

Online Courses on Business Model Innovation for Practitioners in SMEs

Mark de Reuver¹, Martijn Cligge², and Timber Haaker³

Abstract

We develop and evaluate five online courses (MOOCs) on business model innovation, tailored to small and medium sized enterprises (SMEs). Six design principles are found for such courses: regarding type and form of learning contents; time investments from participants; practical examples and tools; integration with daily practice; and participative learning.

Keywords: Business model innovation; Online learning; Massive Open Online Courseware

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1 Delft University of Technology

2 IT consultant

3 Saxion University of Applied Science

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Introduction

While knowledge on business model innovation is finding its way from academia to practice, small and medium sized enterprises (SMEs) are still lagging behind (Kesting & Günzel-Jensen, 2015). For large corporations and high-tech start-ups, business model innovation and tools are becoming a mainstream practice (e.g. Luttgens & Diener, 2016). This is largely thanks to practical tools that are emerging on the intersection of academia and practice, which make more elaborate ontologies and meta-models accessible (e.g. Strategizer; BusinessMakeover.eu). Yet, small and medium sized businesses (SMEs) hardly change their business model, and if they do, they hardly follow any structured approaches or methods to do so (Bouwman, Nikou, Molina-Castillo & De Reuver, 2018).

Educating SMEs on business model innovation poses major challenges (see De Reuver, Athanasopoulou, Haaker, Roelfsema, Riedl & Breitfuss, 2016). SMEs are highly heterogeneous, ranging from start-ups to family firms. Education levels, learning styles, abilities and goals of SME owners and managers differ greatly as well. Low-tech SMEs typically have no direct ties to universities and would not look at university training to improve their business. Especially small business owners often lack time to study, and are generally happy to survive everyday problems rather than spending time on abstract business models.

The aim of this paper is to evaluate whether massive open online courses (MOOCs) can be a teaching method for bringing business model innovation to SME managers and owners. The main research question is: How to design an accessible MOOC on business model innovation for SMEs with heterogeneous (educational) backgrounds? The paper is based on a large project carried out by the authors in creating five MOOCs on business model innovation, provided via online learning platform Edx (www.edx.org). The MOOCs aim at understanding, designing, implementing and testing business models in an SME context. The courses provide a background on core concepts, explanation and illustration of tools for business model innovation through real-life cases, and application of learnings to the daily practice of the SME participant. In total, over 70,000 participants adopted the courses over the past two years worldwide, making our project, to the best of our knowledge, the most

encompassing and most widely adopted online training focused on business model innovation.

Our primary contribution is showing how online courses can be a teaching method for business model innovation. We take a design science research approach, which aims to provide prescriptive knowledge on how to design artefacts in order to realize a goal (Gregor, 2006). As such, our study provides a set of tested design principles on how to create online learning on business model innovation. A secondary contribution is to open education, as our approach is unique in bringing education that is normally restricted to learners with higher education backgrounds, to practitioners with diverse backgrounds.

In this paper, we describe how we developed the courses based on design principles derived from literature review on MOOCs and SMEs (Section 2.1). Next, we illustrate the setup and materials of the course (Section 2.2). After that, we use qualitative and quantitative evaluation data to assess the validity of the design principles (Section 3). Finally, we summarize the lessons learned, generalizations and next steps (Section 4).

Approach

Design principles underlying the course design

To construct our artefact (i.e. 5 MOOCs on business model innovation), we develop and apply design principles. Design principles are testable prescriptive statements on how to do something in order to achieve a goal (Gregor, 2006). After constructing the online courses and evaluating the results, we reflect on the validity and utility of the design principles as a means to generalize towards new knowledge (see Section 3).

MOOCs in general have been developed since around 2008. Hence, we draw upon literature on online learning and MOOCs in general to derive our design guidelines. In addition, we draw upon exploratory interviews with SMEs and SME advisers on the specific topic of business model innovation (De Reuver et al, 2016). Combined, these lead to six design principles, see Table 1.

Design of the online courses

The series of MOOCs consist of five instructor led courses, which were later transformed into self-paced courses. In principle, the courses can be taken in any

Design principle	Justification	Source
(1) simplify the material such that business owners with secondary education can comprehend it;	Since the courses are especially designed for a wide range of different types of SMEs (including business owners with secondary education) the course should also meet the level of secondary education.	Adapted from (Yousef, Chatti, Schroeder, & Wosnitza, 2014)
(2) limit the time to be spent on business model innovation course to 2-4 hours per week so that business owners with a limited amount of available time can still keep up with the course;	Business owners or other business-oriented stakeholders generally have a limited amount of available time. Therefore, the course should consist of small “chunks” which fit within the limited amount of available time.	Adapted from (Moon, Birchall, Williams, & Vrasidas, 2005)
(3) provide inspiring examples and intuitive tooling to make the assignments more relatable to the practical own context of business owners.	Inspiring examples help show what lessons are learned and how more theoretical concepts could be applied in the own context. By having a practical perspective, it becomes easier to refer to the participant’s own workplace and experience.	Adapted from (Margaryan, Bianco, & Littlejohn, 2015; Moon et al., 2005; Yousef et al., 2014)
(4) use video and images rather than text in order to ensure the understandability of the content for business owners with secondary education;	The MOOC should offer learners a variety of rich-media to capture their attention. Also, it is argued that business owners with secondary education can relate easier to videos and images than comprehensive (scientific) textual articles	Adapted from (Guàrdia, Maina, & Sangrà, 2013)
(5) have the learner apply the tools directly on his/her own business in order to provide immediate value and relevance;	Learning is promoted when learners apply their newly acquired skill to solve practical problems. It is argued that learning is further promoted when the newly acquired knowledge is applied to solve problems from the own context. Furthermore, this will directly show the value of the newly acquired knowledge.	Adapted from (Margaryan et al., 2015; Moon et al., 2005)
(6) facilitate collaborative learning and sharing of best practices through forum discussions and peer reviews in order to promote learning amongst the business owners.	Learning involves more than information provision; it requires practice, feedback, and guidance. Furthermore, research on collaborative learning states that learning is promoted when learners collaborate, provide and receive feedback on their performance and contribute to collaborative knowledge.	Adapted from (Guàrdia et al., 2013; Margaryan et al., 2015; Yousef et al., 2014)

Table 1: Design principles for the design of the MOOCs

random order. The series started with a relatively short and simple course, where the main topics of business model innovation were introduced. In subsequent courses the level of difficulty increased by discussing more advanced business model topics and tools¹.

¹ Courses are available via Edx, but here we provide the permanent links to the archived courses:

- <https://ocw.tudelft.nl/courses/value-business-models/>
- <https://ocw.tudelft.nl/courses/design-successful-business-model/>
- <https://ocw.tudelft.nl/courses/business-model-testing/>
- <https://ocw.tudelft.nl/courses/business-model-implementation/>
- <https://ocw.tudelft.nl/courses/business-model-metrics-advanced-tools/>

Course 1: The Value of Business models.

An introduction to business model innovation, and for instance the relation between business models and strategy. Using a simple card game, participants learn to rethink their business model in a playful way. The course also lays the basis for the follow-up courses.

Course 2: How to Design a Successful Business Model
Starting from a design thinking approach to business models, participants learn the major ontologies for business model innovation (i.e. Canvas, STOF, VISOR) in order to design their business models. In the second part of the course, participants focus on specific issues

such as partner involvement and value networks, as well as multi-sided business models

Course 3: Business Model Testing

Participants learn to evaluate their business model, for instance in the view of future environmental changes. Tools include business model stress-testing (Haaker et al 2017) and more generic business case calculations.

Course 4: Business Model Implementation

This course is about moving from a design for a new business model to actually implementing it in practice. For this, students learn tools such as business model roadmapping (De Reuver et al 2013).

Course 5: Business Model Metrics and Advanced Tools

This is the most advanced course, especially suitable for medium-sized firms. Topics include the integration of a new business model into the business and enterprise architecture of a firm, as well as agile working and the operating model. Also, attention is given to metrics that make explicit the performance of a business model.

The courses were bundled in a so-called XSeries, see Figure 1.

Average Length:	6-10 weeks per course
Effort:	2-4 hours per week, per course
Number Of Courses:	5 Courses in Program
Subject:	Business & Management
Institution:	Delft University of Technology (TU Delft)
Language:	English
Video Transcripts:	English, Italian, French, German, Spanish
Price (USD):	\$49 per course

Figure 1: XSeries program as it was advertised.

Structure within each course

Every course had the same structure; 3-5 main blocks which sorted the main subjects of that particular course, see Figure 2. Each block contains around 5 sub blocks, comparable to lessons. Sub blocks could be an instruction, a case study or an assignment. Each sub block consisted of several units. Units could be in the form of an introduction video (discussing core concepts and examples), additional knowledge video (e.g. explaining a certain tool for business model innovation), a case video (in which a business owner explained their business and the application of certain tools), an assignment video (example answers of assignments were shown and discussed by the course team), a feedback video (where frequently asked questions of the learners where answered by the course team), explanation or introduction text, case questions, a quiz or a test (assignment). The sequence of units within a sub block usually started with an introduction video and related quiz, and was followed by a case video plus corresponding case assignment, own company assignment and finally a feedback video. Assessments ranged from self-assessment to peer review. Participants could ask questions and interact via a discussion forum. Teaching assistants monitored the discussion forum.

Videos were recorded in a professional studio. Video clips were typically less than 6 minutes. All videos and cases were provided in English and subtitled. Subtitles were translated into German, Spanish, Italian and French, assuming that SMEs would appreciate the



Figure 2: Structure of a typical course



Figure 3: Screenshot of online learning video

contents in their own language. A screenshot of a video is provided in Figure 3.

During the first year of giving the courses, three webinars were provided as well. The webinars were live discussions in a professional studio with the lecturers and with business owners. Through the webinars, tools were explained, and questions from participants were answered in a livestream.

Key Insights

In this paper, we base the evaluation on the first three of the five courses. In the time between launching the first course (fall-2016) and now (fall-2018), the three courses attracted 20,000, 24,000 and 10,000 participants respectively.

Promotion was created through the existing Edx channels (e.g. newsletters). A professional YouTube trailer was created. In addition, we went through over 30 SME organizations across Europe (e.g. chambers of commerce, business associations) giving those flyers and promotional messages. Participants were also attracted through an ongoing European project in which the tools were being developed, led by an external partner specialized in communication. One method particularly successful were Facebook campaigns tied

to the webinars, with some promoted messages receiving over 1,000 likes.

Around 1-2% of all participants purchase a certificate upon completion of the course. These figures are similar to other online courses provided through the Edx platform.

Evaluation approach

Two data sources were used to collect evaluation data of the course. A first source of data collection were the standard surveys as developed by the learning centre of the TU Delft (these surveys are available on request). At the beginning, in the middle and at the end of each course, respectively a pre-, mid- and post-evaluation survey was sent to the learners. These extensive surveys collected data on the background of each learner, and asked the learners a set of open and closed questions on several aspects such as their comprehension of the course, the workload of the course and the clarity of instruction texts and videos.

Learners were not obliged to fill in the surveys, nor were they obliged to answer every question of each survey. Therefore, the number of respondents differs per survey and per question of each survey. In total, over 103 respondents have filled in the surveys. Some learners provided their opinion on the course on the forum,

while others spontaneously sent e-mails to the course team, in which they provided and explained their opinion of the course. Therefore, a second source for data collection was the forum discussions and e-mails the course team received from the learners.

The combination of the results of open- and closed evaluation questions were used to assess whether the previously discussed design principles were fulfilled. Qualitative analysis was used to structure and summarize the answers to the open questions of the surveys, while quantitative analysis was used to analyse the answers to the closed questions, where often a Likert scale was used to collect the answers. For the qualitative analysis, three-level coding was used, where the higher-order level- one codes comprised of the main open-question. The level-two codes comprised overarching themes (such as several different quotes on the videos of the course) and the level-three codes comprised of more detailed quotes (such as comments on the quality of the videos of the course). An example of a coding network for the mid-survey for an open-question of the first course can be seen in Figure 4.

After the coding process was completed, relevant codes (i.e. codes that could be linked to the previously discussed design principles) were sorted on the design principles. For example, codes comprising of quotes on the comprehension of the videos, assignments quizzes etc.

were assigned to the first design principle, which states that the course should also be understandable for business owners with secondary education. After the codes were sorted on the design principles, for each design principle, quotes were selected which could be used as evidence if a certain design principle was fulfilled or not.

Evaluation results

Design principle 1

Most learners state that the courses are simple to follow and that the course material is clear and understandable. Less than 10% of participants found the courses too difficult.

“The combination of videos, quizzes and assignments make the course dynamic and enjoyable”

Some learners state that the course is too easy compared to other courses on the edX platform. In contrast, some learners acknowledge that the course is relatively simple and basic, but that this is not a problem; it is just a MOOC that facilitates basic knowledge on business model innovation. Several learners asked for more challenge and materials:

“The content was just a short overview. I hoped for some more insights. Background lessons were short [...] I was looking for some more instructions – how and why does it work.”

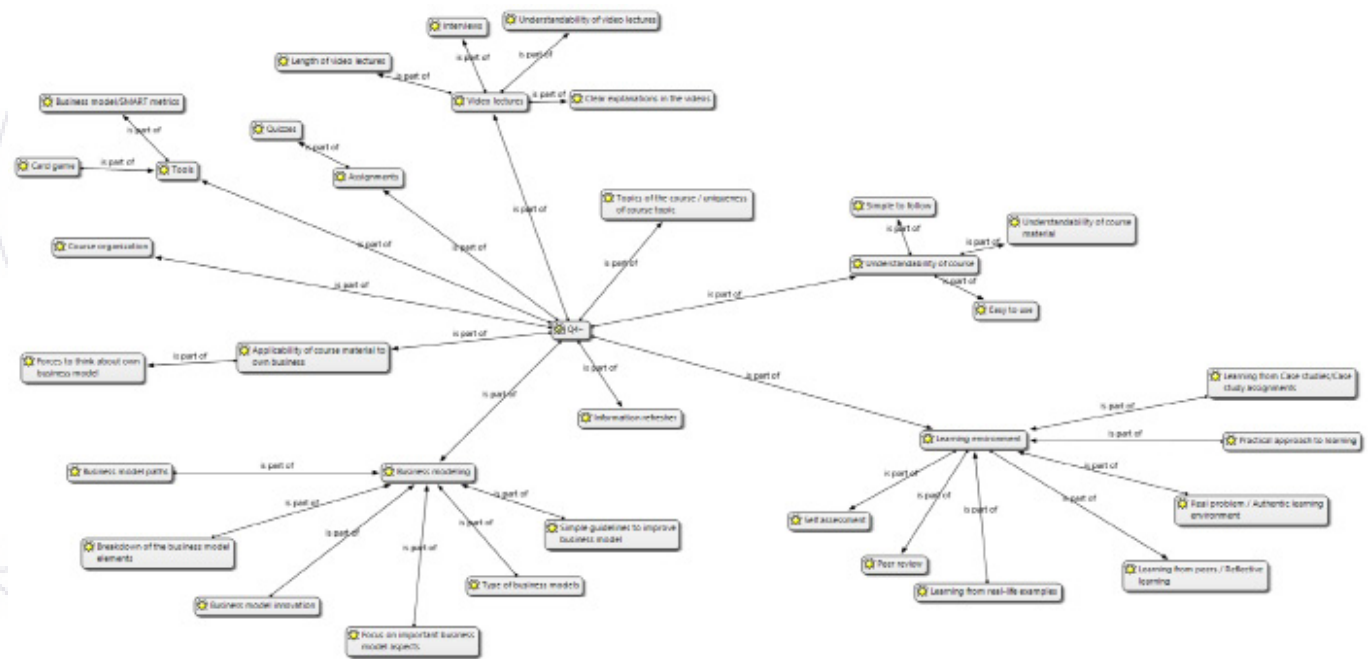


Figure 4: Example of coding network for qualitative evaluation data

For every course 35%-40% of the participants have a bachelor's degree and 30%-35% a master's degree, whereas 15% has only secondary education. These figures make it difficult to determine which type of learners was able to follow the courses easily. If around 60%-70% of the learners were able to follow the course easily (and sometimes even stating that the course was too easy) but had higher education, design principle one is not or only partly met. Nonetheless, the percentage of students that felt that the courses were too difficult is for all courses lower than 10%.

As suggestion for improvement, some learners state that the course also should include quizzes and assignments that are especially developed for more advanced learners. It might be a solution to still include some assignments with a more scientific perspective for learners who want to dive deeper into the concepts of business model innovation. Based on these findings, we slightly adapt the design principle:

Design principle 1a: Simplify the material such that business owners with secondary education can comprehend it

Design principle 1b: Offer additional materials as an optional add-on such that advanced learners find sufficient depth in the course

Design principle 2

Evaluation results show that, by splitting up the courses in small chunks, learners are still able to finish the courses in their limited amount of available time. Generally, there are not many learners that indicated they did not have enough time to finish the course. Learners on average felt that they had more hours available than they were expected to use in the course. In other words, learners that felt that the course was about right in terms of workload and duration. While most learners are nonetheless still able to finish the courses, they tend to neglect to participate in the forum discussions when they do not have enough time.

There are some learners who acknowledge the benefit of the increased flexibility of following an online course, however, other learners complain about the strict deadlines of the assignments and quizzes. They state that the strict deadlines do not fit in their daily agendas due

to for example unexpected changes of available time, which is something that occurs regularly as a business owner. This is illustrated by the following quotes.

"I missed out a deadline due to an unplanned business travel. It is totally understandable that the assignment is closed [...] However, for working people it would be helpful to get a second chance."

Future MOOCs that are developed for SME's could allow for a one-time postponement of the deadlines to meet the dynamic agendas of business owners. In addition, a notification or reminder system should help remember busy business owners to finish assignments in time. Based on these findings, we slightly adapt our design principle

Design principle 2a: Limit the time to be spent on business model innovation course to 2-4 hours per week so that business owners with a limited amount of available time can still keep up with the course

Design principle 2b: Make deadlines flexible such that business owners with an unpredictable time schedule can keep up with the course

Design principle 3

Evaluation shows that practical tools and case examples that fit SME's own context help learners to perceive the value of newly acquired knowledge. The tools, case studies and real-life examples are much appreciated by most learners. According to the learners, the combination of theory explanation and theory application through quizzes, assignments and interviews with real-life business owners in the case studies results in set of courses that has a very practical approach to learning. The tools participants like most are both creative brainstorming tools (i.e. business model card game, thinking hats) and quantitative tools (i.e. business model metrics). Some learners state that they will use the tools in their daily work from now on. The tools and frameworks of the course support this practical approach, by making it easier to apply the business model innovation concepts from theory to practice and the own context.

"I like to reflect my learning against practice. Actually working tools and frameworks are a really useful addition for this!"

No concrete suggestions were provided by the learners to improve the design of the MOOCs on this aspect. Again, a finding is that in the evaluation surveys, participants ask for more: more cases and more tools, even though each MOOC contained between 3 and 5 cases, and between 3 and 6 unique tools. Based on this supporting evidence, we retain our design principle:

Design principle 3: Provide inspiring examples and intuitive tooling to make the assignments more relatable to the practical own context of business owners.

Design principle 4

Videos and images make it easier for learners to acquire knowledge in a rather short period of time. Learners with a secondary education can relate well with visual formats. Besides some specific complaints on the audio or video quality of some video lectures, the videos lectures are generally evaluated positively by the learners. The videos are perceived as short and concise. Learners appreciate the instruction and assignment videos, stating that it is easy to follow and helps them understand the concepts of business model innovation.

"The instruction videos are very clear, which is important to help us understand the concepts of business models and how to apply it to our own company."

One specific group of learners state that merely video and images do not meet their demands. Therefore, future MOOCs for SME's can include additional (scientific) readings to meet these demands.

As suggestion for improvement learners state that more visuals (i.e. images or diagrams) could be incorporated in the videos. Also, a different setting for video recordings is suggested, such as video recordings on location of the interview for the case study videos. (In later stages of the course, some videos were recorded at the location of the interview). Based on these findings, we adapt our design principle:

Design principle 4a: Use video and images rather than text in order to ensure the understandability of the content for business owners with secondary education;

Design principle 4b: Provide additional learning resources in the form of (scientific) readings to meet the needs of advanced learners

Design principle 5

Learners frequently mention the applicability of the course material to the own context. They state that the tools and frameworks force them to think about their own business models, and that it gives them new insights into how they could improve their business model. The tools from the businessovermaker.eu platform give learners possibilities to reflect on their current business model and to highlight important areas for improvement. This demonstrates them how they could use these tools in practice, which should show the immediate value and relevance of the newly acquired knowledge.

"It really stimulated to work on my own business model"

Some learners acknowledge the immediate value and state that they might use the available tools in their daily job from now on. In light of the supporting evidence found, we retain our design principle:

Design principle 5: Have the learner apply the tools directly on his/her own business in order to provide immediate value and relevance;

Design principle 6

Learners often positively mention the value of reflective learning from peers through the peer assessments assignments. Whereas we were first hesitant to ask practitioners to share their business model ideas due to confidentiality concerns, in practice most participants are willing to do so. In addition to this, the forum discussions allow them to have discussions with peers on the topics as discussed in the lectures.

"The peer review is an excellent idea and helpful to see/read how others view my business idea"

As first suggestion for improvement, most learners state that for the peer assignments a quality control system should be implemented. This quality control system should guarantee more sufficient and detailed feedback from peers, while this is currently lacking in some cases. This system could give for example additional points to peer reviewers who give detailed and comprehensive feedback to their peers. Second, learners state that the forum discussions are sometimes difficult to follow, due to a lack of form structure and

organization. Based on the largely supporting evidence, we retain our design principle:

Design principle 6: Facilitate collaborative learning and sharing of best practices through forum discussions and peer reviews in order to promote learning amongst the business owners.

Discussion and conclusion

This paper demonstrated how open online courses can contribute in transferring academic knowledge on business model innovation to practitioners. We developed, tested and refined six design principles for business model innovation courses. We found that the initial design principles were useful in creating courses that are overall well appreciated by participants, and that are especially well accessible to SME managers and owners on diverse education levels. Our evaluation results do point out that there is also a need to offer more advanced, academic learning materials for those learners that are more advanced or looking for more challenge.

In terms of generalization, we must reflect on the enabling conditions that we had while developing online courses on this scale. The development took place within a larger research program on business model innovation, funded by the EU, through which access to tools and cases was abundant. We also had access to an existing MOOC delivery platform (i.e. Edx) with an existing base of users looking for online courses. Further, having a professional studio and video production process is a prerequisite. Even having these conditions, considerable efforts were needed. We had a course team comprising three lecturers, four teaching assistants and one educational advisor. Over the course of 15 months, around

1000 hours by the three lecturers have been invested in designing and creating the courses, and likely another 1000-1500 hours by teaching assistants in preparing materials and running the online course. These figures do not even include the resources for translating subtitles in four different languages, which were outsourced to a professional agency. A tight project management approach is needed to produce and deliver course materials in time and with a consistent quality.

In our project, next steps are currently ongoing. The MOOC environment has been archived, and a new version of the online learning courses has been created, in a so-called Professional Certificate Program (PCP). As the contents of the PCP courses are largely the same, this is a textbook example of the business model pattern 'versioning'. The value proposition of a PCP is, besides online learning, that this will boost the career of the participant. Main changes are that (1) the price of a certificate is increased to 99 euros per course; (2) recommendations from businesses have been added on the course homepage to showcase the impact of participating in the course on career in business; (3) grading and giving feedback for a selection of the assignments by the course team.

Another opportunity we are exploring is how to use the online courseware in a research program on business model innovation and tooling. For this, we are experimenting with having online course participants use one of the tools being developed in a PhD project, including a formal pre- and post-questionnaire to measure the impact of the tool on understanding of business models and idea generation. Methodological issues are still to be explored, especially as, compared to a controlled experiment, the researcher has little influence on who uses the tool in what context.

References

- Bouwman, H., Nikou, S., Molina-Castillo, F. J., & de Reuver, M. (2018). The impact of digitalization on business models. *Digital Policy, Regulation and Governance*, 20(2), 105-124.
- De Reuver, M., Bouwman, H., & Haaker, T. (2013). Business model roadmapping: a practical approach to come from an existing to a desired business model, *International Journal of Innovation Management* 17(01), 1340006.
- de Reuver, M., Athanasopoulou, A., Haaker, T., Roelfsema, M., Riedl, A., & Breitfuss, G. (2016). Designing an ICT tooling platform to support SME business model innovation: Results of a first design cycle. In Proceedings of the Bled eConference, Bled Slovenia.
- Haaker, T. Bouwman, H., Janssen, W., & de Reuver, M. (2017). Business model stress testing: A practical approach to test the robustness of a business model, *Futures* 89 (2017) 14-25.
- Daradoumis, T., Bassi, R., Xhafa, F., & Caballé, S. (2013). *A review on massive e-learning (MOOC) design, delivery and assessment*. Paper presented at the P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC), 2013 Eighth International Conference on.
- Gregor, S. (2006). The nature of theory in information systems. *MIS Quarterly*, 611-642.
- Guàrdia, L., Maina, M., & Sangrà, A. (2013). MOOC design principles: A pedagogical approach from the learner's perspective. *eLearning Papers*(33).
- Kesting, P., & Günzel-Jensen, F. (2015). SMEs and new ventures need business model sophistication. *Business Horizons*, 58(3), 285-293.
- Lüttgens, D., & Diener, K. (2016). Business model patterns used as a tool for creating (new) innovative business models. *Journal of Business Models*, 4(3).
- Margaryan, A., Bianco, M., & Littlejohn, A. (2015). Instructional quality of massive open online courses (MOOCs). *Computers & Education*, 80, 77-83.
- Moon, S., Birchall, D., Williams, S., & Vrasidas, C. (2005). Developing design principles for an e-learning programme for SME managers to support accelerated learning at the workplace. *Journal of Workplace Learning*, 17(5/6), 370-384.
- Siemens, G. (2013). Massive open online courses: Innovation in education. *Open educational resources: Innovation, research and practice*, 5, 5-15.
- Yousef, A. M. F., Chatti, M. A., Schroeder, U., & Wosnitza, M. (2014). *What drives a successful MOOC? An empirical examination of criteria to assure design quality of MOOCs*. Paper presented at the Advanced Learning Technologies (ICALT), 2014 IEEE 14th International Conference on.

About the Authors

Dr ir Mark de Reuver is Associate Professor at Delft University of Technology, Department Engineering Systems and Services. His research focuses on digital platforms, ecosystems and business models. He has been co-coordinator for the H2020 project ENVISION (www.businessmakeover.eu) aimed at developing online tooling for business model innovation by SMEs. He is Associate Editor for Electronic Markets and Telematics & Informatics, and published in journals including Journal of Information Technology, Journal of Business Research, Technological Forecasting and Social Change, and Information & Management.



Martijn Cligge was a student at the Delft University of Technology, where he received his Master's degree in Systems Engineering, Policy Analysis and Management with a focus on IT. He was part of the Business Model Innovation team as a student assistant. Next to that, he wrote his master thesis on business model innovation and implementation in networked enterprises. Currently, he is an IT consultant, involved in large scale ERP (IT) implementation projects.



About the Authors

Dr.ir. Timber Haaker is a professor of business models in the school of finance and accounting at Saxion University of Applied Science in The Netherlands, where he leads the Research Group Business Models. He holds a PhD in Applied Mathematics. He has about 20 years experience in researching, teaching and applying business models, both in industry and academia, and published extensively in books and papers. His current research interests include new business models, i.e. digital business models, data driven business models and sustainable business models, and developing practical yet grounded methods and tools to support business model innovation. He is co-developer of a series of MOOCs on business model innovation for SMEs (<https://bit.ly/2kF5srw>).

