

# DEVELOPING BLUEPRINTS FOR THE IMPLEMENTATION OF VIRTUAL REALITY ROLE-PLAY TO IMPROVE COMMUNICATION AND DIGITAL SKILLS IN TRANSNATIONAL COLLABORATIVE LEARNING

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**Abstract:** Virtual collaborative learning and teaching benefits from using immersive technologies to develop both key competences, such as collaboration, virtual communication, and problem-solving skills, and social and digital skills. VR, which is understood as a scientific and technical field that uses information technology and behavioural interfaces to simulate the individual behaviour of 3D entities in the virtual world is justified by concepts such as immersion and interactivity (technical dimension) and the construction of presence (psychological dimension). As such, the Hotel Academy project aimed at the development of a joint curriculum that allows for virtual interdisciplinary, international, and intercultural collaboration and virtual exchange (COIL) between three European universities from Cyprus, France, and Germany in the field of hospitality management. Based on a thematic analysis of focus group discussions, semi-structured interviews with different stakeholders (2+4 sessions, N=13) and participatory observations in VR role-plays, this paper presents findings from a summative validation of the underlying didactical framework. This includes the dimensions of didactics, organization, technology, economy, education system, institution, and individuals. Based on the validation of the underlying framework, transnational, and cross-institutional blueprints (e.g., multiplier strategy, prototyping strategy, synergetic strategy) are developed for the implementation of this specific VR environment in higher education institutions. Such blueprints are no simple representation of the universities involved in this project but emerged from our qualitative data analysis as part of the recommendations from the involved stakeholders and experts. The blueprints demonstrate empirically grounded archetypes of different states in which higher education institutions can locate themselves. Finally, conclusions are drawn regarding practical implications of the implementation of virtual role-plays and regarding future research directions.

**Keywords:** transnational/cross-institutional cooperation, virtual collaborative learning, virtual reality

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## Introduction

Virtual collaborative learning and teaching benefits from using immersive technologies to develop both key competences, such as collaboration, virtual communication and problem-solving skills, and social and digital skills. VR which is understood as a scientific and technical field that uses information technology and behavioural interfaces to simulate individual behaviour of 3D entities in the virtual world (e.g. Milgram, et al., 1995), is justified by concepts such as immersion and interactivity (technical

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dimension) and the construction of presence (psychological dimension) (e.g. Biocca, 1997). As such, the Hotel Academy project aimed at the development of a joint curriculum that allows for virtual interdisciplinary, international, and intercultural collaboration and virtual exchange (COIL) between three European universities from Cyprus, France, and Germany in the field of hospitality management. This paper presents empirical research based on conversations with different stakeholders of the project to validate the underlying didactical framework (regarding the dimensions of didactics, organization, technology, economy, education system, institution, and individuals) to develop transnational and cross-institutional blueprints (e.g., multiplier strategy, prototyping strategy, synergetic strategy) for the implementation of this specific VR environment in higher education institutions. Finally, conclusions are drawn regarding practical implications of the implementation of virtual role-plays and regarding future research directions.

### **The Hotel Academy Project and Role-Play**

The Hotel Academy research and development project intended to pilot different role-play scenarios for students and lecturers at institutions specialized in tourism and hotel management. It also aimed at developing and evaluating a didactical framework to create virtual immersive experiences and at making recommendations for the implementation of VR role-play scenarios in higher education institutions. Moreover, the project helps to better understand structural and pedagogical barriers and seizing new opportunities in universities, to support the transfer of knowledge, and enforce sustainability of the framework. More specifically, a virtual reality learning environment (VRLE) gives a unique chance to manage a variety of circumstances compared to actual life experiences in these domains.

The goal was to build professional, methodological, and social skills that learners will need in their (future) careers. The 'Hotel Academy' role-play is divided into three parts: (1) A pre-game phase when users determine their roles in both VR and non-VR scenarios. In the scenario phase (2), users assume roles such as hotel management, hotel workers, or tourists, and put their talents to the test. The program creates a virtual hotel where the action takes place and people perform their roles. It is possible to imagine (a) a meeting between the hotel manager and staff, (b) a basic communication process between hotel staff and visitors, and (c) an extraordinary communication process between the parties including a conflict situation (i.e. a possible riot outside the hotel challenging students to control a possibly stressful and even dangerous situation). In the final feedback and discussion phase (3), people gather outside the VRLE to discuss and rate their experiences. This three-phase activity will be incorporated into a standard study module 'Hospitality Management' of two bachelor's (final year) and one master's degree program (first year) of the participating institutions. The exercise has been tailored to the learners' needs and lasted in total about 45-60 minutes (including 15-20 minutes for VR). The scenario is embedded in a synchronous collaborative online collaboration and has players from three European countries. Head-mounted displays (HMD) or alternatively a desktop-based VR environment enable users' complete VR immersion. Each user can design their own avatar, ensuring the greatest possible VR engagement and communication.

## The Didactical Framework

Despite the many benefits and drawbacks of VR, its adoption in formal education is still gradual. The uniqueness of formal education, such as vocational or higher education is that standardization and rules may either stimulate or inhibit educational innovation (Arnold et al., 2022, Fischer et al., 2021). The implications of these issues in the educational setting and associated areas of VR adoption must be extensively examined. The underlying question to develop a didactical framework to learners and teachers in the use of virtual technology in role-play scenarios was this: How can formal education make use of virtual reality to induce, for example, self and social presence as well as immersion? A respective framework for the sustainable implementation of learning and teaching innovations as proposed by Euler and Seufert (2005) provided the conceptual and theoretical basis for the documentation and validation of the didactical framework in the Hotel Academy project (figure 1).

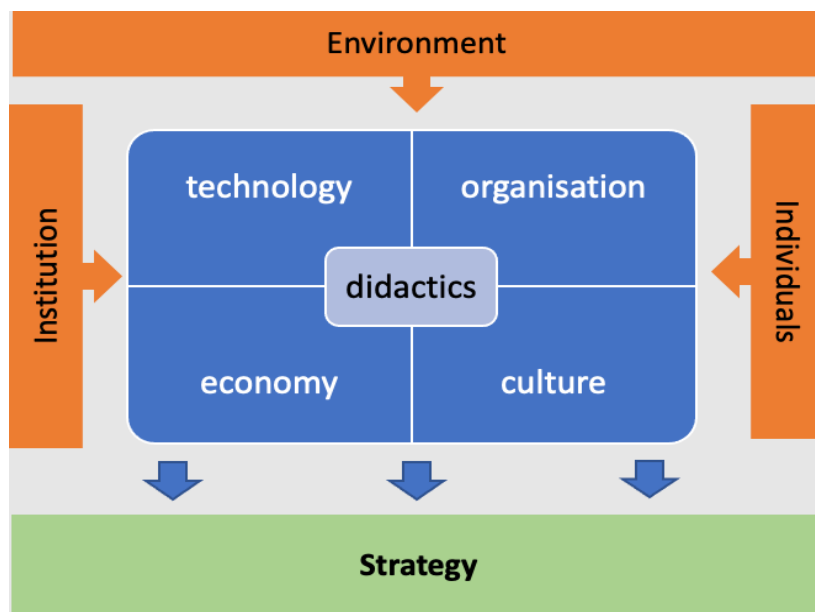


Figure 1: Didactical Framework (adapted from Euler & Seufert, 2005)

Following the Euler-and-Seufert-framework (2005), “education managers” must weigh the risks and benefits of educational innovations across five dimensions and three contextual parameters to formulate educational strategies, according to the Euler and Seufert framework (2005):

- The Didactics component focuses on the pedagogic value of educational innovations, learning outcomes, and curriculum design.
- Organizing educational advances in educational institutions is emphasized in the dimension Organization.
- When adopting VR Technology into formal educational procedures, IT infrastructure, policies, and governance must be addressed.
- Achieving Economic success in educational innovation requires balancing costs and benefits while enhancing current business models.

- Culture defines stakeholder behaviour, conventions, and mechanisms of collaboration and communication. Sustainable educational innovation requires cultural adaptations, and thus change management activities.

Additionally, also the following three contextual parameters below must be considered for the framework's sustainability and the development of institution-specific VR strategies:

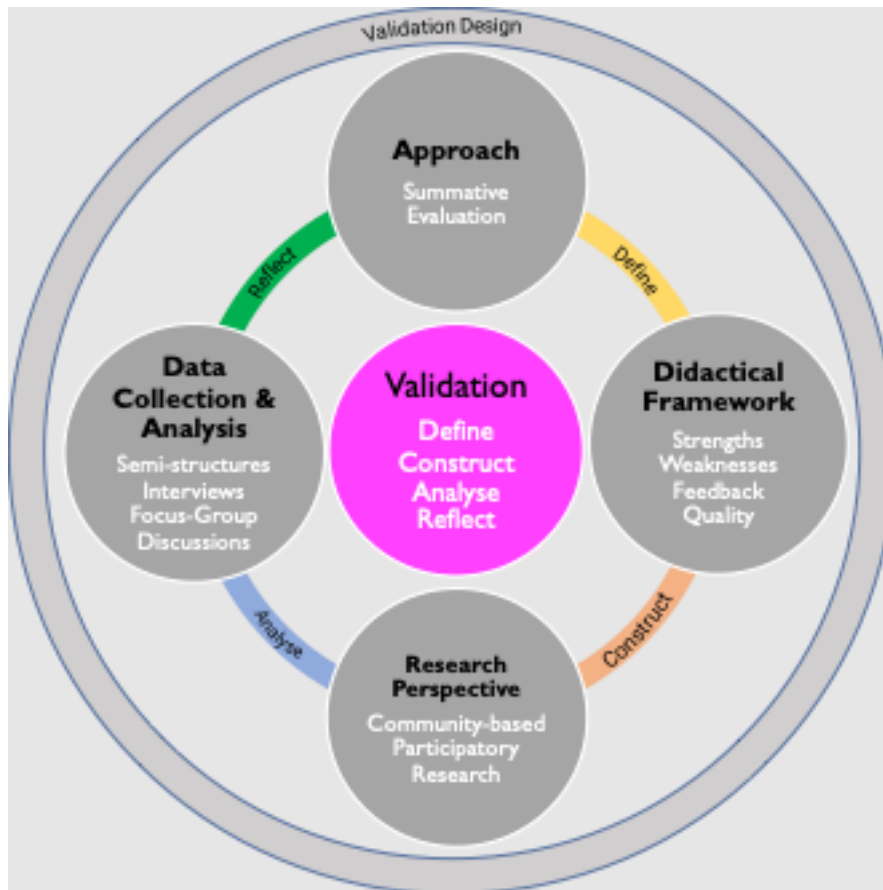
- The Education System defines the rules for structures and processes in the VR classroom. Higher education scenarios, for example, have greater design flexibility than school situations.
- A facility, strategy, or cultural value can be found in the Institution. Experience with digital educational innovations, for example, can help implement VR.
- To establish VR, it is necessary to discuss the experiences and expectations of the Individuals involved (stakeholders).

The Hotel Academy project's didactical framework was evaluated based on the following methodology.

### **Evaluation Methodology**

The underlying validation and evaluation technique not only allows the project partners to gather vital input on the didactical framework and its prototypes early before its permanent implementation but also enhance its quality and reflect on current learnings. An impartial third-person viewpoint based on stakeholders' perspectives, meanings, and ideas within and outside the project was included. The valuation procedure is not only based on a summative evaluation (cf. Scriven, 1991) but also takes into consideration a community-based participatory research viewpoint (see e.g. Hacker, 2013) to better understand diverse use cases, generate approved best practices, and improve the project's results. Semi-structured interviews and focus groups were used to acquire qualitative data.

As can be seen in Figure 2, the whole validation procedure was embedded into a reflective practitioner cycle, including defining the object of research (didactical framework), constructing research based on a specific research perspective (community-based participatory research), the collection and analysis of data (via semi-structured interviews and focus-group discussions), and the reflection of the findings (conclusions and blueprints) at the end of the process (summative evaluation).



*Figure 2: Framework for the Validation (based on Arnold & Rebane, 2021)*

The theoretical sample included three female and ten male participants (N=13) that were recruited from partner networks in the tourism sector (e.g. hotel management) in Cyprus, Germany, and France, members of the projects’ advisory board, and consortium partners in two separate group meetings and four individual sessions. The data collection methods included semi-structured interviews with different internal users and external stakeholders at the different universities (Cyprus, France, Germany) and the project coordinator (France) in three European member states Cyprus, France, and Germany: Based on a set of questions, each partner collected information, facts, and data regarding up to three VR scenarios available and/or interactive role-plays and/or other cross-institutional collaborations and/or in the hospitality and/or tourism sector. These questions included the (a) use of technology, (b) organizational change processes and responsibilities, (c) learning support of staff, (d) socio-cultural conditions and requirements, (d) dealing with economic and financial issues, and (f) the future of technological change. Semi-structured focus group discussions were conducted with all project partners and with the members of the advisory board: The meetings explicitly focused on the evaluation of the didactical framework. The thematic analysis approach adopted in our research emphasises detecting, analysing, and interpreting patterns (so-called “themes”) within the qualitative data and follows a step-by-step procedure (Braun & Clark, 2006): (1) Familiarise yourself with the data; (2) generate initial codes; (3) search for themes; (4) review themes; (5) defining and naming themes; and (6) producing the report. Eventually, from the analysis emerged three different patterns for the implementation of VR role-plays based on the relationships between the different dimensions and components of the didactical framework (cf. Villarroel et al., 2018). Due to the limitations of the paper, we only focus on the main feedback and final blueprints.

## **Results and Discussion**

### ***Main Feedback from Respondents***

The general feedback on the immersive experience was very positive. Respondents felt that the role-play was very practical, realistic, and overall allows participants to apply all the different knowledge they got in different courses into just one simulation. Despite the positive resonance, they also discussed several issues that need improvement and optimization in future iterations: Firstly, the conversation concerning technological concerns and media disruptions that prevent learners from utilizing new technology was on a technical level. When actors cannot move in the virtual room, body language and mimicry, as important parts for communication, cannot be expressed. Headsets and headphones were required so that everyone could understand each other. Moreover, the original plan was to use HMDs, but, due to COVID-19 pandemic requirements, the partners decided to develop a desktop VR version. In the end, it turned out that this new configuration had an additional positive effect, as it allowed for a better problem identification and optimization at an early stage. Respondents not only emphasized the need of an IT department's continual assistance for the scenario's success, but also highlight the importance of pre-installation of the software components, account setup, and user access. Other aspects that can hold learners and teachers back from using technology are for example audio quality, guidelines, installation procedures. Precise role descriptions and a standard scenario script can help to make the procedure of the role-play more successful.

Secondly, the developed VR role-play could be integrated in higher and vocational education and distributed via multipliers in the organizations. One partner mentioned that, from a technical and organizational point of view, the introduction of VR scenarios in teaching is a huge project for their university which is own by a private educational group. However, they will share the headsets and the app with another school from the same group and plan to use the VR app for an executive programme and for vocational training.

Thirdly, all partners will use the VR app for different courses and purposes, as it supports the learning outcomes in various fields of education. But this requires effective collaboration between the pedagogical team and the IT department. This was aptly noted by one respondent: "The pedagogical team, the head of department and his assistant for hospitality is responsible. For the rest, it's the central pedagogical team. Two divisions: one is operations and the other one is the state certifications" (interview partner 1).

Fourthly, all partners agreed that teacher's competence development is necessary for a successful integration and implementation of the VR role-play into the existing infrastructure. Additionally, an adaptation of traditional assessment of learning outcomes will become necessary: "In the end, there will be an exam or a report to assess if students developed communication skills" (interview partner 2). Teachers do also see in the debriefing and reflection of participants' experiences the best way to ensure that the learning outcomes are achieved.

### ***Emergence of Cross-institutional Blueprints***

The developed blueprints help to link the corresponding dimensions of the didactical framework and to achieve a more sustainable and coherent relationship between the use of virtual reality role-plays in higher education teaching and learning. As has been shown, all relevant teaching staff within the participating universities as well as representatives of the administration and the users themselves are involved in the process of implementation. The findings support the development of an empirically grounded and practically verified blueprints, which can be transferred to other universities as a possible ‘transformation path’ for the planning, design, and management of sustainably digitized teaching and learning environments. In particular, the criteria, framework, and initial conditions for such a successful transfer are reflected and provided alongside the following blueprints.

Blueprints describe and analyse the relationships between different components of empirical research (cf. Villarroel et al., 2018). In terms of the Hotel Academy project, the blueprints were developed based on the dimensions of the didactical framework: didactics, organization, technology, economy, and culture. Furthermore, the requirements from the different education systems, institutions, and individuals were also taken into consideration. Three possible blueprints for the implementation and adoption into other European higher education institutions (HEIs) are as follows:

- **Prototyper:** With this method, HEIs introduce new technology in an experimental context. Early in the creation of new teaching and organizational transformation models, prototypes were created and tested in different educational contexts. Prototyping should involve the following steps: To implement new technologies, it is necessary to identify the problem, challenges, and barriers that need to be addressed, ideate solutions to the problem, and evaluate the developed prototypes. Prototyping ensures the development and adoption of new concepts and approaches.
- **Synergist:** This method emphasizes how modern higher-education institutions may incorporate new technical and educational concepts into current labs, departments, programs, and initiatives. For example, an existing mixed-reality lab can provide basic IT support and knowledge gathered from previous initiatives to assist new pedagogic stages. Analog and digital ideas, processes, and technologies must be conceived together, “synthesized,” and “integrated” inside the organization. Finding synergies requires collaboration across several actors and departments.
- **Multiplier:** Experts, teams, and organizations may spread ideas, concepts, and processes to a broad audience that can embrace new technology in their institutions. Additionally, a multiplier is an organization that shares solutions with others to help them improve. Other educational institutions such as vocational education and any other education programs that follow similar learning goals may use the VR role play created in this research (e.g. where students are equipped with communicative skills, teamwork approaches, and social skills).

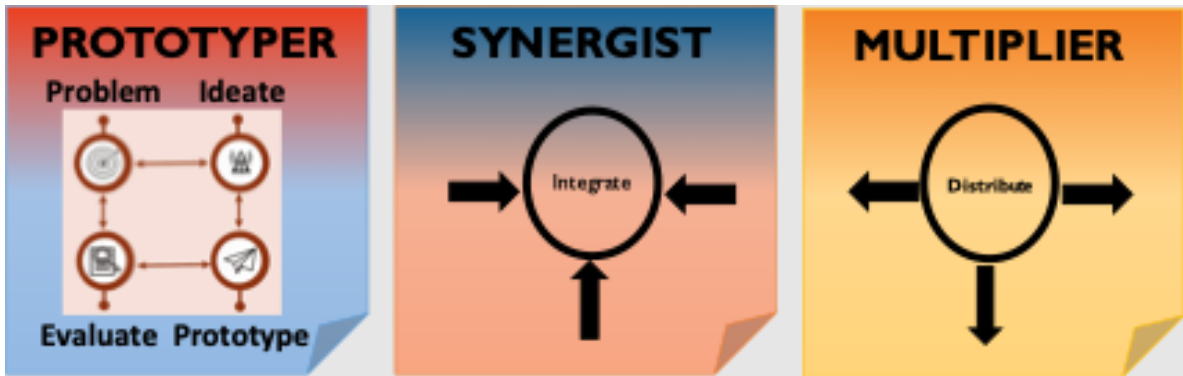


Figure 3: Cross-institutional Blueprints for European Adoption (author's own illustration)

The three above-mentioned blueprints are no simple representations of the universities involved in this project, but they emerged from our data analysis as part of the recommendations from the involved stakeholder and experts. They demonstrate empirically grounded archetypes of different states at which a higher education institution can locate themselves. Nevertheless, each institution should evaluate their current situation according to the following developmental questions:

What previous experiences exist in higher education institutions that are relevant to planning?

- How can these experiences and pre-knowledge be adapted for planning and be integrated into institutional implementation strategies?
- How can digitalization in the organization support the implementation and adoption of new technologies?
- How can organizations adapt to the specific interdisciplinary, (inter-)national, and socio-cultural criteria at home?
- How can blueprints of such processes contribute to sustainable higher education development?
- These questions should show that the implementation of new technologies based on a didactical framework can raise awareness for other kinds of relevant contexts in the different institutions.

## Conclusion

Project partners, experts, and professionals from the fields of hospitality management and digital education, as well as other stakeholders involved in VR development projects, have contributed to the framework for VR implementation in formal educational contexts presented in this paper. The results show a favourable correlation between VR usage and learning outcomes including presence, immersion, and teamwork. However, economic, organizational, and cultural components are still little understood – experiences from actual initiatives abound, but scientific notions are uncommon. This data issue should improve soon as VR enters formal schooling. The proposed approach offers a conceptual and theoretical foundation for integrating VR-Education experiences, drawing conclusions, and recommending educational activities. Future research directions and practical implications should focus on the following aspect of the didactical framework: (1) Didactics: Although the VR's positive learning



effects are immersion, attention control, focusing, spatial perception or presence, research should increase with effects of cognitive overload or even VR sickness over time. (2) Organization: For the successful integration of VR role-play scenarios, other relevant factors need to be analyzed as well, such as the physical environment, teachers training for technological and didactical VR implementation, assessment, and curricula development. (3) Technology: Future research must examine what kind of impact education technology has on the use of digital and virtual spaces. (4) Economics: Another question would be to find ways to develop sustainably acquisition strategies for new technology in the different higher education institutions and to organize a high level of human resources for financial, organizational, technical support. (5) Culture: Research studies in the field of virtual exchange and collaborative learning between European universities should better understand the influence of intercultural issues on the achievement of learning outcomes and student success. (6) Education Environment: For practical reasons a synchronization of the curricula and academic years, time-zones, holiday calendars; requirements of education, age of students provide a huge challenge for each virtual collaborative learning activity. (7) Institution: For successful integration of innovative educational technology, a well-developed IT infrastructure, labs, think tanks, and expertise in dealing with digital educational innovations will strongly facilitate the implementation of VR. (8) Individuals: Future research must pay attention to the impact of an involvement of different individuals with different roles, such as power promoters, expert promoters, and process promoters (Gemünden, Salomo & Hölzle, 2007) on the project's innovativeness and implementation.

### **Acknowledgements**

This research was supported by European Union (Erasmus+ Strategic Partnerships, 2019-2021, No. 2019-1-FR01-KA202-063097).

### **Declaration of Interest Statement**

The authors declare that they have no conflicts of interests.

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