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Author(s): Ramos, Jose L.; de Jong, Frank F.; Laitinen-Väänänen, Sirpa; Cattaneo, Alberto; Pedaste, Margus; Leijen, Ali; Lepp, Liina; Bent, Marije; Burns, Eila; Fialho, Isabel; Evi-Colombo, Alessia; Takkinen, Tiina; Tiebosch, Nadja; Espadeiro, Rui; Boldrini, Elena; Monginho, Richardo

Title: Video-supported collaborative learning: insights in the state of the art in everyday educational practice within the visual-project experiments

Year: 2020

Please cite the original version:

Ramos, Jose L.; de Jong, Frank F.; Laitinen-Väänänen, Sirpa; Cattaneo, Alberto; Pedaste, Margus; Leijen, Ali; Lepp, Liina; Bent, Marije; Burns, Eila; Fialho, Isabel; Evi-Colombo, Alessia; Takkinen, Tiina; Tiebosch, Nadja; Espadeiro, Rui; Boldrini, Elena; Monginho, Richardo (2020). Video-supported collaborative learning: insights in the state of the art in everyday educational practice within the visual-project experiments. In EAPRIL 2019 Conference Proceedings : November 27 – November 29, 2019 Tartu, Estonia, 6, 77-91.

https://eapril.org/sites/default/files/2020-04/Proceedings2019_2.pdf



**VIDEO-SUPPORTED COLLABORATIVE LEARNING:
INSIGHTS IN THE STATE OF THE ART IN EVERYDAY
EDUCATIONAL PRACTICE WITHIN THE VISUAL-
PROJECT EXPERIMENTS.**

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ABSTRACT

Most teachers do not use video tools in a way that contributes to developing conceptual thinking and problem solving skills as relevant work-life competences of the knowledge worker. Europe-wide, there is a need for e-competent teachers in utilizing e-learning with leading digital collaborative solutions. The same holds for pedagogical knowledge of designers in educational technology companies. Video-based e-learning and knowledge building are critical 21st century approaches; the modernization of European higher education institutions calls for a workable pedagogy and skilled teachers to take on the up-to-date video supported collaborative solutions for creative teamwork in online environments.

Video-Supported Education Alliance (VISUAL) is an Alliance of 6 HEIs-Teacher Education (HEIs-TE) and 6 Educational Technology Designers (ETDs) co-creating an evidence-based pedagogical model for Video-Supported Collaborative Learning. The developed solution enhances students' critical thinking and problem solving skills that are important for navigating the increasingly turbulent, knowledge-intensive and entrepreneurial work-life scenarios. The model bridges school and practice, which is important for vocational education and training (VET) and teacher-educators (TE). Furthermore, it will encourage video content creation and sharing as a rising work-life competence. The models will be used and taught in teachers education (TE) so that teacher-students become familiar with Video-Supported Collaborative Learning as an educational tool.

This paper summarizes the results of a cycle of experiments lead by the VISUAL partners from autumn 2018 until spring 2019. The second cycle experiments are being conducted in the VISUAL project from autumn 2018 until spring 2020.

INTRODUCTION

Video-supported collaborative learning: an overview of the research

Theoretical background

In teacher education there is a lack of a workable pedagogy for the use of video tools to support collaborative learning and knowledge building, as a way to become knowledge competent in professional development as well as to prepare students for a sustainable knowledge-based economy and society. Teacher education (TE) and training institutions are not providing full adequate pedagogical and technical guidance to use the video tools for collaborative learning and knowledge building yet.



Students are visual thinkers, observational learners and thus social learners (Bruner, 1969), therefore the employment of visuals in education is promising. However, these benefits are not yet fully exploited in the practice. Most teachers do not know how to use videos systematically in teaching (Rutkowski, 2013). Just showing a video is not enough (Van Gog, 2014) for learning from it. The potential of video-supported collaborative learning has not been fully exploited in teacher education (Hobbs, 2006), although many experiences do exist within teacher education (Gaudin, 2015). Education lacks pedagogical models and structures to promote collaborative learning from and with videos (Krauskopf, 2014).

One of the aims of VISUAL (Video-Supported Education Alliance), is to develop, test, and validate pedagogical models and practices for video-supported collaborative learning (VSCL), primarily in the teacher education and teacher professionalization (primary, secondary and VET education).

Theoretical framework is provided by learning sciences scholars (Sawyer, 2014) showing evidence that students who learn together, in pedagogical approaches such as ‘knowledge building’(Scardamalia, 2014), computer supported collaborative learning (CSCL) (Stahl, 2014) and responsive learning (de Jong, 2015), outperform students whose teachers use frontal, ‘knowledge telling’ pedagogy. However, this does not make CSCL a favourite pedagogy in practice and certainly not in combination with video [Johnson, 2014]. VISUAL project overcomes this lacking practices in the use of modern ICT technology (Zahn, 2012).

Research questions

In our experiments, Video-Supported Collaborative Learning (VSCL) is promoted through evidence-based pedagogical video use and CSCL. We argue that video can be an excellent learning tool when combined with collaborative learning (Krauskopf, 2010). It develops students’ critical thinking and problem-solving skills that are important for the development of entrepreneurial skills and attitudes (UNESCO, 2017). Video seems also to be a promising tool to bridge theory and practice, which is crucial in the vocational education and training (VET) system, and for teacher-educators (TE) as well (Ramos, 2018).

Given the theoretical framework above, with the current paper we aim to answer two main research questions.

RQ1: What works in practice in order to generate a hands-on VSCL-pedagogical model?

RQ2: What works in a co-creative partnership between Higher Education Institutions (HEIs) and companies?



Answering such questions will help us to ground the development of a VSCL pedagogical model. The model can be used in TE so that teacher-students become familiar with Video-Supported Collaborative Learning as an educational tool (Gaudin, 2015). At the same time, working with companies is needed in order to capitalize on the latest video solutions and, at the same time, to improve them based on workable pedagogical insights.

Design and method

Experiments were conducted in 5 European countries (Finland, Estonia, the Netherlands, Switzerland and Portugal). The design is that of a multiple case-based research (Yin, 1984). In each case the same instruments and design were used.

Instrumentation includes experimental descriptions, storyboards, teacher-experimenter interviews and a questionnaire on technology, human impact and teacher professional development are used as pre-measure for good case descriptions.

The questionnaire was also used as pre-post-test in a student version in cases where subjects are student-teachers.

In each case complementary data were gathered on the experimentations in the form of video-ethnographies. During the experiments, Videoblogs of key intervention activities and flow in the classrooms were video recorded.

Appreciative interviews were held with the teacher-experimenters at the end of the experiments.

On top of that, additional measures can be used in single cases.

The analysis focuses on the possible contextual factors related to what works and what does not work in the VSCL-pedagogy. These VSCL-pedagogical practices differ along the cases because of the cultural, educational, institutional and national characteristics of the countries involved.

Results

Preliminary results of all the conducted pre-experimentations reveals the emerging of innovative pedagogical models for video-supported collaborative learning. We briefly describe each of the experiments and emerging models for using video to support collaborative learning and knowledge building.



Building up new pedagogical models for video- supported collaborative learning

Collaborative video problem-solving in primary education

This experimentation was conducted in the University of Évora, Portugal. The main goal of the experiment was to explore innovative approaches for collaborative learning by using video as a digital resource to present a problem to the students.

Designed within the VISUAL research methodology this experiment was conducted in a primary school educational context that already use *Escola Virtual* (Virtual School), a digital platform from Bloco Grafico, a content provider and a VISUAL partner company, which is available for schools, students and teachers of all levels in Portugal.

The type of the videos already available in this virtual platform is mostly content centred and within a pedagogical approach based on knowledge transmission. The main goal of this experiment was to explore innovative approaches for collaborative learning by using video as a digital resource to present a problem to the students.

This experiment involved teachers and students from 3 primary classrooms. Technology was used as a trigger and a resource to and promote problem solving through collaborative learning and knowledge building. The video was used to present the educational scenario of the problem and to identify sources of information that the students tried to enrich with suggestions of their own. Data from the experiment was gathered through classroom observations (video recording some activities) and interviews to the classroom teachers. Researcher notes were used for observation on classroom practices.

Preliminary results show that this approach increased student engagement and collaborative learning, skills related to the quest and selection of information, motivation, responsibility and autonomy.

The pedagogical approach based on video problem solving proved to be a very positive experience for teachers and students, demonstrating that *Escola Virtual* from Bloco Grafico, can successfully be used to create learning video content in the primary school setting.

What is expected in using *Virtual School* is that individuals watch the video and learn with its content. Alternatives for using video may be needed to develop different pedagogical approaches.

Will the use of video, as a digital tool to launch problem-solving tasks and present resources to assist in its resolution, help develop collaborative learning skills and knowledge-building among the students?

This experiment involved teachers and students from three primary classes. The VISUAL researchers team worked directly with the teachers in order to create a video-prototype.



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The video was used to present the educational scenario of the problem and to identify sources of information that the students tried to enrich with suggestions of their own in order to be able to find an answer for the problem presented to them. Teachers gave support to the students.

The students choose the presentation formats (theatre, video, poster) to show their conclusions to the classroom.

Difficulties were reported within the groups when organizing tasks by themselves. This happened when the teacher allowed the students to independently choose how to constitute the groups.

Another challenge concerned the capacity and autonomy level of the teachers to develop this kind of experiments by themselves.

The involvement of the research team was very important in the development of this experiment and gave the teachers the support they needed to be able to carry on with their ideas.

Overall, a pedagogical approach based on video problem-solving was reported to be a very positive experience for teachers and students alike.

Collaborative annotated feedback on video-recorded teaching practices in vocational education

The goal is the enhancement of reflective skills among in-service vocational teachers, and finally the betterment of teaching practice through collaborative peer-to-peer and tutor's feedback on video-recorded teaching practices. The assumption is that delivering and receiving feedback through peer-to-peer, expert-to-novice, and group analysis interaction and collaboration can foster reflection on professional practice, thus consolidating effective teaching but most of all improving teaching practice and developing a critical perspective on one's own professional behaviour. Moreover, the design of the intervention is thought progressively and iteratively, so to provide participants with methodological tools for the analysis of practice and the formulation of feedback.

The study took place within the vocational teacher-training education program at the Swiss Federal Institute for Vocational Education and Training and involved 36 in-service teacher students. *

Feedback delivery was supported by the use of the video-annotation feature embedded in the [ivideo.education](http://www.ivideo.education) software (www.ivideo.education).

The iterative intervention (the seminar lasted four semesters, with a half training-day per semester) foresaw first to analyse the teaching practices of an unknown teacher, then those of a peer (twice) and finally one's own.



Each time the analysis – which took the form of contextualized feedback formulation – was focused on two main teaching activities and applied to real classes video-recording, through three steps: 1. peer-to-peer analysis; 2. Integrative tutors' feedback; 3. collaborative in-class discussion with the whole group.

The sample was split into two conditions: half of the sample provided feedback on their peer's video-recorded lessons through video-annotation.

The remaining participants delivered feedback by writing a report based on in-class direct observation of their peers.

After the self-analysis, a final task involved all the teachers analysing and providing feedback on the lesson of an unknown teacher.

Perceived usability (in terms of ease of use, usefulness for learning, acceptance from the teachers' point of view and adequacy for collaborative learning) and effectiveness in terms of impact on teachers' reflective skills (quality of the feedbacks delivered to peers and quality of the self-directed feedbacks), were measured respectively through a self-reported questionnaire and through the analysis of the quality and quantity of the feedbacks delivered to the peers.

Findings show that teachers in the video-annotation condition evaluated the training experience in a very positive way, witnessing its general usefulness, its specific usefulness for improving teaching practice, and for improving reflexivity (respectively $M=2.17$, $SD=.71$; $M=2.11$, $SD=.83$; and $M=2.28$, $SD=.75$ on a Likert scale ranging from -3 to +3).

In terms of the final measure related to the observational, noticing and reflective skills, statistically significant differences were found between the two groups. In particular, teachers working in the video-annotation condition were able to identify more descriptive indices in the teaching activities (descriptive components identified $M_{con}=8.36$, $SD_{con}=3.17$; $M_{video}=15.38$, $SD_{video}=6.53$; $t(28)=3.65$, $p=0.047$) and more interpretative elements ($M_{con}=7.07$, $SD_{con}=3.29$; $M_{video}=12.13$, $SD_{video}=7.08$; $t(28)=2.44$, $p=0.036$) than their colleagues who did not use video technologies. Moreover, within the video-annotation condition the increment in terms of numbers of alternatives of action calculated through a repeated-measure ANOVA, proved to be significant ($F(2, 32)=3.92$, $p=0.03$).

Results suggest that this study can contribute to the innovation of teachers training programs through the integration of video annotation tools and a progressively increasing collaborative pedagogy, while helping instructors in the creation of curricula where professional competence development is fostered through feedback, self-reflection and collaborative analysis of authentic practices.

* The results of this experiment are detailed in a 2019 paper published by Boldrini, Cattaneo, and Evi-Colombo)



Experimenting the suitability of video diaries in school practicum

The goal of the experiment was to find out what, in the opinion of teacher-students, are the advantages and disadvantages of using video for learning purposes compared to written diary, and whether written or video-diaries are preferred when learning from the experience of fellow students as well as what are the justifications for their choices.

The following research questions were formed: 1) What are the advantages of the video diary format, compared to written reflection, based on the opinion of teacher students? 2) What are the disadvantages of the video diary format, compared to written reflection, based on the opinion of teacher students? 3) Which diaries (written or video) the fellow students comment on the most during the practice and what are the justifications for their choices?

The experiment was conducted with 24 bachelor level 2nd year teacher-students on the “Observation and Pedagogical Practice” course. 20 students were female and four male, the youngest was 21, the oldest over 50, the majority between ages 21-25. These students were studying to become teachers of several subjects in middle schools and this course included their first school practice.

For the study, students were divided into two groups: 13 students reflected their practice experience in a written diary format and 11 students used video for the same purposes. At the end of the practice week, students from both groups made practice summary post in video format.

Students who kept a written diary posted their written reflections about their practice experience onto Moodle Open-Source Learning Platform. Students who used video diary format uploaded their videos to the Flowboard Online Video Platform Flowbox. This is an interactive environment for uploading and sharing video content in password-protected folders.

All students from the course were able to view the reflections from their fellow students. It allowed the students to share with fellow students what they experienced in the school environment.

Students commented on written and video diary posts from their peers. This enabled collaborative learning.

Students answered questionnaires two weeks before and one week after their practicum week. The aim of the preliminary questionnaire was to find out what the students consider as the advantages and disadvantages of the written and video-format diaries; which diaries students plan to read/review and comment on and why. The aim of the follow-up questionnaire was to find out what were the advantages and disadvantages of using the written and video-format practice diaries; which diaries they read/reviewed and commented on and why; what knowledge and skills were developed through the use of different diary formats. During the practice



period, 96 video clips were uploaded onto Flowboard and 84 written reflections were uploaded to Moodle.

Flowbox Online Video Platform provided simple uploading, sharing and commenting. It is a good environment for group reflections and collaborative learning. Most students preferred watching video reflections than reading written diary posts. Students liked the novelty of the video format, they said that watching videos was a pleasant change to reading. Also, more comments were written for video diary posts than for written diaries.

The results of this study showed that assigning video tasks, e.g. adding video diary option to written reflections, are good opportunities to motivate teacher students and to improve their public speaking competence. In the opinion of the students, the video diary reflection format has several advantages over written reflection, although there are also drawbacks. The possibility for students to create videos for professional activities can give them the confidence to create and use video based learning material in their future practice.

Video observations in music education to enhance collaborative learning

The purpose of the experiment, set in School of Professional Teacher Education, JAMK University of Applied Science in Finland, was to explore innovative approaches for enhancing video-based collaborative learning in music education. The aim of this study was to explore how video-observations support collaborative learning in music teacher education from a music teacher's perspective.

In music education and music teacher education, especially in terms of traditional instruments like a 'kantele', the Finnish national instrument, challenges arise as only few students study the instrument throughout the country. Thus, teaching and learning to teach the instrument, is normally based on one-to-one tuition and the power of peers and collaborative learning are not typically used.

In order to enhance collaborative learning in music teacher education, video-based technology platform allowing recording, sharing, on-demand access and analysing was tested in this experiment.

One music teacher and two music teacher students from two different universities, participated in the pilot study. IRIS Connect video platform was deployed, using two cameras and an online platform to record, share and analyse the kantele-instrument teaching sessions. Recordings were made by the music teacher students. Recorded sessions were analysed by the student (self-analysis), a peer-student (peer-analysis) and the music teacher, after which a collaborative discussion was held.

In a first phase, the music teacher familiarised herself with the IRIS Connect platform's video technology and its pedagogical possibilities with mentors with teacher education background. At the second phase, the music teacher students were introduced to the pedagogical procedures of the pilot. Students recorded three



different kantele-teaching sessions and shared the videos with the teacher and the peer student. The peer and the teacher analysed the recordings and gave feedback and comments after each session on the IRIS Connect platform. The students and the music teacher held an online collaborative discussion session related to the feedback received and to discuss the student's personal learning aims. The interim data was collected from the music teacher after the first experiment cycle by using semi-structured interview and analysed by applying inductive content analysis.

Preliminary results from the interim data showed that video-observations in music teacher education is a powerful tool to offer, to the music teacher and the music teacher students alike, possibilities time and place for collaboration. This was especially relevant in the case of music education, where only a few students study a certain instrument and where the distances are so long that face-to-face learning situations are difficult to organize.

According to the interviewed music teacher, the pedagogical activity piloted, made the music teacher students' and the music teacher's collaboration possible. The music teacher students, who video recorded their teaching sessions, received feedback and ideas on how to improve their teaching practices. Acting as a peer, was also seen as beneficial, as it offered a wider perspective for reflection. The video-based collaborative pedagogical solution used in this pilot, made it possible to all partners to analyse the videos at the best time suited to them and to arrange time for collaborative discussions.

The music teacher felt that the pedagogical solution applied in the pilot challenged her to rethink and redesign the pedagogical process she will use. She also felt that this redesign process enhanced music teacher students' learning "better" than before. In addition, the music teacher's own professional competences were improved, particularly in creating and implementing reflective instructions.

Some challenges were faced during the experiment. Firstly, the video technology platform used in this experiment did not transform the sound as accurately as it was hoped for. In music education the quality of sound is a crucial element. This issue was discussed with the company and improvements were made accordingly. The approach by the software provider company was experienced as an important step to enhance cooperation between the organisations.

Secondly, in terms of pedagogical perspectives, the music teacher thought that she would need more experiences in conducting collaborative discussions, either face-to-face or online, to further improve the collaborative learning. However, the dialogue between the music teacher and the music teacher students offered a possibility to share fresh ideas and to work collaboratively.



Students' lesson video recording to enhance reflection and collaborative learning

This experimentation was conducted in The Aeres University in The Netherlands. The experiments aims was to create more understanding on how the role of the teacher trainer enables more Video Supported Collaborative learning during lessons about pedagogy in relation with the theory of collaborative learning.

Participants are teacher-students in the domain of Consumption techniques in the bachelor teacher education in the Netherlands. The environment for recording their lessons in practice is provided by Iris Connect. The collaborative conversations took place face-to-face and in the virtual Knowledge Forum.

During this experiment the students film their lessons (with the software/ application of IRIS Connect) while teaching in vocational secondary education and reflect on these lessons at the university in the different stages described by the literature about collaborative learning. The reflections of the students, new ideas and theory found are developed and discussed in the Knowledge Forum and face to face in the classroom.

Data gathering took place through storyboards, questionnaires (for both students and teachers), ethnographic video-blogs of key situations, and appreciative interviews.

Preliminary findings show that there are some technical concerns with the environments like uploading video recordings by students; students report that they have to get to using the Knowledge Forum. Researcher gather that collaborative learning in the sense of having conversations together about the content of the video recordings is very appreciated by students and helps them in their reflections. The aimed learning outcomes are the following: integration of cooperative learning, collaborative learning, concepts of feedback, shared control, distance learning, and increasing knowledge of concepts usable during teaching. Students are inspired by peer to peer feedback, literature found by the students themselves, as well as literature provided by the teacher trainer as: Bijkerk, L. van der, Heide, W. van der (2006). *Het gaat steeds beter*. Springer Media B.V; Ebbens, S. , Ettekoven, S. (2016). *Samenwerkend leren*. Noordhoff Uitgevers.; Geerts, W. , Kralingen, R. van (2016). *Handboek voor leraren*. Coutinho. ; Slooter, M. (2010). *De vijf rollen van de leraar*. CPS Uitgeverij.

Teacher-Students' reflection supported by narrative video and collaborative learning

This experiment conducted in the domain of consumption techniques in the bachelor Teacher Education in the Netherlands aims to improve the reflection skills of teacher-students in secondary vocational education through peer feedback in genuine, authentic situations.



The environment for constructing narrative videos of their practical experience is EdVisto, a digital storytelling environment, provided by company partner Diesel 21. The collaborative conversations among students took place face-to-face and in the virtual Knowledge Forum.

Students film moments and reflections and share this in EdVisto. The assumption is that knowledge building will improve their reflections. Based on the reflection experience with the movies in EdVisto. Data was gathered through appreciative interviews, storyboards, questionnaires (students and teachers), and ethnographic video-blogs of crucial collaborative situations.

Analysis focused on Video-supported collaborative learning to enhance a deeper understanding of the reason why the chosen film could engender competence development (pedagogical, didactical and subject matter competence) and is guided by the following research questions:

RQ1: Has the students' concept/theory about reflection in general become different (perhaps wider?);

RQ2: Can they discuss about how to improve reflection in general, and consequently can they identify what works for themselves?

RQ3: What is (are) than the right way(s) to reflect? Can students develop a method on how to do this properly and can they tell what works and what does not work?

RQ4: How does reflection contributes to the professional development of the teacher?

CONCLUSIONS

Preliminary results of all the conducted experimentations reveals the emerging of innovative pedagogical models for video-supported collaborative learning.

- *Collaborative video-problem solving pedagogical model* reveals increased student's engagement, collaborative learning skills, motivation, responsibility and autonomy.
- *Video-based-annotation-tools feedback pedagogical model* reveals positive perceived usefulness and effectiveness of video annotation tools used by in-service teacher to improve reflection and, consequently, better their teaching practice.
- *Video-recording - based - diary pedagogical model* proves to be a valuable alternative to written summaries, and can support reflection skills of future teachers.



- *Video-observation-based pedagogical model* in music shows the potential of using video in music education as a powerful pedagogical tool to offer the students innovative solutions.
- *Video recording-based peer-feedback pedagogical model* reveals potentialities of video to understand and promote the role of teacher trainer in the promotion of collaborative learning.
- *Video-recording-based-reflections pedagogical model* reveals potentialities for personal and professional development of student-teachers.

Most of these models were implemented using video live capture and recordings of teaching practices and were combined with company's internet-based video technologies in order to support social learning and interactions, in the field of teacher education, including initial teacher education and vocational teacher education.

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