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Work-in-Progress—Towards a University Wide Implementation of Extended Reality

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Abstract. While university educators worldwide start to see the benefits of using extended reality (XR) in their classes, they often lack a policy framework and support from their management to do so effectively. As a result, various XR initiatives arise throughout universities, leaving all knowledge, expertise and XR learning materials scattered and unexploited by the majority of the other staff. At Thomas More University of Applied Sciences, Belgium, we are working towards a framework for a university-wide implementation of XR in learning. To achieve this goal, there are several challenges to overcome: mapping the existing initiatives and needs, inspiring educators, sharing knowledge and expertise, purchasing hardware and related software within a limited budget, and drafting a pedagogical and organizational policy framework. In this work-in-progress paper, we explain how Thomas More addresses these challenges and works towards a university-wide implementation of XR for learning.

Keywords: XR Policy Framework, XR for Learning, University-wide Implementation, Theory of Change.

1 Introduction

Immersive technologies such as virtual reality (VR), augmented reality (AR) and mixed reality (MR), collectively defined as extended reality (XR), have become increasingly accessible and user-friendly in recent years, leading to its growing popularity in various fields, including education [1]. Research shows that immersive virtual reality offers several advantages over traditional teaching methods, including reduced risk of harm, ample and time-independent learning opportunities and -according to several research studies [2–4] –increased learning effectiveness under certain circumstances. Despite these benefits, adoption is still very low and many educators are hesitant to implement this new technology in their courses due to the lack of a pedagogical framework for implementation [5]. While management of higher education institutions (HEIs) struggle to keep up with the rapid change of the XR-landscape, scattered initiatives pop up throughout the institution, lacking any kind of framework or overarching structure. In this way, the knowledge gained through these individual initiatives remains limited to a few individuals, not being given opportunities to share the expertise and good practices with other staff members.

To address this issue, Thomas More University of Applied Sciences, Belgium (TM) initiated a program to develop a sustainable XR policy that would support educators in using XR as a teaching aid. Thomas More University of Applied Sciences focuses greatly on innovation, combining insights from its higher education and using a practice-oriented approach on research. As the largest University of Applied Sciences, it has 7 campuses spread throughout Flanders (Belgium), making the problem of scattered initiatives even more present.

There is not a lot of research to be found on this topic, and most studies tend to focus on the acceptance of XR on small-scale and short-term applications [6, 7] rather than on institution-wide, sustainable implications. However, there are a few studies with similar goals: [8] discusses the result of their implication at the University of Newcastle, which failed to reach the intended sustainability due to lack of funding, IT support and integration; [9] reports to have been more successful and provides us with some key findings on what to keep in mind while

implementing XR in a HEI. While [8] and [9] focus on the results of the implementation, we wanted to highlight the process HOW to achieve those results. In the remainder of this paper, we will discuss our practical approach of the implementation of XR for learning in our HEI, along with some challenges we faced.

2 Methodology

As several educators had already started experimenting with XR in their courses, we were no longer interested IF extended reality should be used for teaching but rather HOW we could support educators in implementing XR in an efficient way. As such, we investigated which barriers hindered the adoption of XR by the educators at this moment and which initiatives on a university-wide level could help them in the implementation.

To address this question, we adopted the "Theory of Change" framework (ToC) as developed by A. Anderson [10]. This framework guides the process of implementing change by starting from the final goal and working backwards to determine the challenges, solutions, and progress indicators. It comprehensively describes how and why certain changes are expected to occur. Another main advantage is to have a good overview of a project. As such, it lends itself to implementing long-lasting, institution-wide changes on a structural level, making it an ideal fit to suit our needs.

The first step of executing the Theory of Change framework was to decide upon one specific, ultimate long-term goal. It should be a clear-cut desired outcome, as the rest of the framework results would stem from that. For us, by invoking the steering committee, this goal was the implementation of XR technology in our HEI.

The second step of the Theory of Change framework instructed us to start drawing a pathway of change, which is a tree structure where each node represents an essential precondition in achieving our long-term goal. This step helped us determine which preconditions are essential and enabled us to see the overall structure before diving into specific actions. While the ToC provides a structured approach that guides us through the process, we first needed input from our educators and management to understand the current landscape of XR initiatives in our institution and begin drawing our pathway of change. To collect this information, we conducted a survey following [11] and [12]. The survey asked for basic information such as department and course organization, as well as prior experience with and interest in XR, and most importantly, expectations for the program. We also asked about any barriers in adopting XR in their curriculum. The information we gathered served as input to draw our preconditions. *Example preconditions include: educators warm up to the idea to use XR in their classes, educators experiment with using XR and learn from each other, etc.*

Next, we tried to figure out how to turn those preconditions into reality by creating indicators. For each outcome, there should be an indicator which tells us if a precondition was successful. In a ToC, these indicators should then be operationalized, which involves transforming each abstract precondition into practical operations. To accomplish this, we followed the approach outlined in [13], which describes the building blocks needed for an efficient professional development program for educators in HEIs aimed at fostering educational innovation in digital skills. We matched these building blocks to our operational indicators. *Example operationalized indicators include: setting up a platform to facilitate and encourage knowledge sharing, sensitizing educators, etc.*

Only then, in the next step, the ToC asks us to consider which actions and activities, or 'interventions', are needed to bring about our preconditions. We mapped out these interventions based on the results of the survey, as well as the overview of the funding and resources available for the project, all of which helped us determine the necessary interventions toward achieving our required preconditions. *Example interventions include: looking into which software is the best option for our knowledge sharing platform, organizing road shows on each campus, etc.*

Finally, we are told to discuss our ‘assumptions’ with all stakeholders to make sure everyone is on the same page, and to be able to explain all the actions and connections between them. As such, our steering committee helped us finetune our pathway of change.

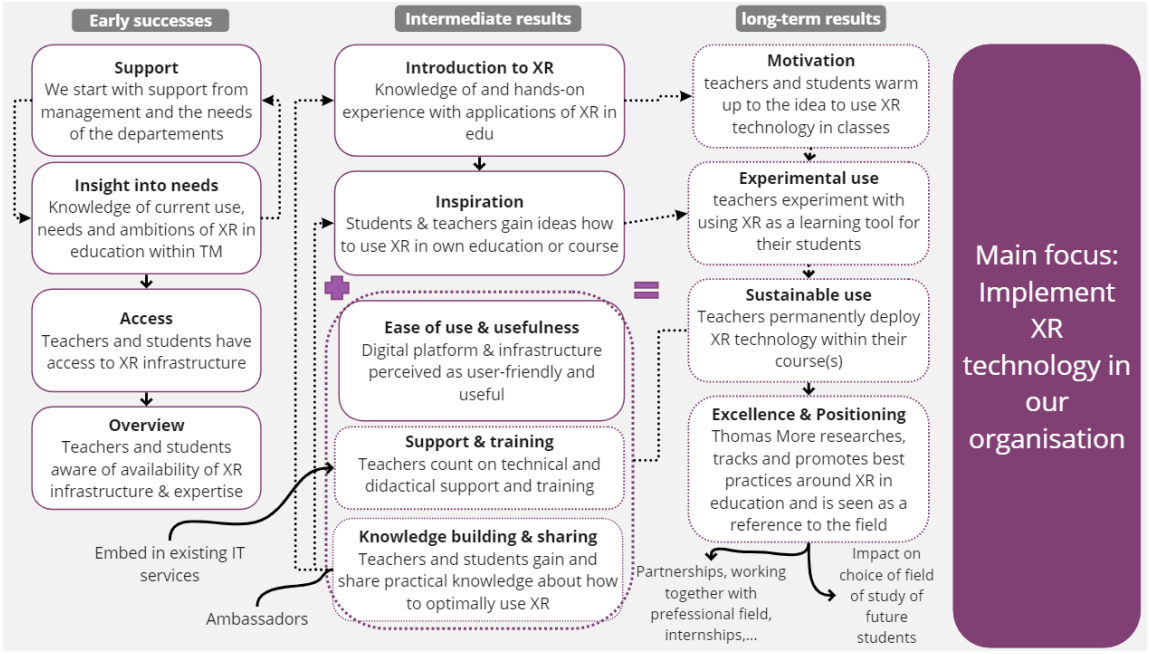

Fig. 1. Fragment of the tree structure of our pathway of change.

3 Results and Discussion

Drafting an XR policy for HEIs as a pathway of change, from the survey data, we defined 5 main challenges: inspiring educators, sharing knowledge and expertise via a digital platform, acquiring and sharing hardware and software with limited funds, setting up collaboration with external partners and establishing communication strategies on the project. These five building blocks are depicted in Figure 2. In this section, we will discuss how we tackled these challenges in our HEI, trying to avoid some pitfalls such as lack of funding, IT support and integration, which can result in a failure to embed XR technology in a sustainable and structural manner [8] and keeping in mind the insights from [9].

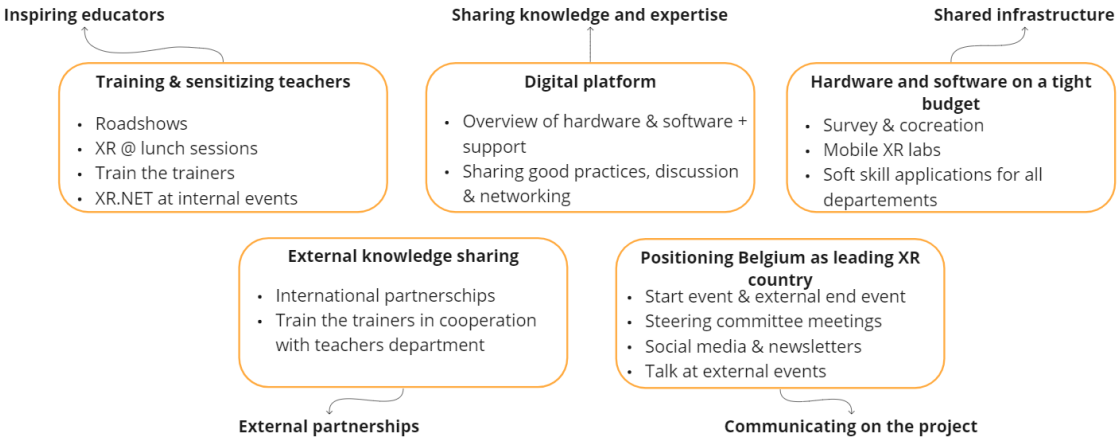

Fig. 2. Five main challenges and some related 'interventions'.

3.1 Inspiring Educators

As [9] prescribes us to "provide support to the campus community" we planned a multi-level approach to familiarize and inspire educators with XR. In the first year, we initiated so-called roadshows to introduce XR to educators on different campuses: we immersed them in several XR demos and explained how this could potentially enhance their courses. Second, we organized XR@lunch sessions to provide low-entry, inspirational

talks on specific XR topics. Last, we set up train-the-trainer sessions to equip educators with the skills they needed to use XR in their classes.

3.2 Sharing Knowledge and Expertise

As Lam and De Jong and Merchie et al. (2016) point out, collaboration and sharing knowledge and good practices is an important part of professional development initiatives [14–16]. Our survey gave us an idea of current XR practices within the institution, but an important part of the project is to give every educator that overview. As such, we established a digital platform connected to the university's intranet to share best practices, lesson ideas, and helpful resources. In this way, we prepare for ongoing sustainment to avoid the pitfalls [8] discuss, which caused their XR applications being discontinued in the end.

3.3 Shared Infrastructure – Hardware and Software on a Tight Budget

We aimed to create easily accessible and specialized XR labs. Moreover, [13] indicates an important part of learning is to allow educators to experiment themselves with new tools. Therefore, we wanted them to be able to teach with XR, but also to create their own virtual worlds and classes, maybe even requiring 3D-scanners to add 3D-objects to these worlds. Having 7 large campuses on various locations dispersed throughout Belgium, it would be impossible to build a specialized XR lab on each of those locations. To overcome those issues, we opted for mobile XR labs. We developed boxes, carrying VR headsets, tablets supporting AR, MR headsets, and a pre-installed WiFi-access point. These boxes can easily be transported to classrooms. Maintenance is provided for by dedicated IT support centers on the different campuses, discharging educators of all typical IT hassle, thereby countering one of the reasons that [8] lay their failure to.

In terms of software, the budget limited us to purchasing only a few application licenses. Therefore, we steered away from campus-specific applications, and chose to focus on software that was useful for each campus, such as XR applications for communication skills training, XR authoring tools allowing educator to create their own XR creations, and foreign language learning. In this way, we strived for quick wins and tried to reach as many educators as possible. Via these low-entry applications educators and management could experience the affordances of XR for education, potentially leveraging adoption of XR for other educational purposes as well.

3.4 External Partnerships

Through an external event at the end of the project, we will show what we will have achieved, position Belgium as a leading country for XR in higher education, and strengthen ties with the field. In addition, as a research knowledge center, we would like to promote XR technology as we see a bright future for XR as an educational tool.

3.5 Communicating on the Project

As educators indicated, one of the main drivers for adoption of XR technology for education is an incentive by the management, indicating XR is not just a gimmick or a hype, but a tool which can actually help educators and students to attain their learning goals more proficiently [5, 17]. Hence, it is important to communicate on the program in such a way, indicating the management's stress on and belief in XR as a tool for learning, an essential requirement of professionalizing educators according to [13]. Moreover, where [8] indicates their lack of IT support and integration in the HEI may have led to an unsuccessful result, we strive to help educators, IT employees, and sub-level managers understand why XR for learning matters, how it enhances their teaching and learning and how it can strengthen the position of the institution as an innovative center.

4 Conclusion

In conclusion, the integration of XR technology in Thomas More University of Applied Sciences was approached using the Theory of Change framework, which helped guide the steps towards a university-wide XR policy. The process involved determining the focus, mapping out the pathway of change, and operationalizing the preconditions through five work packages. Despite some obstacles, the project is currently being implemented and moving forward towards the goal of structural integration of XR technology in the university.

This paper provides valuable insights into the integration of XR technology in a higher education institution (HEI). However, it is important to acknowledge that there are limitations to this paper. The framework used in this paper has been applied to a specific HEI in Flanders, and the educational context of this region might differ from other parts of the world. Furthermore, the approach of Universities of Applied Sciences might differ from traditional universities. While this paper suggests working from an evidence-informed approach to implementing technology such as XR, it is important to note that this method is a work-in-progress and has not yet been fully validated, even though early results suggest that it holds promise for successful integration of XR technology. This paper should be able to serve as a starting point for future research in other contexts and countries. By further validating this framework, we can ensure that the integration of XR technology in HEIs is successful and can provide ample learning opportunities for students while promoting innovation in higher education.

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