MEASURING A CRITICAL IMPACT ON TECHNOLOGY IN EDUCATION: A TOOL FOR OERS EVALUATION

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The context

This paper is part of a wider research project and focuses on the model adopted for evaluating the impact and effectiveness of online teaching and learning, enabling students to adopt a critical approach which could be extended to any online resource which they may use for their lifelong learning. Otten and Ohana, in their *The Eight Key Skills Competences for Lifelong Learning* (2009), a document issued under the support of the EC DG Education and Culture, focus on the identification of a set of skills needed to overcome present youth unemployment and social exclusion in developed countries. The central concepts referred to are: "critical thinking, creativity, initiative taking, problem solving, risk management, decision taking and managing feelings in a constructive manner" (p.10). There should be a closer connection between the above skills, education and digital education in particular. Technology plays a fundamental role in everyone's life and must be approached critically, especially by young people entering the labour market for the first time. In the information society, the amount of online content is constantly increasing, and more content is becoming readily available online. Open Educational Resources (OER) are assuming an ever increasing importance in national educational policies. Between 2005 and 2007 UNESCO identified priorities for the spread of OER (OECD, 2007).

The Laboratory for experimental pedagogy (LPS) based at the Department of Education – Roma Tre University has been working, since 2010, on research focusing on the enhancement of students' critical thinking skills to foster the development and promotion of the critical use of technology in education. A series of departmental projects, coordinated by LPS researchers, have been funded from 2011 to achieve these aims (Poce et al. 2011; Poce, 2012; 2014a). The projects use specific models and coordinated approaches to teaching and learning across a range of disciplines. Students are invited to engage in learning activities, which involve analysis and reflection, individually and in groups, taking into considerations the differences in learning, according to the specific situation. Students work on the different tasks focusing on the identification of cultural and disciplinary contexts, within the *lectio magistralis framework*:

1. *Distinctio* – presentation of the context;
2. *Divisio textus* – analysis of the text;

3. *Collatio* – discussion;

4. *Quaestio* – critical interpretation.

The same analytical method is used on a variety of texts, including Descartes and Rousseau, working online on a dedicated platform. The main aim of the study has been to provide students with the opportunity to approach online learning in a structured way, which can be applied in a variety of contexts.

This paper describes how giving students the tools to carry out an evaluative analysis of the resource they are accessing can enable them develop their analytical and critical thinking skills. It can also help them to gain insight into the importance of 'learning to learn'. These students also gain the ability to characterise the impact of OERs on Higher education teaching and learning. The main scope of the present research project is that students could independently evaluate the quality of online digital resources both as learners and future educators. Doing so it is possible to overcome "brief term instrumental characteristics" of tools and promote long term evaluation processes (Vertecchi, 2012). This proposal concerns an area of research into distance learning which has not been explored in this way previously. The study does not explore the quality of learning in online environments. Rather, it investigates how students should approach the online resources at their disposal, facilitating their critical and reflective skills and adopting a model for analysis.

Hypothesis research questions and objectives

Taking into consideration national and international literature, the wider project, where this study is set, aims to design and test a new evaluation system of open access multimedia educational products, such as the one students experienced in the course of Educational Research Methodology – Università Roma Tre. The goal is to identify tools which enable the user critically to evaluate online resources and their impact on Higher Education teaching and learning.

The research tests the following hypothesis: Students who use a specific system to evaluate the quality of OERs are able to deepen their understanding of online teaching and learning in higher education and acquire sharper critical and analytical approaches to the evaluation of online learning.

Research objectives are the following:

- to define an innovative system for the evaluation of OERs;
- to define new quantitative and qualitative indicators to evaluate the impact of OERs on Higher Education teaching and learning;
- to give students, as learners and future educators, quantitative and qualitative tools to freely assess a range of open access online resources;
- to teach students contents about entrepreneurship education, as described, later on, in the specific example.

As mentioned above, here the focus is limited to the tool for the analysis of the effectiveness of specific examples of OERs.

OERs description

The OERs under investigation were created to integrate face-to-face teaching and learning within the pre-service course of Primary Education based at the university Roma Tre. On a dedicated platform, two lectures, on some passages taken from Rousseau, *Émile, ou De l'éducation* (1762), were podcast. These lectures were organised by reproducing a model that proved successful at Bologna university in medieval times, and has been replicated in different contexts, including today's. Each passage was presented taking into account the following phases:

1. *distinctio*, presentation of the subject(by introducing the context, the author, the setting of the work

2. *division textus*, the analysis aimed at understanding the constitutive elements of the text

3. *collatio*, a discussion of the pros and cons between students and the tutor

4. *question*, the text, following the analysis and the group/tutor discussions, is subject to a global and critical interpretation

In the case of the project all the information mentioned in the first phase were related to Rousseau and his work *Émile, ou De l'éducation* The second phase consisted in recording reading and commenting on the Preface and Book I from *Émile, ou De l'éducation*. The third phase was carried out facilitating online discussion on the issues raised by the readings. In order to accomplish the final phase, as a last assignment, students were asked to produce an essay to be written collaboratively online.

Methodology

More than 200 students, attending the master (pre-service) level university degree in Primary Education – Roma Tre University, were involved in the research, on a voluntary basis and all of them participated actively in the task and filled in the evaluation questionnaire being piloted. Students participated in the online lecturing, as part of the compulsory module in Educational research methodology (6 ECTS), after approval of the Primary Education degree course governing body. The task formed a compulsory curriculum module, which contributed to admission at the final exam. After taking part in the course, they had to carry out an evaluation, according to the *ad hoc* model devised by LPS researchers and described below.

The complete methodological plan was the following:

*   Students' background variables questionnaire administration;
*   OERs completion;
*   Evaluation form, defined according to specific indicators created to assess the impact of OERs on Higher Education teaching and learning;
*   Final questionnaire on the experience.

The evaluation form can be considered an innovative qualitative research tool, based on specific indicators to assess open access multimedia products, like OERs. It was realised by adapting categories taken from the model for the assessment of critical thinking skills by Newman, Webb and Cochrane (1997). It, therefore, represents a tool which analyses the characteristics of OERs with reference to those generic competences which are increasingly demanded by the labour market.

The questionnaire is divided into four sections:

- The first is devoted to Newman et al. (1997) categories of *relevance* and *importance* and contains indicators linked to formal characteristics of course content (e.g. comprehension, feedback effectiveness, video lecturing length and so on).
- The second section is related to the categories of breadth *of understanding*, *argumentation* and *justification* and consists of a series of statements. Students indicate how far they agree with the statements using a five point Likert scale. The statements focus on issues such as level of understanding, step by step learning, growing difficulty, lack of information and explanation, etc.
- The third section is devoted to *critical evaluation*, as students were asked to critically assess content, proposing issues for discussion and reflection, according to The Eight *Key Competencies for Lifelong Learning* (2009). Questions, here, were related to self-assessment of the competencies acquired.
- The last section was designed to identify *novelty*. This is the only open ended section. The aim is to enable students to reflect and express their own opinion/evaluation, adding elements on already identified indicators (e.g. "briefly describe strengths of the course you participated in"; "briefly describe weaknesses of the course you participated in" "how could the course be improved" and so on).

Some Results

Some results regarding one of the OERs attended by Roma Tre Education students are presented and commented on below.

Findings presented here are mainly related to the employment of the evaluation form (questionnaire), because, according to the research group that carried out the work, it represents an innovative tool for investigation and it could be employed to evaluate the impact of various technological instruments used in education and training. A first try out of the tool was carried out in the academic year 2013/2014 and regarded the evaluation of three MOOCs prototypes attended by a small group of education students (30 individuals) based at Roma Tre university (see Poce, 2014b). The present analysis instead is concerned with a larger number of attendees and wants to be a more significant test-bed. The following paragraphs highlights main results.

Data from the first section of the questionnaire in this case highlighted that content was easy to understand, correct, effective, complete and quality of design and presentation were judged very positively. Feedback given to the students was also judged very positively by more than

the 80% of the respondents. Almost 80% of the students rated very positively or positive the variety of multimedia didactic materials. More than 40% of the respondents rated on the average (3) the difficulty of the assessment tests carried out during the course. A similar percentage rated high this difficulty (scores 4 and 5) and only 14% of the students evaluated the tests too much simple to answer.
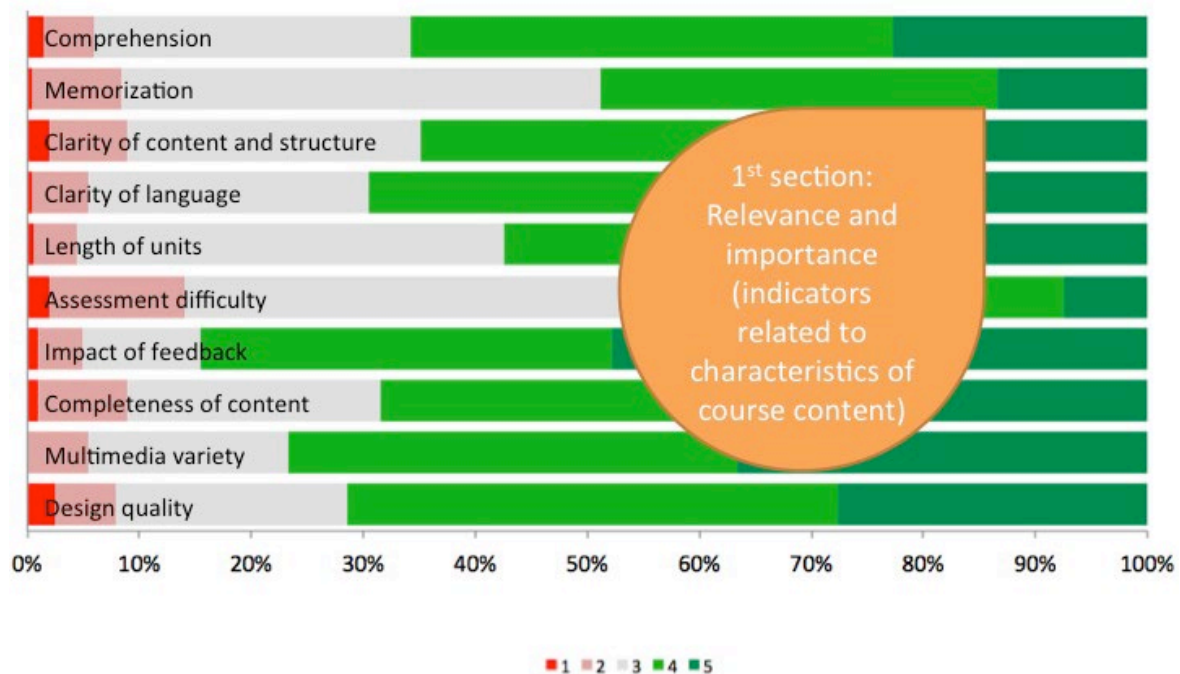

Figure 1. Quality Evaluation – *Relevance and importance* (indicators relate to characteristics of course content)

As regards breadth *of understanding, argumentation* and *justification* general evaluation was positive: more than 80% of the students strongly agree or agree with the statements "I learnt what I expected", "I learnt step by step (growing difficulty)", and more than 50% strongly agree or agree with "The course raised my curiosity and I deepened some topics".

They do not agree, with negative statements, highlighting how the quantity of information was adequate and analyzed correctly.
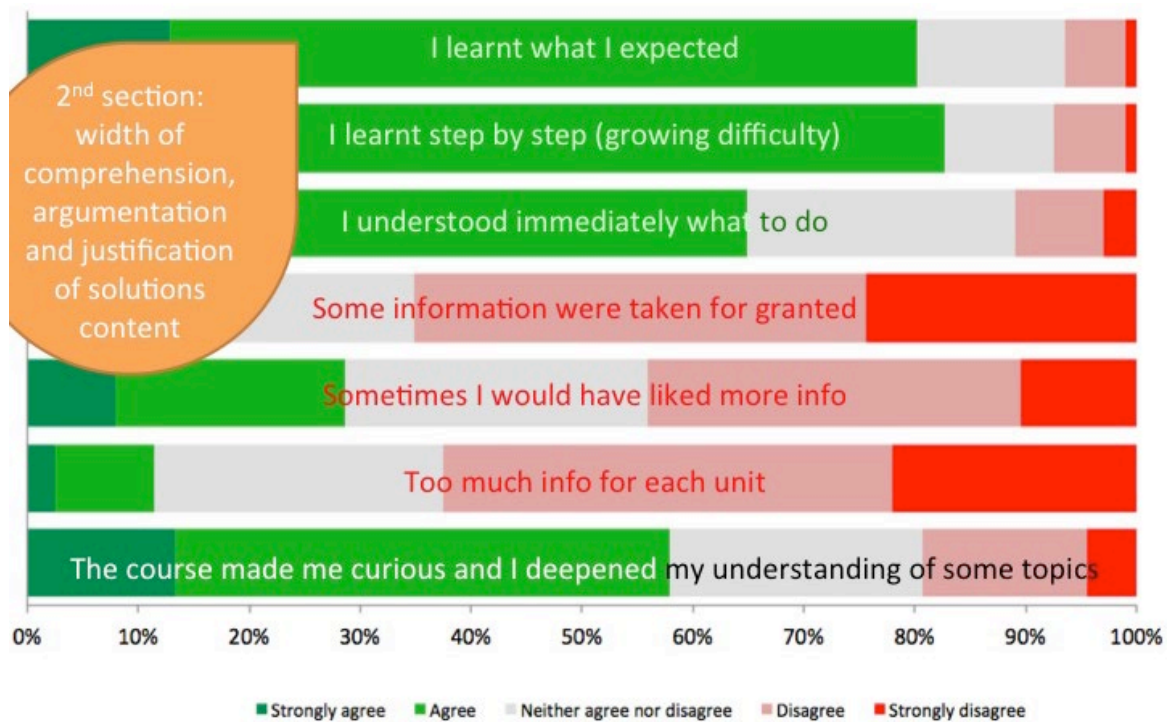
Figure 2. Content Analysis – *Width of comprehension, argumentation and justification of solutions content*

As far as critical evaluation is concerned, it is critical thinking, followed by communication, research design ability, memorizing, problem solving and creativity, the most chosen option. The course subject, readings from Émile, ou De l'éducation by Rousseau, had a strong influence on the acquisition of the skills under discussion. As expected, entrepreneurship is considered less involved in such sort of learning processes.

Figure 3. Critical evaluation (skills acquired)

Figure 4. Tag cloud – *Open ended contributions* (Italian)

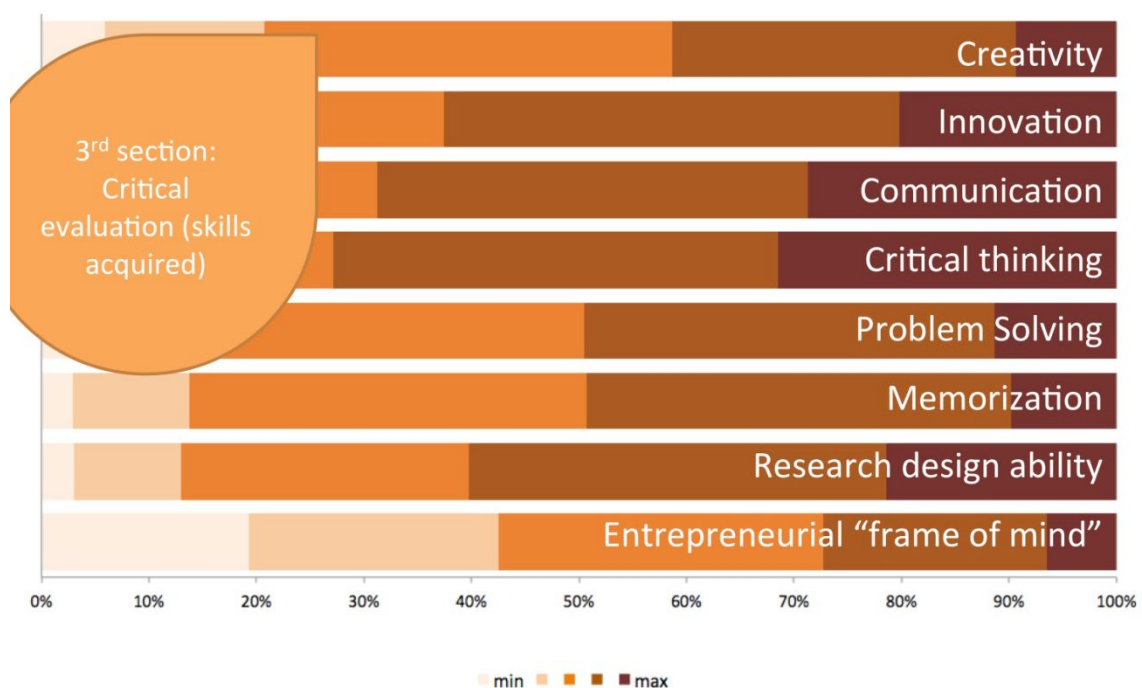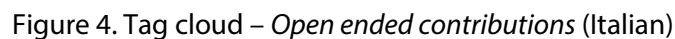As regards open ended questions, a semi-automatic lexical analysis has been conducted considering the raw frequency of the lexicon gathered from the answers. It was visualized in a tag cloud (Figure 4) excluding Italian language common words of all the terms used in the question. More precisely, it has been asked to the students to identify course strengths (in Italian language 'punti di forza') and weaknesses ('punti di debolezza') so these words were not considered in the analysis. As expected, a vast amount of nouns were used by the students. In scattered order: course, platform, work, teacher, lesson(s), activity, clarity, possibility, information(s) and video. Reading the answers given, the last term 'video' appears to be strictly related to the students' quality evaluation, more precisely with the 'multimedia variety' value. It appears that the students loved to watch multimedia presentation of didactic materials.

Conclusive remarks and further research

The aim of the present contribution is to report on the evaluation system, as well as on the evaluation products devised and obtained through this research, which represent, as a whole, an innovation in the field of distance education, in general and in Higher Education, in particular. The above system has been already tested on a previous preliminary research (Poce, 2014b), which already highlighted the effectiveness of the model, even if tested on a small number of cases.

Promotion of OERs is growing in different forms and settings, showing their wide educational potentialities. Actually, the same wide spread and openness, which characterize them, raised high standard methodological, evaluation and qualitative issues to be faced.

The project described here helped to define a system, which tends to match the intrinsic characteristics of OERs (widespread and openness) with those generic competencies, increasingly demanded by the labour market (critical thinking skills, in particular).

The LPS – Roma Tre University research group will carry on with the development of the evaluation tool and will extend the application of the system to other contexts and environments, as it happened with the experience reported here. The Department of Education – where LPS is based - has funded another term of experimentation, which will take place in the second term – year 2014/2015.

References

1. Daniel, J. (2012). Making sense of MOOCs: Musings in a Maze of Myth, Paradox and Possibility. In *Journal of interactive Media in education, 2012(3).* Available online at http://jime.open.ac.uk/article/view/2012-18

2. Downes, S. and Siemens, G. (2008). The CCK08 MOOC – Connectivism Course, 1/4 way. In *Dave's Educational Blog, 2 October, 2008.* Available online at http://davecormier.com/edblog/2008/10/02/the-cck08-mooc-connectivism-course-14-way/

3. Hopkins, R. (2006). Critical reasoning and critical perception. In D. Lopes & M. Kieran (eds.), *Knowing Art,* (pp. 137-153). Den Haag: Springer.

4. Newman, D.R.; Webb, B. and Cochrane, C. (1997). Evaluating the quality of learning in computer supported co- operative learning. In *Journal of the American Society for Information science, 48(6),* (pp. 484-495).

5. OECD (2007). *Giving Knowledge for Free. The emergence of Open Educational Resources.* Paris: OECD Publications. Available online at http://www.oecd.org/edu/ceri/38654317.pdf

6. Otten, H. & Ohana, Y. (2009).The Eight Key Competences for Lifelong Learning: An Appropriate Framework within which to Develop the Competence of Trainers in the Field of European Youth Work. Available online at https://www.salto-youth.net/downloads/4-17-1881/Trainer_%20Competence_study_final.pdf

7. Poce A.; Corcione, L.; Iovine, A. and Agrusti, F. (2011). *Podcasting as a Teaching and Learning Tool. Experimental Evaluation of New Opportunities.* Franco Angeli: Milano. ISBN 978-88-568-4136-7.

8. Poce, A. (ed.) (2012). Contributions to the definition of a critical technology. An assessment study. Milano: Franco Angeli. ISBN: 9788820410063.

9. Poce, A. (ed.) (2014a). *Promoting Science. Studies for the Definition of a Canon.* Milano: Franco Angeli. ISBN 978-88-204- 5872-0.

10. Poce A. (2014b). Developing Critical Perspectives on Technology in Education: A Tool for MOOC evaluation. In A. M. Teixeira & A. Szűcs (eds.), *Challenges for Research into Open and Distance Learning,* EDEN Research Workshop, Oxford (UK), 27-28 October, 2014, EDEN: Budapest, ISBN 978-615-5511-00-4.

11. Stracke, C.M. (2014). The concept of open learning for opening up education. In C.M. Stracke, U.-D. Ehlers, A. Creelman & T. Shamarina-Heidenreich (eds.), *Changing the trajectory. Quality for opening up Education.* Berlin: Logos Verlag Berlin. Available online oat http://mediendidaktik.uni-due.de/sites/default/files/Heinen_Blees_Kerres_Rittberger_Connecting_Users_and_Editors_2014_0.pdf

12. Vertecchi, B. (2012). *Parole per la scuola.* Franco Angeli.

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