THE SELF-REGULATED LEARNING QUALITY ASSURANCE APPROACH TO DESIGNING MOOCS. INSIGHTS FROM THE OPEN VIRTUAL MOBILITY PROJECT

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Abstract

Studies on learning in Massive Open Online Courses (MOOCs) show that Self-Regulated Learning (SRL) is necessary to succeed in an open courses which require learners to set goals, take decisions and monitor learning progress. This paper describes the quality assurance approach focused on Self-Regulated Learning (SRL) applied to the design of a set of mini-MOOCs in the Open Virtual Mobility Learning Hub. We present the results of an investigation into the potential of different learning design elements for the support of SRL metacognitive tasks. The investigation is based on two surveys with learning design professionals who assessed the potential of the mini-MOOCs and the Learning Hub for SRL tasks. The work presented here is based on the outcomes of the Open Virtual Mobility (OpenVM) Erasmus+ project (2017-2020), which is a strategic partnership aiming at the enhancement, development and recognition of open virtual mobility skills in European Higher Education Area (EHEA) through the creation of the OpenVM Learning Hub with MOOCs which include OERs, e-assessment and open credentials and aim to support educators and students in the development, assessment and recognition of open virtual mobility skills. The work presented here focuses on the self-regulated learning quality assurance approach which is based on Design Based Research (DBR) in which all elements are designed, implemented and evaluated in an iterative cycle of production, innovation and knowledge generation. The results suggest that different MOOC design elements may be helpful to support specific SRL phases and tasks such as task-analysis, self-motivation, self-control, self-observation, self-judgement and self-reaction.

Keywords: Self-Regulated Learning, Quality Assurance, Design Based Research, Virtual Mobility, Open Education, Open Virtual Mobility, MOOC, OER.

1 INTRODUCTION

Higher education has been facing new challenges in view of today's globalisation and internationalisation. Virtual Mobility (VM) has been established in as a possibility to enhance and support internationalisation, innovation and inclusion in higher education through the application of digital media and tools to communication and collaboration across borders [1]. Although outward and inward student and staff mobility in higher education has been encouraged in the recent years, the main barriers to a wider uptake has been the high costs of travelling and staying in different countries, as well as socio-economic, political and health-related issues impeding the participation of specific groups in physical mobility. These barriers can be dramatically reduced by adding the virtual component to mobility and making virtual mobility potentially accessible to all [2].

Despite a number virtual mobility initiatives and projects in the past years, the uptake of virtual mobility in higher education is still low and the possibilities of different types of virtual mobility including virtual exchanges and virtual internships remain unknown to many educators and students [3]. Virtual mobility can develop its potential provided higher education leaders, educators, students, international officers, policy-makers and other stakeholders know about and are willing to embrace the opportunities of virtual mobility. Specifically, the involved stakeholders need the necessary skills and readiness for the uptake of virtual mobility in higher education [1].

The Open Virtual Mobility (OpenVM) Erasmus+ project addresses the key challenge to the uptake of virtual mobility in higher education by creating a Learning Hub for achievement, assessment and recognition of virtual mobility skills in context of open education. The Learning Hub serves as a learning environment for educators and students and provides a set of mini-MOOCs for developing, assessing and recognising skills acquired from and/or relevant for the implementation and/or participation in virtual mobility [1].

This paper describes the quality approach focused on Self-Regulated Learning (SRL) applied to the design of OpenVM learning hub with a set of mini-MOOCs and includes the results from the quality survey which was conducted in at the end of two iterations in the project (survey 1 and survey 2), each with n = 7 internal reviewers from partner organisations participating in the OpenVM project.

2 QUALITY ASSURANCE IN THE OPEN VIRTUAL MOBILITY PROJECT

The Open Virtual Mobility (OpenVM) Erasmus+ project (2017 – 2020) is a strategic partnership which aims at development, assessment and recognition of virtual mobility skills in European Higher Education Area (EHEA) through the creation of the Learning Hub with a set of mini-MOOCs. The OpenVM project addresses the need of creating accessible opportunities for achievement of virtual mobility skills in alignment with Open Education (OE) principles [1]. Therefore, the project is called Open Virtual Mobility as it integrates virtual mobility and open education approaches in supporting higher education teachers and students in acquiring, assessing and recognising open virtual mobility skills (i. e. virtual mobility in context of open education). The Group Concept Mapping research in the OpenVM project revealed eight skill clusters needed for successful implementation and/or participation in open virtual mobility and are at the same time a resulting from such implementation/participation [5]. The concept of open virtual mobility is aligned with the OpenEdu Framework by the Joint Research Centre of the European Commission, which recommends a holistic strategy for opening up education along ten dimensions, i. e. access, content, pedagogy, recognition, collaboration, research, strategy, technology, quality and leadership [6]. Currently, half-way through the project, first designs of OpenVM mini-MOOCs aligned with the eight skill clusters and based on the principles of Open Education have been designed and implemented in pilot editions, which are currently undergoing quality-assessment by internal reviewers from partner organisations participating in the OpenVM project and user-testing.

The OpenVM project has been structured into highly interconnected seven Outputs. The first output (Output 1) is dedicated to the analysis and exploration of the skills needed for successful engagement and learning experience in virtual mobility in open educational contexts. The second output (Output 2) is dedicated to the design, implementation and sustainable maintenance of the OpenVM Learning Hub, the online learning environment with MOOCs are available to facilitate development and recognition of open virtual mobility skills. The next three outputs (Output 3, 4, 5) are dedicated to the components the Learning Hub and MOOCs, i. e. tools to improve collaboration (matching tool) and the management of open virtual mobility skills (semantic skill directory) in relation to existing competency frameworks such as ESCO (Output 3); e-assessment tools for assessment of OpenVM skills at three different levels (Output 4); the recognition of skills with open credentials based on the Open Badge standard (Output 5). In Output 6, all the elements are joined together to develop a set of mini-MOOCs based on a sequence related to eight skills clusters and structured into three levels (foundations, intermediate and advanced). The last output (Output 7) is dedicated to the Quality Assurance Framework (QAF) with special focus on Self-Regulated Learning (SRL). The pedagogical quality approach recommends a learning design which promotes autonomous learning and facilitates students' decision-making based on their self-regulated skills [4, 7]. The quality assurance approach is also coherent with the set of OpenVM skills which emerged from Group Concept Mapping conducted in Output 1, i. e. eight skill clusters including autonomous learning and active, self-regulated learning skills [5].

The quality assurance approach in OpenVM project is designed from the perspective of several existing quality assurance frameworks including guidelines with a special focus on the pedagogical design and the autonomous learning approach. These include: (1) ENQA recommendations for higher education institutions [8] and the ESG updated version by ENQA and other agencies [9]; (2) the newest version of the Quality Assessment for E-learning [10]; (3) the OpenEdu Framework [6]; and (4) the MOOC design guidelines by Jansen, Rosewell and Kear [11]. Based on these frameworks, the OpenVM QAF promotes a MOOC design based on student-centred methodologies, accessibility to learning resources, transparency, recognition of skills, diversity and interactivity.

3 SELF REGULATED LEARNING IN MOOCS

Self-Regulated Learning (SRL) is usually described as "learning how to learn" [12], which is a metacognitive process by the learner who engages in a proactive way with motivational, cognitive and behavioral schemes and which takes place in social settings [13]. SRL can be also described as the ability to control, manage, and plan own learning in order to attain own learning goals [15] The model by Zimmermann [13] is the one of the most popular among the many models that already exist and

which has received a lot of attention in the educational technology field. One of the most well-known models by Dabbagh and Kitsantas [14] is based on a cycle of three phases, i. e. forethought, performance and self-reflection and six sub-phases, i. e. task-analysis, self-motivation, self-control, self-observation, self.judgement, self-reaction (cf. Table 1).

Massive Open Online Courses (MOOCs) require high levels of Self-Regulated Learning as learners have to self-regulate their learning, including taking decisions about why, when and how to engage [16] as well as autonomously and actively engage in learning through goal-setting, identifying effective strategies to learn and monitoring progress toward attainment of goals [15]. Self-regulation is important in MOOCs, as it requires a high degree of independence and motivation [17]. According to a number of authors [18, 19, 20, 21], one of the main problems associated with MOOCs has been the high dropout rates. Some authors have suggested that high dropout rates in MOOCs may be related to problems with self-regulated learning [22]. One of possible explanations for low MOOC completion rates have been also the absence of external prompts for making progress, lack of clear (social) norms for completing courses and difficulties with time management [15]. [15] asked successful learners about their SRL strategies in MOOCs and found out that the most common SRL strategies were: (1) reserving time in the week for studying (time management), (2) adapting own study habits to match the requirements of the course (effort regulation), and (3) working without the help from others (reversed help-seeking). Current research have also suggested that self-regulated learning in online learning environments may be enhanced by prompting learners with SRL strategies such as helping learners apply SRL strategies, providing scaffolding, suggesting metacognitive activities such as thinking aloud about own decisions and/or asking learners to explain own actions [15]. However, current research has also shown that only prompting learners in MOOCs about how to engage in self-regulated learning does not help improve course completion or achievement [15]. Therefore, authors have suggested to focus on targeted approaches to scaffolding the learning experience in MOOCs [15]. Other authors have also suggested that the quality of the MOOC design may be the crucial element for enhancing self-regulated learning and learner involvement [23, 24].

Taking the results of current research in SRL in MOOCs into consideration, the QAF in the OpenVM project focuses on enhancing self-regulated learning metacognitive tasks on the level of design of the MOOCs embedded in the learning hub, scaffolding the learning experience into of a set of eight mini-MOOCs, with each mini-MOOC providing learning opportunities at three levels (foundations, intermediate, advanced). Each mini-MOOC begins with the pre-assessment of skills and ends with the e-assessment of skills at each of the three levels. Upon successful completion of each level learners may apply for a digital certificate in form of an open credential based on the Open Badges standard and issued through the Bestr badging platform[1]. This targeted approach to scaffolding learning experience aims to facilitate SRL processes, especially goal-setting, planning, analysis, self-reflection, self-monitoring and organization of learning. The following section describes how OpenVM mini-MOOCs attempt to enhance SRL in the Learning Hub.

4 SELF REGULATED LEARNING IN OPENVM LEARNING HUB

The design of the OpenVM Learning Hub[2] is based on the principles of Self-Regulated Learning and Open Education to promote achievement, assessment and recognition of virtual mobility skills. Both virtual mobility and open education aim to enhance cross-border communication and collaboration, participation in international knowledge flows, and the use of digital media to enhance teaching and learning [1]. The OpenVM Learning Hub aims to create engaging and effective learner experience, making use of meaningful gamification designs. Gamification can be defined as using game elements in non-game contexts [25]. The key design approach in the OpenVM Learning Hub is meaningful gamification, which focuses on providing effective incentives by helping learners find meaning in each underlying activity [26]. The OpenVM Learning Hub hosts OERs and MOOCs dedicated to Open Virtual Mobility as well as tools for group formation, i. e. the matching tool [27], semantic competency directory [28], different types of e-assessment including pre-assessment, peer-assessment, automatic assessment and e-portfolio-based assessment [29], and open credentials based on the Open Badges standard and used to recognise OpenVM skills [30]. The OpenVM Learning Hub is designed as a flexible and personalisable learning environment which allows learners to choose from a variety of options and learning opportunities to support and scaffold own learning [1].

[1] https://bestr.it/project/show/107?ln=en

[2] https://hub.openvirtualmobility.eu/login/index.php

In the following table we present selected examples of the MOOC design elements which aim to support certain SRL metacognitive task on the SRL model by Zimmerman [13].

Table 1. Examples of OpenVM MOOC design elements supporting SRL tasks.

SRL phase	SRL sub-phases	OpenVM elements
Forethought Metacognitive tasks performed before learning	task analysis self-motivation	MOOC welcome/introduction page Pre-assessment of skills Open Credentials to be earned
Performance Metacognitive tasks during learning	self-control self-observation	Tasks & SLR prompts in MOOCs OERs in MOOCs incl. quizzes Matching tool for group formation
Self-reflection Metacognitive tasks at the end of the learning process	self-judgement self-reaction	E-assessment and e-portfolio Peer-assessment activities Discussion forums

5 METHODOLOGY AND RESULTS

Based on the theoretical alignment of OpenVM Learning Hub design elements with the SRL model by [13] and followed by the first implementation of mini-MOOC pilots, the first internal review was carried out in September 2018 with n = 7 reviewers from partner organisations participating in the project and who have been involved in the design of one or more MOOC elements. The results were obtained via on online survey using Google Formular and provided the first insights into how different design elements may be helpful in support of SRL. The results have allowed to extract potentials and challenges of the current design in more detail and revise design approaches that were initially planned and implemented in the first pilots.

Following the OpenVM quality assurance approach based on the cyclic iterative process of Design Based Research, a new internal review was carried out in May 2019 with with n = 7 reviewers from the partner organisations participating in the project (there was an overlap of 3 reviewers from the first and second round). Based on the data from the second an online survey, new assessment of the potentials of different design elements for SRL in MOOCs was explored. The survey included six of the eight elements that were theoretically explored in the first iteration.

The following figures (1-5) present results from the second internal review and are related to the five elements designed, developed and implemented in the first piloting phase of the OpenVM project, i. e. the design of the learning hub, MOOCs, OERs, open credentials and e-assessment.

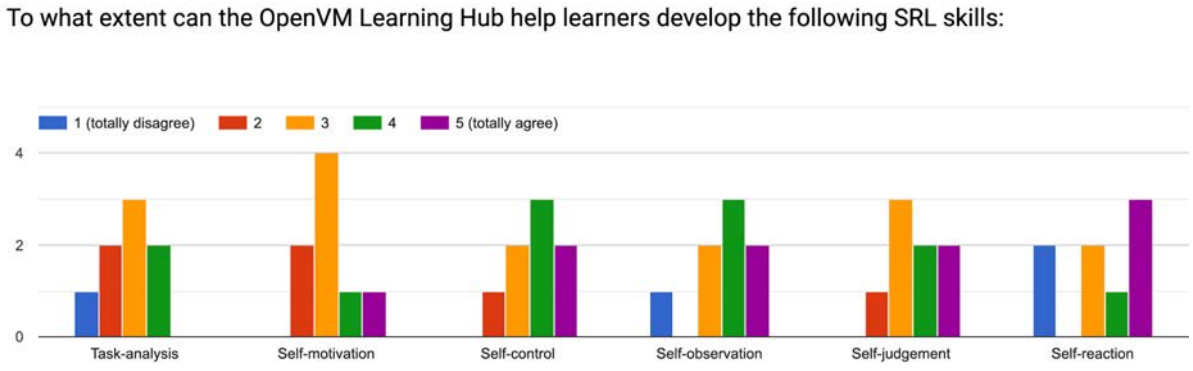

Figure 1. The potential of OpenVM Learning Hub design for SRL. Results of the second review, n = 7.

The OpenVM Learning Hub with the set of mini-MOOCs is a flexible learning environment which can be adjusted to individual learning needs and preferences by providing a range of choices including the choice of learning pathways. The results of the second review indicate that the current design of the

Learning Hub may especially support self-control and self-observation (performance phase) given a total of 5 answers in agreement, as well as self-judgement and self-reaction (self-reflection phase) given a total of 4 reviewers in agreement. The current design of the learning hub seems to be less suited to support task-analysis and self-motivation (forethought phase). These results will be taken into consideration in the next design iteration, especially in the design of meaningful gamification which will specifically target task-analysis and self-motivation at the level of the learning hub design, e. g. through the provision of (a) prompts for goal setting and decisions on desired outcomes of learning across all available courses (task-analysis), and (b) questions about self-efficacy beliefs and the "why" of learning on the meta-level (self-motivation).

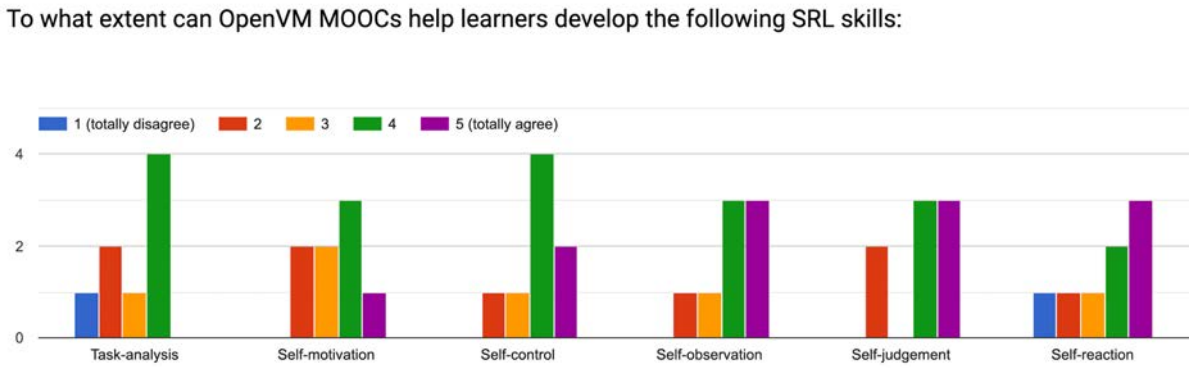

Figure 2. The potential of OpenVM MOOC design for SRL. Results of the second review, n = 7.

The OpenVM MOOC design seems to be well aligned with all stages of the SRL cycle, especially the final phase of self-reflection (self-judgement and self-reaction), but also with the performance phase (self-control and self-observation), and the forethought phase (task-analysis and self-motivation). Specifically, a total of 5 answers in agreement were reached in relation to the potential of the OpenVM MOOC for and self-reaction and 6 answers in agreement for the self-observation. The next iterations of OpenVM MOOC designs however could focus on further improving task-analysis and self-motivation at the level of MOOC design, e. g. through gamification design inside each MOOC providing (a) prompts for goal setting and decisions on desired outcomes of learning across inside each MOOC (task-analysis), and (b) questions about self-efficacy beliefs and the "why" of learning on the meso-level of each MOOC and on the micro-level of each MOOC-level (self-motivation).

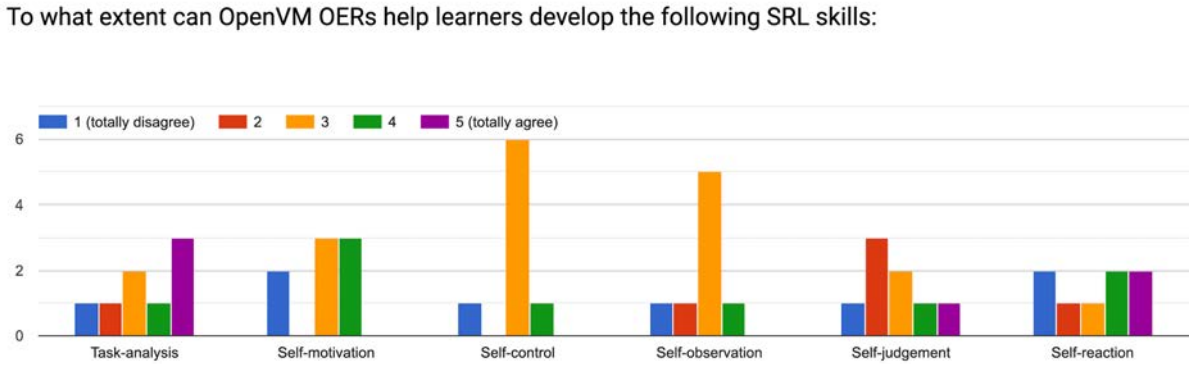

Figure 3. The potential of OpenVM OER design for SRL. Results of the second review, n = 7.

The design of OpenVM OERs seems to be least well aligned with the SRL model. Most reviewers seemed unsure about the potential of OERs to promote self-control and self-observation. Poor scores have been reached especially in relation to self-motivation, self-judgement and self-reaction. Therefore in further iterations of OER design, special attention should be given to alignment of OERs to (a) intrinsic interest of learners (addressing self-motivation), (b) improvement of integrated reflection questions and quizzes to enhance self-evaluation and feedback (addressing self-judgement), and (c) prompts to review and modify learning strategies with OERs (addressing self-reaction). These improvements will be possible due to the upcoming evaluation results from the first pilot phase.

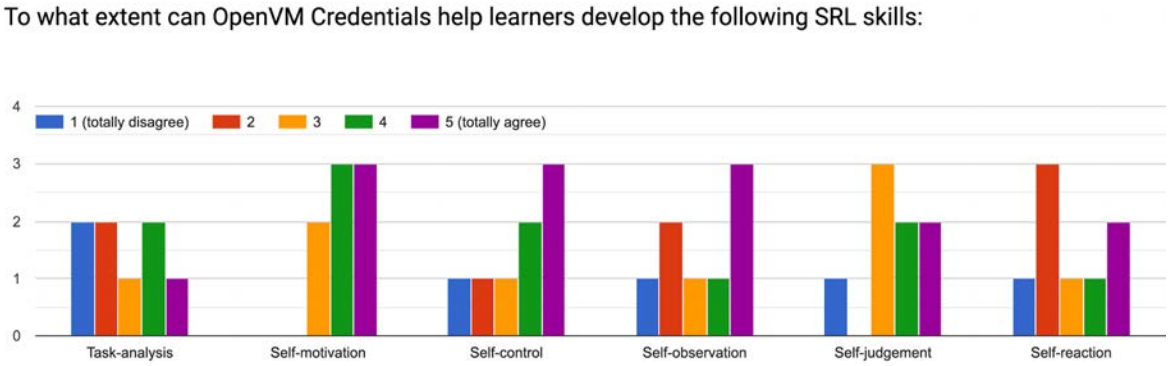

Figure 4. The potential of OpenVM Credentials design for SRL. Results of the second review, n = 7.

Open credentials in the OpenVM project are the elements which received high rating by reviewers for its high potential to support metacognitive processes in all phases of the SRL process. However, it is worth highlighting that the self-reaction, which is the main focus of open credentials, has received a lower number of answers in agreement compared to other SRL tasks. Therefore, the next iteration of the open credentials design and their integration into MOOC design should focus on enhancing self-reaction, e. g. increased feelings of self-satisfaction when completing a MOOC and earning an open credential. This can be reached by a number of meaningful gamification design elements, e. g. by (a) encouraging learners to discover OpenVM credentials in more detail before starting a MOOC, (b) discussing with other learners how open credentials can be used real life settings and (c) providing recognition message for MOOC completion.

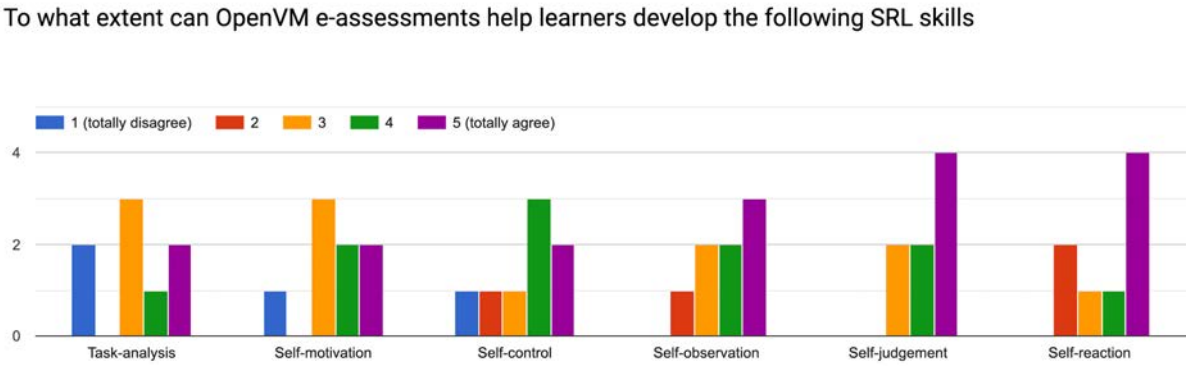

Figure 5. The potential of the OpenVM e-assessment for SRL. Results of the second review, n = 7.

The evaluation of the potential of e-assessment for SRL reached high values in all phases, especially self-reflection phase (self-judgement and self-reaction) which is the main purpose of e-assessment at the end of each level in the MOOC. E-assessment has received 4 and 5 answers in agreement for self-judgement and self-reaction, as well as 4 answers in agreement for self-control and self-observation, which means that e-assessment could also support the performance phase (during learning). Poorer scores have been reached for task-analysis which should be improved in the next iteration, e. g. by supporting strategic planning of the learning process though the already existing pre-assessment, which could include guidelines for learners related to a selection of learning strategies or methods designed to attain desired skill goals.

The following tables (2-3) present detailed results from the first and second review (survey 1 and 2) related to the design of the OpenVM Learning Hub and MOOCs.

Table 2. Potential of OpenVM Learning Hub to support SRL tasks.

OpenVM Learning Hub	First iteration / survey 1 (n=7)		Second iteration / survey 2 (n=7)	
	Disagreement	Agreement	Disagreement	Agreement
Forethought: task analysis	1	6	3	2
Forethought: self-motivation	1	5	5	2
Performance: self-control	3	1	1	5
Performance: self-observation	3	3	1	5
Self-reflection: self-judgement	1	4	1	4
Self-reflection: self-reaction	1	3	2	3

Results of Table 2 show that in the first iteration (survey 1), the reviewers agreed on the potential of the Learning Hub for supporting SRL tasks from the forethought phase (task-analysis and self-motivation), while in the second iteration (survey 2), the OpenVM Learning Hub was viewed as a strong resource for the support of SRL metacognitive tasks in the performance phase (self-control and self-observation). Also, it can be highlighted that for most reviewers (survey 1 and 2) the Learning Hub seems to be useful for supporting SRL tasks in the self-reflection phase (self-judgement and self-reaction). In the next iteration special attention should be paid to improving the design of the Learning Hub to support the forethought phase (task-analysis and self-motivation).

Table 3. Potential of OpenVM MOOC to support SRL tasks.

OpenVM MOOC	First iteration / survey 1 (n=7)		Second iteration / survey 2 (n=7)	
	Disagreement	Agreement	Disagreement	Agreement
Forethought: task analysis	0	6	3	3
Forethought: self-motivation	0	5	2	3
Performance: self-control	2	2	1	5
Performance: self-observation	1	2	1	6
Self-reflection: self-judgement	1	6	1	5
Self-reflection: self-reaction	2	5	2	5

Results from Table 3 show that the rating of MOOC in the performance phase has improved compared to the first iteration with most reviewers giving high scores for self-control and self-observation. Likewise, the self-reflection phase (self-judgement and self-reaction) received high rating both in the first and and in the second iteration. The forethought phase has received lower scores in the second iteration and should be taken into scrutiny. The next design iteration should focus on improving MOOC design elements which can enhance task analysis and self-motivation, e. g. better and more detailed explanations and introductions to learning tasks in the MOOC as well as unifying format designs.

6 CONCLUSIONS

The findings of both surveys suggest that some design elements may be more appropriate to support specific SRL tasks as described in the model by Zimmermann [13]. Despite our efforts to improve the design from the first iteration to the second iteration, some design aspect deteriorated in the second iteration, especially in relation to the forethought phase of task-analysis and self-motivation. Therefore special attention shall be given in the next iterations to improve and/or add new elements to the design of the MOOC targeting both task-analysis and self-motivation. The next design iteration could for example address the current shortcomings in the following ways: unify format and layout in each

miniMOOC in order to help learners' identify and understand the inner structure of the whole MOOC; give prompts for OER in order to promote personal strategies during performance; add more visual elements along with Open Badges to help students' manage their time and enhance their strategy towards their aims.

In general, the SRL model by Zimmermann [13] has proved to be a very useful model for the quality assessment of the MOOC design in the OpenVM project. It has provided a clear structure for the SRL quality surveys and recommendations which can be targeted to the three main phases of the model. Future work should focus on more detailed investigation of further design elements embedded in the mini-MOOCs, including task descriptions, prompts for learners and MOOC levels as well as more detailed investigation into design elements already explored in the first and second survey, e. g. although e-assessment was explored on the global scale, different forms of e-assessment already embedded in the MOOCs, e. g. pre-assessment, peer-assessment, e-portfolios, should be separately evaluated in relation to the SRL model.

Moreover, an exploration of SRL strategies applied by learners in the Learning Hub, e. g. a short online-survey integrated at the end of each MOOC level, could enhance a deeper understanding of how learning hub users cope with SRL in OpenVM MOOCs and provide hints for better scaffolding of the learning experience.

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