

MOOCs and their Impact on Academics



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ABSTRACT

Massive Open Online Courses (MOOCs) have recently become a hot topic in the academic world, launching a wide ranging discussion on a number of issues. In this research, we surveyed academics' awareness, attitudes, perceptions, and experiences of MOOCs. We received responses from 236 academics from 23 countries, who were working in different roles such as teachers, researchers, managers, and pedagogical developers. Participants were invited to answer questions concerning their awareness and attitudes towards MOOCs. For participants with some knowledge of MOOCs, we requested their experiences and their observations of the impact of MOOCs on their students, teaching colleagues, and within their institutions. We found the most common reaction to MOOCs amongst the academics was concern but many were positive about the phenomenon. The academics claimed their students could be motivated to take MOOCs because of flexibility and no cost involved. While many academics were not aware of their students taking a MOOC and had not observed any changes to teaching programs at their institutions because of MOOCs, there was evidence of some activity and future plans for engagement in MOOCs.

Categories and Subject Descriptors

K.3.1 [Computers and Education]: Computer Uses in Education – *computer-managed instruction, distance learning*

K.3.2 [Computers and Education]: Computer and Information Science Education – *computer science education*

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Keywords

MOOCs, Massive Open Online Courses, distance learning, e-learning, open learning, academics, pedagogy

1. INTRODUCTION

Massive Open Online Courses (MOOCs) have gained widespread attention in the academic world over the last couple of years. We have seen claims that MOOCs will cause a revolution in universities by providing global access to low-cost higher education and that MOOCs will raise the global visibility of a select number of universities. On the other hand, concerns about the quality of education through MOOCs and the threat of some aspects of university education becoming obsolete are often voiced. It is obvious that such conflicting perspectives have raised both enthusiasm and anxiety among university faculty members.

While there is much public debate in mailing lists, blogs, and non-academic media, this discussion does not provide an overall understanding of how the MOOC phenomenon is viewed by the academic community. With growing understanding of the potential of MOOCs to disrupt current university course provision and teaching models it is important to determine how academics are prepared to deal with this new phenomenon and realize any potential benefits to their students and their institutions. To investigate this we conducted a survey of the global academic community. The objectives of the survey were to learn about academics' perceptions of MOOCs, as well as concrete initiatives in relation to MOOCs. In this paper we present and discuss the main findings of this survey. Our research questions were:

- (1) What are academics' awareness of and attitudes towards MOOCs?
- (2) What are the perceptions of academics with knowledge or experience of MOOCs?

- (3) Are there differences in academics' perceptions and experiences of MOOC depending on their teaching experience?

For several reasons, we disseminated our survey mainly to computer science teachers. Firstly, computer science itself is a subject that aligns well with MOOCs. Many computer science topics have formal presentations that can be manipulated automatically, thus it is fairly straightforward to develop, for example, automatic assessment techniques for complex assignments instead of relying only on multiple choice questions. Secondly, computer science teachers are often familiar with various technologies used for implementing MOOCs. Finally, the background of most authors of the present paper is in computer science, making it a natural choice of the target group. However, we also received many responses from people with a non-computing background. This allowed us to investigate a fourth research question.

- (4) Are there differences in the experiences of MOOCs between academics from computing and academics from other disciplines?

The present paper focuses on the quantitative findings of the survey. We highlight the findings with samples from the open-ended questions, which help illustrate the varying points of view. A more detailed qualitative analysis of the open-ended answers from the computer science academic community can be found in [9].

We present the related work on the MOOC phenomenon in Section 2 and the details of our survey methodology in Section 3. Main findings are presented in Section 4 with wider discussion on the implications in Section 5. Section 6 concludes our results and ideas for future work are presented.

2. THE MOOC PHENOMENON

MOOCs have rapidly gained the attention of the academic community over the last couple of years. The University of Manitoba sponsored the first MOOC titled "Connectivism and Connective Knowledge" in 2008 [8, 10]; however, the number of institutions offering MOOCs and the number of courses being offered as a MOOC increased dramatically from 2012. The New York Times even dubbed 2012 as the "Year of MOOCs".

Early MOOCs were based on the connectivist pedagogical model that emphasises diversity, autonomy, interactivity and openness in learning [20] and are referred to as cMOOCs. The current offering of MOOCs can be classified as following the cognitive-behaviourist pedagogic model, with some social constructivist activities [17]. They are often referred to as xMOOCs. In this paper, when we use the term MOOCs we refer to those that have been organized by universities on their own platforms (Futurelearn, OpenHPI, OpenupEd, Open2Study), as well as major MOOC players (edX, Coursera, Udacity). We also include cMOOCs and xMOOCs into our definition.

The growing popularity of MOOCs can be attributed to a number of factors. Increasing access to the internet and increased bandwidth has made MOOCs accessible to students from many geographically distributed places, and has created opportunities for online interaction within a global cohort ("Online Learning in Computing," 2013). For computer science subjects, MOOCs offer the potential to lower course costs and provide accessibility to large cohorts of students [3]. MOOCs

also facilitate flipped classrooms [15, 19] and the blending of instructor and student led activities [6].

Much of the discussion about MOOCs generated in mainstream media (blogs and news articles) focusses on problems. For example, Touve [22] notes that in MOOCs there is no guarantee of the quality of the learning that is achieved by the student. Similarly, Daniel [7] points out that quality assurance agencies for higher education focus on completion rates, but MOOCs have poor completion rates as many curious people are attracted to such courses and enroll with little intention or motivation to complete them. Bates [2] argues that with MOOCs there is a lack of a pedagogical foundation for fostering critical thinking skills as the content delivery relies on information transmission, computer marked assignments, and peer assessments. From another perspective, Guzdial [11] decries that while enormous data is collected by the major MOOC providers, the learning analytics are not shared with the course developer, instructor, or the student.

Recently, articles have begun to appear in peer-reviewed education journals [4, 5, 12, 21] but these focus mostly on the learners and the institutions rather than on the experience and perspectives of academics [14]. Similarly, publications in computer science and engineering magazines, journals and conference papers focus on issues such as student online behavior [18], problems with creating resources [13, 24] and in evaluating students [3, 6], and the lack of pedagogical foundations for MOOCs [23].

An exhaustive survey of the published literature on students' and instructors' use of MOOCs [12] found that the reasons for offering MOOCs were mostly because instructors wanted to experience teaching large and diverse cohorts, to increase their personal reputation, or to globally increase student access to higher education. The authors of the study also concluded that the main challenges from the instructors' perspectives was poor student participation in online forums, the lack of immediate student feedback, and issues with student evaluations and preparation of resources.

Given the contentious nature of the discussions on MOOCs, surveys of academics' views on MOOCs in the published literature are limited. Nevertheless, two such surveys [1, 16] have reported interesting findings. Based on responses from more than 2,800 colleges and universities, the tenth annual report on the state of online learning in U.S. higher education [1] tracked the opinions of chief academic officers. The study found that while most institutions remained undecided on moving to MOOCs, the proportion of senior academic leaders that claimed online learning was critical to their long-term strategy was the highest it had been for the last decade. The number of students taking at least one online course had grown, as had also the percentage of academic leaders that believed it takes more faculty time and effort to teach online. The number of programs and courses online had also grown, although academic leaders noted the lack of faculty acceptance and raised concerns about low retention rates and the need for more discipline on the part of online students.

In 2013, Enterasys, an American networking company, conducted a worldwide survey [16] of trends and adoption rates of MOOCs in higher education. The survey found that 44% of several hundred academics who responded valued MOOCs for keeping up with developments in education. The major benefit of MOOCs was seen as raising the visibility of the institution

(35%), and the most important MOOC benefit was reported as improving the quality of the residential teaching (15%). The biggest drawback to MOOCs was seen by 41% of the respondents as the lack of consistent review and grading system.

3. METHODOLOGY

We constructed a survey questionnaire¹ to investigate academics' awareness, attitudes, perceptions, and experiences with the MOOC phenomena within universities internationally. The aim was to get a broad picture of the current situation in the academic world, targeting both people who had experience and those with no experience of MOOCs. We assumed that with the widespread discussion of the MOOC phenomenon, even academics with no prior experience would have developed some awareness and be able to give opinions about the possible impact of MOOCs on students, academic programs, and institutions.

The questionnaire was thus designed to have two parts: (a) a general part for all respondents including those who were not very familiar with the concept of MOOCs (9 questions); (b) a special part (11 questions) only for those having at least some knowledge and/or experiences of MOOCs. Most questions were in multiple-choice format with the opportunity to choose several answers, or in the form of an answer on a Likert scale. There were also a few open-ended questions.

The questionnaire was constructed as a joint effort between the authors. The survey questions were inspired by the literature on MOOCs, on-going discussions on MOOCs in various forums, our own experiences, and our research interests. A pilot study with approximately 20 participants was carried out at an international workshop on engineering education in Sweden, in May 2013. Three of the authors asked the participants at the workshop to fill in the questionnaire. After getting feedback verbally and through emails, we made slight modifications to some of the questions. We used Webropol 2.0 (online survey and analysis software) for constructing the questionnaire.

Emails with the initial invitation and a reminder to fill out the questionnaire were sent out in May-June 2013. The web link to the questionnaire was sent to individual academics as well as to several mailing lists (e.g. SIGCSE, PPIG, CSEd), reaching a large number of lecturers and researchers in universities worldwide. The questionnaire was mainly targeted at people working in the computing discipline for reasons presented in the introduction. However, we also asked people to forward it to interested colleagues in other faculties as we were interested in the perspectives of academics in other disciplines. We closed the questionnaire at the end of August.

The quantitative data from the survey is presented descriptively in tables and graphs. There were large differences in the numbers of respondents to different questions. Most respondents answered the questions (in the general part of the questionnaire) about their awareness and attitudes towards MOOCs; however, the response rate for questions (in the special part of the questionnaire) about perceptions and experiences varied from 29% to 74% as respondents were encouraged to answer these questions only if they had some knowledge of MOOCs. Responses to some questions are compared based on the respondents' teaching experience and whether they were from a

computing or other discipline. Chi-square tests were used for these comparisons. We also incorporate quotes from open-ended questions to illustrate some of the findings.

4. FINDINGS

A total of 236 people completed the survey. All survey participants were invited to answer the questions concerning awareness and attitudes towards MOOCs. However, only those with knowledge and/or experiences of MOOCs were requested to complete the questions about what was happening with MOOCs within their own institutions and their own teaching practice. Fewer people responded to these questions.

Overall, 78% of respondents were working as teachers, with most of the remainder having roles as researchers (60%), educational developers (36%), or postgraduate students (16%) (note that multiple roles were allowed). However, almost all respondents (98%) had some teaching experience, with 81% indicating more than 5 years and 68% more than 10 years of experience. The gender profile was 64% male and 33% female, with 3% not responding to this question.

Most respondents were from Europe (44%) or North America (32%) with the remainder from Australasia (8%), Asia (3%), Middle East (2%) or Africa (1%) and 10% not responding to this question. The disciplines represented by the respondents are shown in Table 1. The respondents were mainly from technical/scientific (74%) or education (20%) disciplines, with the computer science/IT discipline having the most representation.

Table 1 Table 1. Disciplines of survey respondents

Discipline	Number	%
Computer science / IT	142	59.9
Education	24	10.1
Science (Biology, Chemistry, Maths, Physics)	20	8.4
Science/maths education	11	4.6
Engineering	10	4.2
Computing education	8	3.4
Instructional design / E-learning	6	2.5
Engineering education	5	2.1
Arts/humanities	4	1.7
Medicine/nursing	3	1.3
Business/management	3	1.3
Total	236	100

Based on the above demographics the following groupings were made:

- *Discipline*: computing or non-computing
- *Teaching experience*: less experienced (≤ 10 years) and more experienced (> 10 years).

These grouping are used where appropriate for comparisons of responses based on discipline or teaching experience.

¹[http://users.cse.aalto.fi/pakinnun/MOOC/Eckerdal-14 MOOC questionnaire.pdf](http://users.cse.aalto.fi/pakinnun/MOOC/Eckerdal-14%20MOOC%20questionnaire.pdf)

4.1 Awareness of and attitudes towards MOOCs

4.1.1 Awareness of MOOCs

The survey participants rated their awareness of MOOCs in terms of the level of knowledge by using a 5 point Likert scale that ranged from very little to a lot of knowledge. The most common and median response was in the middle of the scale (25%) with the remaining responses almost evenly divided on either side. Only 12% of respondents claimed they had a lot of knowledge of MOOCs, whilst 14% claimed they had very little knowledge. Mann Whitney U tests were used to compare the level of knowledge of MOOCs based on teaching experience of respondents or whether or not the respondents were from the computing discipline. No statistically significant differences were found at $p < 0.05$.

The participants were asked where they had gained their knowledge about MOOCs. The results presented in Figure 1 show that knowledge was most often gained from colleagues or the news media. Comparisons of the responses to this question based on whether the respondents were from the computing or non-computing disciplines were made using chi-squared tests. These showed that respondents from the computing discipline were statistically significantly more likely to gain knowledge from presentations ($\chi^2(1, 236) = 4.578, p < 0.05$) and students ($\chi^2(1, 236) = 4.455, p < 0.05$) than those from the non-computing disciplines. Comparisons of the responses based on the respondents' teaching experience were also made. Chi-squared tests showed that the more experienced teachers were statistically significantly more likely to gain knowledge from the news media, ($\chi^2(1, 236) = 5.522, p < 0.05$), research papers ($\chi^2(1, 236) = 4.116, p < 0.05$), and from taking a MOOC ($\chi^2(1, 236) = 8.174, p < 0.05$).

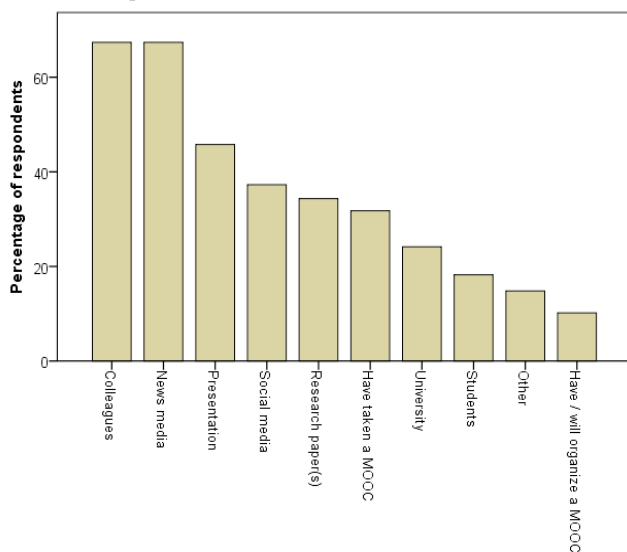


Figure 1. Sources of respondents' knowledge of MOOCs (n=236). (Note that multiple responses were allowed.)

4.1.2 Attitudes towards MOOCs

The participants were asked to identify any attitudes towards MOOCs that they had perceived from discussions amongst their teaching colleagues. They were also asked to identify attitudes

of their university management towards MOOCs. The results summarized in Table 2 show that the most common attitude amongst teachers was one of concern (51%), but management were most often perceived as positive about the phenomena (33%). Note that multiple responses were allowed for these questions and the generally lower percentages for management perhaps indicate that respondents felt less knowledgeable about their management's attitude towards MOOCs.

In open ended questions, the respondents identified several reasons for concern about MOOCs including factors relating to the economy and resources, the kind of pedagogy used in MOOCs, and who provides the education. Concerns about economy and resources were related to the fear of outsourcing programs leaving teachers unemployed or dealing with reduced salaries. Some also remarked that providing MOOCs means more work without extra resources: "Doing an online course well takes time (course design and execution), and resources (automated grading systems, TAs, video production, etc.)."

Respondents also criticized the transmissive pedagogy many MOOCs apply and the quality of teaching and overall design of the courses. The lack of high quality interaction and assessment issues also raised many concerns among respondents. "Transmissive pedagogy in new disguise, lack of active learning, lack of 'hands-on', lack of discussion with peers and social interaction". A respondent with experience of both organizing and taking MOOCs claimed that, "Online delivery is simply another way of delivering content to students. Along with live lectures, small group tutorial/labs/studios, text books, video, etc". On the other hand this respondent argued that there are advantages with delivering content in this format. "The advantage of online delivery is that we can add formative assessment into the material easily, we can show interactive examples (e.g. simulations, running code), discussion forums, Q&A systems".

Table 2 Respondents' perceptions of the attitudes of teachers' and management's towards MOOCs

Discipline	Teachers		Management	
	Number	%	Number	%
Positive	85	35.9	77	32.5
Excited	57	24.1	31	13.1
Uninterested	32	13.5	26	11.0
Confused	65	27.4	37	15.6
Concerned	121	51.1	42	17.7
Negative	56	23.6	11	4.6
Uninformed	51	21.6	39	16.5
Not heard any discussions	27	11.4	77	32.5
Other	24	10.1	14	5.9

Concerns were expressed regarding the imposition of a single and biased education model: "I am most troubled by the threat of colonialism by means of MOOCs. Part of the good news is that MOOCs make it possible to share education with the developing world, but because nearly all of the MOOCs are taught by well-off western professors, there is a danger that these may be used to impose western-centric views on other cultures ...". Finally, concerns that education was being taken

over by organizations outside of the educational sector were also expressed. "... the fact that much of the development is being driven by commercial companies. This is a dangerous move towards privatization of education, using for-profit business models where they are not appropriate." In contrast to this, we found positive comments on the same theme where one respondent writes about MOOCs as "Free and unbiased. Non-commercial."

Comparisons of responses to the attitude questions based on whether the respondents were from the computing or non-computing discipline were made using chi-squared tests. These showed that respondents from the computing discipline were statistically significantly more likely to have heard negative discussions about MOOCs amongst teachers ($\chi^2(1, 236) = 3.884, p < 0.05$) and more likely to perceive their management as confused ($\chi^2(1, 236) = 4.402, p < 0.05$), uninterested ($\chi^2(1, 236) = 5.174, p < 0.05$) or uninformed about MOOCs ($\chi^2(1, 236) = 3.925, p < 0.05$).

Comparisons of responses based on the respondents' teaching experience were also made. Chi-squared tests showed that the more experienced teachers were statistically significantly more likely to have heard confusion in teachers' discussions about MOOCs ($\chi^2(1, 236) = 4.407, p < 0.05$). However, based on teaching experience, there were no statistically significant differences in perceptions of management towards MOOCs.

The participants were asked what they considered would motivate students to take a MOOC. Although the results (shown in Figure 2) indicate the most likely reasons are that MOOCs are low cost or free (75%) and that MOOCs offer students the convenience of studying at their own time and place (73%), a number of other reasons (supplementary resource, course given by a famous university, lack of opportunity to attend campus, or to learn a new topic) were each supported by around half the respondents. Only a small number (5%) considered that students would not be motivated to take a MOOC.

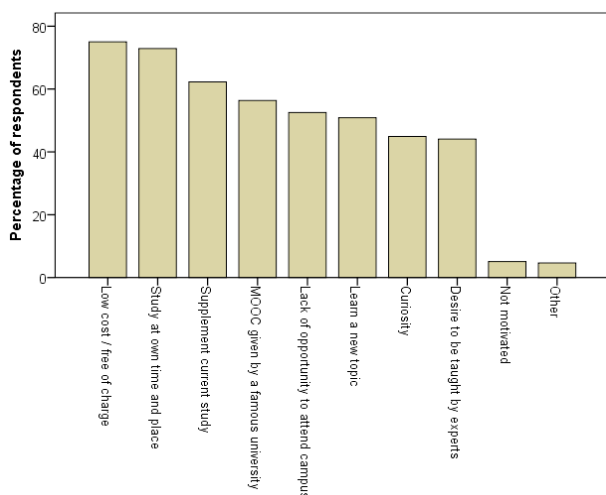


Figure 2: Respondents' perceptions of students' motivation to take a MOOC (n=236). (Note that multiple responses were allowed.)

Comparisons of responses to these questions based on whether the respondents were from the computing or non-computing discipline were made using chi-squared tests. These showed that respondents from the computing discipline were statistically

significantly more likely to consider their students motivated to study a MOOC because they could study at their own pace ($\chi^2(1, 236) = 11.848, p < 0.05$), learn a new topic ($\chi^2(1, 236) = 9.845, p < 0.05$) or were curious to try a MOOC ($\chi^2(1, 236) = 7.465, p < 0.05$). No statistically significant differences were found based on teaching experience.

4.2 Perceptions and experiences with MOOCs

The survey participants were asked a series of questions about their perceptions of student and teacher engagement (section 4.2.1 and 4.2.2) and of activities in their department and university (section 4.2.3). Participants were advised that the questions were intended for those with personal experiences and knowledge of MOOCs. Consequently, a number of participants did not respond to these questions or nominated that these questions were not applicable to their particular situation. For each question, the number of respondents and response rate (RR) is indicated. The response to each question item is shown as a percentage of the total possible responses to show the overall level of support for each question item.

4.2.1 Student engagement with MOOCs

When asked about the behaviour of students they had observed at their institution, almost half of the participants (49%) claimed that they were not aware of students using MOOCs. However, 31% claimed that students were taking MOOCs of their own initiative. Very few (11%) indicated that students were using MOOCs in preference to attending on-campus courses or listening to course recordings. The results are shown in Figure 3. Comparisons of the responses to this question based on whether the respondents were from the computing or non-computing discipline found no statistically significant differences.

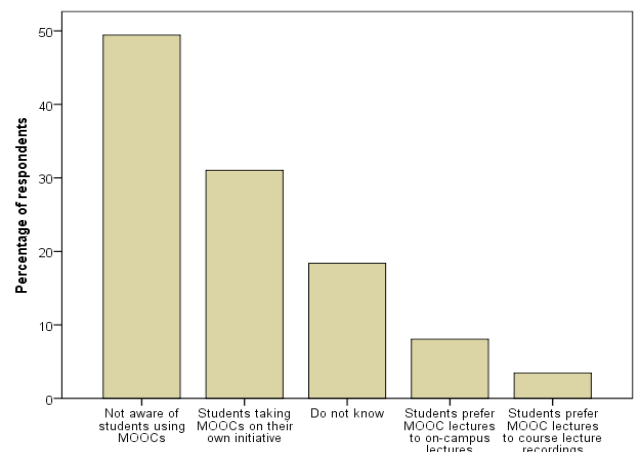


Figure 3: Observations of student behaviour in relation to MOOCs (n=174, RR=74%). (Note that multiple responses were allowed.)

4.2.2 Teacher engagement with MOOCs

When asked about the effect of MOOCs on their campus-based courses, 70% of the participants claimed there had been no effect. Some (20%) claimed that MOOCs had inspired changes in their teaching approach or they were incorporating a MOOC into their course. Only one respondent, an experienced teacher from the computer science/IT discipline, indicated that his/her

course was a MOOC (see Figure 4). Comparisons of the responses to this question based on teaching experience or whether the respondents were from a computing or non-computing discipline found no statistically significant differences.

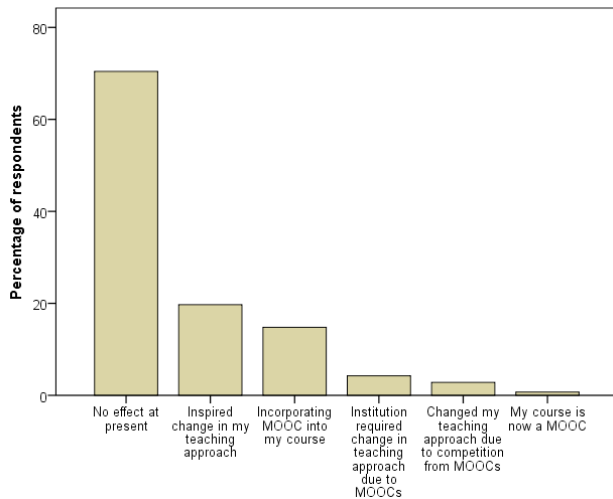


Figure 4: Effect of MOOCs on respondents' campus-based courses (n=142, RR=60%). (Note that multiple responses were allowed.)

Respondents described the effect of MOOCs on their courses as follows: "...This year I replaced some of my lectures with online 'chunks' of video and quizzes. The lecture slot was then used for demos and live problem solving (coding). Students loved it. ...". Respondents also reported that they had started to record their own lectures and developed ways to give automated feedback. "I am recording video lectures, flipping my classroom, and working to give students the ability to have exercises with automatic feedback." Some also stated that MOOCs have provided them with a way to refresh their own knowledge on a topic and thus enrich the quality of their teaching. Finally, MOOCs have also inspired respondents to make their own teaching more interactive and to become aware of the advantages of face-to-face classroom teaching. "Evaluating the strengths and weaknesses of MOOCs has made me realize the value of the classroom context in traditional teaching, and hence how to make better use of it. I've incorporated more inverted classroom concepts, and more hands-on and team activities into the classroom setting."

A question about participants' experience with MOOCs (n=172, RR = 73%) showed that a small number had developed a MOOC (10%) or intended to develop a MOOC (3%). However, a further 13% indicated interest in developing a MOOC. Comparisons of the responses to this question based on teaching experience or whether the respondents were from the computing or non-computing discipline found no statistically significant differences.

4.2.3 Department/institution MOOC activities

Most participants were asked about MOOC activities in their own departments (n=172, RR = 73%). A small number of departments offered a MOOC (11%) or had decided to develop a MOOC (4%). However, a further 14% of departments indicated interest in developing a MOOC. Comparisons of the responses to this question based on whether the respondents were from the

computing or non-computing discipline found no statistically significant differences.

The most common reason given for the respondents' department's decision to develop a MOOC was to increase the visibility of the university (51%). Other reasons supported by 27-33% of participants were related to increasing student enrolments, saving resources, and improving the quality and access to education. The least common reason was being mandated to develop a MOOC by the university (9%) (see Figure 5). Comparisons of the responses to this question based on whether the respondents were from the computing or non-computing discipline found no statistically significant differences.

Responses to open ended questions support the view that MOOCs are regarded as an opportunity for universities to promote themselves. "Departments and universities stand to benefit from increased exposure and status" and to increase recruitment "From the department and teacher's point of view, the recruiting and outreach opportunities are vast. ...". The respondents identified a number of student groups that do not have access to traditional on-campus university studies but that can be reached through MOOCs. "Those who do not have a chance to go to a school, now have a chance to learn (like mothers with babies, soldiers in a deserted area, middle aged/old people who are interested in learning, etc.)". This is also regarded as contributing to increased recruitment. "MOOCs could provide possibilities to support recruitment to universities by providing entry-level courses to high school students."

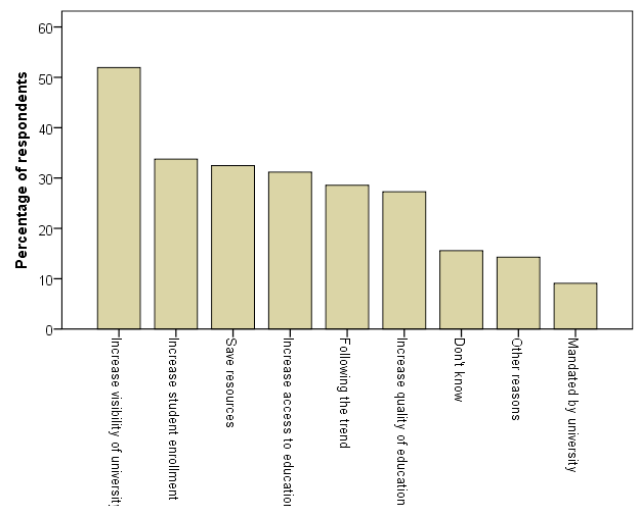


Figure 5: Reasons for MOOCs development (n=77, RR=33%). (Note that multiple responses were allowed.)

Participants claimed that the source of MOOC initiatives in their department had come most often from individual teachers. The next most frequent source was the respondent's university. Very few respondents (3%) nominated students as the source of MOOC initiatives (see Figure 6). Comparisons of the responses to this question based on whether the respondents were from the computing or non-computing discipline found no statistically significant differences.

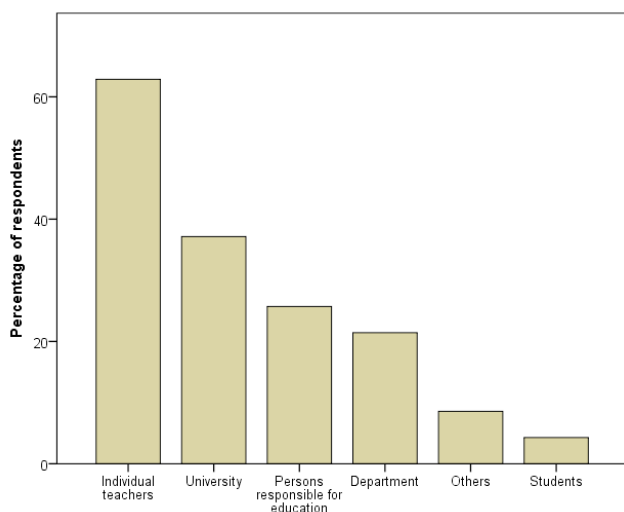


Figure 6: Source of MOOC initiatives in respondents' departments (n=70, RR=30%). (Note that multiple responses were allowed.)

Participants nominated people who have difficulty attending on-campus courses as the main target group for the MOOC initiatives in their departments (45%). However, there were also a range of other groups identified (students at other universities, high school students, students in other departments), as shown in Figure 7. The least considered group was people who are under-represented in higher education (21%). Comparisons of the responses to this question based on whether the respondents were from the computing or non-computing discipline found no statistically significant differences.

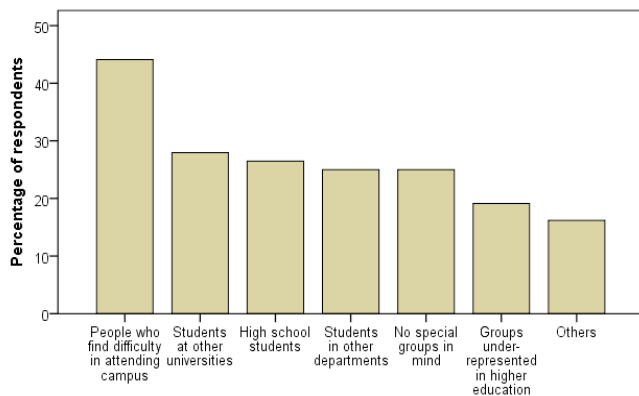


Figure 7: Target groups for MOOCs (n=68, RR=29%). (Note that multiple responses were allowed.)

When questioned about the issue of giving credit for a MOOC course, a number of participants (35%) claimed that there had been no decision as to how or whether MOOCs would be credited in their courses; others indicated there were plans ranging from no credit to awarding a certificate at no cost or for a fee, or a qualification similar to campus students or even credits for traditional (non MOOC) courses (see Figure 8).

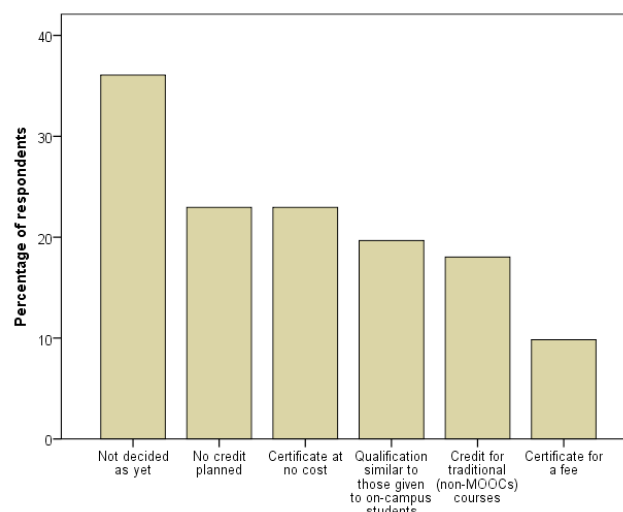


Figure 8: How credit for MOOC courses will be given in respondents' departments (n=61, RR=26%). (Note that multiple responses were allowed.)

The participants were asked to nominate different levels of support for MOOC development in terms of time, funding, and training. Table 3 shows that very few respondents indicated that teachers were given enough support for MOOC development and half the respondents indicated that no support was given.

Table 3 Support for MOOC development (n=45, RR=19%)

	Yes, enough	Yes, to some degree	Not at all
	%	%	%
Did teachers get time for developing MOOCs?	8.9	44.4	46.7
Did teachers get any funding to assist them to develop MOOCs?	6.7	37.8	55.6
Did teachers get any training for MOOCs development?	4.4	28.9	66.7

5. DISCUSSION

In this section, we discuss the findings with specific reference to our research questions.

RQ1. What are academics' awareness of and attitudes towards MOOCs?

The results from the survey show that MOOCs are a topic of high interest among teachers in higher education. Most respondents to our survey had high awareness of but little actual experience with MOOCs. What they knew about MOOCs had seldom come from their own universities although they believed that their management was positive towards MOOCs. Many respondents' perceived their fellow academics' to be cautious but positive towards MOOCs. Fewer expressed negative attitudes and these were more prevalent in the computing discipline. This result is interesting since it contradicts the finding [1] that academic leaders in U.S. maintained there was

low acceptance of MOOCs among faculty. Despite respondents' concerns about MOOCs and uncertainty about the benefits they might bring, our survey found that MOOCs are increasingly being incorporated into conventional education programs. However, this is happening so rapidly that models for how MOOCs could be best used are not yet established and the impact of this new phenomenon on future educational programs is difficult to predict.

RQ2. What are the perceptions and experiences of academics with knowledge of MOOCs?

Similar to other findings [12], we found that academics considered that students would take a MOOC for financial reasons, to learn a new topic, or for curiosity. In addition, the participants of our survey suggested the possibility of students taking a MOOCs in order to choose the time and pace of their study. However, this should be viewed in light of the claim by almost half the participants that were not aware of any of their students taking a MOOC.

We found that academics in computing believed their students were more motivated to study a MOOC compared to students in other disciplines. This raises the possibility of future work. If computing students are indeed early adopters then they might be an interesting group to study to inform understanding of how other groups in the future may use MOOCs.

A common argument in support of MOOCs in the media is the increased possibility for MOOCs to reach people who are currently underrepresented in higher education, e.g. due to economic reasons. Our findings indicate that academics consider this is not likely and believe that possible target groups are students from other universities, high school students, and people who find it difficult to attend campus courses.

A small number of the respondents claimed that MOOCs have influenced their campus-based courses. Most changes involved lectures with the efforts to increase student engagement through the use of videos, quizzes and 'flipping' the classroom. However, some teachers defended the value and strengths of traditional classroom teaching. Thus, it seems MOOCs have inspired teachers to reflect upon and sometimes change the way they organize and deliver their own classes.

Considering the short time that MOOCs have existed, our findings showing that MOOCs have influenced teaching in a number of ways demonstrates the amazing impact that the MOOC phenomenon has had on the academic world. Issues such as access to and alternative delivery of higher education have become prominent news items, heightening awareness of the importance of discussing quality in education among both teachers and management.

We found that academics believed their management is positive towards MOOCs even though many have not heard the topic discussed by management. This is in line with other findings [1] on the positive attitudes to online learning among chief academic officers. It is possible that the potential for universities to get increased visibility, wider recruitment, and economic benefits leads academics to believe that management is positive. On the other hand, respondents identified several reasons for concerns that corroborate the literature. For instance, respondents raised issues related to giving certificates to MOOC students and verification that the work assessed has been done by the student - an issue that has been raised earlier [22]. In addition, issues such as poor completion rates and challenges

relating to pedagogy (including assessment) have also been discussed in the published literature [2, 12, 16].

The most common reason to develop MOOCs given by the respondents is to increase the visibility of the university. However, we also found that initiatives to develop MOOCs mostly come from individual teachers. Of concern are the claims made by our respondents of insufficient training, resources and time for the teachers developing and running MOOCs. There is a real risk that new MOOCs will not support the increased visibility and student enrolment that is expected.

RQ3. Are there differences in academics' perceptions and experiences of MOOC depending on their teaching experience?

We found that the more experienced teachers are more likely to gain their knowledge of MOOCs from the news media, research papers, and from taking a MOOC themselves compared to the less experienced teachers. Furthermore, the more experienced teachers were more likely to have heard confusion in teachers' discussions about MOOCs.

RQ4. Are there differences in the experiences of MOOCs between academics from computing and academics from other disciplines?

We compared answers from respondents in the computing and non-computing disciplines. Some differences were found. The results show that respondents from the computing discipline are more likely to gain knowledge of MOOCs from presentations and students. Respondents from the computing discipline are also more likely to have heard negative discussions about MOOCs amongst teachers and more likely to perceive their management as confused, uninterested, or uninformed about MOOCs. In addition, these respondents are more likely to consider their students motivated to study a MOOC because they could study at their own pace, learn a new topic, or were curious to try a MOOC.

6. CONCLUSIONS AND FUTURE WORK

What do academics know about MOOCs, and what are their experiences of this much-discussed phenomenon? To get a picture of the current situation we constructed and distributed a survey to academics worldwide. The target group was mainly academics in the computer science discipline. By studying the participants' affiliations we do know that people other than those originally contacted filled in the questionnaire. Overall, we received responses from several different continents, many different universities and academics from diverse fields.

MOOCs are a highly debated topic within academia and are fast evolving phenomena. Our survey provides only a snapshot of current thinking among academics, which we expect will quickly change. We argue that the results concerning respondents from computer science are likely to reflect the future evolution of results from other disciplines, because computer science academics are at the forefront in developing and adopting MOOCs. We expect that they are somewhat more familiar with technologies involved in current MOOCs. In addition, they are better qualified for developing specialized MOOC environments, which apply techniques tailored for their own subject, like automatic assessment methods of complex computing assignments. Thus, we are confident that the results reflect, at least to some degree, the perceptions of the wider international community of academics and contribute to our

understanding of the MOOC phenomenon. Overall, we argue that the scope of the survey allows us to raise issues, which should be considered in future developments of MOOCs regardless of their current fast development.

The questionnaire contained a few open-ended questions where we asked the respondents about positive and negative aspects they see in MOOCs, and how the MOOC phenomenon has changed their teaching. The answers to some of the open-ended questions have already been reported elsewhere [9]. Future analyses of the answers to the remaining questions will give an even more nuanced picture of how academics think about MOOCs.

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