

## HOW TO ANALYZE PARTICIPATION IN A (C)MOOC?

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### Abstract

The paper takes a deeper look at participation rates in cMOOCs. To get a better insight into the behavior of learners in MOOCs, studiumdigitale has developed a tool which helps to analyze the contribution of participants in the so called cMOOCs. These are MOOCs which are fostering the active participation of learners in various tools and which are based on the concept of connectivism [1]. After an approach at each part of the definition of MOOCs and the discussion of the different categories of this quite new phenomena a deeper look will be taken into the analysis of two cMOOCs, OPCO11 and OPCO12 which took place 2011 and 2012 [2].

Keywords: Massive open online courses, learning analytics.

### 1. INTRODUCTION AND DEFINITION OF MOOCS

The New York Times called 2012 the year of MOOCs [3]. While in the US, nearly 20 to 50 MOOCs start every month, this phenomena just starts to spread out in Europe. On the first view, the definition of massive open online courses seems so easy, but by now, many different variations of MOOCs have developed in the last years. So in order to better understand the different types of MOOCs we first define MOOCs in general.

As the name says, massive open online courses are courses, that

- take place in the internet,
- integrate some type of openness, and
- attract a large number of participants.

#### 1.1 Massiveness

When addressing the massiveness of MOOCs, several aspects can be regarded. One of them is the number of participants. Some of the first MOOCs as for example the Stanford MOOC on artificial intelligence attracted more than 100,000 participants. Since facilitators often ask their participants to register, the number of registered participants is known for most MOOCs. In terms of massiveness, the number of 150 was defined as to turn an open online course into a massive one. This number is derived from the Dunbar number, an anthropologist who conducted research in the field of social interaction. Here, he found that human beings can manage social relationships to up to a number of 150 peers [4]. Nowadays this number is confirmed in actual studies on the usage of social media such as twitter [5].

Downes, one of the first facilitators of a MOOCs pointed out, that a large number of participants might result in a decline of the level of activity of some learners. He stated that a group of very active learners (so called inner circle) might intimidate a large number of others who then might turn into lurkers [7]. At the end, it might happen that only a small percentage of the participants, the so called inner circle, might be actively involved while the rest might be intimidated by the pure massiveness of the course or the level of expertise of the active learners [7].

So if we discuss the number of participants in MOOCs, we also have to ask the question: What means active participation in a MOOC? In general, MOOCs show a distribution of learners' activity levels just as social networks. They seem so follow the Nielsen rule 90-9-1 [6]: 90 percent are lurkers and more or less passive, 10 percent are active from time to time and 1 percent are more active contributors. Depending on the instructional design of a MOOC, the role of the learners and the meaning of their active contribution varies, as we will see in the discussion of the categorization of MOOCs.

Looking at massiveness of MOOCs, Downes also pointed out that it is not just the pure number of participants which makes them massive, but also the number of tools, input, online places provided and developed during the course [7].

## 1.2 Openness

Looking at the concept of openness in MOOCs, we can differentiate openness in terms of admission such as used in the concept of UK's Open University and in terms of open content or open educational resources.

Most MOOCs do not have any limitation concerning the admission of learners except for the equipment they need in order to have access to the internet and a certain level of media competency.

In its second perspective, openness refers to the way it is used in the term of open educational content (OER). Here, openness means that the content is available freely to the learners and even the public. An interesting discussion developed as whether the content that is produced along a MOOC by the learners also needs to be made available to the public. For example the facilitators of the "MOOC Maker" MOOC (or MOOC "How to make a MOOC" (MMC13)) asked their participants to label their contributions by the creative commons license.<sup>1</sup> Openness is one of the most controversially discussed issues around MOOCs since business models which arise around MOOCs might either start to limit access to content or will charge for tutoring or certification [8].

## 1.3 Online

The easiest adjective to be dealt with is the word online. MOOCs definitely take place in the internet. But while most of the MOOCs are purely online, some MOOC concepts integrate face to face sessions – then they are called Blended MOOCs [9]. They allow universities to use MOOCs of other institutions in order to organize face-to-face-seminars at their own institution which accompany the online event and where students discuss and apply the online material and get tutoring. This combination of online course and seminar sessions often makes it easier for institutions to give credit points for MOOCs.

## 1.4 Course

All MOOCs have major topic and a curriculum often lasting from 4-5 up to 14 or even 23 weeks. The concept of "course" leads us to the next chapter, the different categories of MOOCs. While some MOOCs are rather a combination of lectures and quizzes or tasks for the participants, others types of MOOCs rather reflect community activities where participants discuss and develop topics together. As explained in chapter 2, the different types of MOOCs reflect different underlying concepts of instructional design and ideas about learning theories.

## 2. CATEGORIZATION OF MOOCs

By now, so many MOOCs have taken place and discussions have developed MOOC concepts that they can be differentiated into two or even more categories. The main distinction is made between xMOOCs and cMOOCs

### 2.1 xMOOCs

The x in xMOOC comes from the term extension which was used by the Harvard University and MIT in order to label the online version of their courses. Today, HarvardX the online platform which the University founded in order to distribute its online courses is part of edX<sup>2</sup> an commercial distributor of online courses which kept the x from the Harvard and MIT courses.

xMOOCs are mainly teacher centered courses with clear defined learning objectives realized by ex-cathedra teaching. Lessons are often provided by live video conferences which are recorded and provided online (see figure 1).

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<sup>1</sup> <http://howtomooc.org/>

<sup>2</sup> <https://www.edx.org/>

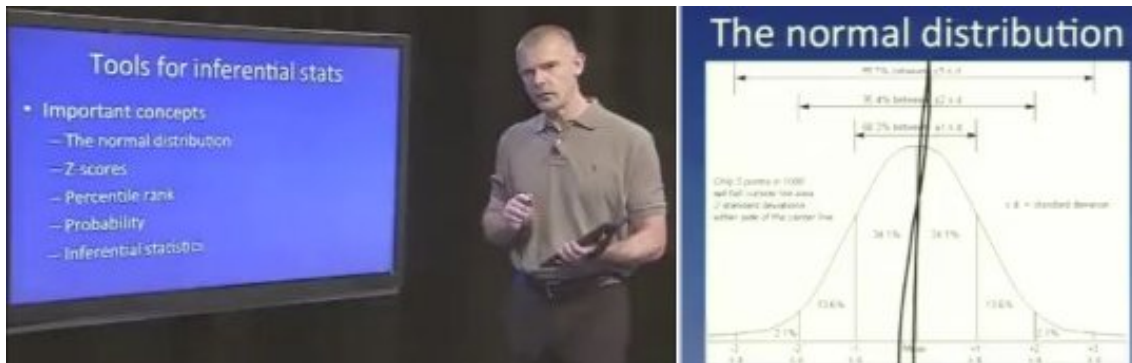


Figure 1: Video Session in the course “Statistik One” by Andrew Corway, Princeton on Coursera. Source: Talk of Prof. Schulmeister “Undercover in MOOCs” on CampusInnovation 2012<sup>3</sup>

Learners mainly learn individually, conduct weekly tests in order to keep up with the curriculum and exchange ideas and questions with other learners in discussion boards. Sometimes teachers allow selected learners to ask questions in live sessions (see figure 2) or they answer accumulated or pre-selected questions in discussion boards.



Figure 2: Discussion with selected students in a video session in the course “Sociology” by Prof. Duneiner on Coursera. Source: Talk of Prof. Schulmeister “Undercover in MOOCs” on Campus Innovation 2012<sup>4</sup>

Due to their extreme high number of participants, xMOOCs are target of some criticism. Critics<sup>5</sup> state that learners are not tutored well enough, which in the face of such large numbers of learners often is just not possible and additionally not part of the concept of those xMOOCs. They have the target to make education scalable. This means: with a higher number of students, the expenses for tutoring do not increase. Also, with such a large number of participants their mixture can become very heterogeneous. Learners come together at very different levels of learning prerequisites and pace of knowledge acquisition. This might turn into a problem when they give each other feedback as used in peer review processes in some courses. Very active and engaged learners on a high level of previous knowledge and knowledge acquisition might become demotivated when getting feedback on a much lower level from learners at a very different level of learning outcome.

This means, that learning objectives, the course syllabus, its pace etc are not target well enough towards specific learners' group and their needs. Due to the heterogeneity of the group, some learners some could be overwhelmed, well others might be bored. In this context, the fast pace that are produced by the weekly sessions and assignments such as online tests are criticized as one of the reason for the high dropout rates in xMOOCs (see figure 3).

<sup>3</sup> <http://lecture2go.uni-hamburg.de/konferenzen/-/k/14447>

<sup>4</sup> ibidem

<sup>5</sup> See for example the Talk of Schulmeister on the Campus Innovation 2012 “Undercover in MOOCs”, ibidem

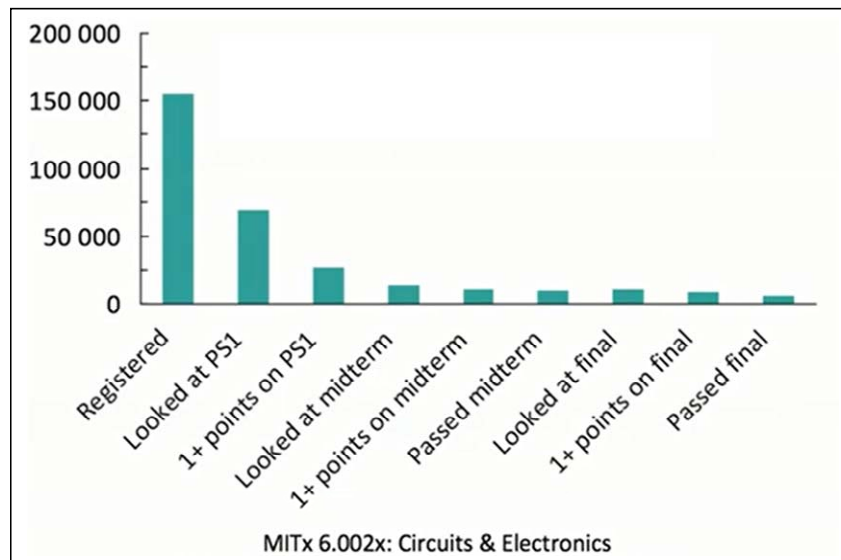


Figure 3: Activity in MIT course 6.002x, Source: Talk of Prof. Loviscach on the conference re:publica 2013<sup>6</sup>

## 2.2 cMOOCs

cMOOCs build on the connectedness and participation of the learners in the course. cMOOCs also provide a course curriculum and weekly or biweekly online sessions but part of the course design builds on the contribution of the learners who exchange ideas, provide links, content, thoughts, summaries, tools, and so on. The cMOOCs were started by Stephen Downes and George Siemens [1] based on the concept of connectivism [10], similar courses were conducted at that time by David Wiley<sup>7</sup> and others [2].

The idea behind the concept is, that the information age demands more and more lifelong learning and one way to deal with this to develop competencies to learn in and from a network. Siemens introduced the concept of nodes which can be people but also sources of information such as networks, platforms, etc. The way we learn is by using those nodes and building our networks in order to have access to information and building up knowledge by being in exchange with these networks and nodes.

While some criticism addresses the concept of connectivism as a learning theory [11] this does not address the concept of cMOOCs itself. The critical points which are stated in concern to cMOOCs is that they tend to overstrain certain types of learners in terms of self organization. Learners need the ability to focus themselves, to keep track with the various activities in the course during its progress, especially when the various interactions with and contribution of the other learners grow.

So while xMOOCs seem to demand from the learner a certain degree of self organization in order to keep track with the weekly sessions and number of quizzes and tests to be completed, cMOOCs rather challenge the learners in terms of social interaction, dealing with various inputs and opportunities.

## 3. GERMAN MOOCs

By now, several German MOOCs have developed. 2011, the first German cMOOC was started on the topic "Future of learning"<sup>8</sup>. It received the label OPCO11 and was conducted by the team of studiumdigitale at the e-learning center of the University of Frankfurt (among them the authors of this paper) in cooperation with Jochen Robes [2]. 2012, the same group conducted the course OPCO12 on „Trends in e-teaching“<sup>9</sup> in cooperation with two other institutions: Multimedia Kontor Hamburg and e-teaching.org. In the same year, Dr. Johannes Moskaliuk of the University Tuebingen offered the open course "Workplace Learning 2011" (OWL11)<sup>10</sup>, lasting from fall 2011 to January 2012. By the

<sup>6</sup> <http://tech.mit.edu/V132/PDF/N34.pdf>

<sup>7</sup> [http://www.opencontent.org/wiki/index.php?title=Intro\\_Open\\_Ed\\_Syllabus](http://www.opencontent.org/wiki/index.php?title=Intro_Open_Ed_Syllabus)

<sup>8</sup> <http://www.opcourse2011.de>

<sup>9</sup> <http://www.opco12.de>

<sup>10</sup> <http://ocwl11.wissensdialoge.de>

end of 2012, the Hasso Plattner Institute started the first German xMOOC on internet topics<sup>11</sup> which attracted more than 10,000 participants. Nearly at the same time, IMC started a MOOC platform called "OpenCourseWorld"<sup>12</sup> and offered the courses in the English and German languages - among them the MOOCs "Learn to lead" and "Learn how to manage a process".

At the beginning of January 2013 a group of students offered the online course "Data security issues in Facebook & Co"<sup>13</sup> and three e-learning activist started a MOOC on "how to make a MOOC" (MMC13)<sup>14</sup>.

In 2013, at least two German open online courses have started: The course ich.kurs13<sup>15</sup> addresses issues of personal development and COER13 which started in April deals with the topic of open educational resources<sup>16</sup>. In May, a course called SOOC started, covering topic around learning 2.0, personal knowledge management and personal learning environments<sup>17</sup>.

By now, due to a funding program of the Stifterverband, around 200 courses, all xMOOCs, are planned and compete for the funding on: <https://moocfellowship.org/>.

## 4. THE CMOOCS OPCO11 AND OPCO12

### 4.1 OPCO11

As mentioned above, in 2011 studiumdigitale<sup>18</sup>, the e-learning center at the University of Frankfurt, and Jochen Robes, an e-learning expert and well known blogger<sup>19</sup>, started the open course "Future of Learning"<sup>20</sup>. The course ran over 14 weeks, starting in May 2011. Referring to the categories described above, it can be located in the category of the social constructivist or connectivist approach because participants were asked to define their own learning objectives and the course design is build on the active participation of the learners. Nevertheless, input was provided through list of links, the provision of material and a one hour talk in a video conferencing tool each week. Each week a new topic was addressed, ranging from mobile learning, game based learning, micro blogging, up to media competences, and learning in social networks.

Each Monday, the topic was opened and introduced by a blog post by one of the organizers. On purpose, the video session with the experts was held on Wednesdays so it became clear that the participants start the discussion of the topics not the experts. This setting was chosen because the course facilitators wanted to point out that the open course is built on the contribution of the participants. In this live video session experts gave a 30 minute long speech or presentation in a video session and afterwards they discussed it with the moderator and the participants. Sometimes two experts were invited in order to discuss a topic from two different perspectives. The video sessions were recorded and published in on the web pages.

The blog posts of participants were collected by an aggregating tool which copied their posts from their blogs into the main blog of the course, if they marked the posts accordingly. Additionally any participant could leave a comment on any page or any post in the main blog and web pages.

Along the course, the participants provided not only blog posts and comments but also audio messages, they created online newspapers, contributed twitter tweets and used etherpads. As the results of the evaluation showed later, twitter was one of the most important media for the participants).

At the end of the week, a blog post was sent out as a newsletter which summarized all events of the week and which ended the weekly session. Nevertheless, discussions of a topic often went on the main blog, the participants' blogs, comments and other media formats – which was absolutely acceptable to the course facilitators.

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<sup>11</sup> <https://openhpi.de>

<sup>12</sup> <http://www.opencourseworld.de>

<sup>13</sup> <http://onlinekurs-datenschutz.de>

<sup>14</sup> <http://howtomooc.org>

<sup>15</sup> <http://ichkurs.de>

<sup>16</sup> <http://www.coer13.de>

<sup>17</sup> <http://www.sooc13.de>

<sup>18</sup> <http://www.studiumdigitale.de>

<sup>19</sup> <http://weiterbildungsblog.de>

<sup>20</sup> [www.opencourse2011.de](http://www.opencourse2011.de)

## 4.2 OPCO12

Based on the feedbacks, which were gathered through the evaluation of OPCO11, certain adjustments were made for the next German MOOC of the group of facilitators. OPCO12 started in April 2012 on the topic "Trends in e-teaching". While in OPCO11, we applied a weekly pace for the topics and online sessions, in OPCO12 we decided to try a biweekly rhythm in order to gain more experiences with the format by varying certain design issues. Additionally, blog posts were categorized by the weekly topics and more effort spent on summarizing topics and contributions than before.

Because a large number of participants (900 out of 1.400 registered learners) became interested in receiving a certificate, for the first time in a German online course digital badges were applied. In order to keep track of the learners' activities, certain levels of participation were defined and learners could decide on three different levels how intensively they want to participate. Subsequently, they documented their contributions according to the specified level in their own badges page. At any time they could adjust and lower or raise their level of participation since the definition of learning objectives and intensity was left to the participants.

## 5. RESULTS FROM TWO cMOOCS

Results are based on two main sources: tracking of user behaviour (registration for the newsletter, blog posts in participants' blogs, comments on the main blog, twitter tweets, access to live sessions and their recordings) and the three evaluations of each courses based on online questionnaires.

OPCO11 attracted around 900 participants who registered for the newsletter, around 40 – 60 followed the live video sessions synchronously and about the same number of participants contributed blog posts on a regular base, left comments on the blog or twitter tweets. In comparison, OPCO12 attracted 1.410 participants who registered for the newsletter, of which up to 200 followed the live video sessions synchronously.

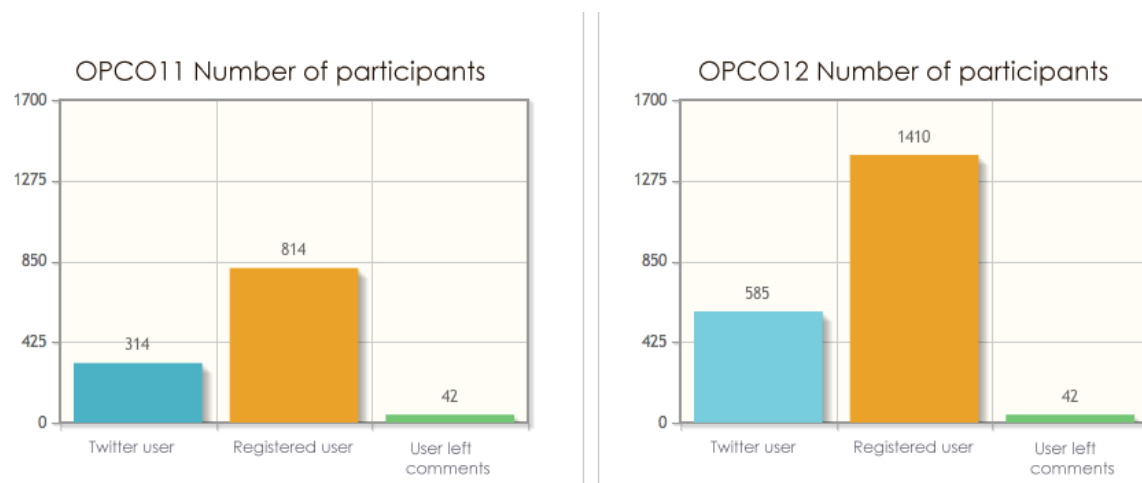


Figure 4: Comparison of OPCO11 and OPCO12: Number of participants

While on the first view, OPCO12 seems to have a larger number of participants, on a second view, based on analysis with a especially developed analysing tool it turned out that although the number of participants, blog posts and twitter user seem larger in OPCO12, the participants of OPCO11 were more active and produced more contributions per person in average. This means, that compared to OPCO12 we had a larger group of active learners in OPCO11 in relation to the total number of participants.

In both courses, questionnaires were used in order to receive more information from the participants. In OPCO11, this questionnaire was even given to the participants before it was used and they could edit it in an etherpad so they could contribute additional questions of interest.

In OPCO11, out of the 65 participants who answered the questionnaire 50.8% were female, 49.2% male. In OPCO12 57% were woman in the first questionnaire (out of 610 answers in total), 60% in the second questionnaire in the same course. The age groups were quite similar with a major group in the age of 35-54 in both courses (see figure 5).

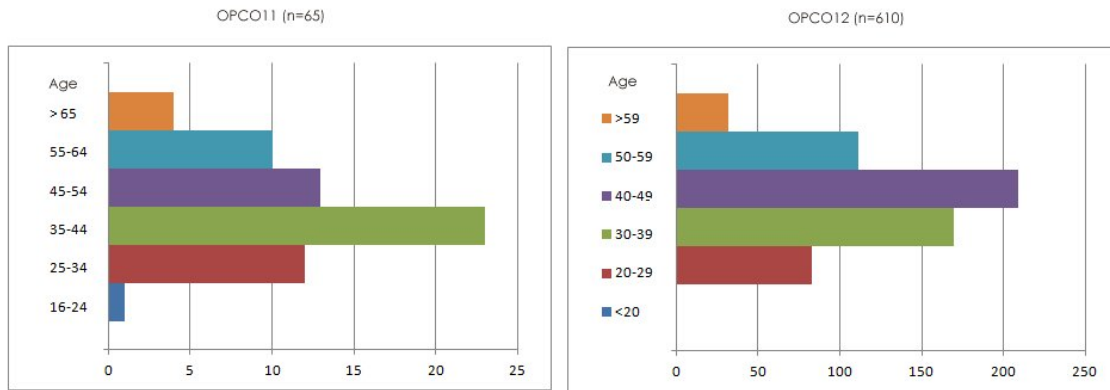


Figure 5: Comparison of OPCO11 and OPCO12: Age of participants, number in each age group

Further considerations were applied upon the development of engagement and participation over the fourteen weeks, the roles and behaviour of different target groups during the course, and the role and function of organizers and facilitators. Figure 8 shows the involvement of different target groups.

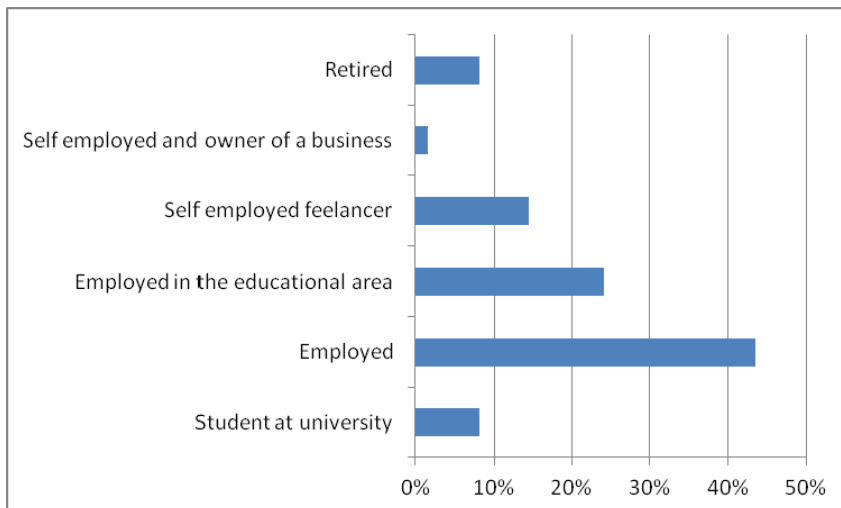


Figure 6: Profession of participants in OPCO11 in percent (n=62)

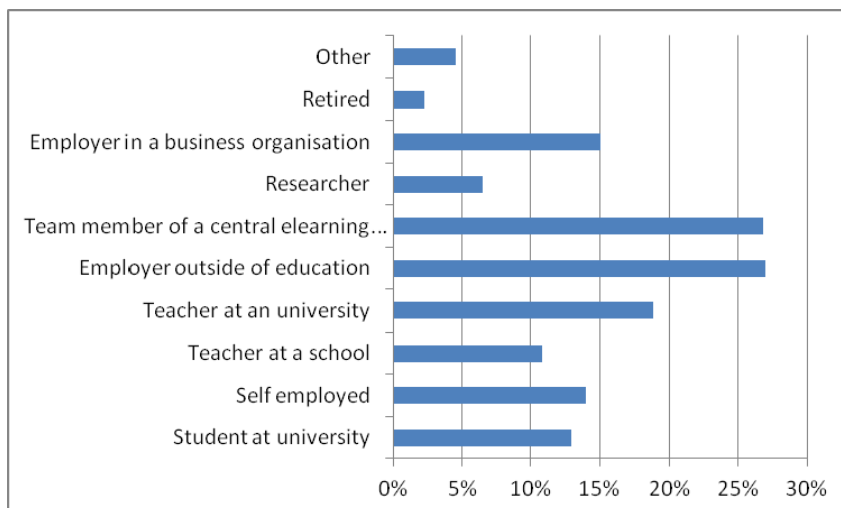


Figure 7: Profession of participants in OPCO12 in percent (n=664)

Looking at the specific participation pattern of different target groups, it turned out that self-employed and employed trainers in adult education seemed to be a very self confident group with high rates of blog posts while school teachers turned out to be more reluctant to post comments actively and stayed rather observant.

The participants were also asked how much time they spent per week or day on the open course. The results are shown in table 1:

Table 1: Time spent for OPCO11 and OPCO12 (results from questionnaires)

OPCO11 (n=63)	Percent	OPCO12 (n=144)	Percent
< 30 min per week	11,10%	< 30 min per week	34,72%
< 60 min per week	41,30%	< 60 min per week	40,97%
< 30 min daily	33,30%	< 120 min per week	22,22%
< 60 min daily	11,10%	> 120 min per week	2,08%
< 90 min daily	3,20%		
> 90 min daily	0,00%		

In the question, which media tool was most important for their participation, twitter turned out to be the main tool beside the course blog in OPCO11 (see figure 8). However, this was not confirmed in OPCO12 (see figure 9):

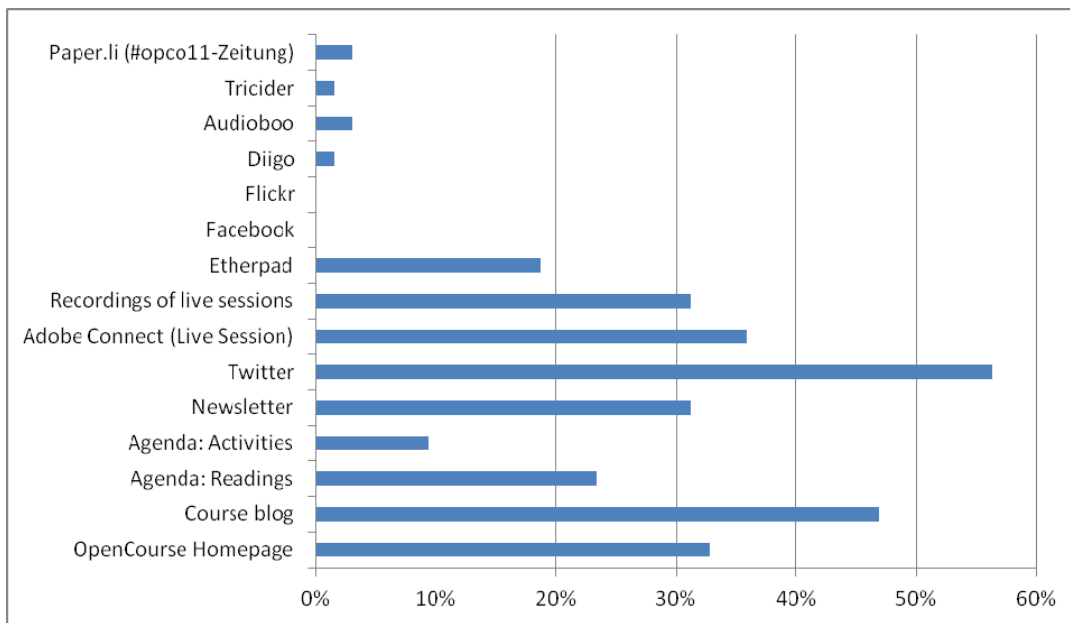


Figure 8: Importance of tools for participation in OPCO11 in percent (multiple answers possible, n=64)

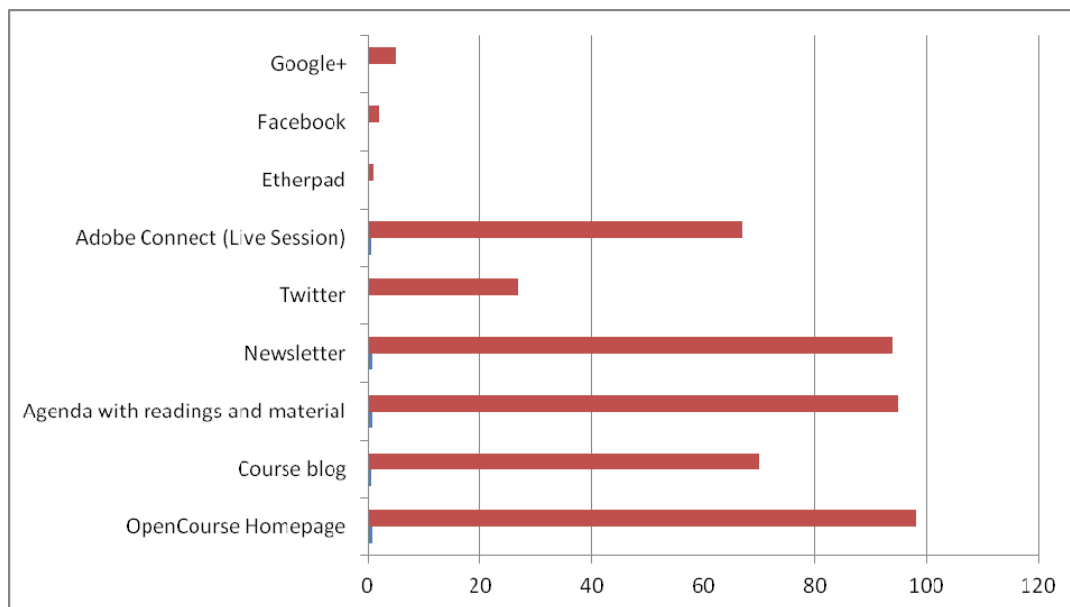


Figure 9: Importance of tools for participation in OPCO12 in percent (multiple answers possible, n=147)



Although the overall participation shows a declining interest (see figure 10), a very interactive live session in week 8 of OPCO11 caused a short peak in week 8 and 9 as a reaction.

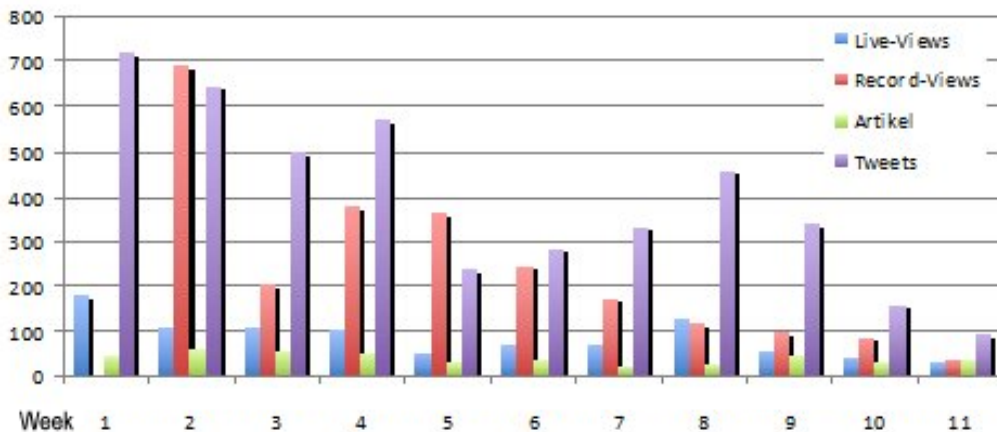


Figure 10: Participation in OPCO11

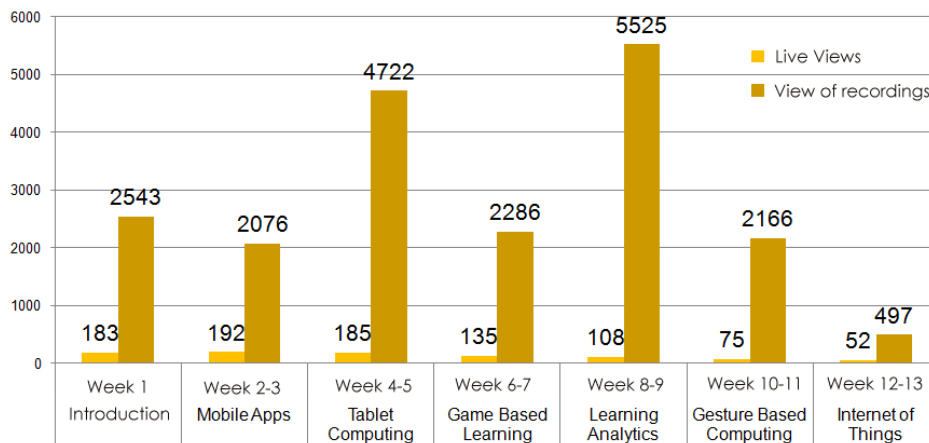


Figure 11: Participation in OPCO12: i.e. Live views and recorded views of video sessions.

The graphical distribution as shown in figure 10 and 11 show, that the rates of participation are quite different from the one we saw in figure 3 for the xMOOC of MIT. This shows that depending on the MOOC design, rates of participation can be kept high along the course. It is important to know that in OPCO11 and OPCO12 participants could focus on certain topics and could even start the course at a later stage in case certain topics were more interesting for them than others. They could also leave the course and return or take a break. So drop-out quotes due to the fact that a learner could not keep track with the course curriculum were less likely. This course design is just different from a one which is more sequentially designed structure and where one unit builds upon the other. This design can often be found in xMOOCs. This does not mean that the course design we used in the OPCOs is superior to the other ones. We just want to show that depending on the objectives of the facilitators, different course designs are possible and that they have an effect on the levels and rates of participation and drop-out quotes.

## 6. SUMMARY

The comparison of OPCO11 and OPCO12 shows that, while age groups and profession as well as time invested of the participants were quite different, the participation rates and preference of tools turned out to be different. While in OPCO11 MOOCs were a new phenomena and many participants took part in order to get to know the format, in OPCO12 different target groups were attracted. The introduction of badges in OPCO12 had an effect on participation and resulted in more output-driven contributions than a purely self organized way as applied in OPCO11. This impression, which we already had as facilitators during the course, was confirmed in the results of questionnaires by those participants who had participated in both courses. They stated that OPCO12 was less a community and that participants referred less to each other – impressions that could be proved by the analysis with the tool that we had constructed. It shows that in OPCO11 a certain group of participants (the so

called inner circle according to Downes [7]) was more active proportionally than in OPCO12 in terms of blog posts and twitter tweets. They also referred more to each other while in OPCO12 more participants contributed statements to receive their certificates (certificates did not exist in OPCO11). These conclusions are supported by results of motivation theory on extrinsic and intrinsic motivation which show that the introduction of external incentives lowers intrinsic motivation [12].

Another conclusion of the analysis of OPCO11 and OPCO12 is that this type of MOOCs (cMOOCs) is mainly appropriate for learners who are highly motivated intrinsically, who can organize themselves well and who have a certain degree of media competencies in order to participate actively.<sup>21</sup>

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