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1. Title of research project

(English): The Structuration of Open Online Education in the Netherlands (SOONER)

(Dutch): De structuratie van open online onderwijs in Nederland (SOONER)

2. Duration of the research project

Start: 1 – 09 - 2015
End: 31 – 08 – 2020

3. Research team

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4. Summary of the research project

The SOONER project focuses on fundamental research about open online education (OOE) in the Netherlands. Open online education is viewed as a strategic activity of an educational institution with systemic implications for the organization. Based on proven approaches for program evaluations from the health sciences, the project will enable systematic and long-term research on open online education from a macro-, meso- and micro-perspective. In addition, this project combines fundamental and accompanying research. SOONER will be organized via three PhD-projects on 1) self-regulated learning skill acquisition in the context of OOE, 2) motivation and intentions as key to drop-out in OOE and last but not least 3) scalable support solutions for OOE including learning analytics. These projects will be framed by a Post-Doc project that focuses on the structural and organizational embedding of OOE.

All projects will start from standardized measurement instruments or will adapt those for the specific context of OOE. All projects will access several sources for their data collection: MOOCs offered by the partner institutions, open courses offered by the OpenupEd partners, courses offered by the SURF projects and institutions participating in the SURF projects. The SOONER project is connected to the MOOCKnowledge project, a European cross-provider standardized survey about MOOCs and the SCORE2020 project, a European project focusing on support needs of educational institutions for OOE. Data from these European projects will be compared to Dutch OOE initiatives and benchmarking options will be explored. All results of the project will be shared via open licenses.

(Dutch):
Het SOONER project betreft fundamenteel onderzoek naar open online educatie (OOE) in Nederland. Open online educatie wordt bekeken als een strategische en organisatorische activiteit van een onderwijsinstelling met systemische implicaties. Gebaseerd op beproefde benaderingen voor programma-evaluaties uit de gezondheidswetenschappen, maakt dit project systematisch en langetermijnonderzoek naar open online educatie mogelijk vanuit macro, meso en micro perspectief. Ook richt het project zich zowel op fundamenteel als flankerend onderzoek. SOONER is georganiseerd in drie PhD projecten gericht op: 1) zelfregulerend leren vaardighedenontwikkeling in het kader van OOE, 2) motivatie en intenties als bepalend voor drop-out (i.e., het gat tussen intentie en werkelijk gedrag) in OOE en 3) schaalbare ondersteuningsoplossingen voor OOE inclusief learning analytics. Deze projecten passen binnen een post-doc project dat gericht is op het inbedden van OOE in de organisatie.

Alle projecten gebruiken gestandaardiseerde meetinstrumenten of passen deze aan aan de specifieke OOE context. Alle projecten benaderen verschillende bronnen voor de dataverzameling: MOOCs die aangeboden worden door partner-instituten, open cursussen die aangeboden worden door de OpenupEd partners, cursussen die aangeboden worden door de SURF innovatie-projecten en instellingen die meedoen met de SURF projecten. Het SOONER project is verbonden met het MOOCKnowledge project, een Europese, aanbieder-onafhankelijke survey over MOOCs en het SCORE2020 project, een Europees project gericht op de ondersteuning van de behoefte van onderwijsinstellingen aan OOE. Data van deze Europese projecten worden vergeleken met Nederlandse OOE initiatieven en benchmarking opties zullen worden geëxploreerd. Alle resultaten van dit project zullen worden gedeeld via open licenties.

5. Research proposal

5.1 Scientific quality

While a lot of expectations are surrounding open and online education (OOE) especially connected to the hype around Massive Open Online Courses (MOOCs), empirical research is still lagging behind to show effects of OOE on increasing quality and accessibility of higher education. Fischer (2014) argued that currently, we are still in the early development stages of MOOCs. He stated that "both the hype and the underestimation [of MOOCs] are more based on assumption and beliefs than theoretical groundings and qualitative and quantitative data". This is the primary motivation behind the SOONER project and the project has the goal to contribute scientific evidence to the rather blurry picture that exists about *conditions* for and *effects* of OOE. One of the problems of the field is its systemic character and the complexity of variables on 4 different levels: (1) the individual characteristics of the participants of OOE, (2) the educational and didactical design of OOE, (3) the organisational embedding and support of OOE in the organisation and (4) the policy-making and financial incentives on a national and European level. As variables on all levels may influence each other, research is just emerging about the relation between variables and the field is also still in development, the question occurs which strategies and solutions will help to innovate (higher) education and contribute to improvement of the quality of education and the accessibility of higher education through OOE.

Whereas some authors chose either a rather *functionalistic* viewpoint and focus on the environmental factors of open education (Mulder, 2013; Quirk, Anderson, & McGreal, 2013; Pepler, 2014) or a rather *subjectivistic* viewpoint and focus solely on the individual (Milligan, Littlejohn, & Margaryan, 2013), we take a *structurationist perspective* following Giddens (2013) who proposed with his *theory of structuration* a middle-ground between both extremes. Following this perspective, we propose a long-term research initiative that alternates between micro-, meso- and macro-level of research.
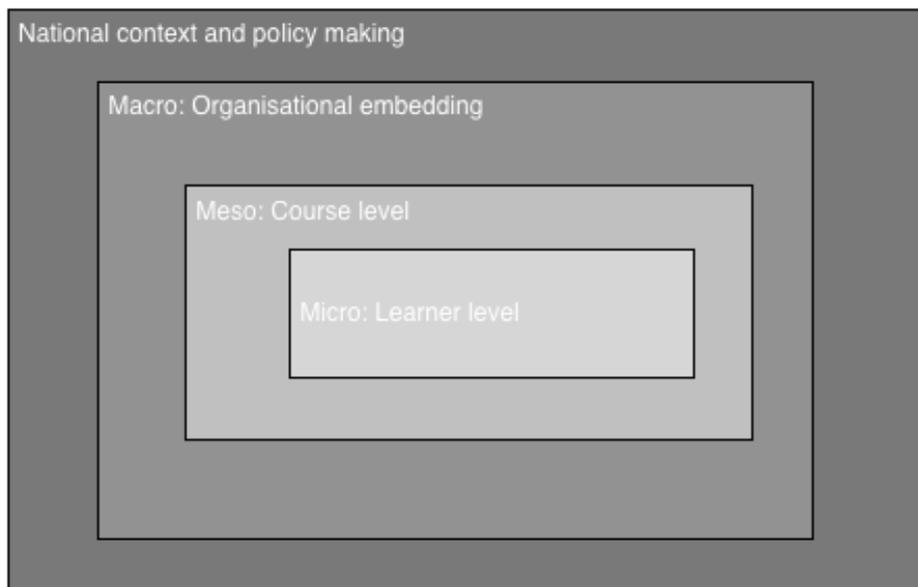

Figure 1: SOONER levels of analysis

The micro-level of OOE is related to the individual characteristics of participants of OOE. On this level two research questions are the most important ones from our perspective. First of all, the level of self-regulated learning (SRL) required for OOE and the development of SRL skill development in OOE needs attention because these skills are prerequisite for learning in this type of education and they are difficult to acquire (Graesser & McNamara, 2010). While initial research started to analyse SLR skills of participants in OOE (Kop & Fournier, 2013; Beaven, Hauck, Comas-Quinn, Lewis, & de los Arcos, 2014) most ongoing research is either based on small-scale data at case-study level or descriptive. In subproject A of SOONER a theoretically grounded and systematic research on these aspects will be implemented that goes beyond data from a single open online course. Another important question on this level is the problem of drop-out in open online education which is addressed in subproject B. Often, a naïve understanding of drop-out is applied and only measures of completion or certificates are taken into account. This approach is not appropriate in the context of OOE since many different intentions can motivate enrolment in MOOCs. Therefore, motivations and intentions need to be taken into account when drop-out is discussed. The perspective taken is intention-behaviour gap. While recently the discussion about intentions in OOE has been initiated (Reich, 2014), a theoretically grounded approach needs to be followed that is able to cover the diversity in intentions and motivation.

The meso-level of OOE is related to the course level. Questions of educational design and support options are the most important research aspects here. The most crucial question for open online education on this level is how tutoring and support can be implemented for a very large number of students without increasing the number of tutors exponentially, which would make OOE a very costly endeavour. One of the core questions for implementing OOE is therefore which educational design approaches and support and feedback options are able to scale (Ferguson & Sharples, 2014). This problem is addressed in subproject C. Promising research has been conducted in this direction in for instance peer-based problem-related question-answering (Van Rosmalen et al., 2008), peer-assessment in MOOCs (Piech, et al., 2013), formative feedback on textual assignments (Berlanga et al., 2012) and project-based learning in MOOCs (Spoelstra et al., 2014).

Last but not least, the macro-level is related to the organisational embedding of OOE. On this level, questions like strategic goals, organizational guidelines and values are important. In addition these three levels are embedded into a national context and environmental variables like funding and structural support of OOE.

Within the SOONER research project, we propose a systematic research project that collects data and evidence about the conditions and dependencies of variables on these levels over a longer amount of time and complements these data with existing data and evidence. The *structuration of open and online educations* is the interplay on variables on all of these levels and is neither static nor evolving from one layer alone. More specifically, we will gather:
- insight in how cognitive and meta-cognitive conditions affect learning behaviour,
- insight in completion parameters
- insight in suited and scalable learner support models,
- insights into relations between organisational strategies, intervention options and effects on quality and accessibility of OOE, additionally
- a set of design principles to support effective SRL strategies,
- learner support tools and instructions

Sub-project A: Self-regulated learning skill acquisition in open online education (PhD project)

Effective self-regulated learning (SRL) skills improve learning (e.g., Paris & Paris, 2001) and are prerequisite for learning in OOE. Students of every age category, however, often lack these skills (Graesser & McNamara, 2010). This PhD project proposal aims to unravel how well-developed the SRL skills of adult students who participate in OOE are (study A1), how SRL skill acquisition in OOE can be supported by instructional design (studies A2 and A3), and if SRL skills can be trained directly before students engage in OOE (study A4). The general purpose of this proposal is to optimize both learning and SRL in OOE. SRL deals with subsequent steps in a learning process (Loyens, Magda & Rikers, 2008). However, in the SRL literature there is a variety of perspectives on how cognitive, meta-cognitive, motivational, and contextual factors influence the learning process (e.g. Boekaerts, 1997; Pintrich, 2003; Zimmerman, 2002). This subproject is theoretically rooted in Winne and Hadwin's (1998) model of self-regulated learning. Winne and Hadwin distinguish four learning phases, namely, task definition, goal setting and planning, studying tactics, and adaptations to metacognition and they describe each phase in terms of the interaction of a person's conditions, operations, products, evaluations, and standards.

Study 1 will use Winne and Hadwin's model to investigate student learning behaviour in OOE. Studies 2 and 3 in this proposal focus on supporting SRL skill development. Although scaffolding SRL is well-investigated (e.g., Azevedo & Hadwin, 2005), supporting the development and acquisition of SRL *skills* is less researched. In addition, hypermedia environments such as OOE impose an extra cognitive load on a student which may lead to a lack of cognitive capacity available for SRL processes (Azevedo, Moos, Johnson & Chauncey, 2010). Based on these observations, it seems important to further investigate supporting SRL skill development in OOE. Graesser and McNamara (2010) describe a number of pedagogical agents that focus on supporting SRL skill development. Their research forms the starting point of the investigation in study 4.

Sub-project B: Motivation and intentions as key to drop-out in open and online education (PhD project)

Currently there is much attention for MOOCs as an alternative way to provide Higher Education to the mass. However, MOOCs in its current form suffers from high drop-out rates up to 97% (Belanger & Thorntom, 2013). This PhD research project is aimed to provide more insight in this drop-out. Important theories that will be used in this PhD study are Self-determination theory (Deci & Ryan, 2000; Ryan & Deci, 2006), the Reasoned action approach (Fishbein & Ajzen, 2010), and Implementation intentions (Gollwitzer, 1999). The research will use learning analytics, questionnaires and structured interviews for gathering the data. Statistical methods will include Structured Equation Modelling (using Mplus, see Muthén & Muthén, 1998-2014) and Hayes process analysis techniques (Hayes, 2013).

Sub-project C: Scaling of support, feedback and interaction in open and online education (PhD project)

While it is debatable, what the term massive means in the context of OOE, the number of participants in OOE requests in any case to analyse thoroughly which educational methods, means for assessment and feedback and interaction possibilities are able to scale (Ferguson & Sharples, 2014). Since a simple linear up scaling of human resources is not possible in OOE, it is an open questions which support and feedback approaches do not increase the tutor load of the instructor while still maintaining the perception of an inspiring and high-quality learning experience allowing the participant to reach intended learning goals. In the PhD project a mixed-method approach will be followed. Desk-research about the state of the art and existing evidence will be combined with observational research and experimental research. Within this context study 1 will focus on which educational methods, assessment and feedback methods and support models are suited for and scalable in OOE. Subsequently, study 2 will look at the impact of implemented assessment approaches and support models on goal achievement. While data from the MOOCKnowledge project (Kalz, et al., 2014; Kalz et al., submitted) and the SURF innovation projects (SURF, 2014) will be used for the observational research, Learning Analytics will be used for the experimental research in terms of its potential to function as a scalable method of assessment and feedback. Alongside the widened access to learning analytics tools (Kraan & Sherlock, 2013), a series of examples has emerged which takes into account various combinations of engagement (attendance and participation on e.g. video lectures, assessments, forums and chats), knowledge, personality and practical preferences of the learner (such as language, time zone and availability) to support the learner directly with for instance peer-based problem-related question-answering (Van Rosmalen et al., 2008), peer-assessment (Piech, et al., 2013), or formative feedback on their textual assignments (Berlanga, Van Rosmalen, Boshuizen, Sloep, 2012) or, indirectly, with dashboards (Verbert, Duval, Klerkx, Govaerts & Santos, 2013) visualising their progress and achievements individually and in contrast to their peers. This research forms the starting point of the investigation for both study 3 and study 4. In study 3 we will focus on how we can select and use peer-support of more-knowledgeable others. Van Rosmalen et al. (2008), Piech et al. (2013) and Spoelstra et al. (2015) propose different but related models which make use of the analysis of a set of traits of the learner to create small teams which successfully assists each other. Continuing upon this research we will create a model and prototype for peer support and empirically test it with regard to what degree it activates and supports the learner to regulate their learning, and it scales up and is portable across MOOCs. Subsequently, in the same way, in study 4 we will focus on how learning analytics be used to design a visualisation dashboard to increase self-regulated learning skills.

Sub-project D: Open and Online Education as means for organizational development and educational innovation of Dutch Higher Education Institutions

While the other projects are related to the micro-or meso-level of OOE, the Post-Doc project will focus on the macro-level. The macro-level is related to the organisational embedding of OOE activities. While the PhD-projects are more related to fundamental research, the Post-Doc-project will primarily to accompanying research of the innovation-projects of SURF. For this purpose the SOONER project will follow the Precede-Proceed Model (Green & Kreuter, 2005) that has been successfully used for 30 years in the health and medical domain. In the SOONER project this model is adapted to the field of education. Central in the adapted Precede-Proceed Model is the relationship between open and online education (OOE) and quality of education (QoE) (see the dark grey areas in Figure 2). Carefully designing and implementing OOE may lead to an improvement of QoE. Improving QoE is a continuous endeavour in the domain of education. The relationship between OOE and QoE is both the starting point as well as the end point of the trajectory in which an innovation/intervention programme is to be developed, implemented, and deployed. In Phase 1, the focus is on getting insight in the current state of affairs regarding OOE/MOOCs and QoE which needs to be improved. Phase 2 focuses on the scale of this state of affairs (who is busy with OOE/MOOCs and who not; is attention for OOE/MOOCs growing and how fast and in which direction?). Phase 3 assesses who or what is maintaining the current state of affairs (i.e. it investigates the predisposing, reinforcing and enabling factors). Phase 4 assesses who or what is responsible for the current state of affairs (i.e. it investigates the policies, regulations and organizational factors). Also in Phase 4 a blue print is made of the innovation/intervention programme. In Phase 5, the innovation/intervention programme is implemented and deployed. Phase 6 monitors and evaluates whether the conditions are changed and a situation has been created that benefit OOE/MOOCs.; Phases 7 examines whether the innovation/intervention programme has resulted in a certain impact that improves the QoE (Phase 7).
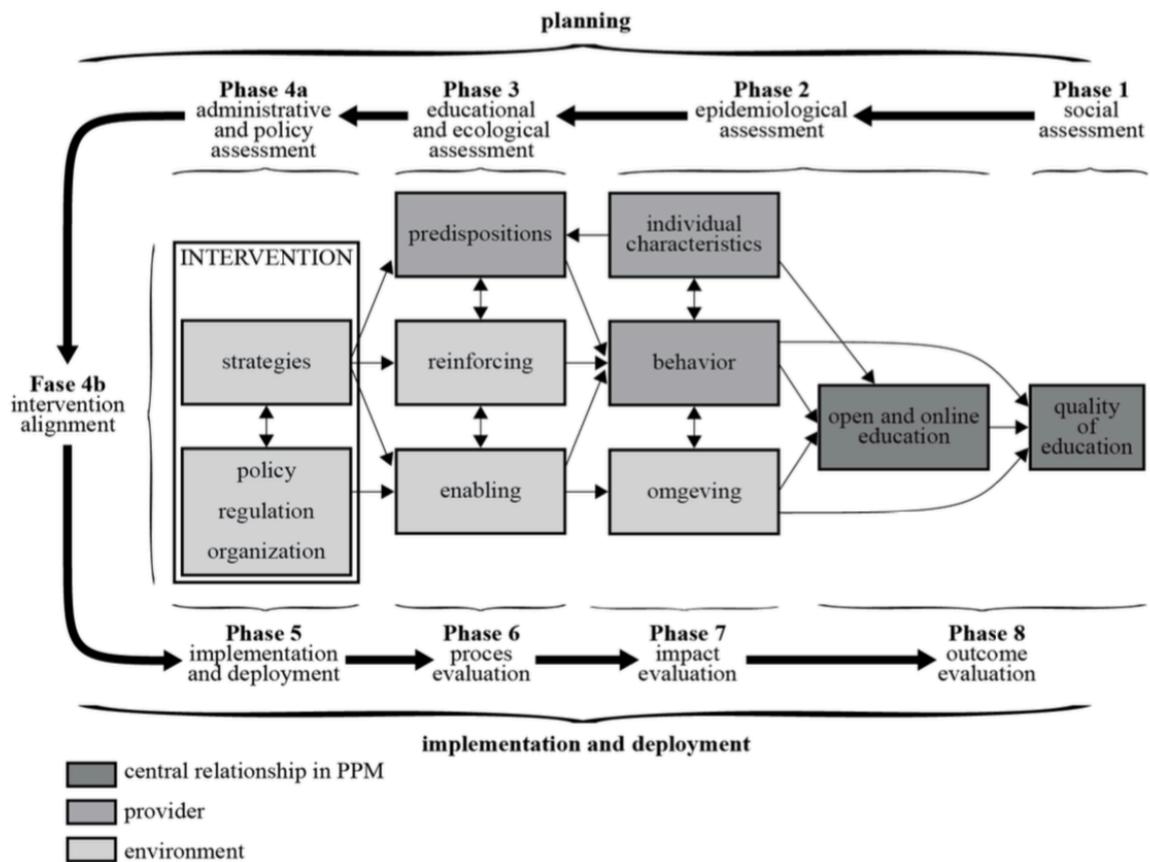
Figure 2: Precede-proceed model for Open Online Education (OOE) (Crosby & Noar, 2011)

The systematic assessment of the initiatives including the organisational embedding and effects on policy and regulations of the educational institutions for potentially 40 projects will produce a unique dataset and insights into relations between organisational strategies, intervention options and effects on quality and accessibility of OOE. The post-doc will be responsible to organize an effective collaboration between the SOONER project and the SURF projects funded during the project runtime. The approach followed will be on the one hand demand-driven, on the other hand the post-doc will approach the project leaders in a standardized manner with a toolbox for evaluating their impact and organisational embedding. Part of the toolbox will consist of standardized instruments developed in related projects on European and international level. If relevant, the Post-Doc will also connect the fundamental research projects with the accompanying research and will facilitate joint data collection and joint-data analysis. While the Phd-projects follow a classical research process, the Post-Doc project is more oriented towards demands of the providers and follows a more agile and iterative process.

Background and related research
The SOONER project builds on related initiatives of the applicants or on findings of recent projects that have links with the SOONER project:

1. The Wikiwijs project (See Appendix B for an overview of publications of Wikiwijs). In this project, the motivations and intentions of teachers to use open educational resources (OER) and other digital learning materials that are not completely free were analysed. Also, organizational perspectives were taken into account. In particular, the role of transformational leadership was investigated.
2. The OpenupEd initiative is a European initiative to aggregate and offer MOOCs from different providers under a joint quality-label that is in line with European values and takes into account the OER history of open education (Rosewell & Jansen, 2014). The project has been initiated in close cooperation between the Open University of the Netherlands and the European Association of Distance Teaching Universities (EADTU).
3. The MOOCKnowledge project (Kalz, et al., 2014, Kalz et al, submitted; see Appendix A for a full description of the MOOCKnowledge project). In this project, the motivations and intentions to take MOOCs and to complete them is investigated. The socio-economic background of the MOOCs takers is assessed and how quality of the MOOCs influences motivations and intentions.

4. The SCORE2020 project as a European Initiative is systematically scanning the needs for support of European Higher Education institution with regard to OOE. The project will deliver a survey instrument to assess strategic goals and support needs of higher education institutions.

The SOONER project will be able to collect data from different MOOC providers during the runtime of the project:

- The Open University of the Netherlands will offer two MOOCs per year during the project runtime for the Dutch educational community. Based on experiences with the first two Dutch MOOCs approx. 1000 participants can be expected per MOOC leading to a total of 10 000 learners.
- In the framework of the MOOCKnowledge project, cooperation agreements with the 12 partners of the OpenupEd initiative have been made to allow data collection in their MOOCs. In addition the project consortium is currently finalising framework agreements with the organisation behind the Spanish MiriadaX platform and the Catalan government who will launch a new platform soon. These agreements will give the project access to approx.100 000 learners per year.
- The Open University of the Netherlands is currently negotiating an agreement with the United Nations Environment Program (UNEP) to develop and evaluate a MOOC on marine litter. From 2015 until 2017 the MOOC is expected to attract approx. 800 000 learners.
- The approx. 40 SURF projects will eventually provides access to additional participants from the Netherlands and worldwide.

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