MOOCs in the continuing vocational training – what motivates employees in MOOCs?

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Abstract

Our aim with this study was to find out how Universities of Applied Sciences (UASs) could respond to the training needs of the world of work and the workforce by offering MOOCs (Massive Open Online Courses). We found out that MOOCs are a suitable method for updating knowledge, and an easy way to participate in continuing vocational training. Working students considered MOOCs as a good way to learning new skills in their chosen field, and the major motivation for participating in them was a desire to gain knowledge and skills they needed in their job.

Our research focus was on two particular MOOCs, namely Sustainable Energy Solutions and Almost Zero Building. These topics are new EU level directives in the energy and building sector, and therefore create pressure to train professionals in the field.

We used the action research method, and the research data consisted of Moodle analytics, student feedback, questionnaire data and interviews with both students and employers. As an analysis matrix we used the student-teacher dialectical framework within self-determination theory.

Introduction and the key concepts

The world of work is in transition. The skills, qualifications and knowledge required in the world of work are changing rapidly, which requires a continuous training of the employees. The continuing vocational training at Universities of Applied Sciences (UASs) is often too slow to meet the needs of the fast changing industrial sectors. The aim of this study is to find out how Universities of Applied Sciences (UASs) could take into consideration the sudden training needs of the world of work and workforce by offering a transparent form of continuing vocational training i.e. massive open online courses (MOOCs). New skills are required in the building and energy sector due to the new European Union directives on the energy performance of buildings, which creates pressure to educate energy and building sector professionals throughout Finland. The MOOCs we examined have developed to fill this continuing vocational training gap. Most of the MOOC participants were employees from the building and energy sector, and they were the target group of our study.

Our research questions were: What motivates employees in MOOCs? What kind of a continuing education method is a MOOC, in the viewpoint of the employees and employers? The key concepts of our study were continuing vocational training, MOOC, motivation and student-teacher dialectical framework.

Continuing vocational training is defined by EU Commission (2011) as follows: "A training process or activity which has as its primary objective the acquisition of new competences or the development and improvement of existing ones, and which is financed at least partly by the enterprises for their employees, who either have a working contract or who benefit directly from their work for the enterprise, such as unpaid family workers and casual workers. The training processes or activities must be planned in advance and must be organised or supported with the special goal of learning."

MOOCs "are courses designed for large numbers of participants, that can be accessed by anyone anywhere as long as they have an internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for free" (OpenupEd, 2015). Various types of MOOCs have been suggested, depending on the learning approach in the course. Examples of these are xMOOCs, cMOOCs and sMOOCs. xMOOCs tend to have a more traditional teacher-centred learning approach with content

presented through short video lectures and learning tested through quizzes. cMOOCs emphasise creation, creativity, autonomy, and social networked learning. (Siemens, 2012; Clow, 2013.) sMOOCs stress intercreativity to work towards collective intelligence (Acedo & Cano, 2016; Brouns et al., 2015). Even though numbers are high for enrolment into MOOCs, the average MOOC completion rates are low. Number of reasons has been suggested for student drop-out e.g. lack of time, starting late, unrealistic expectations, course difficulty and lack of support, feelings of isolation and the lack of interactivity, insufficient background knowledge, lack of digital or learning skills, and earlier bad experiences (Khalil & Ebner, 2014; Onah, Sinclair & Boyatt, 2014). However, it should be realized that completion rate is not a relevant metric to measure student engagement in MOOCs (Hew, 2016). Nor does it mean that MOOCs are ineffective (Rai & Chunrao, 2016). Students may e.g. be only interested in particular topics or materials (Wang & Baker, 2014).

Motivation is contextual and it alters in different situations, based on an individual's understanding of his or her abilities. Motivation concerns aspects of activation and intention like energy, direction, persistence and equifinality. (Deci & Ryan, 2000.) Motivation is a force that energises and directs behaviour (Reeve, 2009). Factors like future economic benefit, development of professional identity, challenge and achievement might influence students´ motivation to learn (Yuan & Bowel, 2013). Motivation to participate in MOOCs is one of the most important factors that may prevent students from completing a MOOC (Khalil and Ebner, 2014). In addition, the level of student engagement can influence student retention (Hew, 2016; Xiong et al., 2015). Motivation is significantly predictive of student course engagement. In turn, engagement is a strong predictor of retention. If students are not engaged, motivated or committed enough, they might drop out even before the first assignment is due (de Freitas, Morgan and Gibson, 2015). Accordingly, our first research question was: What motivates employees in MOOCs?

The main focus on the majority of research on MOOCs has concerned university or further education courses (Bayne and Ross, 2014; de Freitas, Morgan and Gibson, 2015; Hew, 2016; Macleod, Haywood, Woodgate & Alkhatnai, 2015; Veletsianos, Collier & Schneider, 2015). So far, there have only been a few studies on the use of MOOCs in continuing vocational training. According to Wulf, Blohm, Brenner & Leimeister (2014) MOOCs are suitable for vocational target groups because of their independence of place and time. This being so, in our second research question we wanted to consider what kind of continuing vocational training methods MOOCs are, from the viewpoint of employees and employers.

Background theory

Our background theory is based on self-determination theory (SDT). We wanted to find out what motivates our target group in MOOCs, and SDT focuses on the relationship between the students' motivation and the learning environment that in this case was a MOOC. We were especially interested in the student-teacher dialectical framework within self-determination theory because it gave a relevant matrix for our research data evaluation. Even though the framework uses the viewpoint of classroom affordances, we wanted to test how it is applicable in a MOOC environment.

SDT differentiates between intrinsic and extrinsic motivation. Intrinsically motivated people inherently seek out new challenges, are keen to learn and exercise their capacities and explore different matters. People who have extrinsic motivation perform an activity in order to obtain some outcome separated from the activity itself. (Ryan & Deci, 2000). According to Niemiec & Ryan (2009) students tend to learn better and are more creative when intrinsically motivated, particularly on tasks requiring conceptual understanding.

Figure 1 shows a dialectical relationship between student motivation and the learning environment from a SDT perspective. The high level of student motivation and engagement arises both from inherent and acquired sources of motivation. Students' inherent sources of motivation include intrinsic motivation and three psychological needs: autonomy, competence and relatedness. Competence refers to a person's ability to deal adequately with a task. Autonomy is the feeling that one has power over one's own behaviour, for example over one's own learning activities. Relatedness refers to the need to both feel like a part of a group and to feel connected to others in the same group (Ryan and Deci, 2000). Students' acquired sources of motivation include self-endorsed values, intrinsic goals and personal aspirations that are internalised through cultural experience and self-reflections, and vary from student to student. In addition, they include students' different individual orientations and their cause and effect relationship. (Reeve, 2012.)
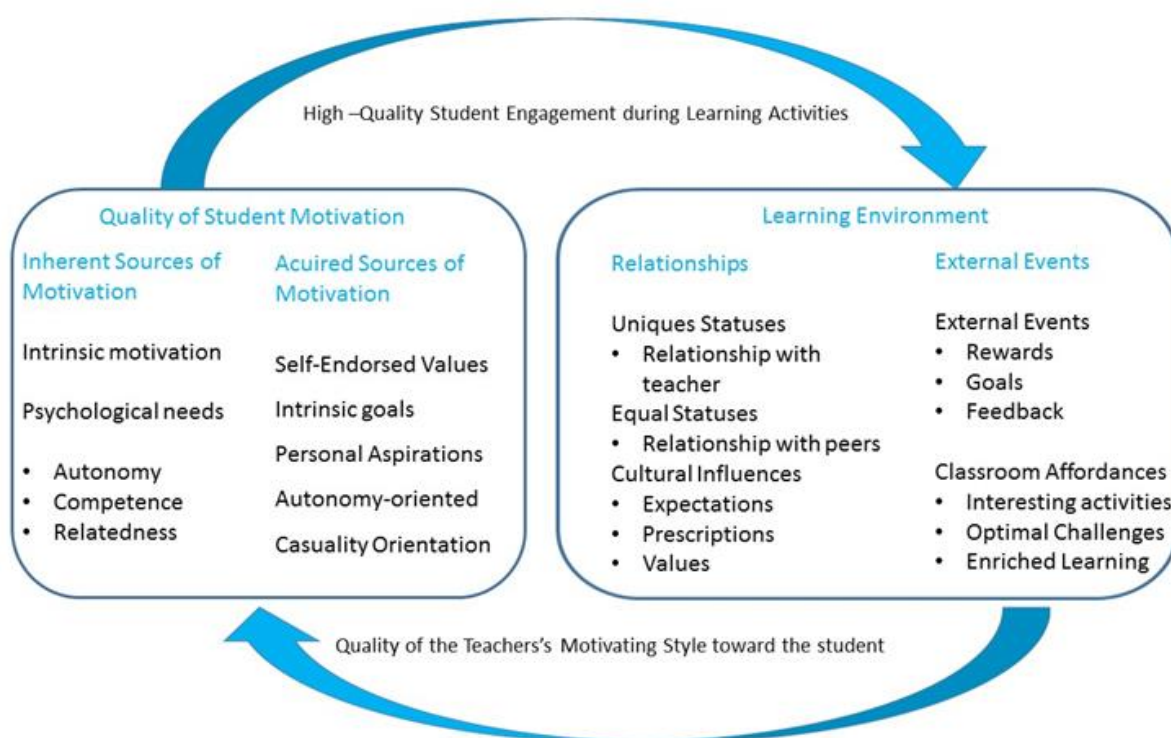

Figure 1. Student-teacher dialectical framework within self-determination theory.

Educational practices that support a student's satisfaction of autonomy, competence and relatedness are associated with greater intrinsic motivation and autonomous types of extrinsic motivation. Both the teacher's orientation and specific aspects of learning tasks are perceived as autonomy. The student's competence can be supported by introducing learning activities that are optimally challenging and allow students to test and to expand their capabilities. Students will only engage and personally value activities they can understand and master. (Niemiec & Ryan, 2009.) Every learning environment has specific external features, such as learning goals and structures, different types of materials and assignments, rewards and feedback systems (Reeve, 2012). It is important that students are provided with the appropriate tools and feedback to promote success and feelings of efficacy, thus providing relevant information on how to master the tasks at hand. (Niemiec & Ryan, 2009).

Other learning environment influences are interpersonal relationships, including e.g. those with teachers, peers and study-related groups, like workplaces and communities as well as social and cultural forces, such as values and learning climate. External events and interpersonal relationships provide students with opportunities, hindrances and an overall climate in which their self-motivation grows. The important factor in the learning environment is the quality of the teacher's motivating style, whether it is autonomy supportive or controlling. (Reeve, 2012.)

Research method and data

We followed the steps of the action research cycle (Tripp, 2003). In action research, there are following basic steps in the cycle of action: 1. Identification of the problem area, 2. Collection and organization of data 3. Interpretation of data 4. Action based on data 5. Reflection (Ferrance, 2000). Action research is a collaborative and self-critical enquiry for teachers (Hult & Lennug, 1980; McKernan, 1991). Fischer (2001) claims that it is a natural part of exploring effective ways of teaching. In action research, it is important to have collaboration between the researcher, informants and other parties of the research (Ferrance, 2000).

Firstly, we realized that due to the new EU directives in energy and building sector there is an educational gap. We started a project in which we developed the MOOCs as a network of teachers, senior lectures and online pedagogy and educational technology experts from ten Finnish Universities of Applied Sciences. We had industry-related company representatives also participating in the planning process. We planned and designed the MOOC contents, and created two pilot MOOCs into Moodle platform, namely Nearly zero-energy buildings and Sustainable energy solutions which both have different sub-courses (MOOC modules) worth 1–3 credits that can be separable studied.

Our MOOCs are very similar to xMOOCs. They include video lectures, reading materials, and the videos are available as pdf files. Evaluation consists of automatically evaluated multiple choice quizzes, short answer questions where participants are asked to answer in one or two words or numbers, written reports and some peer reviewing tasks. There is no starting date nor a deadline for submitting assignments. In each module, there is a discussion forum where participants can ask questions.

Secondly, we tested the courses and then marketed them. Into our research, we collected data on four MOOC modules: 1) Energy efficiency of buildings, 2) Energy efficiency calculation, 3) Energy efficiency requirements, and 4) Solar energy. After the students had completed these modules, we collected the statistics on their progress from Moodle (n = 157), including performance measures. We then studied the course feedback (n = 38), and distributed a questionnaire to the students. However, only 17 of the 157 students answered the questionnaire.

Eventually, we interviewed twelve fulltime or part-time employees and seven employer representatives from the energy and building sector companies, whose employees participated in one of the four MOOC modules. For the interview, we chose participants among those employee participants who had a company email address. We recorded the interviews and transcribed them afterwards.

Finally, we analysed the collected data using the Student-teacher dialectical framework within self-determination theory. We specifically looked for factors that represented different aspects of students' motivation i.e. autonomy, competence and relatedness as well as learning environment features. As the answers to the questionnaire, as well as comments given as part of the course feedback, were very similar to what we learned from the interviews, we have therefore chosen to combine these results for reporting purposes.

Results

In Table 1, we present each course module's participant percentages of performance measures taken from Moodle. The numbers in each section represent the number of students. The total number of students mentioned in Table 1 is the number of registered participants in a module by the time of our Moodle analytics (15.8.2017). The total number of registered participants to all four modules was 157 by that time.

The data shows that there are only few participants who have gone through all the material and completed all the assignments. The number of those who have not yet even opened the first page is 58 percent (64 out of 110 participants) in module 1 (Energy efficiency of buildings), 45 percent (21 out of 46 participants) in module 2 (Energy efficiency calculation), 65 percent (13 out of 20 participants) in module 3 (Energy efficiency requirements), and 56 percent (76 out of 134 participants) in module 4 (Solar energy). The conclusion is that motivation to complete the course varies, between the extremes of either studying the whole course, or dropping out without ever starting it. Some students just browse the material and skip from one site and assignment to another, without any intention of completing the course.

Table 1. Performance measure of MOOC modules, number of students

Module	0 %	1-20 %	21-40 %	41-60%	61-80%	81-99 %	100%	Total
1	64	14	2	6	21	2	0	110
2	21	12	5	3	3	1	1	46
3	13	1	5	1	0	0	0	20
4	76	39	6	2	4	0	7	134

Our first research question was: What motivates employees in MOOCs?

Even though the figures show that most of the students did not finalise the course, it does not mean that they have no motivation to study. The motivation of our interviewees (employees) for participating in MOOCs arises from the desire to learn and deepen their knowledge. They mentioned that one of the reasons for their participation was that the course contents are relevant to their present or future work, for which reason they want to develop their knowledge and skills. Some have a general interest in the energy field. However, some interviewees showed personal interest in the course topics. They need the information at home or during their leisure time. Interviewees also mentioned that they want to share the knowledge with their colleagues and customers. However, interviewees picked just the information relevant to them and that is one reason why there was no need to complete the course.

> HS2M: I enrolled to gain new information, because the world is changing rapidly and I need to stay up to date on developments.

> HS4M: This interests both me and others who make inquiries, and so I need to be up to date.

HS7M: It gives me background information and know-how for my research primarily, but I also have a general interest in the topic.

HS5F: I have always been interested in developing myself, and this course seemed topical, so I decided to participate.

When it comes to student autonomy, independent learning is a very important factor for employees. All interviewees (employees) felt competent enough to study by themselves. We identified several components supporting their autonomy such as free timetables, studying at their own pace, the power to decide what materials to study and what not to study, and the possibility to do the assignments, watch videos and read the material as many times as they wanted.

HS1M: I really liked this way of studying, because I was able to study whenever I had the time.

HS2M: In my opinion, it's good that the timetable is flexible so that it is not compulsory to study certain materials at a given time. I like being able to choose my study pace.

HS11F: I would not expect that in a free course there would be somebody there to guide you all the time. At the workplace, you must be self-directed, if you cannot perform independently, things do not work. So it's good that this is a self-directed course.

The data shows that students with a high level of autonomy want to set the learning outcomes on their own, and the learning outcomes are related to their intrinsic goals. We asked, "How will you benefit from the knowledge and skills you gained from the course?" Most of them answered, "In my present work.", "I want to search for new working possibilities. I hope I can use the knowledge to my benefit in my future workplace."

We discovered some aspects that narrowed their autonomy, such as lack of instructions or insufficient instructions, unclear course structure, nobody to ask for technical or other help, inadequate skills for using the learning platform, and the fact that the course material was not always available when students would have had time to study. All the respondents mentioned that lack of time slowed the progress of studying, or blocked it completely.

Interviewees considered the material mostly useful and relevant to their present or future work. However, some estimated that the content was not challenging enough, and that was their reason for not continuing the course. Some interviewees (employees) mentioned that they were already familiar with the course content and would therefore like to have had more profound information. That may be considered as a competence factor, but it also relates to classroom affordances, as the content did not challenge them enough. Anyhow, this was one reason why some students were not motivated to continue studying.

HS6F: I browsed some of the course content and did some assignments. Nevertheless, as there was nothing new for me, I was not motivated to continue.

The attitude towards using video as learning material was contradictional: interviewees (employees) either liked them or considered them difficult to watch at work or monotonous. Those who liked them said it was an easy way to get information, that videos make learning more alive and were easy to use. Some interviewees said that it is useful to have the videos in text-format as a PDF file as well, as it made reviewing the video easier. Two interviewees (employees) said that it would have been nice to have some

podcasts as learning material. It would have then been possible to listen to the podcasts anywhere, i.e. on the way to work.

> HS3M: The strength of the video lectures is that you can stop it and rewind backwards if you need to check something.

> HS4M: First I watched the video then read the text, as it is easier that way to recall the content.

> HS6F: I found the video material difficult to watch. I prefer text. At work, when the phone rings, it is difficult to watch videos intensively.

> HS5F: I like reading more. Concentration may be disturbed when listening, but it depends on the person of course and how the subject/matter is presented.

Opinions towards the assignments also varied: some interviewees (employees) liked multiple-choice quizzes, as they were easy to fill out, a good way to rehearse the content and test understanding. Some found them useless and preferred assignments where more independent information retrieval is necessary. Short answer questions were good in one interviewee's opinion, providing that the expected answer format was made clear. Some interviewees preferred multiple small assignments instead of one or two larger ones, as they are easier to finish when time is limited. One interviewee stressed that in the world of work, they do not write essays – they write reports and abstracts, and therefore the same terminology should be used in the courses. Some mentioned that the assignments did not serve their needs; hence they did not complete them.

> HS9F: I learn better when I have to find the information by myself. On the other hand, I do not prefer very large assignments; I prefer smaller ones even though I have to make several of them.

> HS10M: Sometimes, the assignment did not serve my interest or needs in the best possible way.

Nearly all interviewees (employees) liked the fact that there was no timetable for returning assignments. One said that when studying among other things such as work, timetables would have helped to complete the course sooner. Timetables would have been useful, for example, if students complete the assignment by a specific date, they can then participate in a particular session as a "reward". Nonetheless, if such timetables existed, they should not be used as a condition to participate in the course.

Having adequate study skills is crucial to being able to successfully complete one's studies. Online learning requires self-directed learning competence. Nearly all interviewees (employees) had previous experience in online learning. Not all had the same level of technical competence, but they learned quickly how to use the learning platform. The data show that all participating students had sufficient ability to complete the courses.

Regarding relatedness, it seems that MOOCs are suitable for those who have strong autonomy. A majority of the students mentioned that they had no need to be connected with other students. Some interviewees (employees) claimed that interaction was not needed between the other students, but interaction with the teacher would have been desirable in some cases, e.g. live online video sessions.

HS2M: For a strong-minded person like me, it is better to study on my own. I don't need the presence of a teacher nor other students.

HS4M: I did not need any interaction and was not interested in participating in the discussions. It probably depends on the character of the person.

HS10M: I did not miss interaction with the other students, but more with the educators.

HS10M: Maybe there could be a discussion forum to ask questions and get answers and instructions.

HS7M: I would have expected more online video sessions.

A majority of the interviewees (employees) said they did not need any certification from the studies. One mentioned that when having a permanent job, there is no need for a certificate. Interviewees' only motivation is to learn and gain the information needed. That is a kind of sign of a participant's intrinsic goals and motivation. Only one hoped that courses are credited so that it would be possible to gain a degree out of them.

HS10M: I do not need the certificate at the moment. I participate only to get the knowledge.

HS11F: Not necessarily. If someone asks what I have learned, I can say that I now know these and these matters. If you have a certificate, and you later forget most of what you have learned, what use is the certificate then?

HS8M: These kinds of courses should be credited so that you could do them in your own order along with work and little by little gain a degree out of them. So that you do not always have to be a student at an institution in order to get a degree. However, it was not my intention to participate in this course because of credits. To get information was the main reason.

Our second research question was: What kind of a continuing vocational training method is a MOOC, in the viewpoint of the employees and employers?

The employers we interviewed had a positive attitude towards the continuing vocational training of employees. Some of them had external educational partners, such as universities, consulting companies or vocational training institutions. Companies are increasingly investing in online training because they consider it an easy way to train employees, especially in situations where employees´ work is decentralised. However, interviewees (employers) said that they were not familiar with MOOCs – both with the word and the study method. One of the interviewees (employers) mentioned looking for training possibilities from the website of the online course company Coursera, but was not aware of MOOCs. The interviewee (employer) suggested that it would be useful to have one website where information is collected, e.g. several continuing vocational training courses offered by different training institutions, organised by theme or sector area.

Although the meaning of the word "MOOC" was unclear, their opinions on MOOCs as a method of continuing vocational training were positive. One advantage of online learning that was mentioned is that it can be done anywhere, meaning there is no need to travel to training events, e.g. from northern Finland to

the southern part of Finland. Another made the point that MOOCs are a good way to advance in one's career. Only one felt that the traditional face-to-face method is better.

> HS8M: This is a great idea. Whatever the subject, if you want to learn and to gain knowledge, it is a great idea. It is possible to do everything at your own pace and in whichever way you want. This gives many people good possibilities for advancement in their careers.

> HS10M: Maybe it would be appropriate for some types of training, but I think that a conventional training method is better, as it enables interaction and networking.

Discussion

The aim of our study was to find out how Universities of Applied Sciences could respond to the training needs of the world of work and the workforce by offering MOOCs. Firstly, we were interested in our target group's motivation in MOOCs. The student-teacher dialectic framework within self-determination theory (SDT) offered a very interesting matrix for our data analysis and helped us to discover our target group's relationship between the students' motivation and the MOOC learning environment. For most of the students in our research, the motivation to participate in MOOCs was mostly intrinsic and based on personal aspirations. Their motivation arises from the desire to learn new knowledge and skills needed in their work, to develop themselves or even get a better job. These results are similar to Yuan and Bowel (2013) who discovered that future economic benefits and development of personal and professional identity might influence students' motivation to learn.

The completion rates of different course modules varied considerably. That result is very similar to other MOOC related studies (Khalil & Ebner, 2014; Onah, Sinclair & Boyatt, 2014). However, that relates not necessarily to the students´ motivation. As Deci and Ryan (2000) claimed the motivation alters in different situations, and is based on each individual´s abilities and intrinsic human needs i.e. competence, relatedness and autonomy. Hew (2016) stressed that completion rate is not even a relevant metric to measure student engagement in MOOCs. According to Wang and Baker (2014) students might be interested only in particular topics or materials. Belander and Thornton (2013) identified gaining an understanding of the subject matter with no particular expectation for completion as one of the factors affecting students' motivation in MOOCs.

In the student-teacher dialectic framework within SDT, the learning environment has specific external features, such as learning goals and enriched materials and assignments (Reeve, 2012). Niemiec and Ryan (2009) also stressed that challenging enough assignments and the way learning tasks are introduced have an effect on intrinsic motivation. It seems that in a MOOC environment, at least in this research study, the students decide on these features themselves, and they arise from the students' own intrinsic goals. Students wanted to set their learning goals by themselves, and they learned just what was necessary to them. Their primary goal was not complete the courses.

Independent learning seems to be a very important factor for the working students. It supports their autonomy and possibilities flexible study schedules and studying at own pace. It also gives students the power to decide what materials to study and what not to study as well as possibility to do the assignments, watch videos and read the material as many times as they want. Also Wulf et al. (2014) consider MOOCs being suitable for vocational target groups due to independence of place and time.

Students mentioned some aspects that narrowed their autonomy and slowed down their study progress or stopped it completely. Among the factors that restricted autonomy were lack of instructions or insufficient instructions, unclear course structure, not having access to technical or other help related to the course, and the fact that the course material was not always available when students would have had time to study. These results are also very consistent with previous MOOC studies. In student-teacher dialectic framework, these are learning environment factors affecting students' motivation. When offering MOOCs for working students there need to be good study instructions, clear course structure, technical help available and course material ready when course starts. Otherwise, there might be a risk that these students stop studying.

All our interviewees' jobs were somehow related to the course modules' content matter. They had competence enough to start studying. Some felt, however, that the content was too basic. They expected to gain deeper information about the subject. Because the intrinsic goals and personal aspirations were not met, these students did not have enough interest to continue their studies. In MOOCs that are targeted to students who are working and are supposed to have diverse prior knowledge on the course content, the materials and assignments should be versatile and multi-level in order for the course to meet the needs of various participants. Otherwise, these students' psychological need for competence might suffer.

Diverse and sufficiently challenging learning activities can enable students to achieve their learning outcomes without the presence of teachers. That is also, what the student-teacher dialectic framework requires. In addition, good instructions for studying and a forum to ask questions will help the students to study by themselves. Videos and podcasts enrich learning and make it more interesting. When it comes to the external events by the framework, the rewards for the students in our research come from the self-set learning outcomes and the feedback from the employer and the customers.

In student-teacher dialectical framework, the relationship with the teacher and the peers is relevant (Reeve, 2012). In this study, the psychological need of relatedness did not play a very significant role. Therefore, it seems that employees in our research preferred xMOOCs instead of e.g. sMOOCs. The reason could be that the students were more autonomy-oriented in their studying. Instead, we found the relationship with other workers in the company and other work-related groups, e.g. the students' customers, to be more important. Therefore, we suggest that these relationships are supported more in a MOOC learning context in continuing vocational training.

Neither the employers nor the students were very familiar with MOOC as a word, but they considered MOOCs as a practical and flexible way to learn new skills, competences and gain knowledge needed in the world of work. One advantage of online learning is that it can be accessed anywhere; hence, there is no need to travel to the training events. One participant suggested that if it were possible to earn study credits for MOOCs, one could gradually study towards a degree while studying alongside work.

MOOCs seem to be a good model for continuing vocational training, especially for those who do not need so much relatedness. MOOCs offer possibilities for working individuals to gain new competencies as well as to develop and improve existing skills of the employees as the definition of continuing vocational training (EU Commission, 2011) suggest. Companies are investing more in online training. For companies, MOOCs are an easy way to train employees, especially in situations where employees' work is decentralised. More information about MOOCs would however be needed. A platform where companies and employees would find several continuing vocational training MOOC courses would be necessary. For MOOCs that are targeted to working students, the materials and assignments should be versatile and multi-level in order for the course to meet the needs of a wide variety of participants, with a diverse range of prior knowledge. In addition to all above mentioned, when Universities of Applied Sciences (UASs) are planning to offer MOOCs

for continuing vocational training, the needs of companies should be taken into account, and workplaces should be regarded as learning environments.

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