Open Virtual Mobility

Final Report on Conceptual Guidelines

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Executive summary

This report provides guidelines for designers and teachers wanting to design (open) virtual mobility activities. The design guidelines are arrived at following the analysis of several virtual mobility cases as well as the OpenVM pilots conducted in the project. The ACAD model was used to determine unique features of each design according to set, social and epistemic design principles, taking into account the eight OpenVM skills from our framework. The design guidelines consist of a set of questions for each of these design guidelines to support designers of (open) virtual mobility activities. The guide is intended as a starting point for learning designers to consider their learning objectives, the intended learning outcomes, as well as how different aspects of design can influence the type of learning environment they create. Furthermore, the guide links up the analysis of design to the learner skills established in O1-A1 and A2. This allows learning designers to think about design from the perspective of the particular learner skill they aim to develop.

1. Aims and Scope

Need within the project

The aim of the project was to enhance the uptake of virtual mobility in higher education and stimulate and support achieving and assessing these skills for institutions, educators as well as students or lifelong learners. The goals of O1 were to develop a conceptual framework and guidelines for achievement, assessment and recognition of virtual mobility skills in higher education. To do so, we needed to understand how Virtual Mobility skills could be *developed*, *assessed* and *recognised*.

In the beginning of the project, it became clear that a more fundamental question needed to be answered first, namely what are the learner skills of importance in Open Virtual Mobility? In O1-A1 and O1-A2, we have elaborated on the nature of Open Virtual Mobility activities and what is unique about the learning environment they work in (figure 1). Also, we have presented the results of a Group Concept Mapping Study that constructed the OpenVM Competence Framework with 7 learner skills and one knowledge domain associated with Open Virtual Mobility Activities. The OpenVM Learner Competence Framework includes a knowledge-focused skill on Virtual Mobility and Open Education.[1]

[1] https://www.openvirtualmobility.eu/outputs/4407-openvm-learner-competence-framework-en/

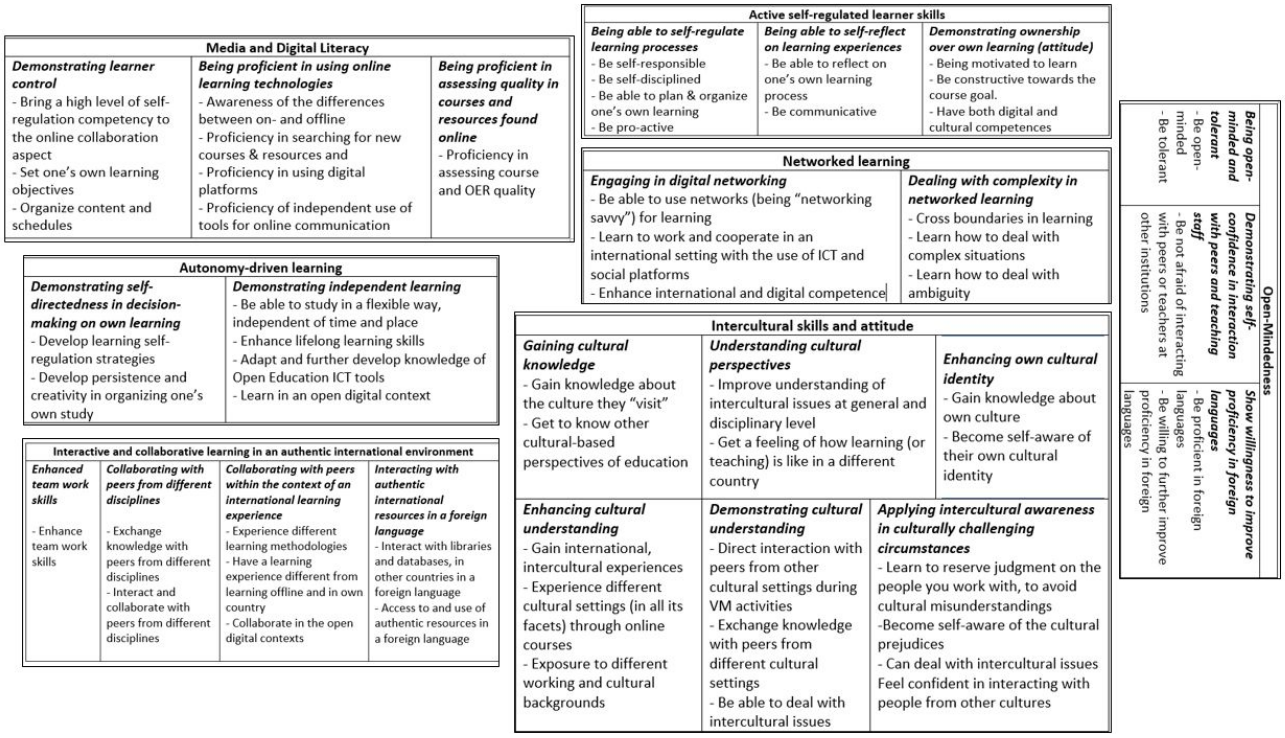

Figure 1. A 7-cluster Open VM Competence framework including subsequent skills and sub-skills, resultant from the GCM study.

Understanding which Open Virtual Mobility skills are developed through VM activities, gave the project the terminology to address learning in Open Virtual Mobility Activities in a more substantial way.

It also created the need to think about Open Virtual Mobility as a concept and how it differs from other forms of Virtual Mobility. The development of Open Virtual Mobility skills has been tackled through OpenVM MOOCs (Output 6). How these skills can be assessed has been looked at in Output 4, and their recognition has been looked at in Output 5.

However, there is another aspect of the design where development, assessment and recognition play a role, namely, in the way the Open Virtual Mobility is embedded within a course and an educational programme. An OpenVM activity is located within a course (often taking up the whole course), and embedded within a programme in an educational institution. In the OpenVM project, this aspect is seen in the different course designs of the pilots as illustrated in figure 2.

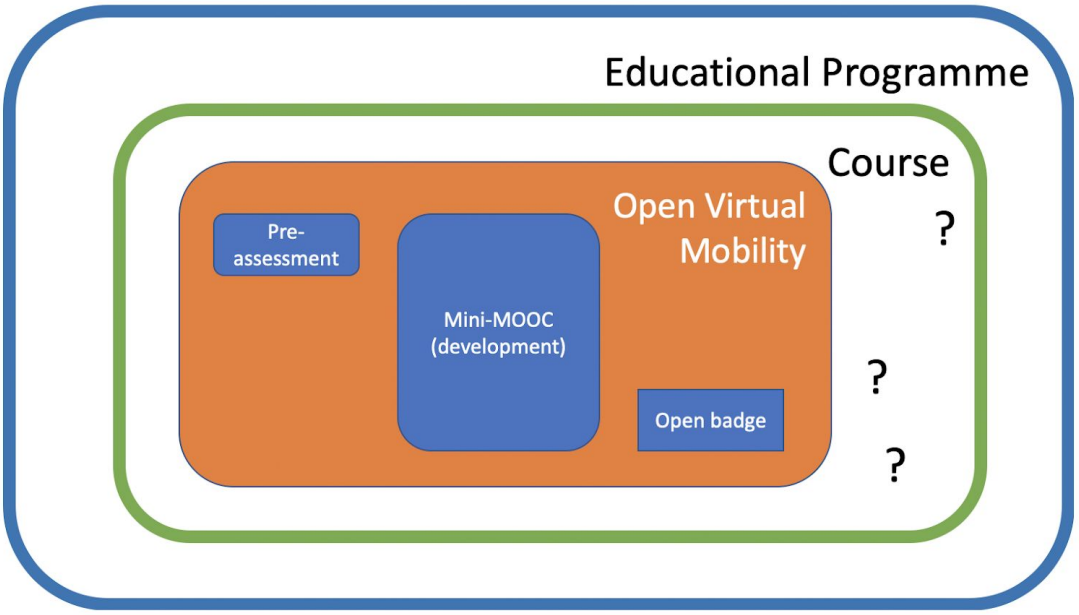

Figure 2. Open Virtual Mobility Activity in context, embedded in wider Course and Educational Programme

In this section of O1, we look at the options available to teachers and lifelong learners to incorporate OpenVM activities within their educational programmes. We consider which aspects of design they need to consider and create supporting documents to guide them in their choices. Taking a critical look at existing Virtual Mobility activities and the pilots, this document presents the results of an analysis of their design and offers practical guidelines that can be used by teachers, educators and teaching support staff to create Open Virtual Mobility Activities.

Within the OpenVM project, this part of Output 1 builds on the first two parts of O1, as well as work in O4 (Assessment), O6 (Pilots) and O7 (Evaluation). The paper is directed at all stakeholders of Open Virtual Mobility: primarily teachers/university professors and HE institutions officers responsible for international collaboration, as well as students.

2. Background and rationale

Open Virtual Mobility as designed learning environments

What has become apparent from the literature on virtual mobility and open education (and open virtual mobility as an example of this) is that these innovative forms of education aim to take advantage of all opportunities offered by the current drivers of change in higher education: internationalisation and digitalisation.

From the perspective of an individual learner or an individual teacher, the goal is to create a rich learning environment that can offer scope to learning, that goes beyond that offered in traditional environments. However, this also poses a challenge in understanding how the design of a course, the use of particular technology, or the use of particular working formats work together to influence the development of OpenVM learner skills.

In recent years there has been increased interest in understanding how complex learning environments work to enable learning.
Physical spaces are designed to enable particular activities within them, but can also afford activities that they are not designed to do (Peschl & Fundneider, 2014). In educational settings, the design of classrooms has taken prominence. In recent years, we see the emergence of hybrid classrooms, where physical and digital worlds blur to create a learning space in which the learner can develop (Tissenbaum & Slotta, 2019; Raes, Detienne, Windey & Depaepe, 2019). This mirrors the concept of the Personal Learning Environments, virtual spaces designed by teachers or learners themselves to support the learning of students in virtual spaces. Similarly, we can consider Open Virtual Mobility as a complex learning environment where physical and virtual spaces together create contexts in which learning can take place.

The work of Carvalho & Goodyear is especially useful in understanding the design of these complex learning environments (Carvalho & Goodyear, 2018). Their work on the Activity Centred Analysis Design (ACAD) model is specifically useful in analyzing the design of Open Virtual Mobility.

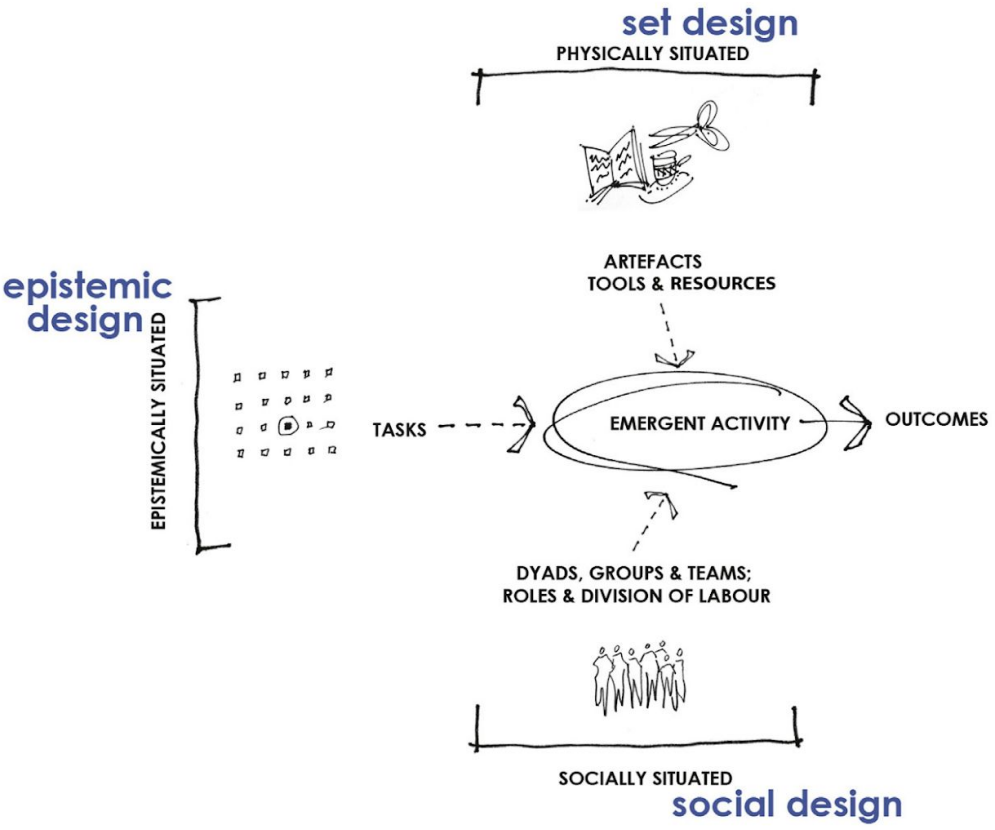

Figure 3. Activity-Centred Analysis and Design Framework (from Carvalho & Goodyear, 2018)

The ACAD framework starts from the concept that learning activity cannot be designed for. It states that learning activity is situated in a particular physical, epistemic and social setting, and the design of these aspects of the setting can influence the emergent activity of the learner. Specifically, the ACAD framework looks at set design (artefacts, tools, physical objects), social design (the roles and responsibilities of the participants) and epistemic design (the tasks taken up by the participants). The designable components create the setting in which student activity can emerge towards a possible outcome of learning. The ACAD framework offers a method to deal with the complexity of the design of the learning environment, thereby offering a suitable framework to view (Open) Virtual Mobility good practices.

Research questions

In this study, we will look at the following research questions:

- What are the unique design features (in terms of set design, social design and epistemic design) of (Open) Virtual Mobility activities and the learning environments they create?
- How do teachers support development, assessment and recognition of VM skills of students in these complex learning environments? By extension, what support exists for lifelong learners in developing, assessing and recognising their VM skills?
- How can teachers and lifelong learners be supported in working and learning in these complex learning environments?

3. Methodology

To answer these research questions, we looked into the design of existing VM activities, as well as the pilots of the OpenVM Moocs (O6) organised within this project. We make a distinction between both because:

- Open Virtual Mobility: the OpenVM pilots have a similar structure, as they work around (one or multiple) mini-MOOCs, embedded in different ways within the educational programme or curriculum
- Virtual Mobility: VM activities involve more direct embedding within the educational programme or curriculum with different forms of institutional collaboration.

3.1 Data Collection

Seven VM cases and six OpenVM pilots were chosen to identify the design features of relevance. For each case, available literature was collected, through their websites, institutional documentation, academic literature, presentations, etc. Participants involved in the cases (primarily teachers or activity organisers) were interviewed for further elaboration (where required and possible).

Table 1 lists the 13 cases taken up in this analysis.

Table 1. VM Cases and OpenVM pilots, with descriptions and intended learning outcomes

Nr.	Cases	Description	intended learning outcome
1	Instructional Design	This case is a joint development and implementation of an international online course in educational design by teams from University of Jyväskylä, Finland, Open Universiteit, the Netherlands and FernUniversität in Hagen, Germany. These three European universities developed a joint online course 'Instructional Design - Creating an educational media product', and implemented it as a pilot in the winter semester 2018/2019 for the first time. The course combined development of professional skills at university level with international project management and international collaboration competences. In mixed project teams, students of three different study programmes in Educational Science collaboratively developed a mobile learning scenario	domain knowledge acquisition non-cognitive skills: collaboration self-directedness self-regulation

		based on theories and models of educational design and realized this design in a mobile learning application. In small international groups of maximum five students, an initial idea on an educational media product was conceived and afterwards, the theoretical foundation, design, implementation and evaluation were developed in iterative cycles. The course ended with a final online presentation, evaluating the results.	
2	Virtual Exchange Alliance	The Virtual Exchange Alliance is a collaboration between eight leading universities, to open their curriculum up to students from partner universities. Commencing in early 2017, the initial pilot involves online courses, including a selection of Massive Open Online Courses (MOOCs). The participating universities are: - The Australian National University, Australia - Delft University of Technology, the Netherlands - University of Queensland, Australia - Hong Kong University of Science and Technology - University of Adelaide, Australia - Rice University, United States of America - Leiden University, the Netherlands - Wageningen University, the Netherlands This is an exchange of MOOCs. Students can learn online at a host university in the partnership and get credits for this at the home university.	domain knowledge acquisition non-cognitive skills: self-directedness self-regulation
3	TalkTech	The TalkTech project is a collaboration between Bentley University (Waltham, MA, USA) and University Politehnica of Timisoara (Romania). The project was initiated and organized by two individual professors (Mark Frydenberg and Diana Andone) responsible for the respective curricula at their universities. Both universities are located in areas that are technology hubs (university, industry), where the employment and the work situation are built around multinationals and international groups. In the 10 years the programme is running, the TalkTech's objectives have remained to develop literacy skills through the simulation of a global work environment in which team members use web-based collaboration and communication tools to create digital content. Research questions that have guided the project since its inception are the following:	domain knowledge acquisition non-cognitive skills: collaboration self-directedness self-regulation intercultural skills media and digital literacy skills

		How does participating in an international collaborative environment for learning change students' perspective over their subject of study (multimedia and internet technologies)? How will students use web-based synchronous and asynchronous technologies to collaborate with international peers to create a tangible work product in a short amount of time? What technical and cultural challenges will students identify in working globally, and how will they overcome them? (Frydenberg, 2018) This virtual mobility activity has been evaluated in several ways: through usage data, interviews with the students and a ZEF evaluation (zef.fi). Over the 10 years of its existence, the programme has been at the base of +/- 9 start-ups.	
4	KU Leuven Stellenbosch Think Tank	The KU Leuven – Stellenbosch University Think Tank is an extra-curricular and interuniversity honours programme in cooperation with Stellenbosch University (South Africa). The programme overarches all faculties. Thus, it has an eminent multidisciplinary character. Each edition, a different central theme is put forward. The total group of 30 students will collaborate over the course of 10 months (from February to November) to develop their own research project. At the end of the project, the results will be presented to the public during a joint concluding event. The participants are assisted by an interdisciplinary academic team of coaches from both universities.	critical thinking non-cognitive skills: collaboration self-directedness self-regulation
5	Erasmus Virtual Exchange Online Facilitated Dialogue	Erasmus+ Virtual Exchange is a ground-breaking project enabling youth in Europe and the Southern Mediterranean to engage in meaningful intercultural experiences online, as part of their formal or non-formal education. This flagship programme is established under a contract with the Education, Audiovisual and Culture Executive Agency, financed by the European Union's budget, and it is implemented by a consortium composed of Search for Common Ground, Anna Lindh Foundation, UNIMED, Sharing Perspectives Foundation, Soliya, UNICollaboration, Kiron Open Higher Education, and Migration Matters.	critical thinking non-cognitive skills: self-reflection intercultural skills

		The Online Facilitated Dialogue programmes enable participants to: - Establish a deeper understanding for the perspectives of their global peers on important issues that matter to youth today. - Develop employability skills such as critical thinking, cross-cultural communication, team-work, collaboration, and media literacy. In this interactive open online dialogue, participants embark on a short and meaningful virtual exchange experience by engaging in constructive communication with individuals from different cultures and countries over topics of mutual interest.They are exposed to different perspectives and the key skills needed for an increasingly globalized workforce. Participants meet face-to-face with peers from different countries, to participate in meaningful discussions in the presence of neutral facilitators.	
6	Erasmus Virtual Exchange Interactive Open Online Courses	Erasmus+ Virtual Exchange is a ground-breaking project enabling youth in Europe and the Southern Mediterranean to engage in meaningful intercultural experiences online, as part of their formal or non-formal education. This flagship programme is established under a contract with the Education, Audiovisual and Culture Executive Agency, financed by the European Union's budget, and it is implemented by a consortium composed of Search for Common Ground, Anna Lindh Foundation, UNIMED, Sharing Perspectives Foundation, Soliya, UNICollaboration, Kiron Open Higher Education, and Migration Matters. Participants can access open online courses across cultural contexts and national boundaries to learn with peers from diverse backgrounds using bite-sized video lectures, supported by skill building activities and facilitated intercultural discussions. Erasmus+ Virtual Exchange offers a range of Interactive Open Online Courses targeting both formal and non-formal education. These courses consist of lecture series, small group dialogue and	critical thinking non-cognitive skills: self-reflection collaboration intercultural skills

		interactive assignments and include the course European Refuge/es, addressing current issues of integration and diversity and an introductory course to dialogue facilitation to learn the basic concepts of dialogue facilitation and Virtual Exchange. Further, Erasmus+ Virtual Exchange is promoting a number of Massive Open Online Courses (MOOCs) enhanced with various degrees of Virtual Exchange elements, to increase dialogue and interactivity.	
7	Engineering Entrepreneurship	This course focuses on professional and intercultural engineering competences. It is part of a postgraduate studies programme, and is organised collaboratively in a European and an US university. At Penn State University, it is part of the Engineering Leadership Development program. At KULeuven, it is part of a postgraduate Program on Innovation and Entrepreneurship in Engineering. The course is described as "A journey from personal professional skills introspection and development towards intercultural and team competencies development." It has had 4 runs with different design choices.	non-cognitive skills: intercultural skills collaboration self-directedness self-regulation
8	Mini-MOOCs in Berlin	The pilot case study in Berlin, Germany took place at the Beuth University of Applied Sciences, which is the coordinator of the OpenVM strategic partnership. Following the COVID-19 pandemic, the summer semester 2020 at Beuth University of Applied Sciences in Berlin started on 20th April 2020 (instead of the regular semester start on 1st April). The piloting of OpenVM mini-MOOCs was integrated into modules in study programs in Department I Economics and Social Sciences and in Department VI Informatics by the same educator, who teaches in both departments. Two mini-MOOCs were integrated into the regular programme: The piloting in Department I included the "Collaborative Learning" mini-MOOC and was integrated into the module "Learning Design" in the bachelor study program "Digital Business (BSc.)". The piloting in Department VI included the "Networked Learning" mini-MOOC and was integrated into the "Learning Design" module in the online master study program Media Informatics.	non-cognitive skills: media and digital literacy skills

9	Mini-MOOCs in Rome	From the beginning of March 2020, the health emergency caused by the spread of COVID-19 imposed an immediate reorganization of the CDM (Center for Museum Studies) post-graduate courses in “Museum Studies” at Roma Tre University. The post-graduate courses are aimed at developing professional, transversal and digital skills in future museum educators. The current mobilization of the world of culture, in particular of the world of cultural heritage, encouraged the creation of specific teaching units aimed at understanding the current state of heritage institutions and at inventing possible strategies to most effective online fruition designing ad-hoc educational activities. Therefore, the post graduate courses’ managing staff prepared a series of units focused on increasing relevant distance learning opportunities to facilitate up-to-date attendance of the educational path started in February. Students were asked to choose mini-MOOCs they were most interested in. It was explained to students that Self-regulated learning skills include the ability to choose the most suitable learning path for one's own needs and purposes. The MOOC attendance was not a mandatory activity, but the attendance for each mini-MOOC was awarded with points. 15 out 30 students enrolled and completed one or more mini-MOOCs.	non-cognitive skills: media and digital literacy skills
10	Mini-MOOCs in Ibiza	The foundational level of the Active Self-Regulated Learning mini-MOOC was introduced in the subject of Educational Processes and Contexts of the Secondary Teacher Education Master program of the University Balearic Islands (UIB). The program is a face-to-face course for BA students who want to become teachers in Secondary Education and has been held in the Ibiza center for the UIB since 2010. This first pilot took place before the COVID-19 pandemic. However, the new edition in November 2020 will introduce in the design new discussion activities in which students can reflect on the affordances of OpenVM in the post-pandemic society.	domain knowledge acquisition non-cognitive skills: media and digital literacy skills reflection

		The subject is aimed at introducing students to institutional learning contexts along with other approaches to learning such as non-formal and informal learning. From the very beginning the subject has included numerous learning designs to introduce digital environments both with the aim of extending learning opportunities but also to give future teachers the experience to transfer digital tools into their future professional careers. However, learning through MOOCs had never been integrated before and so, due to the participation in the OpenVM project, students were offered innovative activities including mini-MOOCs, which were coherent with the syllabus of the course.	
11	Mini-MOOCs in Balearic islands - PhD	The OpenVM MOOC has been offered as an online course for PhD students of the Institute of Educational Research and Innovation of the University of the Balearic Islands. There were 37 students from Spain and other South-American countries and the vast majority were doing the online PhD program in Educational Technology.	non-cognitive skills: media and digital literacy skills reflection
12	Mini-MOOCs in Slovenia	This pilot case included third-year students of the Organization and Management of Information Systems program in the subject of Multimedia Systems. The course is part of the higher education study program in the Faculty of Organizational Sciences in Kranj, which is a member of the University of Maribor. The OpenVM mini-MOOC “Collaborative Learning” was used for the pilot. In Slovenia, COVID-19 demanded a rapid adjustment of the method of implementing the study process at all levels of education in the country. In the period before COVID-19, the Faculty of Organizational Sciences used blended learning methods and techniques in the educational process. The ratio of ex-cathedra and distance lectures is 50% - 50%. Lecturers at the faculty already had a lot of materials for distance education prepared before the COVID-19 period. The leap to full distance education, however, required a great deal of effort and adjustment. The use of OpenVM mini-MOOCs was therefore very welcome.	non-cognitive skills: media and digital literacy skills
13	Mini-MOOCs in Timisoara	In this case study all OpenVM mini-MOOCs were	non-cognitive skills: media and digital

		piloted, each student being required to choose two of them for piloting. The integration took place within the Web 2.0 Technologies course with 4th year Bachelor students from the Multimedia Specialization of the Faculty of Electronics, Telecommunications and Information Technology of the Politehnica University of Timisoara. After the COVID-19 lockdown was imposed on Timisoara, all university activities moved online.	literacy skills reflection

3.2 Data analysis

The data analysis was performed in the following way:

1. Each case was described according to the ACAD model on the major aspects of set, social and epistemic design, as well as the intended learning outcome.
2. In a next step, set, social and epistemic design were further specified into themes and based on this a coding scheme was made (Table 2).
3. The coding scheme was used to recode the descriptions of the cases.
4. Emerging patterns in the coded data were investigated, to formulate conceptual guidelines regarding the design of (open) virtual mobility.

Table 2. Coding scheme based on set, social and epistemic design (Carvalho & Goodyear, 2018)

Set design			
Materials	Form of resources	Is content delivered (through text, audio, video, etc.)?	Y/N
Technical environment	Shared space	Are there shared spaces?	Y/N
	Multimedia functionalities	Does the technical environment support multimedia resources?	Y/N
	Learner ownership	Is learner ownership enabled by the technical environment?	Y/N
Places	International setting	Do students interact in an international setting?	Y/N
	Cross-cultural primary interaction	Is the primary interaction of students in an international/cross-cultural setting?	Y/N
	Mono-cultural primary interaction	Is the primary interaction of students in a local setting?	Y/N
Time	Synchronicity	Do students meet synchronously?	Y/N
	Asynchronicity	Do students meet asynchronously?	Y/N
Organisation / Institutional embedding	Embedded in programme	Is the course embedded in an educational programme/curriculum?	Y/N
	Teacher network	Did the course emerge from contacts within a teacher network?	Y/N
	Institutional network	Did the course emerge from contacts within an institutional network?	Y/N

Student-created artefacts	Student-created artefacts	Do students create artefacts?	Y/N

Social design			
Roles student	Individual work	Do students work individually?	Y/N
	Group work	Do students work in group?	Y/N
	Networked work	Do students work as a network?	Y/N
Roles teacher	Monitoring	Do teachers monitor the progress of self-directed and self-regulated students?	Y/N
	Feedback	Do teachers give feedback to students at several moments in the course?	Y/N
	Facilitation	Do teachers facilitate the activities of students?	Y/N
Responsibilities student	Level of initiative taking by student	Do students need to take initiative in the organisation and planning of their learning activities?	Y/N
	Selection of partners in groups	Can students select their group mates themselves?	Y/N
Responsibilities teacher	High level of facilitation by teacher	Do teachers largely facilitate the activities of the students?	Y/N
Student characteristics	Level of education (bachelors/masters/phd/postgraduate)	What is the level of education of the students?	B, M, PhD PG
	International students	Is the student group culturally diverse?	Y/N
	Institution	Which educational institutions organise the case?	open
	Age	What is the age group of the students?	#
	Size of groups	What is the size of the student groups?	#

	Diversity of groups	Are the student groups culturally diverse by design?	Y/N
	Home culture	What is the home culture of the students?	open
	Visiting culture	What is the visiting culture of the students?	open
Teacher characteristics	Teacher team	Is there a teacher team?	Y/N
	Priorities teacher team (e.g. collaboration)	What is the teachers' team priority for the teaching experience?	open
	Academic background teacher team	Is the academic background of the teacher team interdisciplinary?	Y/N
Support staff	Project coordination	Is there a project coordinator?	Y/N
	Technical support	Is there technical support staff?	Y/N
	Logistical support	Is there logistical support staff?	Y/N

Epistemic design			
Tasks student	Domain-specific knowledge acquisition	Are the students introduced to new domain knowledge?	Y/N
	Generic skills & competencies	Are the students expected to learn new generic skills and competences, such as collaboration, creativity, self-regulation, critical thinking, reflection, digital and media literacy skills, or other OpenVM learner skills?	Y/N
	Build student attitude	Is the goal to work on students' attitude related to things like confidence, empathy, curiosity, self-reflection?	Y/N

	Assessment and self-assessment	What will assessment look like?	open
Tasks teacher	Joint delivery of course material	Does the teacher team jointly deliver course material?	Y/N
	Joint coaching of students	Does the teacher team jointly coach the students in the course?	Y/N
	Joint assessment of students' performance	Does the teacher team jointly assess the students in the course?	Y/N
Support for student	Designed scaffolded support	Is there designed scaffolded support?	Y/N
	Procedural information	Is there procedural information given to the student?	Y/N
	Self-directed students	Are the students expected to be self-directed within the course?	Y/N
Support for teachers	Support for teachers	Is there support for teachers?	Y/N
Support for staff	Support for staff	Is there support for other staff?	Y/N

4. Results

The results of the analysis are presented in full in Annex 1. Here, we try to answer the research questions.

RQ1: What are the unique design features (in terms of set design, social design and epistemic design) of (Open) Virtual Mobility courses and the learning environments they create?

The analysis has revealed some remarkable things regarding the learning environment created through the design of (open) virtual mobility. Firstly, the intended learning outcomes in our cases are not primarily domain knowledge related, but rather mainly relate to the development of non-cognitive skills or attitude development. In fact, the designs where knowledge acquisition is of primary concern, perhaps unsurprisingly involve the use of MOOCs. This suggests that digitalisation and internationalisation create possibilities to train non-cognitive skills in a way that traditional educational settings might not be able to. Moreover, a design using MOOCs may offer an efficient way for learners to acquire particular domain knowledge.

Secondly, the different aspects of design contribute to different possibilities for the learning designer. Regarding set design (or the virtual and physical materials supporting the course), the main point of choice seems to be whether course materials are offered in an organised and possibly scaffolded way to the learner, of if the learner is challenged to seek out their own relevant resources, creating more opportunities for developing non-cognitive skills (particularly, media and digital literacy, open-mindedness and active self-directed learning). Technology is used generally to support the creation and delivery of materials, potentially giving rise to learner ownership. Furthermore, some of our cases worked with student-generated artefacts, in which students are invited to create an individual or group tangible outcome to their work. Regarding social design, the extent to which interaction and collaboration with other students is encouraged, can differ in each design. Our cases portray examples of learners' individual work as well as group work and network-based structures. One common factor seems to be the international, cross-cultural setting of the courses. However, the extent to which learners are involved in the (direct) interaction with fellow learners (in a cross-cultural context) can differ.
Finally, regarding epistemic design, students' epistemic tasks in our cases are primarily focussed on combining several cognitive and non-cognitive tasks. There is a spectrum of support, ranging from "high level of facilitation by the teacher" to "high level of self-directedness by students". Teachers can collaborate in the delivery, coaching and assessment of courses, but can do each of these alone, depending on the teacher team priorities. Sometimes, in the case of the use of MOOCs, for example, teachers' interaction with their colleagues in other institutions may not be possible or deemed necessary.

Lastly, (Open) Virtual Mobility can take the scope of the whole course, or play a smaller, well-defined role within a larger course. An example of the latter is the way miniMOOCs were used in the pilots, as a way to deepen knowledge about a particular OpenVM skill that can be developed in other contexts.

In conclusion, the unique features of (Open) Virtual Mobility are non-cognitive skills, the flexibility of moving between high levels of facilitation against high levels of learner autonomy or providing challenges to allow students to grow.

RQ2: How do teachers support development, assessment and recognition of VM skills of students in these complex learning environments? By extension, what support exists for lifelong learners in developing, assessing and recognising their VM skills?

Development

Although the complex learning environment created by (open) virtual mobility designs afford various options, the analysis has shown clearly that the learning objectives set by the teacher and the intended learning outcomes have a great influence on which aspects of the complex learning environment are supported. In other words, if a teacher values autonomous learning or the development of intercultural skills and competences, this will have an effect on the choices she makes in the set, social and epistemic design she uses. The development of non-cognitive skills in the selected cases is often supported through reflection (reflective texts, discussion hours or e-portfolio). Although the development of interpersonal skills such as collaboration is encouraged in many designs, it remains unclear if the development of these skills is actively supported by teachers, and which strategies they use to do this within the courses. However, the formal context of our cases, with a teacher who is guiding the process, does create opportunities for learners to focus on developing these non-cognitive skills.

For lifelong learners, on the other hand, the options for active support seem to be less. These learning strategies could be supported by an e-portfolio or a personal learning network of peers and mentors. The outcomes of the OpenVM project, through the miniMOOCs, are especially useful here, as they offer a way for learners to deepen their knowledge on a particular learner skill. There is therefore scope to use these miniMOOCs in conjunction with other mobility programs.

Assessment

The content of the assessment in the analysed cases seems to be largely either on gained knowledge (e.g. MOOCs) or on the quality of a learner-created output (e.g. report, presentation, etc.). In some cases, there are reflective texts, which also discuss the learning experience (e.g. miniMOOC in Ibiza).

For cases embedded within existing courses or in a curriculum, assessment can be influenced by the general quality scales used within the programme. Although students are most often assessed by their own teachers, sometimes part of the assessment is conducted by an external person, either a colleague teacher (e.g. Entrepreneurship Engineering), or a trusted institution (case of MOOCs).

Recognition

The formal recognition of (Open) Virtual Mobility is still unclear in our cases. In many of the running examples, (open) virtual mobility has been embedded into existing courses or programmes, thereby eliminating the need to create a new form of recognition for this form of learning. The pilots (using the mini-MOOCS) recognise the efforts of the learners through Open Badges on generic learner skills created within this project. Here too, this form of recognition is viewed as an optional certification for the student (counting for a percentage of the course), along with other work conducted within the course.

In other words, although (open) virtual mobility affords teachers and learners with the possibility to explore different (non-cognitive) skills and competences, in practice this added value (from the point of the student) is not explicitly taken up in formal recognition processes. The Open Badges created in this project might offer a potential solution for this issue.

In conclusion, the learning objectives set by the teacher or the learner have a great influence on what the (open) virtual mobility design and activity look like. In practice, recognition of the (open) virtual mobility is taken up in traditional forms of certification, by embedding these courses within existing courses and educational programmes.

5. Bringing OpenVM to practice

The results of this study open the door to a practical output for teachers, students and lifelong learners: A guide to support teachers or learners in the creation of new Open Virtual Mobility.

RQ3: How can teachers and lifelong learners be supported in working and learning in these complex learning environments?

Based on the outcomes of this study, we have created a design guide for learners and teachers who want to work with OpenVM and create courses as Open VM. The guide is intended as a starting point for learning designers to consider their learning objectives, the intended learning outcomes, as well as how different aspects of design can influence the type of learning environment they create. Furthermore, the guide links up the analysis of design to the learner skills established in O1-A1 and A2. This allows learning designers to think about design from the perspective of the particular learner skill they aim to develop. The guide can be found in Annex 3.

Here we also include some general guidelines regarding the design for the different OpenVM Learner Skills (Table 3).

Table 3. General guidelines for 7 OpenVM Learner Skills from the GCM study (O1-A1/A2)

INTERCULTURAL LEARNING	
Developing intercultural skills and attitude implies that the student acquires cultural knowledge and a better understanding of cultural perspectives, including understanding of the own cultural identity, that the student enhances and demonstrates cultural understanding and can apply intercultural awareness in culturally challenging circumstances.	
Preliminary Design Guidelines	***Argumentation and Examples***
Allow learners to work in cross-cultural teams	Allowing learners to interact directly in the form of international, cross-cultural teams, with shared responsibilities, gives learners the opportunity to develop their intercultural skills. This principle is used in all cases, apart from the Virtual Exchange Alliance, that focuses more on giving learners the experience of studying in another educational system through MOOCs.
Take the local contexts into account within the course activities (to increase authentic context)	Choosing activities that allow learners to think about their cultural context and system, contrast it with their peers' settings and formulate own learning, allow the learner to delve deeper into their intercultural learning. (e.g. Professional and Cross-cultural Skills in Engineering course, ThinkTank, Open Facilitated Dialogue)

Take time for explicit (individual or team) reflection on cultural setting, intercultural experiences, challenges experienced	Building in guided reflection moments on the intercultural experiences during the activity can support learners in further developing their intercultural learning. Especially aspects such as cultural understanding, awareness and attitude development can be enhanced by active guided reflection. (e.g. Professional and Cross-cultural Skills in Engineering course, ThinkTank, Open Facilitated Dialogue)

NETWORKED LEARNING	
Developing networked learning implies that the learner engages in digital networking and deals with complexity in networked learning.	
Preliminary Design Guidelines	***Argumentation and Examples***
Offer an explicit context of networked companies, learners, professionals, etc.	By integrating the available and accessible social network of peers, professionals, relevant companies and organisations, etc. in the course activities, learners can be made aware of the context in which their learning is situated.

ACTIVE SELF-REGULATED LEARNING	
Being an active self-regulated learner implies that the student is able to self-regulate the own learning process, can reflect on the learning experience and one's own progress and can demonstrate that he/she has the agency of one's own learning.	
Preliminary Design Guidelines	***Argumentation and Examples***
Use independent project work to elicit learner self-regulation	Independent project work, often in groups or teams, creates opportunities for learners to develop their active self-regulation skills. The context of a team also gives them the scope to self-reflect on their learning strategies. This principle is used in all cases, apart from the Virtual Exchange Alliance, that focuses more on giving learners the experience of studying in another educational system through MOOCs.
Offer guided support, coaching, opportunities to self-reflect on learning experiences	Although feedback on the self-regulation process is partially acquired through the progress of the project, explicit guided support and coaching by the teachers can help students to develop their self-regulation skills.

MEDIA AND DIGITAL LEARNING	
Media and Digital Literacy implies that the student is able to use resources effectively to learn, can assess the quality of resources and demonstrates "learner control".	
Preliminary Design Guidelines	***Argumentation and Examples***

Use independent project work to elicit learner control	Giving learners the responsibility over the topic and direction of their project work creates an opportunity to develop learner control.
Give free choice in the use of technology	Letting learners decide about how they structure their online interactions, and which technologies they use for this creates scope for developing media and digital literacy skills. In particular, this approach allows students to think about learning technologies and their affordances. (e.g. TalkTech, Professional and Cross-cultural Skills in Engineering course)

AUTONOMY-DRIVEN LEARNING	
Being able to learn in an autonomy-driven way implies that the student self-directs, and regulates her own learning process, independently chooses in what mode or context to study, what tools to (learn to) use and how to organize the learning process.	
Preliminary Design Guidelines	***Argumentation and Examples***
Use independent project work to elicit self-directedness.	The choice of independent project work can also create a context in which learners can develop their autonomous learning skills.
Coach for independent learning- lifelong learning skills	Virtual Mobility activities can be used to develop autonomy-driven learning skills as a lifelong learning skill by tackling content of general interest that transcend the limits of a course or program. The focus is placed on the topic that can continue into further learner-driven goal setting. (e.g. ThinkTank as part of the Honours programme, Erasmus+ Virtual Exchange, Virtual Exchange Alliance, etc.)

INTERACTIVE AND COLLABORATIVE LEARNING IN AN AUTHENTIC INTERNATIONAL ENVIRONMENT	
Interactive and collaborative learning in an authentic international environment implies that the student develops teamwork skills, collaborates with peers across disciplines and contexts, acquiring new international learning experiences and interacting with authentic international tools, systems and resources in a foreign language.	
Preliminary Design Guidelines	***Argumentation and Examples***
Allow learners to work in cross-cultural teams	International teams give learners the context in which to engage in team work, with the added complexity of international collaboration. A shared goal requires them to work together, understand each other and negotiate to reach the desired outcome. (e.g. Professional and Cross-cultural Skills in Engineering course, TalkTech, ThinkTank, etc.)

Include examples from local contexts	Incorporating examples from the different locations in the virtual mobility partnership can increase the authenticity of the learning context. Additionally, this creates a context in which the learners can learn from each other in authentic international situations.

OPEN-MINDEDNESS	
Open-Mindedness implies that the student is tolerant to others, has an open attitude towards others, demonstrates willingness to improve knowledge (of foreign languages) and demonstrates self-confidence in interaction with peers and teachers.	
Preliminary Design Guidelines	***Argumentation and Examples***
Allow learners to work in cross-cultural teams	International teams give learners the context in which to engage in team work, with the added complexity of international collaboration. A shared goal requires them to work together, understand each other and negotiate to reach the desired outcome. This creates a situation where learners will need to develop an open-minded attitude. (e.g. Professional and Cross-cultural Skills in Engineering course, TalkTech, ThinkTank, etc.)
Include examples from local contexts	Incorporating examples from the different locations in the virtual mobility partnership can increase the authenticity of the learning context. Additionally, this creates a context in which the learners can learn from each other in authentic international situations.
Take time for explicit (individual or team) reflection on open-mindedness	Building in guided reflection moments on the learning experiences during the activity can support learners in cultivating an open-minded attitude. (e.g. Professional and Cross-cultural Skills in Engineering course, ThinkTank, Open Facilitated Dialogue)

6. Conclusion

In this research, we have looked at the design of 13 cases of (Open) Virtual Mobility to understand how they create learning environments to support their students' learning. By analysing their design following the ACAD framework, we have identified unique features regarding the set, social and epistemic design features. Combining this with the OpenVM skills, the analysis has resulted in a design guide and the formulation of some general design guidelines to support designers and teachers in design, developing and delivering (open) VM skills and activities to acquire these skills. The design guide is provided in Annex 3.

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Annex 1: Results of the Analysis

	Set design												
	Materials	Technical environment			Places			Time		Organisation / Institutional embedding			Student created artefacts
	Form of resources	Shared space	multimedia functionalities	learner ownership	International setting	cross-cultural primary interaction	mono-cultural primary interaction	synchronicity	asynchronicity	Embedded in programme	Teacher network	institutional network	Student created artefacts
VM Instructional Design	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y
Virtual Exchange Alliance	Y	Y	Y	N	Y	N	Y	NA	Y	Y	N	Y	NA
TalkTech	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N
KULeuven Stellenbosch	Y	N	N	N	Y	Y	N	Y	Y	Y	N	Y	Y
Erasmus Virtual Exchange Online Facilitated Dialogue	Y	N	N	N	Y	Y	N	Y	N	N	Y	N	N
Erasmus Virtual Exchange Interactive Open Online Courses	Y	Y	Y	N	Y	Y	N	Y	N	N	Y	N	N
Engineering Entrepreneurship	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Mini-MOOCs in Berlin	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	N
Mini-MOOCs in Rome	Y	Y	Y	Y	Y	N	Y	N	N	Y	N	Y	N
Mini-MOOCs in Ibiza	Y	N	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y
Mini-MOOCs in Balearic islands - PhD	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N	Y	Y
Mini-MOOCs in Slovenia	Y	N	Y	Y	Y	N	Y	N	N	Y	Y	N	Y
Mini-MOOCs in Timisoara	Y	Y	Y	Y	N	N	N	N	N	Y	N	Y	N

	Social design																												
	roles student			roles teacher			responsibilities student		responsibilities teacher	student characteristics									teacher team characteristics	teacher characteristics		support staff		
	individual work	group work	networked work	monitoring	feedback	facilitation	student initiative taking	selection of participants in groups	high level of facilitation by teacher	level of education	international students	institution	age	size of groups	diversity of groups	home culture	visiting culture	teacher team	priorities teacher team (e.g. collaboration)	academic background teacher team	project coordination yes/no	technical support	logistical support
VM Instructional Design	N	Y	N	N	Y	Y	N	NA	Y	M	Y	FernUni, OU, Jyvaskula	NA	NA	Y	NA	NA	Y	NA	NA	N	N	N
Virtual Exchange Alliance	Y	NA	NA	N	N	Y	Y	NA	Y	B, M	Y	Alliance	NA	NA	NA	NA	NA	Y	NA	NA	Y	Y	Y
TalkTech	N	Y	Y	N	Y	N	Y	Y	N	B	Y	Timisoara Boston	19-22	NA	Y	NA	NA	Y	new learning experience	Y	N	N	N
KULeuven	N	Y	N	Y	Y	N	Y	N	N	M	Y	KULeuven,	NA	NA	Y	NA	NA	Y	challenging learning	Y	Y	N	N

Stellenbosch											Stellenbosch							experience for students in honors programme					
Erasmus Virtual Exchange Online Facilitated Dialogue	Y	N	Y	Y	Y	Y	N	N	Y	NA	Y	NA	NA	NA	Y	NA	NA	N	building attitude	Y	N	N	N
Erasmus Virtual Exchange Interactive Open Online Courses	Y	N	Y	Y	Y	Y	N	NA	Y	NA	Y	NA	NA	NA	Y	NA	NA	N	building attitude	Y	N	N	N
Engineering Entrepreneurship	N	Y	Y	Y	Y	Y	N	NA	Y	M	Y	KULeuven, Upen n	NA	NA	Y	NA	NA	Y	building attitude	Y	N	N	N
Pilot Berlin	Y	N	N	N	N	N	N	NA	N	B	N	Beuth	NA	NA	N	Beuth	MOOC	N	new learning experience (digital world)	NA	NA	NA	NA
Pilot Rome	Y	N	N	Y	N	Y	N	NA	N	PG	N	Roma Tre	NA	NA	NA	Roma Tre	MOOC	N	new learning experience (digital world; transversal skills)	NA	NA	NA	NA
Pilot Ibiza	Y	Y	Y	Y	Y	Y	N	N	Y	B	N	UIB	NA	NA	N	UIB	MOOC	N	new learning experience (digital world; transversal skills)	NA	NA	NA	NA
Pilot Balearic islands - PhD	Y	Y	Y	Y	Y	Y	Y	N	Y	PhD	Y	UIB	NA	NA	N	UIB	MOOC	N	build reflective attitude	NA	NA	NA	NA
Pilot Slovenia	Y	N	N	N	N	Y	Y	NA	Y	B	Y	Slovenia	NA	NA	N	Slovenia	MOOC	N	new learning experience	NA	NA	NA	NA

| | | |

Engineering Entrepreneurship	Y	Y	Y	presentation	Y	Y	Y	Y	NA	Y	NA	NA
Mini-MOOCs in Berlin	Y	Y	N	open badge	NA	NA	NA	Y	Y	Y	Y	NA
Mini-MOOCs in Rome	Y	Y	N	open badge	NA	NA	NA	Y	Y	Y	Y	NA
Mini-MOOCs in Ibiza	Y	Y	Y	portfolio; open badge	NA	NA	NA	Y	Y	Y	Y	NA
Mini-MOOCs in Balearic islands - PhD	Y	Y	Y	portfolio; open badge	NA	NA	NA	Y	Y	Y	Y	NA
Mini-MOOCs in Slovenia	Y	Y	N	report; open badge	NA	NA	NA	Y	Y	Y	Y	NA
Mini-MOOCs in Timisoara	N	Y	N	online presentation; open badge	NA	NA	NA	Y	Y	Y	Y	NA

Annex 2: Virtual Mobility cases

4.1 TalkTech

The TalkTech project[2] is a collaboration between Bentley University (Waltham, MA, USA) and University Politehnica of Timisoara (Romania). The project was initiated and organized by two individual professors (Mark Frydenberg and Diana Andone) responsible for the respective curricula at their universities. Both universities are located in areas that are technology hubs (university, industry), where the employment and the work situation are built around multinationals and international groups.

In the 10 years the programme is running, the TalkTech's objectives have remained to develop literacy skills through the simulation of a global work environment in which team members use web-based collaboration and communication tools to create digital content. Research questions that have guided the project since its inception are the following:

- How does participating in an international collaborative environment for learning change students' perspective over their subject of study (multimedia and internet technologies)?
- How will students use web-based synchronous and asynchronous technologies to collaborate with international peers to create a tangible work product in a short amount of time?
- What technical and cultural challenges will students identify in working globally, and how will they overcome them? (Frydenberg, 2018)

In the programme, American students are second year Bachelor students in Business studies. Their Romanian counterparts are 4th year Bachelor students in Telecommunications Engineering. The students (19-22 year olds) are paired to each other and assigned to projects on research about technology development on which they collaborate during an eight-week long period. Students select their partners at the beginning of the project. In principle, group composition is not changed after the students make their choice.

The students work together with collaborative multimedia tools,create a tangible artefact in the process of collaboration and write an essay together that is published online. Upon completion of the projects, students present the outcomes in joint presentations.

The programme uses a Project Based Learning Approach ("Introduce, Create, Synthesize, Apply, Work"). Students work in groups independently, with minimal support from the teachers, which pushes the students to do things by themselves and look for feedback from business (start-ups) on their own. The technology used, the general topics of interest and some milestones for planning purposes are given, but further planning and activities need to be filled in by the students themselves.

A common platform is used for communication and collaboration, however students are free to use other tools and communication channels to organize their collaboration. On average, they use 17 different tools

[2] http://talktechproject.net/

over the whole project. Students decide themselves if they want to exchange private telephone numbers for easier communication.

Professors perform the assessment together: they both view the student projects and decide on the grades. The joint presentations count for about 35% of the final mark.

This virtual mobility activity has been evaluated in several ways: through usage data, interviews with the students and a ZEF evaluation (zef.fi). Evaluation from students has shown that the technology used is important: they need to be introduced early in the course, support collaborative activities and be easy-to-use. Students do note that the programme as a whole is time-consuming. Over the 10 years of its existence, the programme has been at the base of +/- 9 start-ups.

4. 2. Professional and Cross-cultural Skills in Engineering

The Professional and Cross-cultural Skills in Engineering is a 6 ECTS course organised collaboratively by KU Leuven (Belgium), a European university and Penn State University (United States). At Penn State University, the course is part of the Engineering Leadership Development program. At KU Leuven, it is part of a postgraduate Program on Innovation and Entrepreneurship in Engineering. The course is described as “A journey from personal professional skills introspection and development towards intercultural and team competencies development.” Students on both sides of the Atlantic collaborate in projects with an engineering focus. The teachers take an active role in guiding their students in their personal growth and intercultural competence development.

The learning objectives include (Van Petegem, 2019):

- Demonstrate a proficiency in engineering team-building, leadership and service.
- Construct creative solutions to engineering problems incorporating cultural differences among team members and external stakeholders.
- Critically analyze personal and engineering team-member competencies and biases.
- Formulate and apply strategies to improve engineering team dynamics.
- Provide effective feedback, recognition, motivation and corrective guidance for engineering team members with various cultural and national backgrounds.
- Evaluate engineering business opportunities in the context of international and cross-cultural markets.
- Examine moral, ethical, and legal dilemmas in cross-cultural environments.
- Apply course concepts in an international team-based engineering project.

Since its first run in 2015, the course design has been adapted based on feedback from the students and experiences of the teachers. In the first run, synchronous videoconference lectures were given twice a week by faculty from both institutions and by guest speakers. In a major experiential learning project, the students tackled a concrete engineering problem in the global world. The students, in mixed teams encountered virtual, cross-cultural challenges and tried to resolve them while applying several course concepts. Students were free to choose their own technology to achieve the interaction and collaboration. On request of the American students, some Dutch language lessons were included.
For the second run, the videoconference sessions were stopped and online material was developed by the PSU team. The online learning module created possibilities to work in a flipped classroom model (students first study the material and each week discussions about the topic are facilitated in the classroom). There were no changes to the assignments and project work.

During the third run, Skype for Business was used to organise web conference sessions. The student group on the KU Leuven side had at that time become very diverse and international. Therefore, short language and culture lectures were integrated in the sessions.

Currently, the course is in its fourth run (Spring 2019). The language lessons are now integrated in the online environment. The technology used for the video conference sessions is Zoom. No further major changes were made to the format, assignments and project work.
As for the evaluation of the students, there is no exam. Students are evaluated on the basis of their work on the project and the level of participation during the videoconference sessions.

4.3. KU Leuven - Stellenbosch University Think Tank

The KU Leuven – Stellenbosch University Think Tank, currently in its fifth run, is an extra-curricular, interuniversity and intercultural honours programme organised by KU Leuven (Belgium) in cooperation with Stellenbosch University (South Africa). The programme is multidisciplinary, overarching all faculties.
The objectives are that students:

- deepen and share knowledge of discipline, and broaden it by outstepping boundaries of their own field of study
- share insights and perspectives in direct dialogue with students and experts from various disciplines
- look at their own context and points of view in a different way when confronted with students with different daily reality and cultural context
- are challenged to think out of the box
- develop transferable skills
- gain experience in communicating experiences to a broad audience

Each year, students can apply to join the programme, and approximately 15 (Master's) students at KU Leuven and Stellenbosch University each are selected. It is a requirement that they are enrolled as a Master student when applying, and for the duration of the programme activities. The selection is made on the basis of motivation, grades and study progress shown in the previous years. The experience shows that primarily students looking for extra study challenges, apply. In the selection, it is also taken into account that the disciplines are proportionately represented.

The group is facilitated by academic staff from diverse disciplines on both sides (4 in Stellenbosch and 4 in KU Leuven, together with one project coordinator in Leuven).

The total group of 30 students collaborates over the course of 10 months (from February to November) to develop their own research project. Each edition, a different theme is put forward (e.g. Health, Well-Being and the Future of Health Care in 2019). However, within the given central theme, students get the opportunity to shape and define the content of their project independently and creatively.

The Think Tank provides a platform for students to deepen and share the knowledge of their own discipline and to broaden the knowledge by stepping beyond the boundaries of their own field of study. Students share their own insights and perspectives in a direct dialogue with their fellow-students and are assisted by a team of experts from various disciplines from both universities, led by an academic coordinator. The members of the academic team take on the role of 'coaches' and as such are guided by the input of the group. They ask provoking questions and facilitate when required.

The Think Tank project includes both physical and virtual mobility. The collaboration takes place via online platforms and tools. Besides the video conference sessions (sometimes also with invited speakers) that are

organised on a regular basis, students can choose independently how they organise their collaboration and decide through which channels they keep in touch. In addition, both groups of students meet each other twice a year: once during the spring semester for a short Focus week and once during the autumn semester for an intense Workshop week. The physical mobility in the Focus week was added in the third run of the programme, when experience showed that only online mobility was not enough to reach the desired outcomes and quality for the students. At the end of the project, the results are presented to the public during a joint concluding event.

Students in the programme are continuously evaluated. Each team evaluates their own students. Selected students engage themselves to participate in the sessions, as well as in the Focus and Workshop Weeks. They should also show a clear effort to contribute to the project and to collaborate with their fellow-students, both at KU Leuven and at Stellenbosch University.

Those students who take part during the whole course of the programme, and who add value to and complete the full process, receive a certificate signed by both institutions. In addition, at KU Leuven the programme is also included in the list of 'Extra-Curricular I-Portfolio' activities (the ePortfolio platform offered to KU Leuven students).

4.4. Virtual Exchange Program

The Virtual Exchange program is a collaboration among 12 universities across the world to open up their curricula to students from partner universities. Through the program, students studying at the partner universities can select online, for-credit courses (MOOCs), organised at their own institution, or any of the partner institutions, giving them access to education from top universities around the globe. Students learn at their own pace and at a time and place that suit them, without the need to travel.

The pilot was organised in 2017, and since then, the programme is continuously evolving and changing. Participating universities are at different stages of program availability and course offerings. Current active partners are: Delft University of Technology (the Netherlands), École Polytechnique Fédérale de Lausanne (Switzerland), Leiden University (the Netherlands), Rice University (USA), the Australian National University (Australia), the University of Adelaide (Australia), Universidad Carlos III de Madrid (Spain), Université Catholique de Louvain (Belgium), University of Queensland (Australia), UPMC Sorbonne Université (France), Wageningen University & Research (the Netherlands), Hong Kong University of Science and Technology (Hong Kong). Examples of courses in this exchange scheme cover a wide range of topics, including Solar Energy, Digital Signal Processing, Astrophysics, Introduction to Computing with Java, English Grammar and Style,..

The institutional MOOCs are offered through various MOOC platforms, such as edX and Coursera. The extent to which direct interaction and collaboration between students across the world are integrated in the MOOCs is not clear.

All courses involve online engagement with the curriculum and formal assessments. Some courses may have a final written exam, which will take place at the home university of the student. In line with other learning abroad experiences, on successful completion of the Virtual Exchange, students receive a formal result and grade from the partner university and credits towards their degree.

4.5. Erasmus+ Virtual Exchange Program: Interactive Open Online Courses

Erasmus+ Virtual Exchange is a ground-breaking project enabling youth in Europe and the Southern Mediterranean to engage in meaningful intercultural experiences online, as part of their formal or non-formal education.

This flagship programme is established under a contract with the Education, Audiovisual and Culture Executive Agency[3], financed by the European Union's budget, and it is implemented by a consortium composed of Search for Common Ground[4], Anna Lindh Foundation[5], UNIMED[6], Sharing Perspectives Foundation[7], Soliya[8], UNICollaboration[9], Kiron Open Higher Education[10], and Migration Matters[11].

Erasmus+ Virtual Exchange works with several formats. One of the formats is the Interactive Open Online Course. Students can access open online courses across cultural contexts and national boundaries to learn with peers from diverse backgrounds. The online courses can consist of lecture series, small group dialogue and interactive assignments. There are also specific courses aimed at refugees, addressing current issues of integration and diversity. The programme also includes an introductory course to dialogue facilitation to learn the basic concepts of dialogue facilitation and Virtual Exchange, as well as customised training for teachers willing to create interactive open online courses.

Further, Erasmus+ Virtual Exchange is promoting a number of Massive Open Online Courses (MOOCs) enhanced with various degrees of Virtual Exchange elements, to increase dialogue and interactivity.

4.6 Erasmus+ Virtual Exchange Program: Online Facilitated Dialogue

Another Erasmus+ Virtual Exchange format is the Online Facilitated Dialogue programme. This format enables participants to:

- Establish a deeper understanding for the perspectives of their global peers on important issues that matter to youth today.
- Develop employability skills such as critical thinking, cross-cultural communication, team-work, collaboration, and media literacy.

In interactive open online dialogues, students engage in a short and meaningful virtual exchange experience through constructive communication with individuals from different cultures and countries over topics of mutual interest. The aim of the dialogue is to create meaningful interactions between peers. The dialogues are facilitated by neutral moderators. Erasmus+ Virtual Exchange also organises training for facilitators.

4.7 Instructional design

[3] https://eacea.ec.europa.eu/homepage_en
[4] https://www.sfcg.org/
[5] http://www.annalindhfoundation.org/
[6] http://www.uni-med.net/en/
[7] https://sharingperspectivesfoundation.com/
[8] https://www.soliya.net/
[9] https://www.unicollaboration.org/
[10] https://kiron.ngo/
[11] http://migrationmatters.me/

This case is a joint development and implementation of an international online course in educational design by teams from University of Jyväskylä, Finland, Open Universiteit and FernUniversität in Hagen, Germany (Firssova, Vogel, Brouns, Diegel, Formsn & Stracke, 2019; Vogel, Diegel, Firssova, Kaananen, Stracke & Brouns, 2019).

These three European universities developed a joint online course 'Instructional Design - Creating an educational media product', and implemented it as a pilot in winter semester 2018/2019 for the first time. Following the evaluation of the first run, some revisions were made and the course was offered again in spring 2020. The course combined the development of professional skills at university level with international project management and international collaboration competences.

In small international project teams of maximum five students, created by teachers, students of three different study programmes in Educational Science collaboratively developed a learning scenario based on theories and models of educational design and realized this design in a learning application. Working in their assigned team, students first needed to jointly decide on the topic of their learning scenario. Next, they had to create and provide the theoretical foundation and design and implement their design. Furthermore, teams evaluated each other's products. The course ended with a final online presentation, evaluating the results and reflecting on product and process. In the second run, teachers were assigned to individual teams, with teachers of the other universities as backup. Teachers consulted each other about feedback on students work to ensure that feedback took into account the cultural dimensions and differences of each university.

In the first run, the course lasted eight weeks, in the second run this had to be reduced to six weeks to fit into the curriculum schedule of the universities. At the FernUniversität in Hagen and the Open Universiteit, this course was part of another larger course, while at the University of Jyväskylä, this was a stand-alone course, still part of the curriculum. At every university the course was awarded with 5 EC. While in the first run the course product was assessed as part of the international course, in the second run assessment took place in the context of the main course.

The course was implemented in an online learning environment that provides content, activities and regular communication facilities like discussion forums. Weekly virtual classes were scheduled in which teachers provided and explained the assignments and answered questions. Quickly these planned sessions evolved into working sessions: students were placed in break-out rooms to discuss and elaborate on the assignment of the week. Unmoderated virtual class sessions were available for students to use should they wish so. Furthermore, students were free to use any communication medium of their liking.

FernUniversität in Hagen and Open Universiteit are distance teaching universities, although the University of Jyväskylä is campus-based their Open University department joined the project. Therefore, student population was international and students came from different countries and timezones. Not only did students have to navigate cultural differences, such as language and time issues, they also needed to invest in understanding the differences in conceptual meaning of theories and concepts.

Annex 3: Design Guide for Open VM

This form can be used as a design guide to think about a new OpenVM activity. The design can have on which learner skills are developed. The relevant OpenVM learner skills are mentioned in the third column, where appropriate.

Partner teachers	fill in names of partner lecturers	
Partner institutions	fill in names of partner institutions	
Year of study	Which year of study are your students in? Specify if it is different in your partner institution	
Educational programme	Which educational programme do your students belong to? Specify if it is different in your partner institution	
Intended Learning Outcome	Which learning objectives do you want to achieve? Think about the learning objectives (i) for the students, (ii) for yourself as a teacher or (iii) for yourself as a lifelong learner?	

Epistemic design

tasks student	Are the students introduced to new domain knowledge? In which domain?	
	Are the students expected to learn new generic skills and competences, such as collaboration; creativity, self-regulation, critical thinking, reflection, digital and media literacy skills, orother OpenVM learner skills? Which?	
	Do students work on their attitude related to things like confidence, empathy, curiosity, self-reflection? Which?	
	What will assessment look like?	
tasks teacher	Does the teacher team jointly deliver course material?	
	Does the teacher team jointly coach the students in the course?	
	Does the teacher team jointly assess the students in the course?	
Support for student	Is there designed scaffolded support? On what aspects do you provide support? Who is responsible for this support? Are there own/shared materials you can reuse?	
	Do students receive information on how to approach and carry out the tasks?	
	Are the students expected to be self-directed within the course? What kind of support will you provide them for this?	
Support for teachers	Is there support for teachers?	
Support for staff	Is there support for other staff?	

Social Design

Roles student	What do students work on individually?	
	What do students work on in group?	
	What do students work on as a network?	
Roles teacher	Will you monitor the progress of self-directed and self-regulated students? How?	
	How often do you give feedback to students in the course? On what aspects of their work?	
	Who facilitates the activities of students? You as a teacher, support staff, or the students themselves?	
Responsibilities student	Do students need to take initiative in the organisation and planning of their learning activities?	collaborative learning self-directed learning
	Can students select their group mates themselves?	collaborative learning openmindedness
Student characteristics	What is the level of education of the students?	
	Is the student group culturally diverse? How can students benefit from this diversity?	intercultural learning
	What is the size of the student groups?	
	What is the home culture of the students?	
	What is the visiting culture of the students?	
Teacher characteristics	Do you work together with colleague teachers in the other institution as a teacher team?	
	What is your and the teachers' team priority for the teaching experience?	
	Is the academic background of the teacher team interdisciplinary?	
Support staff	Is there a project coordinator?	
	Is there technical support staff?	
	Is there logistical support staff?	

Set Design

Materials	Will you provide students with content? How will the content be delivered (text, audio, video, etc.)? Do students need to search and find their own content? will you be using existing materials or create new material will this material be "open"; do you consider open licensing (free licence, creative commons, public domain?	self-directed learning media and digital literacy skills
Technical environment	Will shared spaces be used? Which?	
	Does the technical environment support multimedia resources?	
	Which level of learner ownership is desired?	media and digital literacy skills
Places	Do students interact in an international setting?	intercultural skills
	Is there interaction of students in an international/cross-cultural setting? How will this work in practice?	
	Is there interaction of students in a local setting? How will this work in practice?	
Time	Do students meet synchronously?	media and digital literacy skills
	Do students meet asynchronously?	
Institutional embedding	Is the course embedded in an educational programme/curriculum?	
	Are there colleagues in your teacher network who are potential partners for this VM?	

	Are there departments in your institution who can help with the creation of international contacts?	
Student-created artefacts	Do students create artefacts? Which?	self-directed learning media and digital literacy skills
	Will the artefacts be made available through licensing (copyright, open licences)? Will the artefacts be made available as open educational resources?	open-mindedness