





Designing Virtual Mobility as a transformative learning experience

Diseñando la Movilidad virtual como una experiencia de aprendizaje transformadora

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Abstract

Virtual student mobility and blended student mobility are becoming a key strategic policy area in European educational policy, with the aim of providing all students in Europe with the experience of mobility during their studies. This article looks at the extent to which these forms of mobility are designed to support transformative learning experiences, through the analysis of three virtual mobility cases in secondary education and three cases in higher education, using the Activity-Centred Analysis and Design (ACAD) Framework. The findings show that virtual mobility offers suitable learning environments where transformative learning can occur. However, structured reflection needs to be more elaborately designed for and supported to achieve its full potential. The article suggests that structured reflection is currently primarily focused on the development of intercultural skills and attitudes, but offers opportunities for other learner skills in virtual mobility (such as collaborative learning and networked learning). The article suggests some methods to do this.

Keywords: Virtual Mobility; Virtual Exchange; Critical Reflection; Transformative Learning; ACAD

Resumen

La movilidad virtual y la movilidad híbrida del alumnado se están convirtiendo en un área estratégica clave de la política educativa europea, con el objetivo de proporcionar a todo el alumnado de Europa la experiencia de la movilidad durante sus estudios. Este artículo examina en qué medida estas formas de movilidad están diseñadas para apoyar experiencias de aprendizaje transformadoras, a través del análisis de tres casos de movilidad virtual en la educación secundaria y tres casos en la educación superior, utilizando el Marco de Análisis y Diseño Centrado en la Actividad (ACAD). Los resultados muestran que la movilidad virtual ofrece entornos de aprendizaje adecuados en los que puede producirse un aprendizaje transformador. Sin embargo, la reflexión estructurada debe diseñarse de forma más elaborada y recibir más apoyo para alcanzar todo su potencial. El artículo sugiere que la reflexión estructurada se centra actualmente en el desarrollo de habilidades y actitudes interculturales, pero ofrece oportunidades para otras habilidades del alumno en la movilidad virtual (como aprendizaje colaborativo y el aprendizaje en red). El artículo sugiere algunos métodos para ello.

Palabras clave: Movilidad virtual; intercambio virtual; reflexión crítica; aprendizaje transformador; ACAD



1. INTRODUCTION

Virtual student mobility and blended student mobility are becoming a key strategic policy area in European educational policy, with the aim of providing all students in Europe with the experience of mobility during their studies (European Commission, 2021a; Wulz & Rainer, 2015). This is apparent in the creation of university networks such as UNA Europa and new initiatives as part of the new Erasmus+ programmes in Higher Education, and the expansion of continuing initiatives such as eTwinning in Primary and Secondary Education (eTwinning, 2021; European Commission, 2021b). With the COVID-19 crisis of 2020, it is expected that these forms of mobility will become even more important.

Within in the European Higher Education Area, Virtual Mobility (VM) is defined as “*a set of activities supported by Information and Communication Technologies, including e-learning, that realise or facilitate international, collaborative experiences in a context of teaching, training or learning.*” (Erasmus+, 2020). In blended mobility, both physical and virtual mobility are combined to create mobility learning experiences for students. Several projects have focused on the benefits of VM, which include intercultural competence development, international outlook, and development of (international) collaboration skills and qualities in self-directed learning (Op de Beeck et al., 2008; Rintala, 2011). Moreover, VM activities also create contexts in which teachers can work together on educational activities across institutions. In this article, we focus on VM characterized by collaboration and international interaction between the students or pupils. This form of VM is also referred to by the terms “Virtual Exchange” or “Collaborative Online International Learning” (Evolve, 2021; SUNY Coil Center, 2021), and is seen by some scholars as a policy of “internationalisation at home”, embedded in curriculum reform (De Wit, 2016).

Learning experiences within VM and blended mobility are multi-faceted, focusing on the development of several learner skills. Rajagopal et al. (2020) describe 7 competence areas in learner skills that can be developed in Open Virtual Mobility, which are: (i) Intercultural skills & attitudes, (ii) Networked Learning, (iii) Active Self-regulated Learner skills, (iv) Media and Digital Literacy, (v) Autonomy-driven learning, (vi) Interactive and Collaborative learning in an authentic international environment and (vii) Open-mindedness. The design of a VM activity plays an important role in defining which learning skills can be developed, how they can be developed and to what extent.

Mobility can be an occasion where transformative learning takes place for the individual learner (Nada et al., 2018; Wihlborg et al., 2018; Mezirow, 1997). This also applies to virtual forms of mobility as discussed by Duffy et al. (2020). For an individual, transformative learning is the “process of effecting change in a frame of reference” (Mezirow, 1997, p5), that “encompasses cognitive, conative, and emotional components and is composed of two dimensions: habits of mind¹ and a point of view”. Transformative learning originates from adult learning, where

¹ Mezirow defines *habits of mind* as “broad, abstract, orienting, habitual ways of thinking, feeling, and acting influenced by assumptions that constitute a set of codes”, that may be “cultural, social, educational, economic, political, or psychological.” (Mezirow, 1997, p5-6).



learners might be triggered to acquire new frames of reference, letting go of held meanings and develop new understandings. The goal is to become “autonomous, responsible thinkers.” (Mezirow, 1997, p8). Transformative learning theory assumes that learning has individual and social dimensions. The learner reflects actively on own experiences, creating learning on held meaning schemes, learning new meaning schemes or learning through meaning transformation (Kitchenham, 2008). In recent years, the emphasis on individual rationalism has been extended to include the social recognition and intersubjectivity of learners towards each other (Fleming, 2014; Fleming, 2018). As illustrated in Figure 1, transformative learning theory projects a dynamic interplay between the individual and the social dimension, where individual habits of mind articulated in specific points of view are questioned through a disruption in mutual recognition (imbalance in self-confidence, self-respect or self-esteem) on the social level. Individual critical reflection then reframes held beliefs and attitudes, developing identity and reinstating self-confidence, self-respect and self-esteem, resulting in more participation of the individual in society.

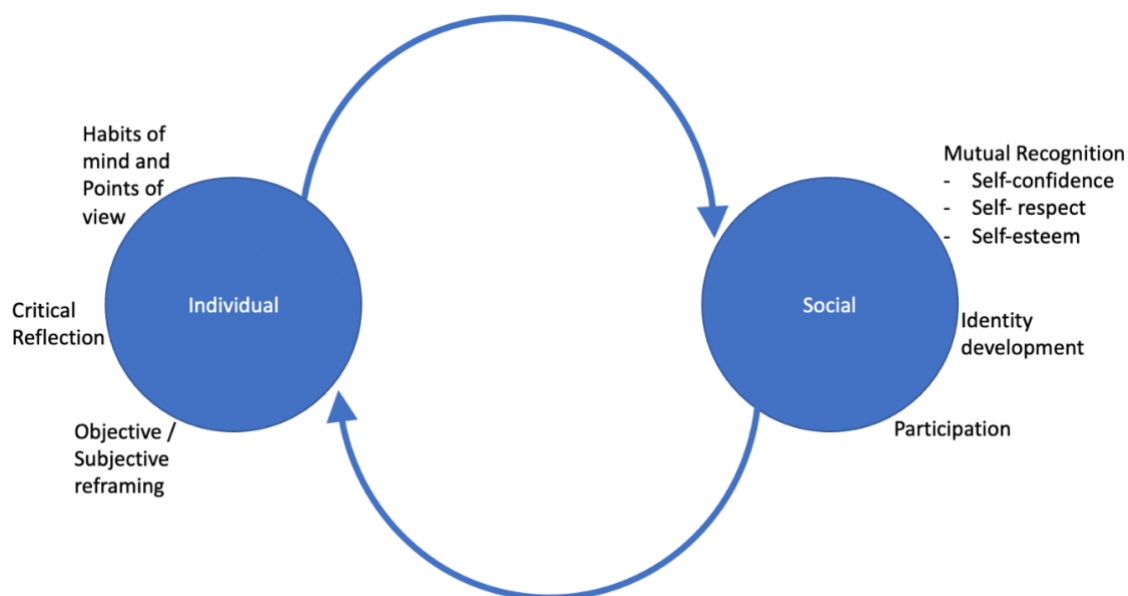


Figure 1 Transformative Learning Theory (based on Mezirow (1997), Kitchenham (2008) and Fleming (2014))

Transformative learning theory is a useful framework to look at student mobility in its physical form. In higher education and professional learning, this type of mobility has played a key role on an individual level in the forming of identities, personal relationships and professional outlooks (Salajan & Chiper, 2012). The experience of spending some time in other unfamiliar settings causes re-evaluation of held beliefs and attitudes or interest in the development of certain competences, which is of particular value, both on an individual level, and in the context of future employment (Roy et al., 2019). In secondary education, physical mobility is used as a

way to introduce reflection on global issues such as democracy, moral issues, etc. (Baiutti, 2018).

However, for mobility experiences to become transformative learning experiences, much depends on the extent to which learners engage in critical reflection on issues related to identity development (Chwialkowska, 2020; Ceo-DiFrancesco et al., 2020). This can be achieved either through natural predispositions of the learner or through structured critical reflection guided by a teacher or coach. In physical mobility that is conducted as learning experiences, teachers and guides emphasize the importance critical reflection (Barton & Ryan, 2020). Moreover, the extent to which learners can engage with the social dimension, and be aware of imbalances in self-confidence, self-respect and self-esteem, also plays a role. Here, physical mobility, due its immersive nature, creates an environment where held points of view are questioned. In some virtual mobility experiences, this self-questioning is encouraged through focusing on and developing intercultural awareness (European Commission, 2021c; Stevens Initiative, 2019).

Viewed from a teacher perspective, transformative learning can be designed for by providing opportunities:

- for the learner to be agentive: **learner agency** refers to the extent to which learners engage in learning activities working towards learning goals.
- for the learner to be self-directed: **learner self-directedness** refers to the extent to which the learner directs their learning activities, in particular, in setting learning goals, defining learning activities, assessing outcomes, taking decisions, and reassessing taken decisions. (Bandura, 1997)
- for the learner to reflect critically on their learning and the results of their experience: **learner reflection** refers to the extent to which learners can take distance from the learning activities, the educational process and the learning outcomes, to view it an objective way to be able to assess the quality of the experience, (Mezirow, 1997; Ryan, 2013; Schön, 1983).
- and for the learner to build capability and competency resulting in **changes in the self**: This involves giving the learner the opportunities to discover and build capability, self-efficacy and competencies according to what they consider important. In recent years, there has been increased interest in heutagogy, “a theory of learning, where the learner is enabled to independently learn through a process of discovery” (Hase & Kenyon, 2000; Blaschke & Marin, 2020; Glassner & Back, 2020), where the emphasis lies on double loop learning (where goals are critically viewed and dynamically changed) and triple loop learning (where learners reflect on how they learn).

The support offered by the teacher, facilitator or coach, needs to be in line with these goals. Depending on the needs of the learner, this support can involve various levels of scaffolding (Ryan, 2013).

More than physical mobility, VM works in an intentionally designed complex learning environment. Although VM is situated within formal education, informal and non-formal



situations are designed by seemingly blurring the boundaries of formal education, through international collaboration with teachers in partner institutions. Through design, students and pupils are placed “out of their comfort zone” and asked to engage in activities to elicit certain experiences rather than sole knowledge-acquiring learning goals. Complexity is introduced for the student or pupil by requiring them to engage in social learning and self-directed learning in an intercultural environment. In other words, a VM learning environment works through the situatedness of the learning that takes place within the environment (Brown, Collins & Duguid, 1989): the context defines learning opportunities. However, it is a designed environment, partially created by a teacher/guide who supports learners, and as such, teachers/guides can design them to enable and encourage transformative learning. However, it is unclear to what extent virtual mobility is currently able to elicit transformative learning experiences for students and pupils. If Virtual Mobility is to achieve the strategic aims of mobility for all, this is a crucial question to answer.

The research question in this article is: “To what extent are VM activities designed for transformative learning experiences?”

We will consider these sub-questions:

RQ-A: How are learner agency, learner self-directedness, reflection and identifying required changes in self embodied in the design of VM activities?

RQ-B: What is the designed role of the teacher/facilitator/coach in supporting these activities?

2. METHODS

To answer these research questions, we looked into the design of 3 existing VM activities in Higher Education and 3 existing VM activities in secondary education.

2.1 Data collection

The cases were selected on the following basis:

- the activities have run over several years in established formats, which have been continuously tweaked to create the desired learning experience.
- learners engage in direct interaction with peers from other countries
- the researcher has access to the VM organisers in case of any questions

For the Higher Education cases, we chose three Virtual Mobility actions in European universities or with European Higher Education, compiled in the OpenVM project (Rajagopal & Firssova, 2020). Three cases in secondary education were chosen, organized within the EUMind (Europe Meets India) Network, a network of schools across the Netherlands, Belgium, France and India, that creates and supervises virtual exchange projects in which Indian and European students work together on real-life issues such as sustainability, different generational perspectives, different social behaviours, human rights and arts & culture. The network organises this



through online projects in which pupils interact directly around different themes, three of which were included in this research.

The selected cases (see tables in Annex 1) were described with a focus on the intended design of the teacher-designers. This follows recurrent conceptualisations in literature of the distinction between proposition, intention and actual enactment (e.g. distinction between written curriculum-intended curriculum-enacted curriculum (Gehrke et al., 1992; Remillard, 2005); design conjecture mapping (Sandoval, 2014; McKenney & Reeves, 2018); distinction between intended activity of students and actual activity of students (Elen, 2020; Goodyear et al., 2021). Collected as part of the OpenVM project, the HE cases were described based on publicly available material (published articles, presentations, websites, videos) made available by the teacher designers of the courses. These descriptions were clarified and amended as required with the teacher designers' perceptions of the intended designs (Table 1). The secondary education cases were described based on the project scenario's developed by the instructional designers of the EUMind network, consisting of three phases (Topic selection, Research and Collaboration, Comparison and Reflection) (Table 2).

2.2 Data analysis

The data analysis was performed in the following way:

1. Each case description was analysed according to the Activity-Centred Analysis and Design (ACAD) framework on the major aspects of set, social and epistemic design, as well as the intended learning outcome (Carvalho & Goodyear, 2018; Goodyear & Carvalho, 2019; Goodyear et al., 2021). The instrument "Design Guide" developed in the OpenVM project specifically for Open Virtual Mobility on the basis of ACAD, was used to structure the case descriptions.
2. Using the ACAD-based analyses, insight was gained into the teaching intentions of teacher-designers, as they emerge from the provided support to learners in the VM cases. We then considered if the emerging teaching intentions contribute to learner agency, learner self-directedness, critical reflection and changes in self.



3. RESULTS

Table 3 presents the results of the analysis.

Table 1 Teacher support for Learner agency, self-directedness, reflection and changes in self per case

	Learner agency	Learner self-directedness	Reflection	Changing Self
Professional and Cross-cultural Skills in Engineering	<i>Teacher sets tasks.</i> Learners work on a collaborative engineering project.	<i>Teacher sets tasks.</i> Learners set own learning goals and define process.	<i>Teacher is facilitator</i> Learners are invited to reflect on professional and intercultural challenges emerging from activity	<i>Incidental teacher support.</i> If learners indicate further steps for lifelong learning, they are encouraged.
TalkTech	<i>Teacher is facilitator.</i> Learners work on a collaborative technology entrepreneurship project.	<i>Teacher is facilitator.</i> Learners set own learning goals, define process, and select collaboration tools.	<i>Incidental teacher support.</i> Learners are invited to reflect on learnings emerging from activity.	<i>Incidental teacher support.</i> If learners indicate further steps for lifelong learning, they are encouraged.
Erasmus+ Virtual Exchange Online Facilitated Dialogue	<i>Teacher is facilitator.</i> Learners engage actively in dialogue on topics of mutual interest in culturally diverse group	<i>Incidental teacher support.</i> Learners determine their own further activities.	<i>Teacher is facilitator.</i> Learners are invited to reflect on intercultural challenges emerging from the dialogue	<i>Teacher is facilitator.</i> Learners are invited to consider how intercultural experience has changed their perspectives
EUMind Human Rights	<i>Teacher is instructor</i> and sets tasks that are well described in a common project scenario. Learners work on a collaborative research project.	<i>Teacher is facilitator.</i> Learners make a group action plan (dividing tasks and roles – time schedule activities). Learners determine their topics and goal. Learners may start awareness activities concerning the chosen topic (social wrong).	<i>Teacher sets tasks.</i> Learners are invited to reflect on the whole experience of the project.	<i>Incidental teacher support.</i> Practice-based research (interviews), intensive and autonomous group work, international and intercultural collaboration are the new ways of learning in focus. Some students have experienced new ways of learning and have developed new competences. Surveys taken in the framework of EUMIND projects have demonstrated that some pupils have enjoyed very much new ways of learning.
EUMind GoGreen	<i>Teacher is instructor</i> and sets tasks that are well described in a common project scenario. Learners work on a collaborative research project.	<i>Teacher is facilitator.</i> Learners make a group action plan (dividing tasks and roles – time schedule activities). Learners choose a topic and conduct research following the assignments described in the project.	<i>Teacher sets tasks.</i> Learners are invited to reflect on the whole experience of the project.	
EUMind OnStage	<i>Teacher is instructor</i> and sets tasks that are well described in a common project scenario. Learners work on a collaborative creative project.	<i>Teacher is facilitator.</i> Learners make a group action plan (dividing tasks and roles – time schedule activities). Learners choose a topic and prepare and perform a collaborative creative project.	<i>Teacher sets tasks.</i> Learners are invited to reflect on the whole experience of the project.	



This allows us to answer our research questions. In answer to RQ-A, the analysis shows that the studied VM activities do design for learning, by clearly encouraging learner agency and learner self-directedness. Both in secondary education and higher education, learner agency is designed for by creating authentic interactive and collaborative opportunities in an international setting. In both contexts, the learners are in charge of their learning activities and are required to take responsibility for them. In the EUMind projects, emphasis is given to these collaborative self-directed learning activities, with much scaffolding and instruction provided. In contrast, in higher education, collaborative tasks are led by the students, with minimal instruction. In one HE case, Erasmus+ Virtual Exchange, learner agency is intended through the active participation in dialogues with peers in an international setting. Important to note here is the difference between interaction (sharing of views and information) and collaboration (working together to achieve a common result, product). Although the design of VM might aim for collaboration between the learners, very often only interaction seems possible.

Learner self-directedness is designed for at different levels within the two contexts. In secondary school cases, there is more self-directedness in the Human Rights projects (learners brainstorm on topic and are free to choose their *social wrong* to research) and in the On Stage projects (learners determine how to present the self-chosen topic about the other country). In Go Green, the topic is determined by the teachers. However, in the execution of the collaborative task, only the On Stage projects gives the most opportunities for self-directedness. In the other projects, the teachers offer elaborated instruction for the pupils to conduct their collaborative research and facilitate this process. However, pupils are required to self-organise in their groups to perform the task. In higher education, students are expected to be self-directed in setting their goals, and defining the process to achieve their collaborative tasks. They receive little to no support in these processes. Teachers facilitate as required. In other words, there is a lot of variability in the extent to which learners are self-directed and the extent to which they are supported in this.

The extent to which learner reflection is designed for in the analyzed cases differs greatly between the two educational contexts. In secondary cases, learner reflection is elicited through a reflective task at the end of the project, but seems to be incidental during the activities, with teachers encouraging natural reflection when it is initiated by the learners themselves. In the design of the online projects, pupils are only required to reflect on the experience at the end of the project through self-assessment sheets. Although the design (as seen in the chosen topics and the method of working with parallel groups in different countries) aims to elicit meaningful natural reflection in the learner, there does not seem to be structured guided critical reflection. In the Higher Education cases, when structured critical reflection takes place (as in Professional and Cross-cultural Skills in Engineering or Erasmus+ Virtual Exchange Online Facilitated Dialogue), it is primarily focused on the development of intercultural competences. In TalkTech, critical reflection is focused on domain knowledge, self-determination, collaboration and intercultural competence.



Identifying required changes in self is generally not intended by design. However, teachers clarified that it does occur incidentally and is then supported on demand. Although capability building may result from these virtual mobility activities, it can be argued that only the Erasmus+ Virtual Exchange Online Facilitated Dialogue is designed to achieve this kind of transformation in the individual learner. In the other cases, any transformation seems to be incidental.

In answer to RQ-B, we distinguished different intended teacher roles in the analysis, which can occur together. These are:

1. Teacher sets the tasks: the teacher sets tasks for the learners.
2. Teacher is the instructor: the teacher sets tasks for the learners and gives procedural details on how to execute the tasks.
3. Teacher is facilitator: the teacher acts as a facilitator to engage in conversation with the learners to execute the task, to reflect on the learning experience or to offer any other flexible support.
4. Teacher offers incidental support: the teacher builds on the requests of learners on self-transformation and offers incidental support to achieve these goals.

In these roles, we see that teacher as a facilitator is a multi-dimensional role, which is taken up to facilitate learner activities (answer questions, support progress or encourage participation), facilitate learner reflection and provide possible support in future learning activities. In secondary school, teachers take up roles as instructors, to provide sufficient scaffolding to enable learners to fulfill their tasks. In both educational contexts, the teacher sets tasks, giving learners responsibility for their learning activities, and the teacher offers incidental support following learners' curiosity or self-determined learning.

Answering our main research question, VM activities are designed for transformative learning, but require more intentional support for critical reflection. VM activities focus on creating authentic situations to elicit critical reflection on the part of the learner. For this, they focus on creating opportunities for learner agency and learner self-directedness within authentic interactive, potentially collaborative, spaces, with appropriate levels of teacher support. However, they do not always offer structured critical reflection, that would enable and encourage the formation of altered frames of mind and points of view, to create true transformative learning experiences.

4. DISCUSSION AND CONCLUSIONS

In conclusion, Virtual Mobility creates potential for transformative learning, and as such, can be an important driver in the strategic aim to achieve Mobility for All. This potential is created through the use of authentic interaction and communication spaces, facilitated by ICT, within an international setting. However, critical reflection - crucial for transformative learning - is



currently not always intentionally designed, but starts from the learner's natural inclination to reflect. Following Goodyear and Carvalho (2019), it is true in this case that "much of the learning that students do is accomplished without direct supervision." (p53).

It is important to note that opportunities exist for designing intentional structured guided reflection (Boud et al., 1996). Learner activities can encourage learners to critically reflect, through the use of journals and logs (Yang, 2009; Anson, 1997), portfolio's (Kidwai et al., 2010), and discussion and negotiation activities to support this reflection. In recent years, much research has been conducted on levels in critical reflection and how to elicit deep reflection. Bain et al. (1999) identify 5 levels of reflection: "reporting", "responding", "relating", "reasoning" and "reconstructing." Rodgers (2002) describes four phases in reflective practice: presence in experience, description of experience, analysis of experience and experimentation. Higher levels of reflection lead to more transformative learning.

Interestingly, teachers can use purposeful learner activities to allow learners to reflect at higher levels, increasing the possibilities for transformative learning. Ryan (2013) points to several good practices regarding the teaching of reflection to stimulate reflection at higher levels. Table 4 lists the levels of reflection, with teaching strategies and their implications for VM design. Several observations can be made. Firstly, the recommendation to focus on one topic for reflection to reach higher levels of reflection is particularly relevant for complex environments such as virtual mobility. One way to achieve this, is to focus on particular learner skills (Rajagopal et al., 2020) and develop a learning track focused on reflection, that runs for the duration of the VM activity. Secondly, the teacher or educator can scaffold several steps in the reflection adapted to the needs and capabilities of the learner. This can include introducing relevant academic topics and resources at the stage of reasoning in HE, or conducting reflective focus group sessions with secondary school learners, in which learner experiences are contextualized by the teacher. Finally, it is important to recognize that the achievement of levels in critical reflection may be restricted by the learner's developmental phase. More research is required on developmental aspects of critical reflection.

Regarding changes in held frames of mind or changes in self, the analysis shows that these are rarely designed for in Virtual Mobility activities. Moreover, this transformative step is related to the levels of reflection and appear at the highest levels of critical reflection (Table 4). Additionally, the examples where transformative changes to the self happen (as explained by the teacher-designers), seem to be situated in activities that focus on the development of intercultural skills. This is not surprising as intercultural competence development focuses explicitly on the development of the self. Deardorff's models on Intercultural Competence start from the individual level (Attitudes) and social level (interaction with others, building Knowledge and Comprehension and Skills) to achieve internal and external outcomes. The internal outcome is an internal shift in frames of reference, that can be observed in the external outcomes (behaviours and new attitudes) (Deardorff, 2006). This focus on the transformation of the self, in terms of intercultural attitudes and behaviours, has therefore been the starting point in educational practice in intercultural development. For example, the IEREST manual that presents ten intercultural teaching activities to support students in HE in a mobility, emphasizes the perception of the self and the other, working with the concept of "multiple identities"



(IEREST, 2015). The authors state that the teaching activities “aim at stimulating students to go beyond national diversities and enjoy their own and others’ multiplicity as individuals.” Here, frames of references are articulated and seen as entities to be molded by the learner. Moreover, teaching strategies in intercultural competence development point to (i) the importance of creating safe environments, in which learners are able to share their thoughts and apprehensions freely (Ceo-DiFrancesco et al., 2020), (ii) the importance of using dialogue as an instrument to engage in critical reflection (Deardorff, 2020; Van Maele, 2020) and (iii) the importance of creating cycles of action and reflection through the use of instruments to support reflection-in-action (Schön, 1983). These lessons learnt from intercultural competence development can be extended to other skill development within Virtual Mobility, for example, collaborative learning, openmindedness or networked learning.

Table 2 Levels of reflective practice and teaching strategies (drawing on Bain et al. (1999), Rodgers (2002) and Ryan (2013))

Bain et al. (1999)	Rodgers (2002)	Description of level	Ryan (2013)'s teaching strategies	Implications for VM design
Reporting Responding	presence in experience	Learner reports on the experience, as lived by themselves, peers and others. The focus is on determining the multiple perspectives present (including the learners' subjective experience) in an observational way.	the need to provide a specific focus for reflection (p149) -encouraging 'noticing' (p 150)	Focus reflection on one topic (e.g. on one learner skill) Play with individual-group reflections Introduce 'noticing' strategies to observe "in action"
Relating	description of experience		asking learners to focus on the analysis of their own skills / knowledge / behaviour (p151)	Ask learners to reflect on VM activity from their own experience, with a focus on the roles they took up
Reasoning	analysis of experience	The experience is analysed for meaning-making, seeking deeper understanding	Asking learners to connect own experience with academic knowledge/theory (p152)	Engage in individual or group reflection with academic/theoretical input from the learners themselves or the teacher as facilitator
reconstructing	experimentation	Learners formulate general learnings and try to apply these to their own future behaviour	Using action plans, possibilities for low-risk trials (p153)	Ask learners to formulate individual or group-level action plans to approach new tasks



This study has a number of limitations:

- Due to time constraints, we have worked with descriptions of intended designs of VM activities as they were implemented. Future research would benefit from starting from the experiences of the students, pupils and teachers, including an investigation of design choices made and alternatives considered.
- We also combined cases from higher education and secondary education. Future research should consider these two contexts separately, as they appear to have specific needs with regards to supporting critical reflection.
- We restricted ourselves to a specific type of Virtual Mobility, with high levels of international collaboration within a given task to be completed within a given time period. Other types of VM may offer different opportunities for transformative learning.
- One factor not considered in this research is the question of learner motivation to participate in virtual mobility. Learner motivation is often indicated as a key benefit and driver of physical mobility. It is not clear in which circumstances this motivation also plays a beneficial role in virtual mobility.

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ANNEX 1

This page presents descriptions of the Virtual Mobility Cases analysed in the article “Designing Virtual Mobility as transformative learning experiences.”

Table 1 VM Cases in HE

VM activity	Description
Professional and Cross-cultural Skills in Engineering	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.
TalkTech	<p>The TalkTech project is a collaboration between Bentley University (Waltham, MA, USA) and University Politehnica of Timisoara (Romania), initiated and organized by two individual professors responsible for the respective curricula at their universities.</p> <p>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. It focusses on allowing students to cultivate an international outlook on the subject of study (multimedia and internet technologies), through self-directed use of web-based synchronous and asynchronous technologies to collaborate with international peers to create a tangible work product in a short amount of time. It considers the technical and cultural challenges students encounter and how 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. (Frydenberg & Andone, 2018; 2019)</p>
Erasmus+ Virtual Exchange Online Facilitated Dialogue	Erasmus+ Virtual Exchange (established under a contract with the Education, Audiovisual and Culture Executive Agency, financed by the European Union’s budget) 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 implemented by a consortium composed of Search for Common



VM activity	Description
	<p>Ground, Anna Lindh Foundation, UNIMED, Sharing Perspectives Foundation, Soliya, UNICollaboration, Kiron Open Higher Education, and Migration Matters.</p> <p>The Online Facilitated Dialogue programmes enable participants to establish a deeper understanding for the perspectives of their global peers on important issues and develop employability skills such as critical thinking, cross-cultural communication, team-work, collaboration, and media literacy. In these dialogues, 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 (virtually) with peers from different countries, to participate in meaningful discussions in the presence of neutral facilitators.</p>



Table 2 VM Cases in secondary education

VM activity	Description
<p>EUMind Human Rights projects</p> <p>15-17 years</p>	<p>Topics and research questions are described in a common project scenario.</p> <p>Schools are clustered in pairs and in each school, groups dealing with the same topic are linked to each other.</p> <p>The ‘Human rights’-project deals with anger (as a positive force) and commitment. The two central questions are:</p> <p>(1) Focus on a concrete social wrong in your area. What social injustice do you witness in your area and how do you feel about this? Which human rights are violated here?</p> <p>2) How could you <u>make a change</u>?</p> <p>Phase one. Choice of a common topic.</p> <p>Pupils work in local groups on own topics (chosen after brainstorm) related to issues in Human Rights. The teachers of both partner schools help the pupils to choose- if possible- similar topics. Pupils may choose their own ‘injustice independently from what their peers in the partner school have selected.</p> <p>Phase two. Research and collaboration</p> <p>Each local group makes an action plan and divide the roles and the tasks</p> <p>Each local group conducts research on a common topic based upon interviews, literature and own observation but they use their own cultural background as their basis. They interact directly through digital technology and maintain each a website to publish the process of research</p> <p>Phase three. Comparison and reflection</p> <p>The pupils contrast their findings with those of the parallel group in the partner school. Each local group reflects on its project experience and conducts a self-assessment against concrete criteria given in the project scenario. Each local group can nominate itself for a certificate of excellence to be awarded by an international jury. Extra. To respond to the question ‘How could you make a change?’ some local groups conduct awareness and charity activities related to their topic</p>



<p>EUMind GoGreen projects</p> <p>13-15 years</p>	<p>Topics and research questions are described in a common project scenario and explained by the teachers. Schools are clustered in pairs and in each school, groups dealing with the same topic are linked to each other.</p> <p>Topics and research questions:</p> <ol style="list-style-type: none">1 Saving energy at school: How can energy be saved at school in the most effective way?2. Waste management / rubbish in the school: How can waste management be realized most effectively at school?3. My green meal: How can you make your meals greener?4. Ecological companies: What measures do companies take to implement a more eco-friendly policy?5. My green trips: How can you make your trips greener?6. Save food: How can we reduce food waste at home and at school? <p>Phase one. Choice of a common topic.</p> <p>The teachers of both partner schools help the pupils to choose common topics related to issues in GoGreen.</p> <p>Phase two. Research and collaboration.</p> <p>Each local group makes an action plan and divide the roles and the tasks. Tasks are described in a detailed way in the common project scenario. Each local group conducts research on the common topic based upon local interviews and own observation. Both groups interact directly through digital technology and maintain each a website to publish the process of research</p> <p>Phase three. Comparison and reflection.</p> <p>The pupils contrast their findings on the common topic with those of the parallel group in the partner school. Each local group reflects on its project experience and conducts a self-assessment against concrete criteria given in the project scenario. Each local group can nominate itself for a certificate of excellence to be awarded by an international jury.</p>
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VM activity	Description
EUMind OnStage projects 14-15 y.	<p>The overall assignment is to create a TV show on a topic that gives some information about the habits, culture of the other country. Schools are clustered in pairs and in each school, groups dealing with the same topic are linked to each other. The information is based on input from the pupils from the partner school. The project scenario gives some general suggestions on how to prepare and to perform the TV show. (e.g. length of the TV-show, criteria to find a suitable topic, the script of the play etc.)</p> <p>Phase one. Choice of a common topic.</p> <p>The teachers of both partner schools help the pupils to choose a similar topic for the TV-show. But groups may select their 'own' topic independently from what the groups of the partner school have chosen. Groups dealing with the same topic are linked to each other.</p> <p>Phase two. Preparation of the TV-show and collaboration.</p> <p>Each local group makes an action plan and divide the roles and the tasks. Both local groups need to interact intensively to get information from each other on the topic of the tv-show. The groups interact through digital technology and maintain each a website to publish the process of research.</p> <p>Phase three. Comparison and reflection</p> <p>The pupils compare both TV shows on the quality of the content and on several aspects of the performance. Each local group reflects on its project experience and conducts a self-assessment against concrete criteria given in the project scenario. Each local group can nominate itself for a certificate of excellence to be awarded by an international jury.</p>

