



USING HYPERVIDEOS IN INITIAL VOCATIONAL EDUCATION: EFFECTIVENESS AND MOTIVATION OF INSTRUCTIONAL SCENARIOS

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Introduction

In recent years the role video can play in fostering and sustaining learning has considerably increased, and the enormous recent success registered by Massive Open Online Courses (MOOCs), in which short instructional videos support lectures, is just one confirming instance among many (see *inter alia* Giannakos, Jaccheri, & Krogstie, 2014). However, quantitative confirmation that video is one of the most-used media in schools (Corporation for Public Broadcasting, 2004) cannot be enough, and many contributions pointed out the limitations of using videos in classes (e.g. Hobbs, 2006).

In this debate, hypervideo has been considered a video-based tool able to overcome some traditional video limitations, like for example the difficulty to actively interact with the contents or the limitations for reflection or annotation to be supported (Chambel, Zahn, & Finke, 2004). In fact, several scholars pointed out that the use of the interactive features typical of a hypervideo can be a valuable instructional strategy to support learning. In particular, such a body of knowledge argues that hypervideo can be an effective tool for learning given some conditions, like for example:

- To exploit the interactive features of hypervideo, like navigation control, segmentation or functions related to the possibility of adding hyperlinked additional materials like pictures, texts, web-pages (Schwan & Riempp, 2004; Zhang, Zhou, Briggs, & Nunamaker, 2006);
- To exploit the reflective features of hypervideo, e.g. through video annotation tools (Colasante, 2011; Hulsman & Van der Vloodt, 2015) which are often integrated in hypervideo interfaces;
- To give an active role to students (Zahn, Krauskopf, Hesse, & Pea, 2010), e.g. by involving them either in a learning-by-design task on authoring the video, or in video-capturing their work experiences (Cattaneo, Nguyen, Sauli, & Aprea, 2015).

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However, while most of these contributions focus on learning, few study addressed the question of how hypervideo can be integrated in instructional scenarios and there is a gap in the literature on evidence-based guidelines to properly integrate hypervideos in instructional scenarios (Stigler, Geller, & Givving, 2015; Berk, 2009).

Therefore, this is the leading question of our contribution, which constitutes an exploratory study to investigate the effects of three different hypervideo-based instructional strategies on learning, as well as the process the teacher passed through when designing the interventions. Learning is considered both under the indices of knowledge acquisition and knowledge transfer in practice, and under the indices of motivation and perceived usefulness.

Methods

Sample and procedure

Four first-year classes of clothing designer students ($N = 38$, female = 36; $M_{age} = 17.16$, $SD_{age} = 3.40$) from an initial vocational school in the Italian-speaking part of Switzerland (Scuola d'Arti e Mestieri della Sartoria, SAMS) have been involved and randomly assigned to four different conditions: (a) Plenary lesson ($n = 6$), where the teacher used the hypervideo in front of the class as a support for her teaching; (b) Individual use ($n = 11$), where students individually used the hypervideo in front of a screen in a computer lab; (c) In-group use ($n = 12$), where students, in groups of three each, have been asked to build the interactivities of the video, adding learning materials to the raw video; (d) Traditional lesson (control group, $n = 9$), where students attended a traditional lesson, without using the hypervideo. The three experimental conditions are illustrated in Figure 1.

The teacher, the content of the lesson (seam anomalies) and the learning materials have been the same in all the four conditions. The raw video was produced by the teacher, who then took care of transforming it into a hypervideo, both including the audio and integrating additional materials and interactivities. In the plenary condition, the audio was silenced, substituted by the teacher's voice; students directly participated in the discussion. In the individual condition, the teacher gave the assignment and let the students work alone with the hypervideo, anyway being at their disposal for any question. In the in-group condition, the raw video was given to the groups without any additional material, but in order to structure and facilitate the task, the same elements included in the teacher-generated hypervideo were given to students as possible materials to use. The traditional lesson was led as it was always the case in the school when treating this topic. Although we did not want to have a media comparison study, we included this fourth condition under the request of the teacher and her colleagues, eager to know the difference in the outcomes with respect to the "traditional" scenario. In order to get students familiar with the interface, a preliminary lesson on a different topic (how to thread a needle) was managed by the teacher using the hypervideo tool in all the four classes.



Figure 20. Illustration of the three experimental conditions: plenary (left), individual (centre), in-group (right)

All the four scenarios had the same structure, mainly based on three different parts: (a) an Introduction, where the teacher exposed the topic and the objectives to be reached at the end of the lesson, and activated prior knowledge connected to the new topic (10 minutes), (b) a Central phase (50 min. for plenary, individually and control; 85 min. for in-group), where the hypervideo was used as described above; and (c) a Closure phase (30 min.), where the teacher involved the students to summarize the main contents of the lesson. The full procedure is shown in Figure 2.

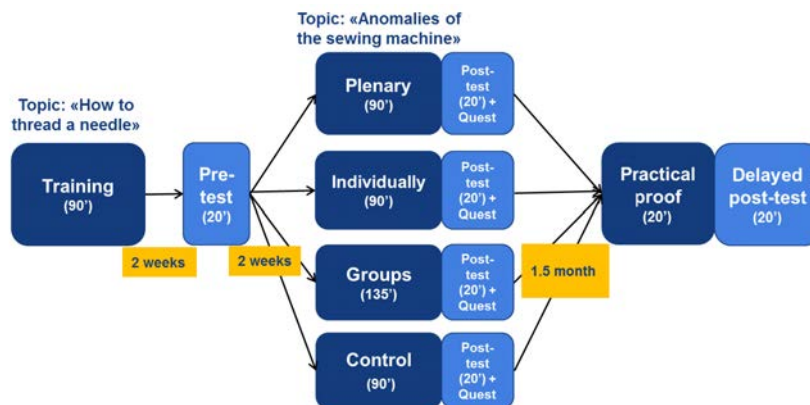


Figure 2. Scheme of the complete procedure

Measures

Declarative knowledge acquisition was measured through a pre-/post-/delayed-post-test design. The test contained questions related to anomalies of the sewing machine, most of them conceived as open questions about how to manage practical professional situations. The remaining questions asked to match the right description to a picture. The highest possible score amounted to 50 points. The pre-test was submitted one week before the lessons; the post-test immediately after the lesson; the delayed-post-test 1.5 month after the lesson.

Just before filling-in the delayed-post-test, students were asked to perform a practical proof too, in order to have a measure of their skills in managing sewing anomalies. Each student had 20 minutes to pass through four different sewing machines, and for each of them to identify which was the current anomaly, explain its causes and how to solve it. A thinking aloud protocol recorded their answers.

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Satisfaction and perceived usefulness were assessed in the three experimental conditions through a questionnaire based on the Usefulness, Satisfaction and Ease of Use scale (USE; Lund, 2001; 11 items). Motivation was measured in all the four conditions through a questionnaire too. We considered two main dimensions: Task relevance and Flow. For the former we used a subscale of the Specific Final Motivation Questionnaire (SFMQ; Van der Meij, 2013; 5 items), for the latter, 10 items from the Flow Short Scale (FKW; Vollmeyer & Rheinberg, 2006). All the items were based on a 6-points Likert scale from -3 = *totally disagree*, to +3 = *totally agree*.

Results

As a preliminary analysis we checked for the groups to be comparable, using three different measures: grades from the middle school, grades from the first semester, and the pre-test score. An ANOVA was performed and results show that the students in the different conditions did not differ as regards to middle school grades, $F(3,28) = 1.60$, *n.s.*, first semester grades, $F(3,31) = .35$, *n.s.*, and prior knowledge, $F(3,34) = 2.24$, *n.s.* We could then proceed with the following analysis.

Declarative knowledge acquisition was measured through a repeated-measure general linear model. Mauchly's test indicated that the assumption of sphericity had been violated ($X^2(2) = 27.5$, $p < .001$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.64$). The main effect was significant ($F(1.28, 43.43) = 57.56$, $p < .0001$). Post-hoc comparisons showed significant differences between the individual condition and both the in-group and the traditional conditions, in favour of the first (Descriptive statistics and figures respectively in Table 1. and Figure 3.).

Table 4: Descriptive statistics of the pre-post-delayed-post tests

Condition	n	Pre-test	Post-test	Delayed post-test
		M(SD)	M(SD)	M(SD)
Plenary	6	4.25(2.86)	30.58(8.55)	30.25(11.84)
Individually	11	7.45(2.69)	31.05(4.91)	37.26(9.66)
In-group	12	5.98(4.09)	24.52(9.62)	32.19(11.54)
Control group	9	4.47(1.08)	21.47(4.55)	26.21(9.35)
Total	38	5.78(3.15)	26.64(8.04)	32.36(10.82)

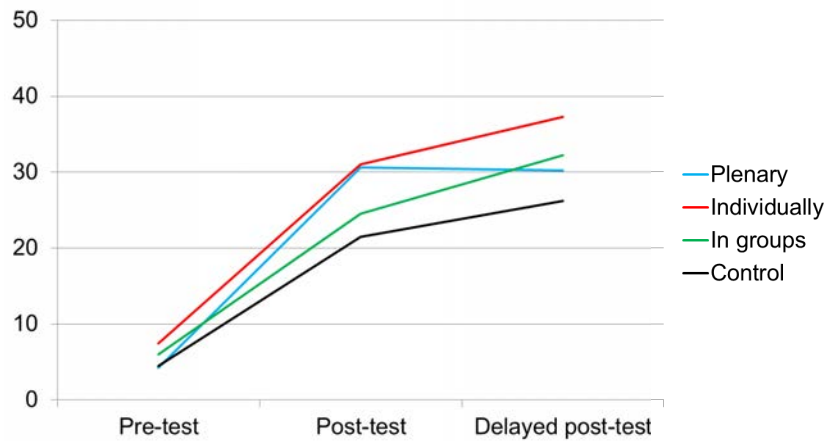


Figure 3. Results of the GLM repeated measures in graphical form

A one-way ANOVA on the practical proof score showed a significant difference at the 0.9 significance level ($F(3,26) = 2.43, p = .09$). Post-hoc analysis showed that all the three experimental conditions outperformed the control group.

Satisfaction and perceived usefulness were generally high in all the three groups (Satisfaction: $M = 2.08, SD = .73$; Usefulness: $M = 2.24, SD = .78$), with higher scores for satisfaction in the in-groups condition and with higher perceived usefulness in the plenary condition. A one-way ANOVA showed significant differences for perceived usefulness only ($F(2,26) = 4.13, p < .05$), with the plenary condition emerging with respect to the individual one.

Task relevance and flow also showed a high degree of motivation with no significant differences among the groups and with the plenary condition showing the highest scores in both dimensions.

The analysis concerning the teacher's role and of her reflections about the implementation are still in progress and will be presented at the congress.

Discussion

The study presented here constitutes a first exploratory investigation about the effectiveness and perceived usefulness of using hypervideo in different instructional scenarios within initial vocational education. Although preliminary, this study shows that hypervideo represents an effective way to learn and an incentive for student's motivation. Knowing the critics about media-comparison studies, results show anyway that the use of hypervideo is effective both in terms of declarative knowledge acquisition and students' satisfaction – experimental conditions always outperforming the control group. We can also be moderately positive with respect to its effectiveness for sustaining the transfer of such a knowledge into professional practice. Generally speaking, the most promising condition seems to be the one where students interact individually with the hypervideo, which is not surprising considering the literature on using videos for instructions and the related emphasis on the importance to control pacing of information (e.g. Delen, Liew, & Wilson, 2014; Merkt, Weigand, Heier, & Schwan, 2011; Zhang et al., 2006). As well, positive results concern the plenary condition,

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where sharing and interaction among students can be profitable to learning. This result is interesting when considering that we have few studies in the literature on this way of using hypervideo in a real class, and it suggests then the possibility to further investigate under which conditions the use of hypervideo in a plenary strategy is worthy of attention. The in-group condition resulted to be more satisfying for students, but at the same time it required a bigger effort both in terms of time and cognitive load and in terms of organization. The question would be to investigate more to what extent such an investment is worthy depending on different kinds of content.

Concerning teachers' practice, the study also gives indications about how their role changes across the different instructional implementations and about their competence development too. For example, the teacher could realize what it means to prepare the learning resources for the four implementations, and which are the requirements for having good materials. As a paradigmatic example we cite the design of the hypervideo in its video, audio, and additional materials components. The currently missing analysis will give us useful guidelines for teachers and trainers willing to use hypervideos in their practice.

All in all, these findings inform us about the opportunity to integrate – and to further investigate the use of – hypervideo in an instructional scenario, especially in those contexts like vocational education where theory and practice have to be related one to the other. The implementation of the three hypervideo-based instructional scenarios gave us some hints about the different possibilities we have to use hypervideo in classes and the different effects it can bring to the learners. Of course, the study is only preliminary in this respect, and its limitations have to be faced, starting from increasing the sample size and balancing the different conditions, which was not possible acting in an ecological framework with authentic classes. Other instructional possibilities also emerged from this experience in order to increase students' creativity and to connect formal and informal learning, for example asking students to directly provide the raw video exploiting their professional experiences during stages or in-company training. Finally, this option bring us toward a new possible learning environment, which is conceived beyond the boundaries of the school and – with respect to dual vocational education in particular – without artificially distinguishing between the world of school and the world of workplace practice.

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