 1984) that he

explains to the PT. The purpose of this mentoring phase is to co-construct representations around the concepts of skill (9), accidents and the need for mastery (13).

Their exchanges continue regarding managing the handstand task. The CT uses the digital tablet, to show photographs of the "pupils instruction sheet" (mediation) that the PT had photocopied and left near the mat without feedbacks (Fig.2).

Excerpt 2: mentoring session (risk of injury when performing a handstand).

> 14. CT: so to try to optimize these mentoring sessions, we're going to come back for a moment to the handstand [displays on the screen the photocopy of the instruction sheet left near the mats]/ here's the instruction sheet that you had given them↑
> 15. PT: yes↓
> 16. CT: I wonder how relevant it was to show this illustration here in relation to what you actually asked them to do
> 17. PT: this one was normally crossed out/this one is against the wall/oh no I didn't print out the right one↑/in fact// normally they should have done it on the mat//like this [mimes the position] and so the spotter was on the side in case they slipped, and they got into the handstand position in the direction of the arrow
> 18. CT: yes, but it was clearly not the right illustration so you see↑you could have gathered your pupils together/made a demonstration and said, "what I expect from you is level 1" and well↑
> 19. PT: yes↑I see that yes, yes
> 20. CT: they would have understood it too↑because the instruction sheet isn't enough for a pupil//[starts a video clip]//this is what happened/look//[shows the excessive curve of a student's spine]//you see↑you can't say to a child "OK you have an instruction sheet so that's good now you know what to do"//in that case the sheet has to be really perfect and the pupils super attentive and all the criteria have to be there↑and that would mean that we don't have a role to play/we could just give them the instruction sheet and then leave//a pupil can't start on a task with just the sheet/things have to be explained one way or another↑

This excerpt focuses on the inadequacy of the pupil's instruction sheet and the importance of involving them while ensuring optimal postural and motor safety. The CT gains the PT's attention ("you see") (5) and contributes to his training with some professional and pedagogical rules for teaching design (group the pupils, demonstrate the expectations, check that they have understood) (7). The CT then concludes the exchange to reminding the PT to apply this advice to the pupils. He tells the PT what posture is required from a teacher (Clot & Faïta, 2000) through a professional rule: when pupils begin a new task, their safety cannot depend on a sheet of paper.

The opportunity is then offered to PT to say what could not be said until then with the professional concepts acquired with the help of the CT to designate and judge his actions, reconsider his pedagogical choices and design of learning situations. In physical education and sport, design of learning situations can be completed by other teaching support material (technical instruments or tools like pupils' observation sheets, a record of motor performance, organisation of a workshop). Finally, in this excerpt, a feedback video (between 30 seconds and two minutes) of PT's activity (self-confrontation) and collective pupils' activity (video-confrontation) are used to help him/her to understand the evolution and necessary regulation of collective system activity

(Engeström, 1987, 1999). Video excerpts allow the user to go back (several times, frame by frame, or in slow motion) to moments that were significant for joint analysis. Interactions between the CT and the PT were assisted and mediatised by psychological and technical instruments (Vygotsky, 1978a) for jointly constructed the meaning of a professional problem the PT had encountered. The PT agreed with the CT (19) on the actions he needed to take to avoid repeating his error and become more efficient (sense and efficiency) (Leontyev, 1981a, 1984).

Improving pupils motor skills and involving them in safely setting up the gymnastics equipment

Theoretical assumption 2: through the digital tablet mentor's feedback video and support about pedagogical design transform the PT's activity and the collective activity system (Engeström, 1987, 1999) in accordance with the institutional expectations (rules, division of labour, community) on the safe learning environment for pupils.

Two weeks later, the PT told the researcher (R) about his professional learning experiences during the mentoring sessions and how they had transformed his classroom practice.

Figure 3.

Self-confrontation interview with feedback on the use of photographs and videos during the mentoring session.

Excerpt 3: Self-confrontation interview

1. R: so why did you immediately choose this series of photos↑
2. PT: because without really thinking I knew that I was not very effective//I was waiting to see a photo so I could talk about it because there was a big problem with the way I dealt with the equipment
3. R: did the problem have to do with/safety↑or with setting up the equipment quickly↑
4. PT: well uh it had to do with safety and also because the space was narrow and they couldn't see anything/they were talking//and in terms of organization I wasted a lot of time!
5. R: and so the following week how did you handle it↑
6. PT: the following week I got there 15 minutes early and I got everything out↑//I calmly went through the steps for moving the equipment safely/how to block it because it's a rather dangerous system where you have to turn a crank and [mimics the gesture of rocking] your

feet can get crushed↑//then I took the pupils 3 at a time and showed them how to do it/and how to put the equipment back
7. R: what happened next↑
8. PT: well the next few weeks it was quiet↑moving and setting up the equipment I got a lot faster and they got points too because it's part of the evaluation↓[R restarts the video of the interview] and then the handstand was a disaster/it was way too complicated/the two times I stopped by to see this group I didn't notice it//I have pupils who have coordination problems so some of them weren't able to do it//here's where I didn't take into account the diversity of the pupils [R restarts the video]
9. R: you didn't print out the right instruction sheet↑
10. PT: in fact I didn't realize it/this sheet showed bar support while I meant to put them against the wall↑
11. R: and so you changed it
12. PT: well yes I made a new instruction sheet to make it simpler because the safety rules weren't good↑here again it was okay, but for overweight girls you can imagine↑I was lucky that the CT filmed it/even the curvature of the student's back [puts his hand to his face] is a disaster ↑.

Several factors contributed to the pupils' failure at the handstand (sub-triangle1: Subject-Tools (or Instruments)-Object). The PT was inexperienced in teaching the gymnastics activity. The pedagogical support material was unsuitable for pupils and their characteristics (12), and the PT was unable to regulate his own teaching practice (8). Still upset by the danger of his initial choices ("[it] was a disaster"; "what a catastrophe") (8;12), the PT considered the CT's mediations and counselling as concrete help in transforming his design in gymnastic education, acknowledging that he would not have been able to do it alone (12). He finally recounted to the R the process of realising the consequences of his choices and ascribed new meaning to his experience ("it was not effective"; "it was way too complicated"; "the safety rules were no good") (Vygotsky, 1978a, 1978b). To transform the activity based on the professional meaning that arose from exposure to the "concepts", the PT needs to be able to anchor the alternative actions proposed to the concrete circumstances of daily professional practice. The PT's previous concerns about time and classroom management had changed ("taking into account the diversity of the pupils"; "it's part of the evaluation"). He also referred to new actions that he undertook in the following lesson and throughout the weeks following the mentoring session (8; 12). He thus found that he could help the pupils become more successful, ensure the safe management of the equipment, and be responsible in a calm manner (8).

This excerpt 3 documents how a PT reorganized his classroom practice thanks to an improved understanding of the conditions required for his pupils' success and for their safety (Leontyev, 1984). He was able to do so in a large part because of the operational advice and scaffolding provided by the CT by means of video feedback about the collective teaching-learning activity system (Engeström, 1987, 1999) displayed on a digital tablet and other media during the mentoring sessions.

The usual mentoring interactions rarely a joint activity based on mediation (Chaliès et al., 2009; Chaliès et al., 2007). They are often devoid of any reference to means by which a PT can implement the CT's advice. Our study, documents a mentoring session with intersubjectivity that allowed the PT to investigate the causes of his difficulties and dysfunctions linked to tensions in the collective activity system (Engeström, 1987, 1999).

Discussion

A few recent studies confirm the cognitive value of video analysis and feedback video of one's own teaching activity or that of another (another PT or a more experienced teacher) (Ceven McNally, 2016; Endacott, 2016; Gaudin & Chaliès, 2012). It appears to strengthen reflexivity, selective attention to classroom and, more broadly, professional vision (Gaudin & Chaliès, 2015). The outcome is a deeper understanding of pupils learning processes and pedagogic strategies. Ultimately, video feedback helps PTs understand their own difficulties, which in turn helps them accept the need for further training to overcome their deficiencies (Ciavaldini-Cartaut, 2015). Nevertheless, the use of video and photographic traces to analyse the teaching-learning activity system (Engeström, 1987, 1999) and the correlations of effects between the teacher's activity (his actions, his behaviour, his didactic and pedagogical choices) and the pupils' activity remains rare during mentoring interaction(Ellis et al., 2010). A C.H.A.T theoretical perspective make it possible to illustrate how pedagogical advice is based on tensions specific to the collective nature of the teaching-learning activity and to the lack of experience of PTs. This is one of the strong points of this contribution, independently of the disciplinary field of reference which is physical education and sport.

This contribution has limitations of any case study. We therefore do not attempt to generalise our results. It documents how to use some mediation and a digital tablet during mentoring session in perspective for address the PT's difficulties: a multimodal usage of photographs and video feedback in teaching education (Ciavaldini-Cartaut, 2016b, 2016c). This use was part of a joint investigation conducted by a CT and PT as they sought to understand the safety problems encountered when setting up the equipment in a gymnastics lesson. Our approach was intended to be holistic and consider the cognitive, perceptual and emotional components of the PT's activity in an "authentic" work situation (Leontyev, 1981b). In addition to the process of gaining greater awareness, which the PT explained, this approach prompted an actual transformation in his classroom practice not the mere intention to change. From the viewpoint of joint activity and mediation (Roth, 2007) the discussions initiated by the CT allowed the PT to explain his perception of class events, which had initially been influenced by his concerns about time management and class control. In this context, there was a resonance between his initial choices and his lack of effectiveness. With the support of his CT and the video feedback and excerpts, this resonance helped him draw correlations between his didactic and pedagogical errors and (1) the pupils' learning difficulties and (2) the danger of the situations to which they were exposed (handstand task and equipment set-up). In other words, meaningful insights were gained during the dialogue about the concepts of danger and safety through the mobilisation of "psychological and technical instruments" (Vygotsky, 1978a, 1978b). The meaningfulness and efficiency (Leontyev, 1981b, 1984) of the CT's advice, supported by the video feedback and photographs, can be considered as levers in the reorganization of his classroom practice, prompting him to move beyond his brief flashes of effectiveness.

Conclusion

The cultural-historical activity theory offers new perspectives for understanding the levers of effectiveness of mentoring and teaching-learning activity. This article offers new ways for mentoring with the mediation of a digital tablet and video feedback use (Ciavaldini-Cartaut, 2018; Hamel et al., 2019; Wilson, 2014). What is the relevant use of these mediations and this technical

device to professionalise and jointly build pedagogical knowledge during the mentoring interactions or sessions in different disciplines? Innovations related to the use of digital technology in the classroom are still struggling to orientate the practices of teacher educators or mentors at master's degree. It's the case in France because mentors still alternate between their classrooms and university responsibility without a real training. The use of digital tablets and video feedback in mentoring sessions is still rare except in physical education and sport. So, the use of digital tablets to document the classroom practices of PTs is still struggling to become widespread despite the technical accessibility of the tool. CTs should receive specific training to learn how to define the framework for a joint investigation and advisory activity with PTs and to ensure a respectful and empathetic posture during interactions with a view to greater involvement of their professional reflexivity. Independently of innovations in the physical education and sport teachers' training, the problems of class management, time management, and the material and pedagogical organisation of teaching offer the opportunity for an activity-oriented analysis. It allows us to focus on the collective dynamics of engagement in tasks, on the rules and professional gestures that are transversal and complementary to disciplinary knowledge. However, the current context of the reform of teacher training in France (2021) and the reduction of mentoring and stage supervision must not lead to the importance of cross-curricular learning other than didactic learning being underestimated. This teacher's training "de-professionalisation" would mean that they would only be the responsibility of the mentors' expertise during classwork situations. This division of labour would reintroduce an opposition between knowledge and experience but also between theory and practice.

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