360 DEGREE VIDEOS WITHIN A CLIMBING MOOC

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ABSTRACT

In this research study a course, combining both computer-supported and face-to-face teaching using the concept of blended learning, has been designed. It is a beginners climbing course called "Klettern mit 360° Videos" (climbing with 360° videos) and the online part has been implemented as a Massive Open Online Course (MOOC). This research study presents the background of the course, the course concept, the course itself and the results of the evaluation. To measure the difference between the pure online participants and the blended learning participants the MOOC has been evaluated independently from the blended learning course. It should be mentioned that all participants (whether pure online or both) evaluated the course in a positive manner. The use of technology enhanced learning realized by the concept of blended learning proved to be a well-suited method for this course setting. Furthermore, many advantages of computer based learning, blended learning and 360°-videos have been reported by the participants.

KEYWORDS

Technology Enhanced Learning, MOOC, 360 degree, Blended Learning, Climbing

1. INTRODUCTION

The opportunities of digital media in sports have already been discovered very early (Hebbel-Seeger, Kretschamen & Vohle 2013). For example, in many different sports, pictures and videos are used to visualize or track movements. In terms of computer based learning (technology enhanced learning, TEL), with a special focus to learning videos, different projects already exist. Nevertheless, surprisingly very few studies for computer based or blended learning courses in sports have been published.

In 2011 a research study took place in Germany to survey the deployment of digital media in physical education (Opitz & Fischer 2011). Sports students were asked about technical equipment in schools and their estimations for digital media usage in physical education. It turned out that most of the students reported positive experiences with digital media in physical education, but that the frequency of use was very low. About 46% stated, that they had never considered using digital media in physical education. Additionally, the majority of the interviewed students reported that the technical equipment in schools is either very bad or non-existent.

Some universities in German speaking Europe and further education institutions, like school, are currently using learning management systems when it comes to teaching sports. For example, since 2006 the platform "sports-edu" is used to support physical education in seven German institutions (Sensing & Frenger 2010). With Sports-edu, videos and additional content for different sports are provided and the platform is used to manage user profiles. The online courses are usually used in combination with practical courses following the concept of blended learning.

In the research field of Technology Enhanced Learning, Massive Open Online Courses are increasing dramatically. Since the first course created by George Siemens and Stephen Downes in 2008 (McAuley et al, 2010), followed by the famous MOOC of Sebastian Thrun, different MOOC platforms are searching for lecturers providing so called xMOOCs (Carson & Schmidt, 2012). An xMOOC can be characterized by a number of videos, additional learning objects and self-assessment presented in a structured way (mostly on a weekly basis) (Ebner et al, 2016).

After exploring existing projects in sports and bearing in mind the current trends in the field of TEL the basic idea for the study was to create a field study combining a MOOC and face-to-face-teaching. Furthermore, the use of 360 degree videos was being explored. In order to include the above-mentioned

criteria, a climbing course for beginners supported by 360° videos was designed. The course has been split in two different parts. Over the course of five weeks, the stand-alone MOOC provides the basic knowledge about climbing such as rules and security with regards to climbing. Twelve different videos are used to present the main theoretical concepts of the course. Some of the videos are recorded using 360° video-technology to provide the viewers with new viewing-angles and interactive video learning. Afterwards the face-to-face part was designed and combined with the MOOC to a blended learning concept. In short, the MOOC provides theoretical background to the practical climbing lessons taught in a face-to-face manner.

We tried to answer the following research questions:

1. Is the concept of blended learning using a MOOC suitable for sports?
2. Is the use of 360 degree videos in sports appropriate for the target group?
3. What are the advantages and limitations of this learning scenario?

2. DESIGN OF THE RESEARCH STUDY

2.1 Course Design

Most traditional climbing courses take place in indoor climbing halls and cover theoretical and practical basics. During these courses a lot of time is used to teach and learn the theoretical basics that are required to ensure save climbing. Of course, in many courses the time for the practical part is limited and important practical basics are handled as briefly as possible. To use the time more efficient and to enhance the practical part, the course was designed to teach the basic knowledge beforehand by using an online course. Providing those contents online allows the participants to learn independently and more accurately. Therefore, the essentials are provided in videos and additional content is offered for a more detailed study.

The MOOC itself consists of five chapters, each building on the one before. Each chapter covers a different subject in one or more videos. Self-assessments are provided at the end of each chapter, to enable individual learning progress. The self-assessments are not mandatory, but allow the participants to check their acquired knowledge by doing some multiple-choice questions.

Following the idea of blended learning, the final face-to-face course extends the MOOC with a practical lesson for each chapter. Due to safety reasons, the blended learning course has been designed for only a small group of attendants. The practical lessons are a follow up to the weekly topics of the MOOC and rely on the theoretical part. This allows the participants to apply the learned techniques and procedures right away. To increase the improvement achieved through the course, in the first lesson a video of each participant's climbing techniques are recorded. At the end of the last lesson another video is recorded to compare and analyze the progress.

Due to the nature of a MOOC – its openness – other participants were also able to join the online course for free. We call the people who only participated in the MOOC and therefore only learned the theoretical part of the course pure-online-users. Figure 1 shows the two different learning scenarios. First the blended learning scenario represented by the changing online and face-to-face parts and second the MOOC scenario represented by just online parts.

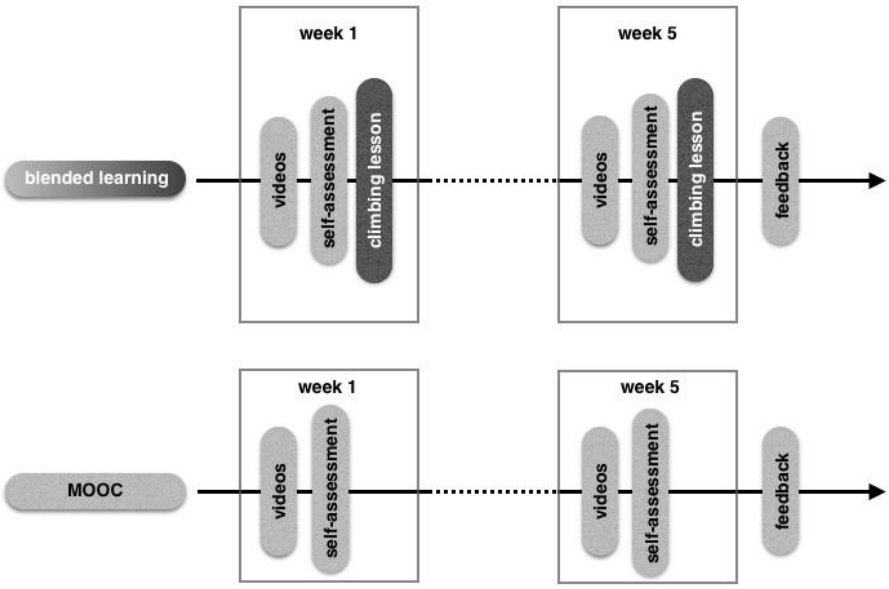

Figure 1. Course Design

2.2 Didactical Approach

The didactical approach of the course design is following three major issues:

1. The currently upcoming 360 degree video technology allows to capture engaging and immersive videos. By recording beyond the common field of view, many advantages of 360 degree videos can be used. On one hand, everything happening around a 360 degree camera is captured and on the other hand while viewing the video, the viewer is able to interactively controls his/her personal field of vision. By allowing the viewer to interact with the video, more attention is paid to the video and to the content, which enhances the learning experience. During planning and recording the videos, it was attempted to make as much use of the 360 degree camera as possible. This ensures that the viewer can continuously follow the events on the screen.
2. The self-assessment in each chapter is used to allow the learner to check their learning progress on their own. Additionally, the self-assessments aim to encourage the participants to learn the contents more precisely. These self-assessments are implemented as straightforward tests in form of multiple choice quizzes. To pass the self-assessment, participants have to engage with the material on a deeper level instead of merely watching the videos.
3. To encourage the participants of the blended learning course to learn the contents of the MOOC, participants were informed that the basics learned online were required to take part in the practical lessons. To affirm the necessary basic knowledge, the participants were asked short questions throughout the practical lessons.

2.3 MOOC Platform

The course was published on the MOOC platform imoox.at. iMoox is a redesigned learning management system operated by Graz University of Technology and the university of Graz (Ebner et al, 2015). The platform opened in 2013 and is frequently used for MOOCs about various topics as well as for university lectures (Khalil & Ebner, 2015) (Ebner et al, 2016a) (Höfler et al, 2017).

iMoox offers all capabilities that are required for the planed course. The system is well suited for managing user data and providing all course contents. Additionally, self-assessments are implemented in a very intuitive way. The platform provides a straightforward course system and also allows the participants of the MOOC to access all videos and content independent from time and place.

Figure 2 gives an overview of the final MOOC. The weekly course topics are found on the left-hand side. Above the main content, four blue buttons allow to navigate to the news, the course description, the available files and finally to the discussion forum. The main part consists of a short welcome message and an introductory 360° video. If a learner scrolls down he/she also gets additional web-based content and the weekly self-assessment.

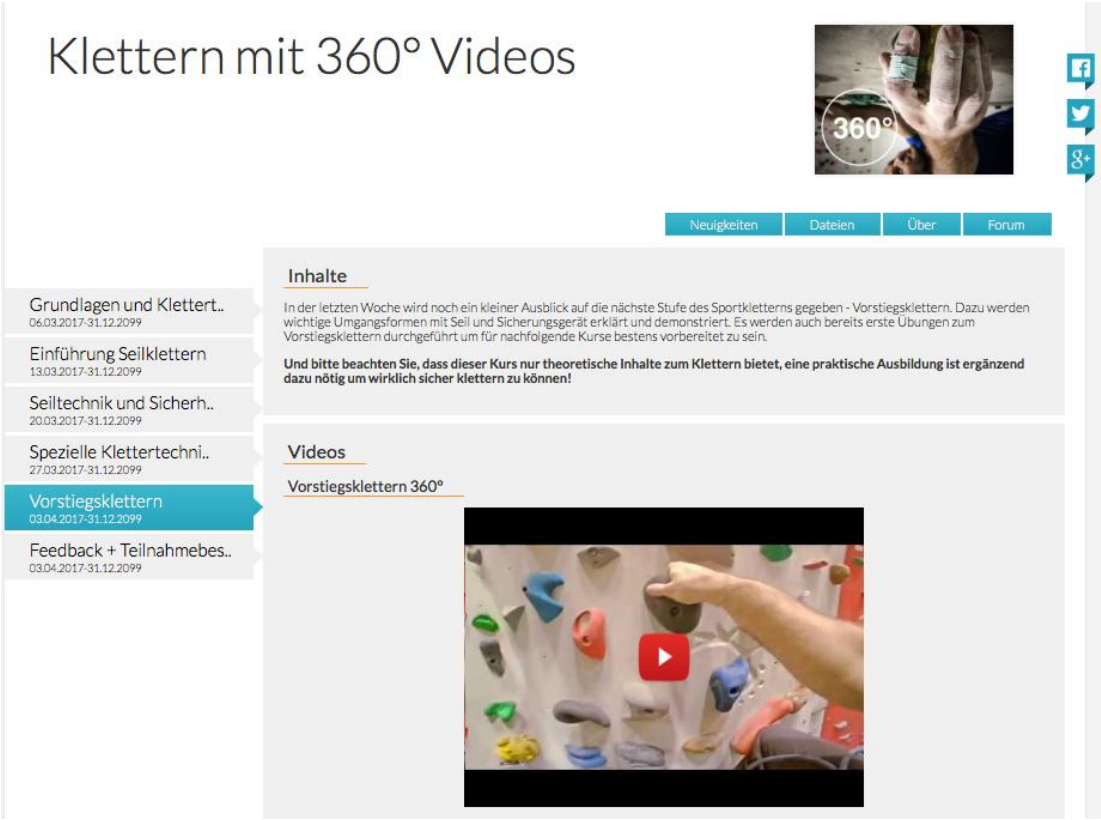

Figure 2. Overview about the main elements of the MOOC

2.4 Course Development

All videos were recorded in an indoor climbing hall in Graz. In some videos, 360 degree video technology has been used to capture spherical videos. In order to use the full potential of the 360 degree videos, well-structured film scripts were produced beforehand. To allow viewers to have an efficient learning progress, a lot of testing of camera mountings was required.

Especially when watching 360 degree videos with virtual reality headsets, fast movements are very confusing. Even though climbing is a sport with a lot of movement, a chest mount for the 360 degree camera created steady videos. This mount also simulates a first person view.

In some videos the camera has been positioned in the middle of the room while events are happening all around the camera. In climbing one of the partners stays on the ground while the second one tries to climb to the top. In this situation, the viewer can change the point of view between the two climbing partners, depending on what is considered as important.

2.5 Research Design

Different research methods have been used in order to evaluate the MOOC and the blended learning course. When signing up for the MOOC a reason has to be given (short sign-in survey). This survey is used to analyze the intentions of the participants. In order to complete the MOOC, the participants have to give a final feedback via the iMooX system. The feedback includes multiple-choice questions about the MOOC and

about the experience of the participants. Additionally, the questions cover experiences with 360 degree videos, computer based learning and blended learning. Furthermore, the course itself and the adequacy of the used concepts are evaluated. To explore the limits of 360 degree videos and blended learning in sports, the participants are asked to think about the possibilities to apply this method for other sports.

To evaluate the blended learning course scenario two different feedbacks are used. On the one hand, the participants have to take part in a survey and on the other hand interviews are carried out to get subjective impressions. The survey is quite similar to the evaluation of the MOOC but also includes questions about the practical lessons and blended learning. First they have to answer questions about their experiences, later on they are asked about their usage of the online contents and videos. The survey also covers the self-assessments and some comparisons between the blended learning climbing course and traditional climbing courses. The interview is used to analyze the recorded videos of the participants. Furthermore, every practical lesson is analyzed to determine advantages and disadvantages of the blended learning scenario.

3. FIELD STUDY

The field study took place in March 2017 with a five week MOOC and the corresponding blended learning course. To find volunteers for both course concepts, a short 360 degree promotion video has been published and promoted via social media. The MOOC took place with 103 participants and the blended learning course, for security reasons, only included eight participants. Table 1 shows details of the blended learning course participants and figure 2 shows their prior experience before attending the course.

Table 1. Participants of the blended learning scenario

Participants	Age	Sex	Experience
n = 8	mean: 24.3 min: 21 max: 33	male: 3 female: 5	none: 4 beginner: 3 intermediate: 1

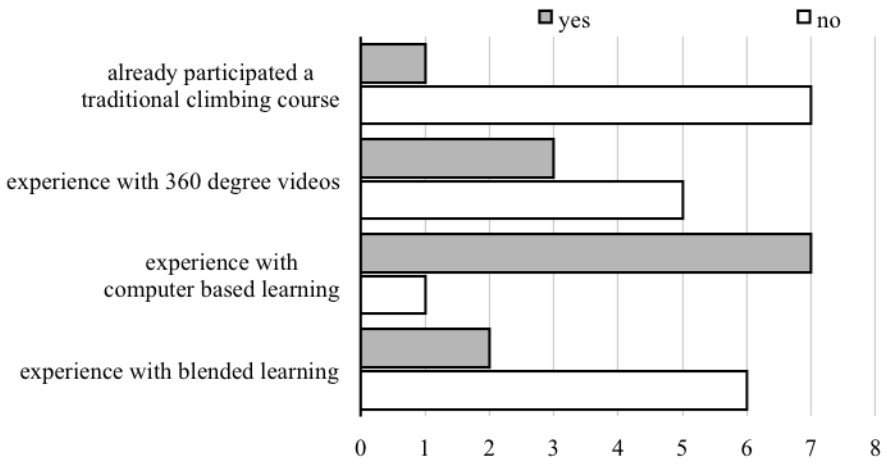

Figure 3. Experience of the blended learning course participants

ISBN: 978-989-8533-68-5 © 2017

4. RESULTS

4.1 MOOC

The results of the survey that took place before the start of the MOOC are presented in figure 4. It turned out that most of the participants wanted to know more about the course, but only 19% planned to pass the course from the beginning. This result already hints that only a few participants had the idea to take an active part within the course.

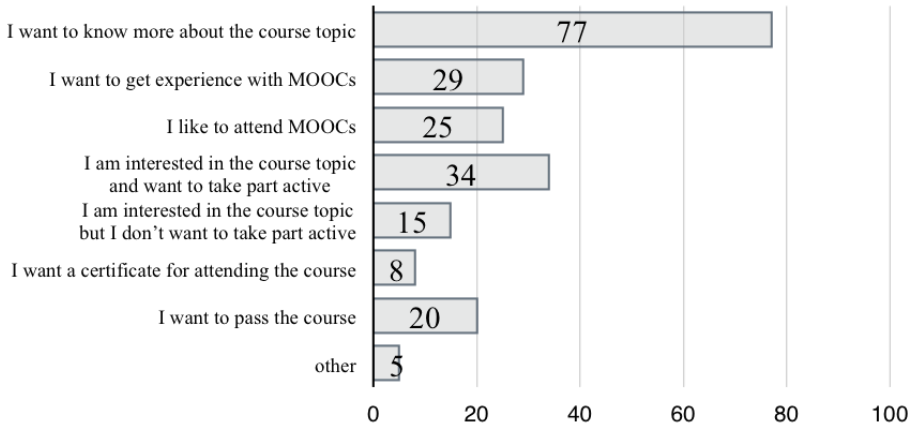

Figure 4. Experience of the blended learning course participants

This anticipation turned out to be true, since only 70 self-assessments were completed and only eight of the pure-online participants gave feedback at the end via the iMooX feedback system. Despite the small number of feedback, the results turned out to be very positive. The use of 360 degree videos has been evaluated by the majority as "much better" or "better" compared to traditional videos, while only two participants evaluated the videos equally.

One additional part of the survey was to evaluate the benefit of 360 degree videos in different subjects of the MOOC. The best-suited subject for usage of 360 degree videos turned out to be the "climbing techniques". Figure 5 shows the results of 360 degree video usage in the course. Almost all participants described the usage of 360 degree videos in the course as better, compared to traditional videos. Specially the videos about climbing techniques turned out to enable new viewing angles and learning scenarios that would not possible without 360 video-techniques. In terms of suitability of computer based learning for other sports, all participants said that 360 degree videos in combination with a blended learning scenario would be very beneficial.

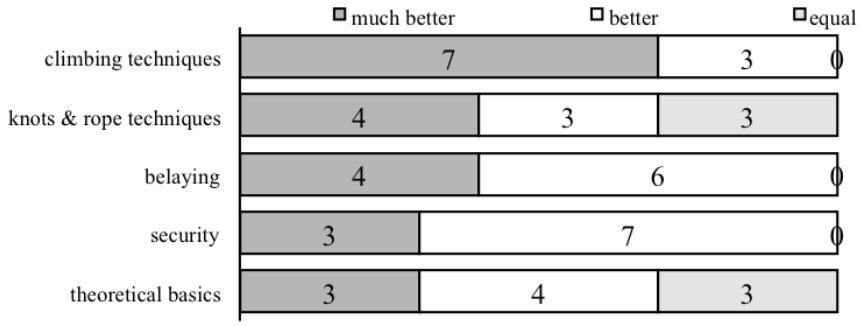

Figure 5. Results of the survey question: "Compare 360 degree videos to traditional videos"

4.2 Blended Learning Scenario

During the practical lessons, the participants, their motivation and their acquired knowledge from the MOOC have been observed. Throughout the whole course a lot of motivation and enthusiasm was observed. The participants were able to transform their prior knowledge to the practical lessons. Sometimes participants even urged to put their learned techniques into practice. During the lessons, questions regarding the videos and contents were asked. One participant described the benefits of the blended learning scenario:

"The videos and contents allowed me to acquire a basic knowledge for climbing and climbing techniques. In the practical lessons we used those techniques in fun exercises, which helped me to learn everything better and to improve my skills."

The results of the feedback of these participants turned out be even better than the feedback of the MOOC. All of them described the online content as well prepared and well suited for blended learning. The results of the survey in figure 6, regarding the content usage show that the participants consumed the offered contents more than once.

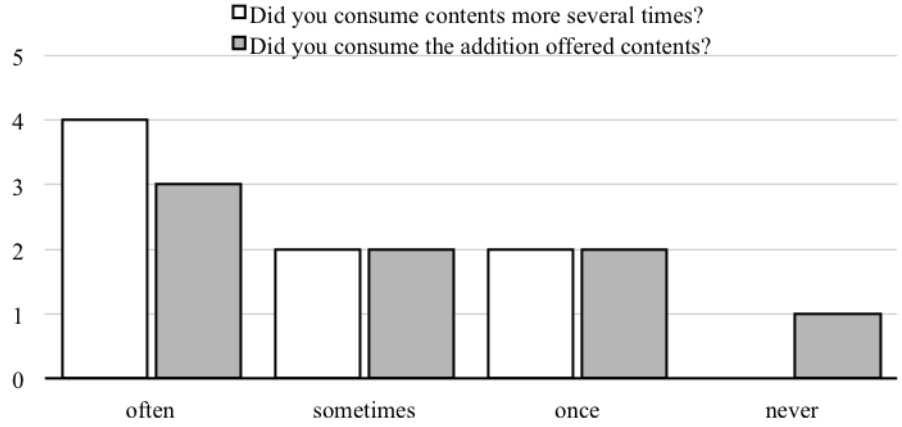

Figure 6. Content usage

The benefits of the self-assessments were also evaluated very positively . All participants rated the self-assessments as very beneficial to self-check their learning progress. Almost all participants, except one, reported that the self-assessments motivated them to learn the content of the MOOC more precisely. These statements have also been confirmed in the final interviews. All interviewed participants described the MOOC as very helpful in order to learn the basics.

One of the main aspects of the interview was the analysis of the recorded videos of the participants climbing techniques. All participants analyzed both of their videos to experience their progress through the climbing course. Later on problems and advantages encountered in the practical lessons were discussed. Besides some basic technical problems at the beginning of the course, no other problems occurred.

The last part of the feedback covered the blended learning scenario in this course and for other sports. All participants described the used concept for climbing as very reasonable. To verify that the blended learning course has been suited appropriately, all participants have been asked if they could have attended the practical lessons without learning the MOOC contents. Almost all participants agreed that it would not have been possible to follow the instructions during the practical lessons unprepared. This confirms that the blended learning scenario was used efficient. The closing question of the feedback asked about whether the blended learning climbing course motivated the participants to attend further blended learning courses. 75% replied that they are planning to attend further blended learning courses, while 25% perhaps want to attend further online courses.

5. CONCLUSION

The study clearly shows that Technology Enhanced Learning and especially blended learning are a well-suited concept for climbing. There are many benefits that can be achieved by outsourcing and reprocessing theoretical basics that are required. This on the one hand can save time in practical lessons and on the other hand allows the course participants to learn the contents individually and in their preferred learning speed. In a practical lesson this has also been mentioned by a participant. During the face-to-face lessons a traditional course took place right next to the group. In this traditional course the basic security contents were discussed very quickly. One of the blended learning course participants noted:

"I am glad that we could learn the theoretical contents regarding security and belaying more detailed at home. The course next to us covered the content in very short time, I definitely would not fell very save in that course"

This quote summarizes many of the most important aspects of a blended learning scenario and shows that the concept is very well suited for climbing. In many other sports blended learning could allow the participants to learn the basics individually and more accurate. Also 360 degree videos could bring many benefits to nearly every sport. The possibility of capturing everything that happens around an athlete or elsewhere in the room leads to new learning experiences by changing the view to a personal one.

Learning videos allow time and place independent learning and each participant can choose their own learning speed. This also supports self-responsibility by controlling the learning process. 360 degree videos bring even more benefits: Interacting with the video can raise the motivation of the viewer and draws the attention to the content.

Of course, there can also be downsides. The content has to be well prepared in order to be beneficial. But this study showed that blended learning and 360 degree videos can bring many advantages in climbing and presumable other sports as well.

REFERENCES

Carson, S., Schmidt, J. (2012) The Massive Open Online Professor Academic Matter. *Journal of higher education*. Retrieved from: http://www.academicmatters.ca/2012/05/the-massive-open-online-professor/

Ebner, M., Scerbakov, A., Kopp, M. (2015) All About MOOCs. *Digital Medien in Arbeits- und Lernumgebungen*. Jost, P, Künz, A (Ed.). S. 148-155. Pabst, Lengrich

Ebner, M., Kopp, M., Scerbakov, A., Neuböck, K. (2016) MOOCs in Engineering Education: First Practical Experiences from two MOOCs. In: *Handbook of Research on Applied E-Learning in Engineering and Architecture Education*. Fonseca, D., Redondo, E. (Eds.). pp. 224-236. doi:10.4018/978-1-4666-8803-2

Ebner, M., Schön, S., Khalil, M. (2016a) Maker-MOOC – How to Foster STEM Education with an Open Online Course on Creative Digital Development and Construction with Children. *Conference Proceeding 19th International Conference on Interactive Collaborative Learning (ICL2016)*, Belfast, pp. 1233-1244

Hebbel-Seeger A.; Kretschamen R.; Vohle F. (2013) Bildungstechnologien im Sport: Forschungsstand, Einsatzgebiete und Praxisbeispiele. In: Ebner, M.; Schön, S. (eds) *Lehrbuch für Lernen und Lehren mit Technologien*. Berlin: epubli, pp. 465–473.

Höfler, E., Zimmermann, C., Ebner, M. (2017) A case study on narrative structures in instructional MOOC designs, *Journal of Research in Innovative Teaching & Learning*, Vol. 10 Iss: 1, pp.48 - 62

Khalil, M., Ebner, M. (2015) A STEM MOOC for School Children - What Does Learning Analytics Tell us? In: *Proceedings of 2015 International Conference on Interactive Collaborative Learning* (ICL), Florence, Italy, pp. 1-7

McAuley, A, Stewart, B, Siemens, G. (2010) *Massive Open Online Courses Digital ways of knowing and learning, The MOOC model For Digital Practice*. Retrieved from: http://www.elearnspace.org/Articles/MOOC_Final.pdf

Opitz C., Fischer U. (2011) Medieneinsatz im Sportunterricht der Sekundarstufe II. *sportunterricht*, 60 (1). pp. 10-15.

Sensing C., Frenger, R. (2010) Die technologische Infrastruktur zur kooperativen Erstellung von Web-Based Trainings und deren Nutzung in innovativen Lernsettings. In: Wiemeyer J., Hansen J. (eds.), *Sport-Medien-Gesellschaft.* Sportverlag Strauß, pp. 163-168