

# Virtual 3D Entrepreneurship: An Exploration of Entrepreneurship Activities in Immersive Settings

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**Abstract:** This article aims to present the potential of virtual 3D and virtual reality for entrepreneurship activities such as the creative process and idea generation in the context of digital entrepreneurship education. It describes the set-up of a virtual 3D platform as part of the international project AGORA to explore how immersive technologies can support online creativity sessions. Following a Design Science Research methodology, the project team has dealt with the relevance of the topic, scholarly literature, and an iterative process for the development of the 3D platform. The paper discusses this process and motivates educators and practitioners to further explore and apply immersive technologies as an innovative tool for raising interaction and creativity in online sessions on innovation management and entrepreneurship education.

**Keywords:** Virtual 3D, Creativity, Entrepreneurship, Virtual Reality, Design Science Research

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## 1. Introduction

Given the importance that visual perception has in how humans understand the world, virtual 3D technologies and virtual reality (VR) seem to be the future of the internet. Not surprisingly, investments in these markets are on the rise: by 2030, products and services based on virtual and augmented reality could contribute US\$1.5 trillion to the global economy (PricewaterhouseCoopers 2019). A three-dimensional internet will impact virtually every sphere of human interaction and it raises questions about how processes in all fields of knowledge will evolve. Creativity and idea generation will not be an exception. But how can entrepreneurship educators and higher education institutions in general address this challenge in an iterative and cost-efficient manner?

Following the cycles of Design Science Research proposed by Hevner (2007), this article introduces the development of a virtual 3D platform (AGORA 3D) for digital entrepreneurship education with an emphasis on creativity. All activities described here are work-in-progress within the framework of the project AGORA, an international initiative led by the Strascheg Center for Entrepreneurship (SCE) at the Munich University of Applied Sciences (HM) and funded by the German Academic Exchange Service (DAAD). The research activities of the SCE and the HM in the project AGORA aim at supporting international entrepreneurship collaboration by setting up innovative digital tools that allow interaction between entrepreneurship stakeholders (students, start-up, established companies, investors, civil society, public sector, etc.) in new synchronous and asynchronous manners.

## 2. Methodology

This case study presents the design and set-up of the platform AGORA 3D. Data has been collected between May 2021 and March 2023 in the form of surveys, interviews, and observations made by the project team. Theoretical inputs from Design Science Research (DSC) have contributed to project implementation and will therefore be addressed throughout the article. Thanks to its pragmatic nature, DSR highlights the application of artifacts, i.e. novel solutions, to solve a real-world problem or address an opportunity in a given environment (Hevner 2007) providing a suitable framework for the implementation of the artifact at hand, i.e. the AGORA 3D.

The first section deals with the context that led to the exploration of VR in entrepreneurship education, corresponding to the Relevance Cycle of DSR proposed by Hevner (2007), in which the focus lies not only on the design of artifacts but also on their application and their connection to the contextual environment of the problem and the definition of the requirements. The second section addresses the Rigor Cycle (Hevner 2007), i.e. the existing knowledge about creativity in VR stemming from science, practical experience, and expertise. Finally, section three addresses the Design Cycle (Hevner 2007) and covers the set-up of AGORA 3D, the artifact resulting from iterations, feedback, and evaluation conducted by the project team.

### 3. Results

#### 3.1 Relevance Cycle - Context of Entrepreneurship Education within and post-Pandemic

As a result of a growing international network and Covid-19-related constraints, HM and SCE have expanded their digital entrepreneurship education offerings. Amid the pandemic, project-based entrepreneurship classes at both institutions incorporated asynchronous formats through massive open online courses (MOOC), as well as synchronous formats via online conferencing platforms like ZOOM or MS Teams. In addition, digital collaboration tools such as cloud drives like Sync & Share, digital whiteboards like Miro, and virtual project management solutions like Trello were used for teamwork. Students in online classes had the opportunity for coaching, reflection, and live question-and-answer sessions. However, it was common for instructors to encounter a relatively anonymous audience, with many students opting to keep their cameras and audio off.

The communication on these current digital collaboration platforms is limited to two-dimensional audio and partial video, which makes it difficult to have three-dimensional encounters and interactions. Also, important factors that contribute to creativity, such as the individual's physical space, are not considered in digital 2D formats. The SCE and HM are researching how to improve this situation by experimenting with VR and virtual 3D technology in entrepreneurship education. The primary focus at the time of writing is on how these innovations can support creativity and idea generation in online lessons.

#### 3.2 Rigor Cycle - Literature Review

Since the project started, research and regular exchange with different target groups of AGORA 3D, such as instructors, students, and industry partners, has been a core activity to ensure innovation and avoid the implementation of existing, well-known processes (Hevner 2007). Furthermore, this has allowed for testing and iterations of AGORA 3D from an early stage, taking into consideration feedback and wishes from potential users in order to improve creativity sessions on the platform.

Creativity depends on a variety of factors, such as personality, talent, and motivation (Taplick, 2021), and lays the ground for idea generation for innovative solutions. The individual physical space constitutes an important factor influencing creativity, because it has an impact on other factors such as interpersonal interaction, sharing of information, autonomy, and a sense of control, all of which contribute to the creative process (Vithayathawornwong et al. 2003).

Further, being able to look around the physical environment is associated with a higher number of creative ideas. In video conferencing, this number decreases significantly, as participants tend to fix their visual focus on conversation partner(s) – that is to say, on the screen. In their study of the effects of video conferencing on collaborative idea generation, Brucks and Levav (2022) point out that video conferencing hinders idea generation because the virtual space shared by participants is limited to the screen of the device being used. When virtual communicators restrict their visual domain to the shared environment of a screen, their cognitive focus is also narrowed. This narrowed focus restricts the associative process responsible for idea generation (Brucks and Levav 2022).

#### 3.3 Design Cycle - Development of AGORA 3D

As Hevner (2007) posits, the Design Cycle takes input from the other two cycles for the construction, testing, and evaluation of artifacts and processes. In this project, the first step was the definition of the requirements for the software to set up AGORA 3D, based on inputs from the Relevance Cycle and ongoing research activities conducted in the Rigor Cycle. Using a four-factor scale (25, 50, 75, and 100), the project team in collaboration with two professors and three students assessed four software suppliers: Anata ([www.anataworld.com](http://www.anataworld.com)), ENGAGE ([www.engagevr.io](http://www.engagevr.io)), Mozilla Hubs ([www.hubs.mozilla.com](http://www.hubs.mozilla.com)), and Spatial ([www.spatial.io](http://www.spatial.io)).

The criteria for the assessment included quality of visuals, usability, access to the platform (e.g. download of software and required sign-up information), country of origin (relevant for European data protection policies), price, supported devices, and satisfaction with the customer support of the software provider. Based on the results an initial AGORA 3D was created on Mozilla Hubs, an open-source platform for which no licenses are necessary, and therefore it is a suitable backup for the financial sustainability of activities after the project end. But at the end, the project had to switch to the platform Spatial, because of its rapid development, intuitive character for hosts as well as users, and compatibility with different devices.



Figure 1: SCE 3D - Immersive representation of the Strascheg Center for Entrepreneurship on the SCE/HM AGORA 3D

#### 4. Discussion

Research and experience in creativity and digital entrepreneurship education laid the ground for the design and iterations of AGORA 3D. The platform currently offers a space for Meet&Match, it displays information about project partners (ten international universities) as well as posters of start-up teams; further, it has portals that allow users to teleport to other virtual 3D spaces. On AGORA 3D, every user generates an avatar and accesses the space through their computer, mobile device, or VR headset. The project team has observed that for most participants, creating an avatar is a new activity that triggers their creativity and team spirit, as they have the possibility of selecting skin color, hair, clothes, body shape, etc.; it also serves as a warm-up and a team-building activity.

The emphasis on a dynamic and fun experience is paramount in the creative process. Users always have an experience – whether good, bad, or indifferent – whose quality makes them feel more or less committed to the creative activity. Ideally, it drives them to continue and keeps them motivated to perform at their best (Kohler et al. 2019). Thus, an enjoyable and engaging experience is extremely valuable because it brings participants into the flow, a state of mind that people try to maintain and seek to repeat.

AGORA 3D allows for visualization and interaction with digital information in various forms, such as uploading presentations, videos, pictures, 3D models, and sticky notes for feedback. These collaboration mechanisms and tools help teams identify potential errors, adjustments, and improvements at an early stage, leading to increased efficiency and efficacy and saving time and money in the innovation process.

Testing of AGORA 3D occurs mostly during project-based innovation seminars, where students are asked to familiarize themselves with the platform and the toolkit containing sticky notes, import of digital and 3D content,

teleport possibilities, and avatars' reactions. Observations made by the project team indicate that for most participants, the novelty of being in VR for the first time has a positive impact on their motivation and willingness to check out the virtual 3D spaces. When asked to give feedback on one of the rooms, for instance, a participant wrote on his sticky note "I want to stay in this place forever." Such enthusiastic reactions tend to be the rule when participants experience VR for the first time.

As mentioned above, video conferencing reduces idea generation due to the visual focus of users on the screen. Idea generation in a virtual 3D/VR environment can help overcome this problem because the user's eyes gaze around the virtual space while wearing a VR headset. Consequently, in principle, the visual-cognitive link that contributes to idea generation is present. Moreover, virtual 3D/VR allows users not only to set up creative spaces that resemble their physical spaces but also to create spaces that look completely different and are even imaginary or inaccessible in the physical world. Users can teleport to another planet for a creative and inspiring brainstorming session or immerse themselves in places relevant to their target audience to better understand its daily context, problems, and needs.

Furthermore, since creativity in groups relies on team members' communication and ability to access, visualize, and display content, technologies that expand visual representations are beneficial. Ewenstein and Whyte (2011) draw attention to the communicative dimensions of visual representations as artifacts to interact with and point out that they play a central role in knowledge work. Also, research on the use of virtual worlds in industry underlines that visualization provides opportunities to communicate differently in a remote work context and helps create greater awareness and understanding of different insights, ideas, and cultures (Bosch-Sijtsema & Sivunen 2013).

## 5. Conclusion

Given the rising importance of digital education and international collaboration, through the project AGORA, the SCE and HM are looking into innovative tools, like the AGORA 3D platform, to support entrepreneurship activities in digital sessions. Immersion has positioned itself as one very likely future of the internet and, as such, it will impact human communication and interaction in unknown ways. Indeed, 3D and VR allow for new ways of bringing people together to meet, exchange and ideate overcoming some of the limitations of 2D formats, such as a restricted visual field and low interaction levels.

Because of the novelty of the topic, the project team has followed a DSR approach during the conception and implementation phases of the 3D platform. This has enabled the team to understand the context, existing challenges, academic literature, and perform iterative adaptations whenever required. Throughout the entire process, students have been involved as they are the main target group and users of the platform.

Although student participation has been high (more than 700 visits to the 3D rooms between in 2022/2023) and reactions as well as feedback are very positive, the actual use of 3D and VR by students is still very low. Despite having the opportunity to rent the available VR equipment, like headsets and 3D cameras, users remain rather cautious. When asked in a survey about the reasons, students stated that they would appreciate more time for instructors to show them how to use the equipment, because they felt there were too many technical barriers. Also, motion sickness and lack of intuitive usage have prevented students from using the equipment more often. Nonetheless, it is worth noting that most of the participants in seminars and workshops have expressed that they would find it a good idea to complement online lessons with activities in VR.

Creativity and idea generation in online sessions can benefit from the introduction of new digital tools, such as 3D and VR; furthermore, research shows that other relevant areas in entrepreneurship education, including team building, generating empathy, prototyping, marketing, and public speaking can also be improved through these technologies. For the second half of the project (2023-2024), the AGORA team will further explore and test further applications of 3D and VR in the realm of entrepreneurship education and the development of new business models.

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