

Evaluation of a MOOC to Promote Information Literacy First Evaluation Results

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Summary

The aim of this paper is to present the evaluation framework and preliminary results of the evaluation for a Massive Open Online Course (MOOC) on Information Literacy (IL) and its application within a Business Administration course. The aim of the evaluation was to assess user experience and progress of the students' knowledge of IL after completing the MOOC. The evaluation approach consisted of three phases: First, the students were asked to fill out a short self-assessment questionnaire and a shortened adopted version of a standardized IL test. Second, they completed the full version of the IL MOOC. Third, they were asked to fill out the full version of a standardized IL test and a user experience questionnaire. The evaluation results show that the MOOC was able to increase the IL skills of the students and was also perceived well. The evaluation approach worked well and can also serve as model for evaluations of other MOOCs, in particular on IL.

Key words: MOOC, information literacy, evaluation

Introduction

MOOCs (Massive Open Online Courses) are freely available online courses that have no entry limitations and are aiming at unlimited participation (Bozkurt et al., 2017). In November 2016, the European Union funded project *Information Literacy Online* (ILO) was started with the aim to develop, evaluate and disseminate a multilingual open-access MOOC designed to improve students' information literacy. Information literacy (IL) refers to the “set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning” (ACRL, 2016).

The content framework of the ILO MOOC is based on the SCONUL Seven Pillars of Information Literacy (SCONUL, 2011), on the ACRL Framework for Information Literacy for Higher Education (ACRL, 2016), on the Metaliteracy model (Jacobson, Mackey, 2016) and a good practice analysis in IL education (Robinson, Bawden, 2018). This led to the following MOOC content:

- Module 1: Orienting in an information landscape
- Module 2: Research is a journey of inquiries
- Module 3: The power of search
- Module 4: Critical information appraisal
- Module 5: Information use: the right and fair way
- Module 6: Let's create something new based on information and share it!

The content was developed in English first and later translated to Spanish, Catalan, German, Croatian and Slovenian. The final content was implemented into the *OpenEdX* platform following a pre-defined workflow (Libbrecht et al., 2019). An important final development stage of the ILO MOOC was the evaluation of two areas: a) the user experience and b) achievement of the planned learning outcomes (ie., progress of the students' knowledge of IL after completing the MOOC). While there are already several scientific contributions available that report about experiences and evaluation results of MOOC projects, there is a lack of such work regarding MOOCs on IL. The aim of this paper is to present the evaluation framework and preliminary results of the evaluation of this MOOC to encourage its further development which we hope would lead to the use of the MOOC in the area of business studies with its final goal of promoting IL and its application within this study area.

State of the Art

There are several scientific publications reporting on experiences and evaluation results of MOOC projects. A common approach is to use questionnaires on the user experience. A study about the MOOC experience at the Spanish National University of Distance Education used surveys covering 17 MOOCs offered by the university's own platform to analyse completion rates and the overall user experience (Gil-Jaurena et al., 2017). For an Australian study, conducted in cooperation with the OpenLearning platform, an evaluation form was embedded directly into the MOOCs to collect and analyse participants' attitudes and the perceived usefulness (Rawlings et al., 2017). A MOOC on literature searching for health libraries was evaluated by asking participants to fill out a feedback form at the end of the MOOC to derive recommendations for future projects (Young et al., 2017).

The most common approach to evaluate IL skills are standardized questionnaires (Beile, 2008). There are several tests that are optimized for specific target groups and educational levels, such as the Information Literacy Test of the James Madison University focusing on students (Cameron et al., 2007), the Beile Test of Information Literacy for Education focusing on future teachers (Beile, 2005), the Tool for Real-time Assessment of Information Literacy focusing on pupils (Kent State University Libraries, 2013), and the Information Literacy Test (ILT) for Higher Education (Boh Podgornik et al., 2016). The advantage of standardized IL tests is that they are quick and easy to administer and produce readily analysable and comparable data. However, no single test is able to capture the complexity of learning: While standardized IL tests in multiple-choice format are good at measuring lower-order thinking skills, they are not suited to measure higher-order thinking processes. Multiple forms of assessment would be needed to fully measure student performance and program effectiveness (Beile, 2008; Beutelspacher, 2014).

Methodology

The evaluation approach, applied in this study, consisted of three phases: First, the students were asked to fill out a short pre-test. Second, they completed the full version of the ILO MOOC. Third, they were asked to fill out a longer post-test. To allow matching of the pre- and post-test questionnaires, self-generated identification codes (Yurek et al., 2008) were used. Both questionnaires were implemented into LimeSurvey.

The pre-test consisted of four parts: 1) a questionnaire on personal background information, such as age, study program, and previous degrees; 2) a self-assessment of IL skills consisting of seven questions on previous experience and information needs which were rated on a three-point Likert scale, finishing with an open question on perceived problems regarding information needs; 3) a shortened adopted version of a standardized IL test (Boh Podgornik et al., 2016) consisting of 12 single-choice questions (Figure 1 gives an example of one question within this questionnaire); 4) a short questionnaire with three subject-related questions. Students were expected to complete the pre-test in 5-7 minutes.

The post-test consisted out of three parts: 1) the full version of a standardized IL test (Boh Podgornik et al., 2016) consisting of 39 single choice questions; 2) the same three subject-related questions as in the pre-test; 3) a user experience questionnaire. This questionnaire asked for the language setting used when attending the MOOC and allowed an open response answer on the overall experience with the MOOC. Afterwards, nine usability aspects were to be rated on a five-point Likert scale. For two of these aspects, participants had the possibility to leave comments. Finally, participants were asked how

important they considered to have information in various formats within the course and had the possibility to leave open-response comments on anything particularly disturbing or anything particularly appealing when using the user interface. Students were expected to complete the post-test in 15-20 minutes.

20 students (14 male and 6 female) of the course *Business Intelligence* at the University of Graz, Austria, participated in the evaluation between March and April 2019. The course introduces students into web sources for competitive intelligence analyses and one business intelligence software tool. The age of the students ranged from 23 to 41 years (mean 26 years). All of them were enrolled in either the master program Business Administration or Business Education and Development, except one student, who was enrolled in the doctoral program of Economics and Social Sciences. The students were asked to participate in the German version of the MOOC outside of the regular class hours at home. They were required to register with their real name and active participation was encouraged and checked by their instructor.

*7) In Google Scholar, "Find articles with all of the words" is equivalent to the search operator:

Choose one of the following answers

OR

AND

AND NOT

NOT

No answer

Figure 1: Example of one question within the pre-test, source: Question adapted from Boh Podgornik et al. (2016).

Findings

The self-assessment before attending the MOOC showed that the students were confident about their skills, but were also aware of shortcomings (Table 1).

Table 1. Self-assessment of students

Item	Never	Sometimes	Frequently
I often search for information as part of my study activities	0%	15%	85%
	Not at all	Some of them	Most of them
I know the most important sources of information in my field	0%	85%	15%
	Never	Sometimes	Always
I know which source to use when I need a particular type of information	5%	80%	15%
	No	Sometimes	Yes
I can successfully use most sources to retrieve the information I need	0%	35%	65%
I usually find the information I need in the sources that I'm using	10%	25%	65%
I can compare and evaluate different resources	25%	25%	50%
I know how to use information appropriately to the task	20%	35%	45%

85% of the participating students frequently (weekly or several times a month) search for information as part of their study activities and 15% search at least sometimes (several times during a semester) for information. 85% believe to know some of the most important information sources in their field, but only 15% believe to know most of them. 80% sometimes know which source to use when a particular type of information is needed, but only 15% believe they always do. 65% of the students

think that they can successfully use most sources to retrieve the needed information and acknowledged to usually find the information need in the used sources. The students appear to be less confident regarding comparing and evaluating different resources and using information appropriately to the task, where 25% and 20% answered with *no* and only 50% and 45% answered with *yes*, respectively. As main problems regarding their information needs the students reported to struggle with finding relevant information and information overload.

As Table 2 shows, the average result of the standardized generic questionnaire increased by 6.54% from 78.33% before attending the MOOC to 84.87% after the students have attended the MOOC. The worst test result increased from 50% to 64.10%, while the best test result decreased from 100% to 94.87%. A Wilcoxon signed rank test shows that the observed difference between pre- and post-test is significant ($Z=-2.073$; $p=0.038$).

Table 2. Results of the generic questionnaire before and after the MOOC

Testing point	Av. Result	Min Result	Max Result	Mean Points	Max Points	Std. Deviation
Pre-Test	78.33%	50%	100%	9.40	12	1.90
Post-Test	84.87%	64.10%	94.87%	33.10	39	2.86

The average result of the subject-related questionnaire increased by 28.33% from 31.67% before attending the MOOC to 60% after attending the MOOC (Table 3). However, before and after attending the MOOC there were students that gained nothing as well as those gaining 100%. A Wilcoxon signed rank test shows that the observed difference between pre- and post-test is significant ($Z=-2.538$; $p=0.011$).

Table 3. Results of the subject-related questionnaire before and after the MOOC

Testing point	Av. Result	Min Result	Max Result	Mean Points	Max Points	Std. Deviation
Pre-Test	31.67%	0%	100%	0.95	3	0.80
Post-Test	60%	0%	100%	1.80	3	1.12

As the previous results have shown, some students seem to have done worse in the test after the MOOC, as the best achieved test result decreased. An analysis of the questionnaires paired through the self-generated identification codes shows that indeed the test result decreased for 5 students in the generic test and for 3 students in the subject-related test. Nevertheless, the majority of 15 students in the generic test and 17 students in the subject-related test were able to increase their results. The maximum increase was 37.18% and the maximum decrease - 7.05% for the generic part. In the subject-related part students were able to both increase their result by 100% as well as decrease by -100% (Table 4). The fact that the results of a few students decreased from the pre- to the post-test might be explained through the fact that the generic post-test was much longer (39 vs. 12 questions), while the subject-related test was quite short (only 3 questions), where only one wrong answer already had a relatively high impact on the result.

Table 4. Change of the test results

Item	Generic part	Subject-related part
Average increase	6.54%	28.33%
Students increased	15	17
Maximum increase	37.18%	100%
Students decreased	5	3
Maximum decrease	-7.05%	-100%

The user experience questionnaire asked for ratings on a five-point Likert scale, with 1 meaning *very unsatisfactory* and 5 meaning *very satisfactory*. Table 5 provides an overview of the results. As can be seen, the highest satisfaction was reported for finding the next/previous navigation buttons (4.82), moving between the individual lessons (4.55) and the navigation in the user interface (4.50). The highest dissatisfaction was with the amount of information on the screen (3.00), clarity and general quality of the text of the lessons (3.27) and amount of material in the course (3.50). As reasons for

their rating of the organization of the interface (buttons, menus, etc.) (3.77) the students commented positive ratings with “very intuitive” and “simple structure” and critical ratings with “slow video speed”, “usability issues with quizzes” and “animations would be nice”. As reasons for their rating of the language of the interface (3.64) students commented positive ratings with “clear” and “easy to understand” and critical ratings with “spelling errors”, “grammar errors” and “some elements are in English”.

Table 5. Reported user experience

Item	Mean	Min	Max	Std. Deviation
Navigation in the user interface	4.50	2	5	0.86
Finding the next/previous buttons	4.82	4	5	0.39
Moving between individual lessons	4.55	2	5	0.86
Amount of material in the course	3.50	2	4	0.60
Amount of information on the screen	3.00	1	4	0.53
Clarity and general quality of the text of the lessons	3.27	1	5	1.12
Layout of the text on the screen	3.73	2	5	0.98
Organization of the interface (buttons, menus, etc.)	3.77	1	5	1.15
Language of the interface	3.64	1	5	1.18

The students were additionally asked how important they considered to have information in various formats (e.g. text, videos) within the course. The mean of the answers on a five-point Likert scale was 4.23, which means *very important*. Finally, the students were asked whether they found anything particularly disturbing or anything particularly appealing when using the user interface. Not all students answered these open questions. As particularly disturbing, students named “hard to distinguish between exercises and content”, “multiple choice quiz, but only single answer selectable”, “progress bar not accurate”, “some content too detailed and some videos too long”, “too much text” and “different length of the single learning steps”. Five students answered this question with “no”. As particularly appealing students named “easy navigation”, “simple structure”, “helpful quizzes” and “lots of videos and examples”. Two students answered with “no” and one with “neutral”.

However, in the open answers regarding their overall experience with the MOOC the students gave mainly positive comments: students called the MOOC “very helpful and informative”, “well structured” and acknowledged “valuable references to external websites and information sources” and “different media formats”. Critical comments were given regarding “too detailed content”, “video speed” and “server connection issues”.

Conclusion

The results show an increase in the test result by 6.54% for the standardized IL test and 28.33% for the subject-specific questionnaire. A Wilcoxon signed rank test shows that the observed increase is in both cases significant. Thus, it seems that the MOOC was able to increase the IL skills of the students. However, the knowledge gain was lower than the increase of 13% (from 65.6% to 78.6%), that was achieved when a group of 163 students took the same standardized IL test as in this study after participating in an IL-specific study course (Boh Podgornik et al., 2016). A possible explanation is that the sample in this study consists of Masters students who already had a profound previous knowledge and already achieved good results in the test before attending the MOOC (78.33%). This is also supported by their reflected answers given in the initial self-assessment.

The evaluation of the user experience showed that the MOOC was generally perceived well. The students provided detailed feedback on issues like “multiple choice quiz, but only single answer selectable”, which enabled an immediate localization and fixing. Some of the mentioned issues could not be immediately fixed, like criticism of “too detailed content”. However, this point of criticism might be also explained with the profound previous knowledge of the participants, or even with general attitude of learners when learning something new.

The evaluation approach itself worked well and can also serve as model for evaluations of other MOOCs, in particular on IL. However, this work comes also with several limitations, that in turn provide avenues for future research: First, the evaluation included a relatively small sample of 20 students out of a single discipline (Business Administration) and on a similar level in their studies

(Master). Second, the students only attended the German MOOC, which is just one out of several available language versions of this ILO MOOC. Third, the evaluation of IL knowledge gains was based only on single-choice questions in the standardized IL test. Multiple forms of assessment would be needed to fully measure students' performance and the effectiveness of the MOOC. Further evaluations are planned, based on a more diverse and larger sample that will involve the MOOC in all available languages.

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