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Proceedings of the 18th European Conference on e-Learning

Aalborg University
Copenhagen, Denmark
7-8 November 2019

Edited by
Rikke Ørngreen, Mie Buhl and Bente Meyer

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Breaking Sequentiality: An Interactive MOOC

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Abstract: One of the common weaknesses of Massive Online Open Courses (MOOCs) is their lack of interactivity with the learning materials. Where MOOCs do offer learning materials with a degree interactivity, this is usually limited to single content items. In any case, even interactive learning materials are generally constricted within a sequential order that is often subject to a strict schedule. Sequentiality and scheduling restrict the autonomy of the learner in choosing how and when to consult the learning materials and engage in the learning activities. Changing the sequential and scheduled approach of traditional MOOCs poses educational, methodological and technological challenges for designers, instructors and learners. This contribution proposes an Interactive MOOC (I-MOOC) prototype, based on hypervideo and learning activities that are not bound to a precise timing or a specific sequentiality. The purpose of the I-MOOC is to offer participants autonomy in deciding their schedules and customizing their own learning paths. The I-MOOC provides various levels of interactivity: with the learning materials through hypermedia; between peers; and with the instructors. This paper illustrates the e-learning model underpinning the design of the I-MOOC, its multi-platform architecture, and the reactions of the users who participated in an initial pilot evaluation.

Keywords: interactive MOOC, hypervideo, mixed e-learning

1. Breaking sequentiality: The interactive MOOC

There has been a tendency to group MOOCs into two categories: eXtended MOOCs (xMOOCs), based on video-lessons followed by learning activities presented in a linear order, and connectivist MOOCs (cMOOCs), where learners set their learning objectives and regulate the intensity of their commitment (Alexiou et al, 2016). What is observed is that almost all MOOCs are based on sequentially organized content, delivered over a specific period of time. Often, sequential fruition is conditioned, i.e. completion of a module is a prerequisite for accessing the following one. This imposed sequencing prevents learners from self-regulating their own learning process.

In A Taxonomy of Massive Open Online Courses (Pili & Admiraal, 2016) different types of MOOCs are illustrated. The “iMOOC” (interactive MOOC) category is defined by "its learner-centered approach, the flexibility of study, and interaction between students, which are uncommon features in other MOOC formats" (Pili & Admiraal, 2016). Other types of interactive MOOCs that can be found in the literature concern the interactivity offered by virtual environments (Zhang et al, 2018) and the semantic reorganization of video content (Zhao et al, 2018). In such cases, however, even if there is greater *student-learning materials* interactivity, the organization of the contents remains sequential.

2. Research background

The TRIS project (Benigno et al, 2018) proposes an educational model for the creation of the Inclusive Hybrid Class (IHC), a learning environment that blends the physical and the virtual. The IHC is capable of generating active and collaborative participation in school lessons for children who are unable to physically attend school due to serious debilitating conditions. The Interactive MOOC (I-MOOC) presented in this contribution reports the transfer phase of the TRIS Project, a massive e-learning action designed to train school teachers on how to create and run an IHC from the methodological-didactic, organizational and technological points of view.

The development of the I-MOOC takes into account three requirements:

- To set up an online training course for a large number of users (Italian school teachers);
- To create a platform with a high level of interactivity, both with the learning materials and between peers;
- To offer a MOOC without a specific timeframe or sequential organization of the learning materials.

The I-MOOC design differs from standard MOOCs design and implementation, since: (a) it seeks to offer different ways of exploiting the contents; (b) didactic activities are not subject to rigorous scheduling and (c) the workload of the tutor must be light. The design challenge is both didactic-methodological and technological: (i) how to

increase the interactivity of learning materials; (ii) how to design interactive learning activities that do not impose precise timing and that lighten the tutoring load.

3. The e-learning design

The e-learning model adopted in the implementation of the I-MOOC is the result of an integration of several e-learning approaches modulated between interactive learning and content-driven learning. Fig. 1 schematically illustrates the components of the model in relation (a) to the learning processes it intends to implement, (b) to the types of interaction functional to their implementation.

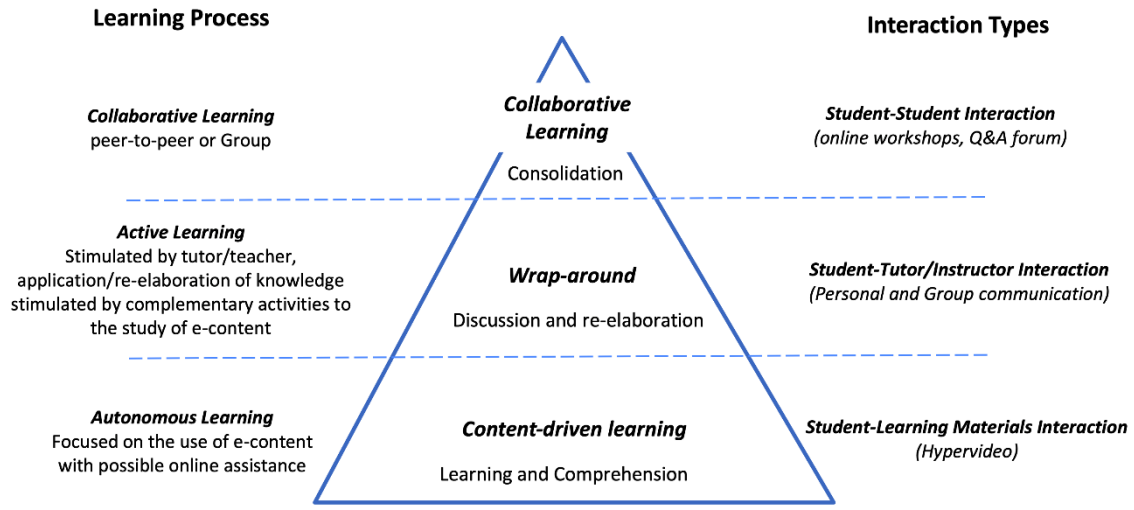

Figure 1: The relationship between the learning process and the type of e-learning interaction (Trentin, 2016)

In accordance with the model, the following three levels of interaction were implemented.

3.1 Interactivity with the Learning Materials

The I-MOOC is formed by a hypervideo environment in which students can browse the video contents in different ways, in order to increase their engagement.

This hypervideo comprises around 50 video clips with an average duration of 4-5 minutes each. These were produced as multi-purpose 'bricks' that reconfigure according to each navigation modality that learners take through the course contents: by macro-arguments (the main axes of the TRIS model); following the TRIS model modulation protocol over time; or exploring the application context of the model. More details are provided in Section 4.1.

3.2 Interactivity with the instructors (teacher and tutor) and student scaffolding

Interactivity with tutors is achieved through the Virtual Classroom environment, using a direct channel ("ask the tutor") and the thematic forums available to the participants. A further communication channel for student-instructor interaction is reserved for the delivery of the final report, which is evaluated by the instructor and determines the formative credit.

The function of the tutor is predominantly "pull" (on request answers) and moderately "push" (proactive); the latter is limited to a few circumstances, such as reminding learners of the only deadline scheduled in the I-MOOC, the launch of the two online Moodle Workshops of the course.

As a massive course, diversified solutions ease the pressure on the tutoring staff. Strategies included:

- the creation of a contextual didactic guide;
- the preparation of detailed scripts to support learners in carrying out activities (contributions to the Forums; papers and exercises to be peer-reviewed in the online Workshops; final papers for the awarding of formal credit certification);

- the use of a status bar indicating learners' progression through the course (completed and upcoming activities, results, etc.).

3.3 Interactivity among learners

Within the Virtual Classroom environment, the interaction between the participants unfolds in: the Community Forum; in specific forums for discussions and collaborative work; in the Q&A forums; and in the Workshops devoted to the peer-review of learner assignments.

In order to lighten the burden on tutors, many of the learning activities that stimulate interaction between the participants involve automatic functions provided by Moodle, such the Workshops and Q&A Forums.

Collaborative interaction in Workshops and Forums for learning consolidation are restricted to learners who are adequately prepared and not by "occasional" participants. To access these collaborative interaction spaces, learners need to complete preliminary activities, namely the vision of the Hypervideo or the study of some chapters of the reference book. Verification of learner readiness for those activities is conducted using assessment tests.

4. The architecture of the I-MOOC

The TRIS I-MOOC was developed by integrating two digital environments (Fig. 2): The Hypervideo environment, where the student can freely navigate and study the video contents using a dedicated player developed with Klynt software and embedded in a Wordpress webpage; the Virtual Classroom environment developed using the Moodle platform, where the learner carries out activities in order to achieve the formal credit certification. Both environments can be accessed from PC or mobile devices.

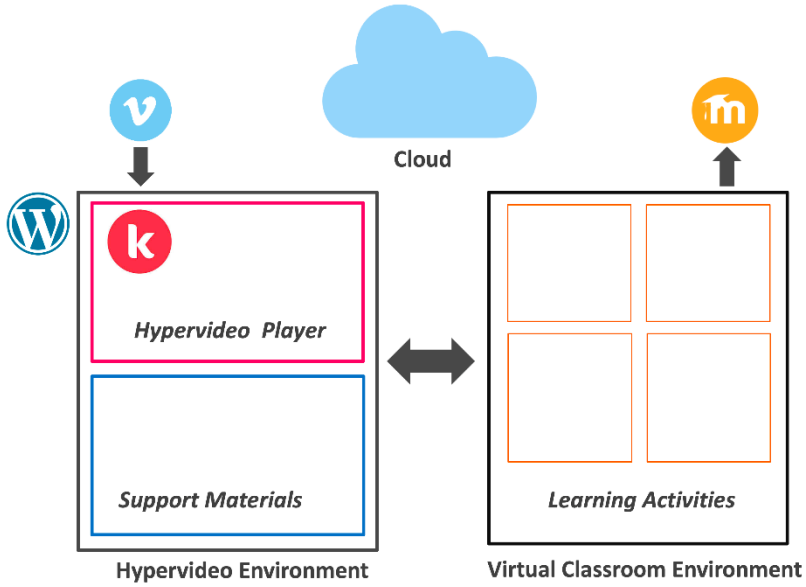

Figure 2: The architecture of the TRIS I-MOOC.

4.1 Hypervideo environment

Interaction with the learning materials is based on interactive video or hypervideo (Hammoud, 2016). The I-MOOC's hypervideo is of a database type, it incorporates different videos, whether interactive or not, with two levels of interactivity: (a) with each single video and (b) with the entire set of videos. The video clips have been produced in different formats: live-action, animation and 360° video (Fig. 3). Interactions with single video clips comprise:

- Bookmarking of key moments
- Prompts to consult given chapters of the course textbook
- Immersive 360° navigation of certain videos.

Figure 3: Examples of video format in the Hypervideo environment.

The second level of interactivity concerns the different ways of browsing the contents. The video-lessons are divided into four thematic macro-categories which corresponding to the four macro-areas of the TRIS model: the psycho-social context, the methodological-didactic axis, the organizational axis, and the technological axis. The video-lessons are linked together (Fig. 4), which highlights the hypertextual nature of the I-MOOC.

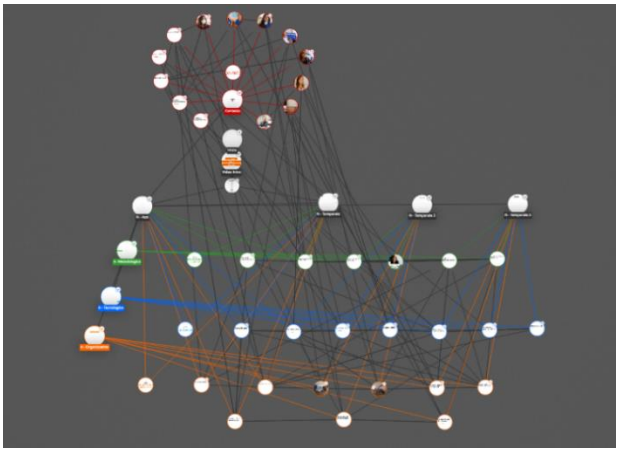

Figure 4: The Hypermedia structure of the Hypervideo.

Fig. 5 illustrates the three navigation modes of the hypervideo: (i) according to the axes of the TRIS model; (ii) according to the temporal modulation protocol of the model; (iii) according to exploration of the psycho-social context of the model. Fig. 5 also shows (bottom right) the screen displaying the three navigation modes.

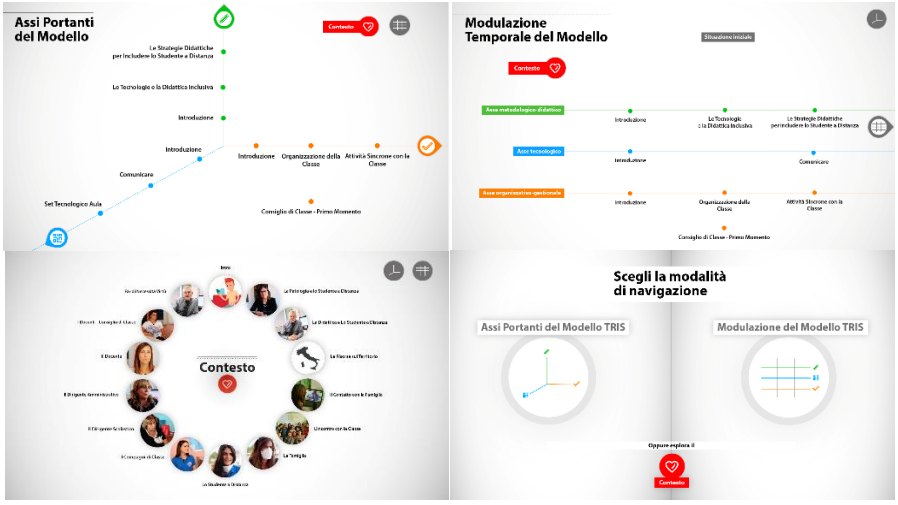

Figure 5: Navigation modes of the TRIS I-MOOC

In addition to the Hypervideo, the leaning materials include the course reference book, video-lessons in audiobook format, and the voice-over scripts.

4.2 Virtual Classroom environment

Fig. 6 shows the main section of the Virtual Classroom, which hosts the I-MOOC learning activities. The course modules are organized in four independent quadrants. The modules share the same structure, which follows the progression indicated in Fig. 1.

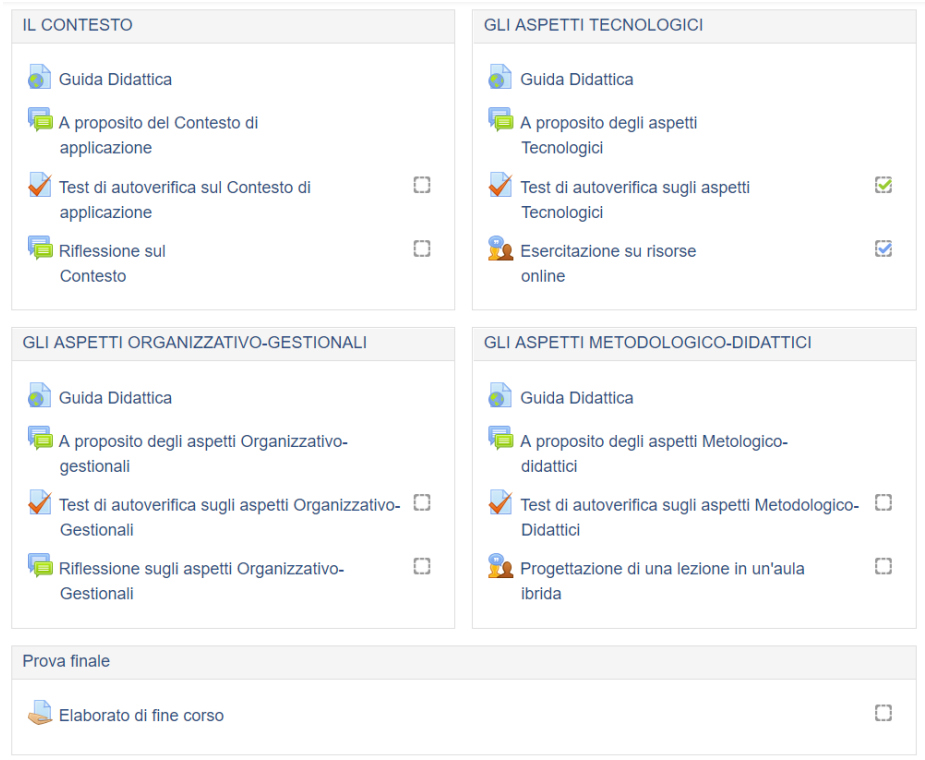

Figure 6: The main section of the Virtual Classroom environment

5. Conclusions and future work

Currently, the I-MOOC is being validated by a sample of about 100 teachers, varying in gender, geographical area, school level, subject area, previous experience of socio-educational inclusion, skills in the educational use of technologies.

Future research will involve in-depth analysis of the data collected during the pilot phase. Some considerations can already be drawn based on the initial reactions during the first run of the TRIS I-MOOC. The first impact with the I-MOOC prototype was very positive. Almost none the participants reported any significant problems either in using the system, orienting themselves in the multi-platform environment, choosing a navigation path in the Hypervideo environment, or in understanding the learning activities to carry out. Factors possibly contributing to these impressions were: the clear interface of the Hypervideo; the contextual didactic guide; the detailed description of assignments and ways to complete them.

In future, in addition to introducing improvements to the Hypervideo environment, the TRIS I-MOOC will involve the development of *Hey Tutor!,* a conversational application (chatbot) with push/pull tutoring functions. This app will help to lighten the workload of human tutors: in "pull" mode, through the management of FAQs; and in "push" mode through reminders, notifications, proactive interventions addressing participants in danger of dropping out, etc. The alpha version of this chatbot is currently being tested at ITD-CNR in the field of language learning (Ravicchio et al, 2019).

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