

Hypervideo for supporting declarative and procedural knowledge: evidences on cognitive and motivational effects

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Abstract

In recent years the role hypervideo can play in fostering learning has considerably increased. Scholars pointed out that the use of its interactive features can be a valuable instructional strategy to support learning. This holds particularly true for vocational education and training, where hypervideo can support both procedural and declarative knowledge. However, this strategy is often limited to individual settings, where students use hypervideo alone. Other uses of hypervideo for learning, as well as their implementation in authentic classrooms have been poorly investigated so far. This study aims to put together several studies (N=527 students) where hypervideo has been integrated in different instructional scenarios in vocational school contexts in order to measure learning acquisition, perceived usefulness, satisfaction, and motivation. Students from the sample represent different VET curricula and they have been randomly assigned to one out of five different conditions: hypervideo used in plenary lesson, used individually, used in couple, designed in groups, and no use of hypervideo (control group). Results show that concerning learning there is not an effect of the experimental condition, although the hypervideo conditions are significantly more effective than the control condition; on the contrary, there is mixed evidence concerning the effect that the different hypervideo-based conditions could have on perceived usefulness, satisfaction, and motivation.

Introduction

In an era where video-based learning is more and more diffused, hypervideo constitutes a further opportunity to foster and sustain learning, as it can overcome some traditional video limitations, like for example the difficulty to actively interact with the contents or to support reflection (Chambel, Zahn, & Finke, 2004). However, while most contributions focus on learning, few study address the question of how hypervideo can be integrated in classroom instructional scenarios (Stigler, Geller, & Givving, 2015; Berk, 2009).

Method

The study includes several in-field experiments driven in the past two years under the project IV4VET (Interactive Videos for Vocational Education and Training). According to a Design-Based Research approach, the experiments were all realized in collaboration with vocational teachers and implemented in real classroom settings. Every experiment followed the same procedure, although the teacher, the content and the possible choice between the conditions were different because of context constraints.

In general, in every experiment students were randomly assigned to one of the 5 following conditions: 1) Plenary lesson, where the teacher used the hypervideo in front of the class; 2) Individual use, where students individually used the hypervideo in a computer lab; 3) In couple use, where students used the hypervideo in couple; 4) In group use, where students, in groups, designed and built the interactivity of the hypervideo; 5) Control lesson, where students attended a traditional lesson, without using the hypervideo.

The sample comprises 527 students from 44 different VET curricula (mean age=18, 315 males and 206 females¹), and followed a lesson where the hypervideo was integrated in one of the two main disciplines of the dual Swiss VET system: professional knowledge (n=182) or general culture (n=345). In the experiments 23 teachers were involved; some of them realized more than one lesson with the hypervideo, in this case testing different scenarios. Students are distributed as

¹ Values that don't correspond to the total should be attributed to missing data.

follow in every condition: Plenary (n=220), Individually (n=150), In couple (n=103), In group (n=30), and Control (n=24).

In the majority of experiments – even if not in all of them – learning acquisition has been measured through a pre-/post-test design. Data about learning acquisition from the different experiments were standardized to zero mean and unit variance in order to be comparable. Students were also asked to fill in a questionnaire at the end of the experience about satisfaction, perceived usefulness (USE; Lund 2001), task-relevance (SFMQ; Van der Meij, 2013) and flow (FKS; Vollmeyer & Rheinberg, 2006).

Results

Before the experiments, we did not find any significant difference between the conditions concerning the level of knowledge of students in the pre-test ($F(4, 507)=1.471, p=.210, \eta^2=.011$), showing that the groups are comparable.

Comparing pre- and post-test, notwithstanding of conditions, we found a significant increase in knowledge due to the treatment, $t(33)=-11.479, p=.000, d=1.689$. However, we did not find any significant difference among experimental conditions comparing the pre- and post-test scores, $F(3,474)=.550, p=.648, \eta^2=.003$, indicating that there is no influence given by the way hypervideo is used.

Concerning the data from the questionnaire, we found mixed evidence which is reported more in detail in Tables 1 and 2. We found significant differences among the experimental conditions, both concerning perceived usefulness of hypervideo ($F(3, 497)=9.713, p=.000, \eta^2=.055$) and satisfaction in using it ($F(3, 497)=9.993, p=.000, \eta^2=.057$). Post-hoc comparisons reveal that the students who worked in plenary and individually, found the activity much more useful and satisfying, compared to students who worked in couple or in groups². Significant differences between conditions, were also found concerning task-relevance ($F(4, 519)=17.77, p=.000, \eta^2=.121$) and flow ($F(4, 517)=7.20, p=.000, \eta^2=.053$). Post-hoc comparisons indicate, in general, that students from the in-group and the control conditions, perceived the task as more relevant compared to the other conditions. The condition which led to the lowest level of task-relevance and flow is the in couple one.

Table 1. Means and Standard Deviations for the four variables according to the condition (Lickert-scale from -3 = totally disagree, to +3 = totally agree).

	Perceived usefulness	Satisfaction	Task relevance	Flow
Plenary	1.44(1.01)	1.51(1.15)	1.60(0.08)	1.11(0.94)
Individually	1.55(0.98)	1.66 (1.11)	1.62(1.26)	1.21(0.99)
In couple	0.98(1.27)	0.98(1.51)	1.03(1.42)	0.72(1.31)
In groups	1.99(0.69)	2.13(0.68)	2.73(0.39)	1.60(0.98)
Control	NA	NA	2.71(0.42)	1.63(0.77)

² Usefulness and satisfaction were not measured in the control condition.

Table 2. Overview of the results of the post-hoc comparisons.

Usefulness	Plenary, Individually >** In couple, In groups
Satisfaction	Plenary >** In couple, In groups Individually >** In couple Individually >* In groups
Task-relevance	In groups, Control >** Plenary, Individually Plenary, Individually, In groups, Control >** In couple
Flow	In groups, Control >** Plenary In groups, Control >* Individually Plenary, Individually, In groups, Control >** In couple

N.B: *Significant at p-value: $0.1 < p < 0.5$; **Significant at p-value: $p < 0.5$

Discussion

Concerning learning acquisition, we did not find any influence from the different learning strategy integrating a hypervideo, indicating that hypervideo can be effectively used in many different ways. Concerning perceived usefulness and satisfaction, we found that both the plenary and the individually condition have higher scores compared to the other conditions. As for the individual condition, this result could be brought back to the literature about hypervideo which highlights the importance of giving the control of the tool to students. And, concerning plenary, a possible explanation could be the fact that this kind of lesson is very similar to a “traditional” lesson, where the teacher explains in front of the class. Therefore, students do not have to cope with a new kind of activity which would require them more effort, concentration, and/or team-work. On the contrary, with regard to task-relevance and flow, we found higher scores in the in group and in the control conditions. The fact that students who worked in group obtained higher scores in task-relevance and flow could be explained by the difficulty of the task, which requires them to be concentrated.

Our data show the effectiveness of hypervideo as an instructional tool, but still require further investigation to better understand and exploit its full potentials for vocational education in the different instructional scenarios.

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