accelerate

Accessible Immersive Learning in Art and Design

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Case Study

Bionics; testing the potential of immersive technology on classic design subjects and exploring the pedagogical opportunities and implications of immersive technology on students' learning.

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1. Case Study aims:

The case study pairing between Chernivtsi University and School of Form created an opportunity to find a new path of collaborative textile design processes. SWPS School of Form implemented a project called "Bionics". The aim was to use two-dimensional graphic projects as inspiration for designing in three-dimensional space, focused on working with textile mapping. To create outcomes students used Gravity Sketch software and the results were presented in a shared Frame VR space. A common virtual classroom was created in Frame VR as a space for experiencing, inspiring, observing and comparing the students final results.

The target group at the School of Form were 3rd year students of Communication Design. Operating mainly in the area of 2D graphics; designing visual identifications, illustrations, book publications, applications and websites and operating in the field of photography, video, animation or typography. Their level of technological advancement in 3d modelling was beginner level. Students had completed an obligatory basic course of the Rhino program in the first year of studies whereas their experience with immersive technology was nonexistent or one-off.

The purpose of engaging Communication Design students in this project was to test the potential of immersive technology in classic design. An attempt to creatively transfer 2D illustrative projects to the 3D world with the possibility of going beyond the existing limits of scale, materials and layouts. Students were given the opportunity to create space that would be difficult for them to access in the real world. At no cost, they could check how their designs worked when applied to fabrics or transformed into jewellery objects. They transcended the restrictions of paper and their works received new, unexpected incarnations. An additional advantage, undoubtedly, was the possibility of cooperation beyond the physical classroom and, as a result, arranging a conceptually related virtual exhibition with Chernivtsi University, several hundred kilometres away.

2. Methodology:

The case study was divided into 3 sessions each taking 45 minutes. The first session focused on the introduction to the VR space. Due to the amount of headsets, this was structured in a rotational set up with students placed in 2 groups of 4 . One group set up and redesigned graphic projects in Adobe Illustrator software to apply designs to the 3d textile model whilst the second group was introduced to the VR space and created all necessary accounts (Meta Quest, Landing Pad). Then they rotated. One account on Sketch Fab and Frame VR were registered as well.

The method of incremental adaptation of students to the new environment was used to minimise and avoid negative experiences. The first step for participants was to define the boundaries of their mobility area in the headset. Then they were free to explore which allowed students to gradually test, play and experiment with the new technology. Most of them watched a short animation, a favourite concert, or perfect spot on the earth available in the media application. This was to familiarise students with the changing Metaverse around them.

The second session focused on the study of the relationship between textures and 3d models. The first part of the session was completing an interactive tutorial prepared by the authors of the Gravity Sketch software. The available tutorial was found to be adequate in terms of advancement, intuitiveness and functionality. Then basic knowledge of surface properties (especially uv division) was conveyed. A basic model of textile was created together. For testing various textures all students used the same 3d model. This unification allowed for clear perception of the differences between the mapped textures. The session ended with exported final outcomes. One of the important tasks of the lecturers was to explain the relation between uv surface division and textile mapping. They made clear how the tools work and supported students during other phases of the project.

The last session focused on importing models into Frame VR and curating an exhibition. It was necessary to use SketchFab as a bridge between Gravity Sketch and Frame VR. Participants divided tasks and worked in groups. SWPS Students were inspired by the final results of the case study partner (Chernivtsi National University) and decided to explore immersive technology further. They designed the concepts of jewellery based on their textures.

3. Student Experience:

Information about the user experience was collected through an online survey. The results of that research are presented below (in translation).

Stage 1. Determining the level of knowledge of students in the field of VR / AR
1. What is your impression of distance learning or blended learning in 2020-2022?
  1. *Less demanding/less important classes gained together with this form (they were more accessible), and more complicated/important classes lost because they did not allow for full possibilities. In general, less contact with other students and lecturers was also a weak issue.*

2. *I had to quickly adapt to the new rules, get to know Google Meets tools. There was no presence of other people and no possibility to leave the house to go to the university. I had to listen to and watch boring PowerPoint presentations.*
3. *I'm rather of the opinion that distance learning is easy, you save time and energy, and as for blended learning, it's not bad.*
4. *Rather negative, stationary I have contact with people, which has a positive effect on mental health.*
5. *Very big difficulties with focusing, "skipping" online classes, and when we came to universities, everyone preferred to talk and spend time with each other than to listen in class. Less motivation for anything, monotony, time merges into one mass.*
6. *I am a high-functioning extrovert, so I had big problems with remote learning. I learned less well and felt worse.*

2. What was your knowledge of VR/AR before joining the project?
1. *Small, I had a headset on my head once for 15 minutes. I knew a little about technology from class.*
2. *Quite low and practically purely theoretical, I was working on issues related to VR / AR in terms of humanities such as ethics, sociology, including availability in VR/AR design.*
3. *My knowledge of VR\AR was limited because I had a negative opinion about it before, but I decided to take a closer look at VR\AR. And most of it interested me, but the other part still left me unanswered. I need more time to get used to it*
4. *I've used these technologies in museums and games before*
5. *I heard about it, I used it once in my life, I treated it as a way to entertain myself, not work or study.*
6. *I know the terminology and IOT and the basics of the metaverse, but I haven't worked in any programs.*

3. What was your knowledge of 3D modelling before starting the project?
1. *The course of the basics of the Rhino program taken 2 years earlier in college.*
2. *I went through a basic Rhino design course a few years ago, I didn't really have the skills.*
3. *I have a stable knowledge of 3D modelling, because I had contact with several 3D modelling programs (RHINO, Sketchup).*
4. *I took a course on learning Rhino.*
5. *For a year I modelled 3d in classes at the university, in a computer program.*
6. *I know the basics of Rhino and SketchUp.*

4. Do you think that VR/AR technologies can be effectively and usefully used in your learning? If so, how and why?

1. *They are perfect for quickly conceptualising ideas, being able to create 3D things with the swipe of your hand is downright groundbreaking.*

2. *Of course, they can be a solution to make online design teaching more attractive and allow people to meet in virtual space. These technologies allow you to gain new design experience and create them yourself, e.g. through 3D modelling in VR, which allows you to create and view an object / object in real time, from every angle and on a one-to-one scale. It is a new space and possibilities for creators, which ensures fulfilment in designing with the use of a new medium.*

3. *It is so useful and effective that we can use VR/AR in our field of communication design. Since we implement visualisation and VR/AR is based on it, our role is to improve visual communication.*

4. *It is an interesting tool, especially in the context of exhibitions that can be viewed from all over the world thanks to VR. It facilitates the flow of the results of artistic and scientific activities, but I prefer the analog and tangible world.*

5. *Yes I think it gives new design possibilities, facilitates many things (e.g. 3D modelling is more intuitive), allows people from different corners of the world to be in one room and experience together, allows you to create things that are physically impossible in reality, thus stimulating creativity.*

6. *Yes, it expands spatial skills, immersion affects the absorption of knowledge and strengthens sensory impressions, thanks to which there is a chance that knowledge can be absorbed faster.*
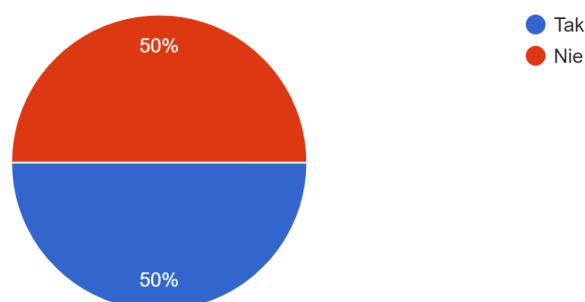
Stage 2. Determining the students' impression of the first use of the headset
1. Were your expectations related to the use of the headset confirmed?

- 50% tak (yes)
- 50% nie (no)

1. Czy potwierdziły się Twoje oczekiwania związane z użytkowaniem słuchawek?
6 odpowiedzi

2. Did you feel comfortable the first time you used the wireless VR headset? Describe this experience:

1. *Generally yes, but I have to admit that sometimes the image blurred unpleasantly and also after a long time my head started to ache a bit.*
2. *Yes, because I knew that I had a safe space and a group of people to ensure that the experience went smoothly, for example, by verbal introductions and instructions before using them.*
3. *It was a terrible experience. Glasses aren't comfortable, they give me a headache, and for people with poor eyesight, it's hell. I hope they fix it over time. As for the wireless set, it is convenient.*
4. *Using the headset is difficult for me because of my prescription glasses. After 20 minutes of using the headset, I had a headache and experienced nausea.*
5. *I didn't feel comfortable, I was a little nauseous, I had a headache.*
6. *It was an exciting experience, after adjusting the glasses the vision was comfortable. Despite the short introductory session (20 minutes), I felt motion sickness after removing the equipment. The feeling did not appear on subsequent attempts.*

3. Your recommendations for using the VR headset during the session. Give an example based on your session work.

1. *It is worth taking breaks/swapping with other users of goggles to avoid headaches.*
2. *Going through the tutorials with mindfulness can save the user from asking a lot of questions later and allows for full immersion in the VR world.*
3. *Well, if it's used in a session, it's interesting, but unfortunately I think live communication is better.*
4. *I have no recommendations.*
5. *Take off your gear often, work alternately in real life and VR, do shorter sessions than one long one.*
6. *I believe that goggles are the best to relax, unwind and creatively release stress.*

Stage 3. Questionnaire about working in Gravity Sketch

1. Have you had previous experience using Gravity Sketch. If not, what was your first impression of using Gravity Sketch?

1. *I did not have one. It was an amazing experience, very intuitive. I felt like I was teleported to the future. Creating in Gravity Sketch brought a lot of fun and you wanted to do something there.*
2. *I had no such experience. After the first use, I was impressed by the possibility of modelling, in virtually any scale and objects could be viewed from any perspective. The ways of designing, e.g. drawing models in the air, were also fascinating and opened my head to new possibilities.*

3. *The first impression was not bad, it was interesting to see the 3D model in real life, but there were moments that it was not comfortable.*
4. *NO. GS is an interesting 3D modelling tool, better than the ones I used on the computer.*
5. *no, everything was very intuitive.*
6. *I have not used it before, but I am very impressed with how intuitive and precise this software is. I will gladly use GS in the future.*

Student reflections:

Please share your reflections on working in the project - regarding hardware, programs, way of working, systems, etc.

1. *The project went quite smoothly. We had time to get to know the technology and use it in practice, which brought a lot of fun and practical skills. We could easily create an exhibition and use our works in a new context. It was a very valuable experience that opened up new possibilities.*
2. *An important point was the cooperation of the leaders and the whole team, the motivation of each person helped to achieve the intended goal. We implemented the plan of creating the exhibition step by step and everyone was involved and strongly interested in new VR / AR technologies, for most it was a new experience and everyone wanted and was willing to test themselves in modelling, moving around space, giving various properties to objects.*
3. *One thing I wasn't happy about was that I couldn't fully immerse myself in VR because the glasses were causing my eyes to hurt terribly. And it made my job difficult.*
4. *The project was a positive experience for me, mainly due to the experience of something new and the group in which I worked. Using the oculus was difficult due to symptoms such as headache.*
5. *Very interesting experience. I was sceptical about VR, and now I would like to work in it more. It would be interesting to work in parallel with other groups of students and share your design process on an ongoing basis.*
6. *Quick introduction and intensive work time, but I am satisfied with the effects and the fact that I had a chance to familiarise myself with the equipment and programs.*

4. Findings:

Conducting the case study in the form of intensive sessions within one week eliminated the process of multiple introductions to the project and allowed the participants to maintain a high level of engagement. Students willingly took on additional tasks such as 3d modelling jewellery based on the textures they designed.

Dividing the participants into two groups and preparing tasks for both was important. Everyone had their job and did not feel like waiting for their turn to put on the headset. Setting up all the necessary user accounts in the first session allowed the next meetings to go according to plan.

The Gravity Sketch software is not equipped with a more advanced tool for surface editing. It is impossible to add/reduce uv divisions of the surface, so the base 3d model of the textile was remodelled several times, which was demotivating. For students who had a basic level of 3D modelling skills, this task was very challenging and required constant support from the lecturer.

It is not able to open a .grs file (Gravity Sketch format) on another headset. Students could not open a file with a 3d model of surface that could be modified on several headsets. Additionally, Gravity Sketch does not offer modifications (scaling, rotating) of textures. Each input must be adapted to the dimensions of a specific surface. The lack of these functions added additional complexity and removed the immediacy of modelling and experience for the students.

How the file is exported defines further manipulation of the 3d object in the Frame VR. The 3d model should always be located at the origin of the coordinate system. Otherwise, moving and scaling the model in Frame VR is very unintuitive.

Importing files from Sketch Fab to Frame VR is frustrating. Models are processed for about 30 minutes before they are ready for import. Possible replacement of 3D models is frustrating and time-consuming. The best solution is to start from uploading all files to Sketch Fab and then import them all to Frame VR.

5. Evaluation:

The survey carried out at the end of the case study confirms the results of the "Diagnostic Report; The Experience of Online Education". Students admit that despite several advantages of such education, i.e. getting to know new tools for working on-line or saving time and energy, they are not in favour of this form of acquiring knowledge.

They lacked contact with other lecturers and students, they had more problems with focusing on the subject being taught, or difficulties with motivation to learn.

As a result, many students complained of worse mental well-being. Undoubtedly, studying design is associated with a greater need to exchange thoughts, inspire each other or act together. It is also necessary to be able to physically touch the produced object, in the case of communication design students with a printed poster - where, although the whole process rests on their shoulders, it is a source of great satisfaction and expanding artistic/design awareness. In their case, the VR experience was not a solution to the pandemic problem, but rather an extension of the spectrum of the media used. We worked as a group, meeting in the real world — in the screen printing studio where we work on a daily basis. VR tools gave us the opportunity to create an exhibition with 3D artefacts such as fabrics and jewellery, which we would never have thought about before as it went beyond our current interest and imagination.

To sum up, VR technology is not a solution to the problems of remote education for us. Students desperately need physical contact with other students, teachers or the subjects they create. Currently, VR is not able to replace them. However, what was fascinating was how it brought to their design experience the possibility of cheap and therefore "safe" methods that can go beyond the framework of 2D reality, any simulation of space, objects and experiences in it.

6. Recommendations:

1. Schedule an organisational session to create all the necessary user accounts.
2. Attention should be paid for correct export of 3d models from the Gravity Sketch.
3. First experience of new technology, in this case immersive one, is very important. Based on this case study we recommend self-exploration of the VR space by users. Participants are engaged and eager to discover new technology on their own.

7. Next steps:

1. Workshop on the basics of screen printing in VR for the University of Chernivtsi
2. Design a joint clothing collection in VR and produce it
3. A joint exhibition of textiles - graphics - combined products

8. Appendices:

Definition of UV division in screen printing: In the algorithmic 3d modelling each surface is defined by control points in 2 directions ("U" and "V"). These letters are conventional variables. "X", "Y", and "Z" are already used to denote the axes of the local cartesian coordinates in the software.
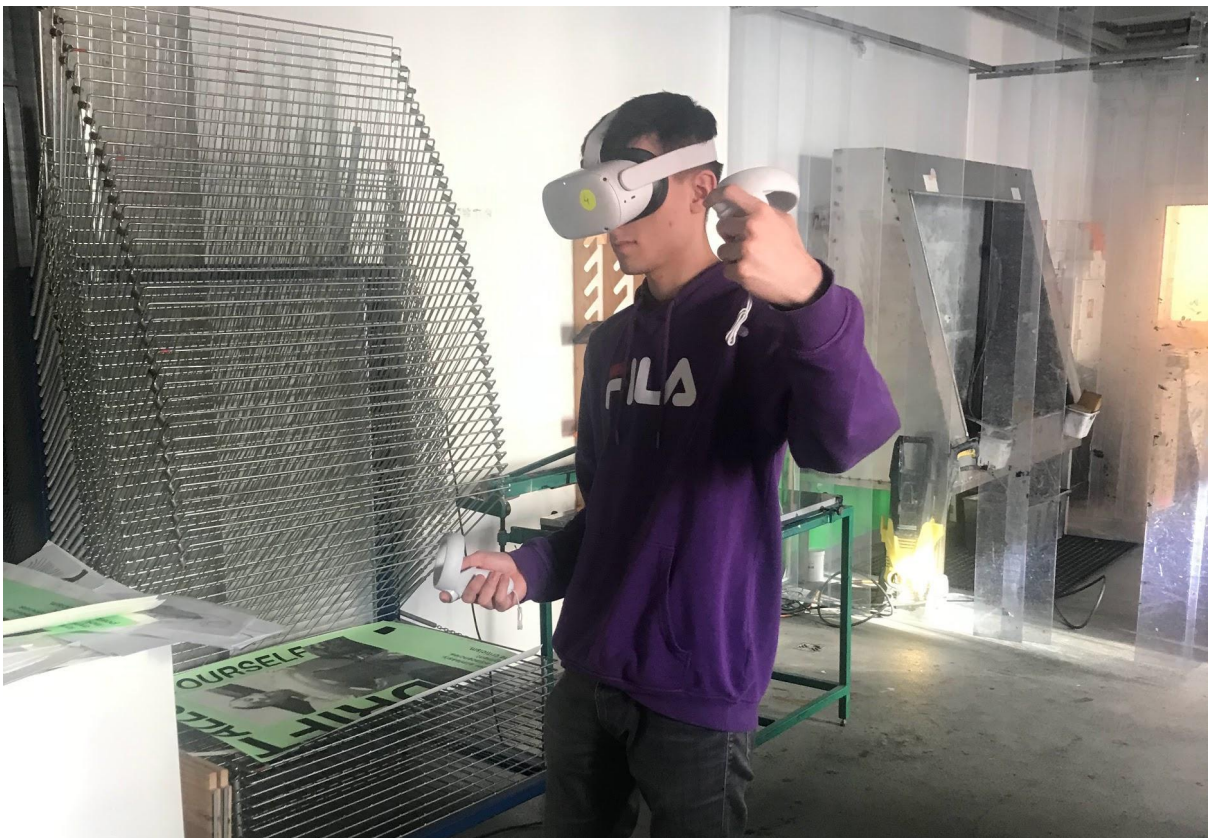
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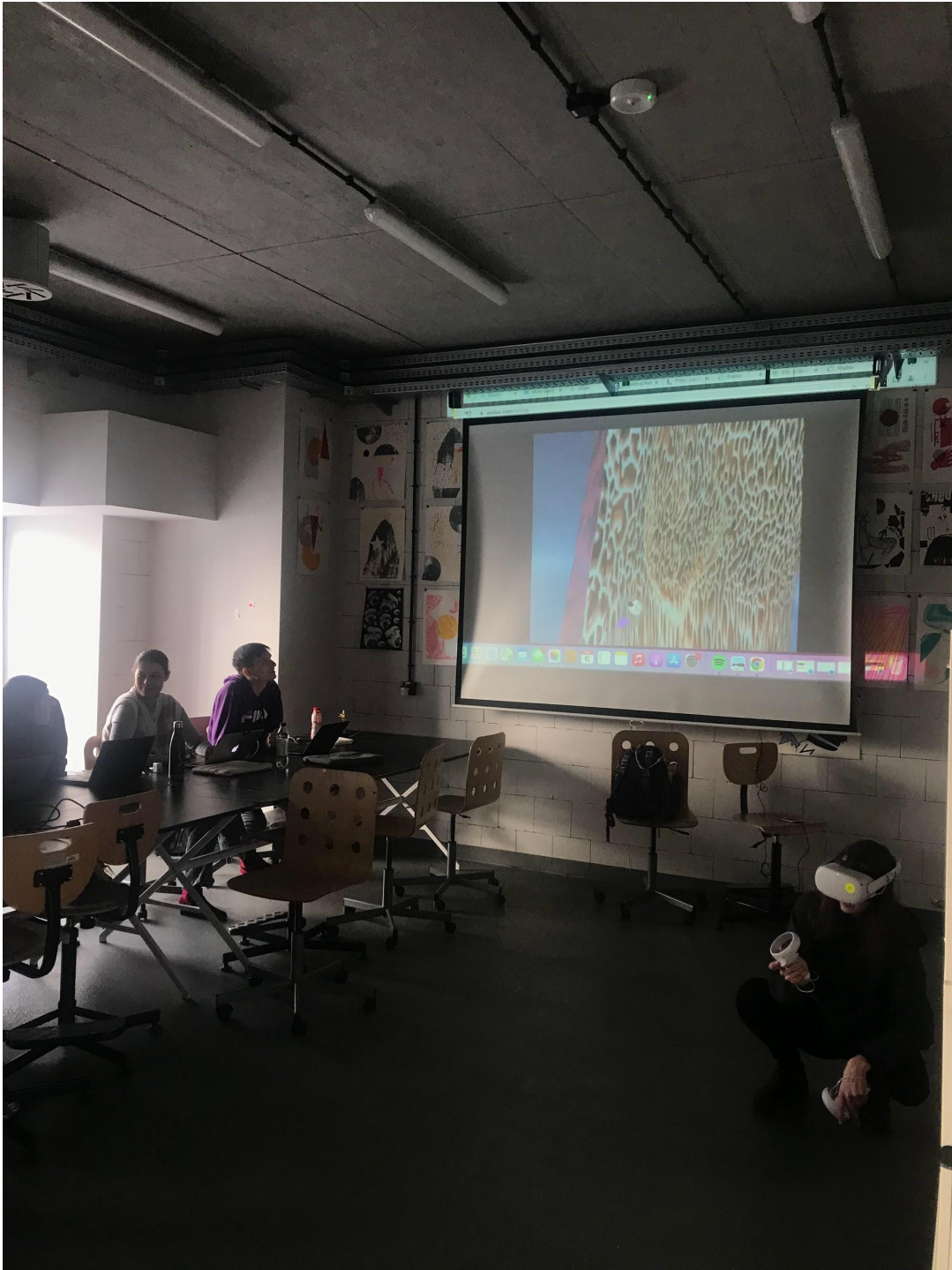Session 1 | School of Form
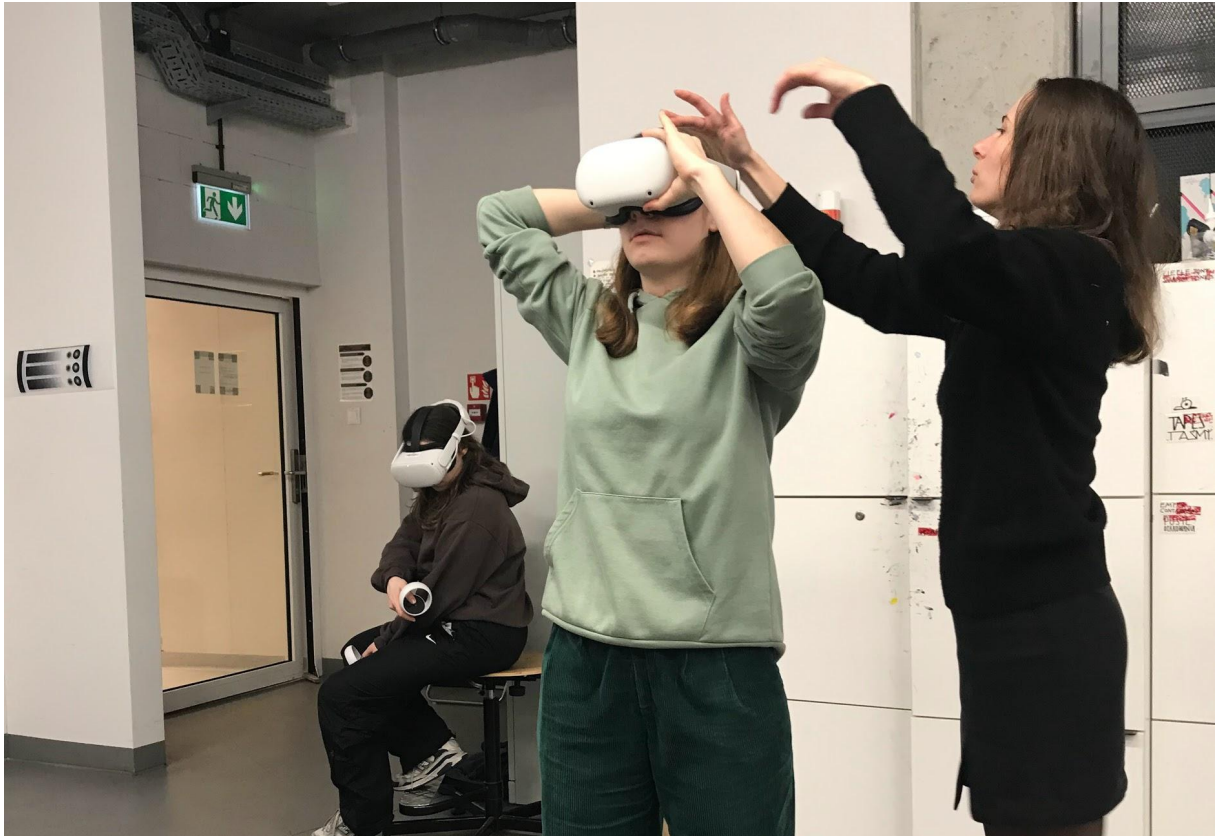
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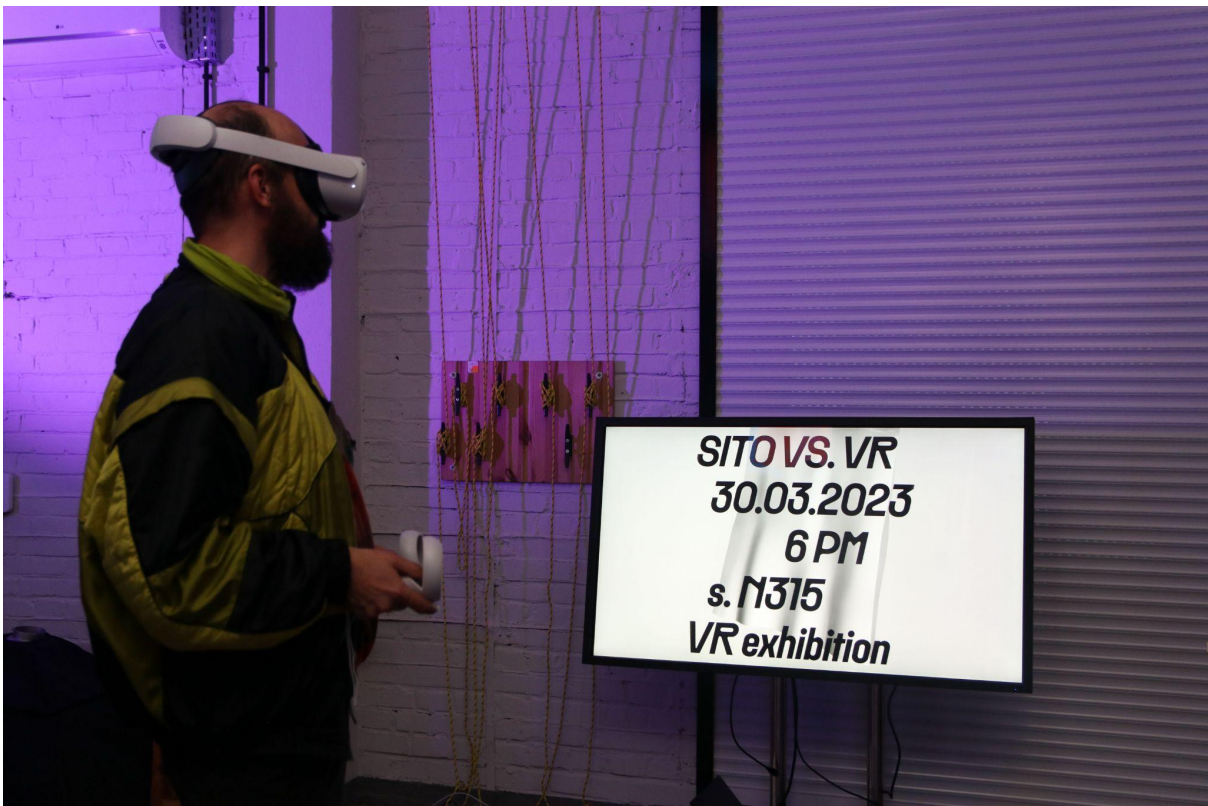

Session 3 | School of Form

Session 2 | School of Form

Session 2 | School of Form
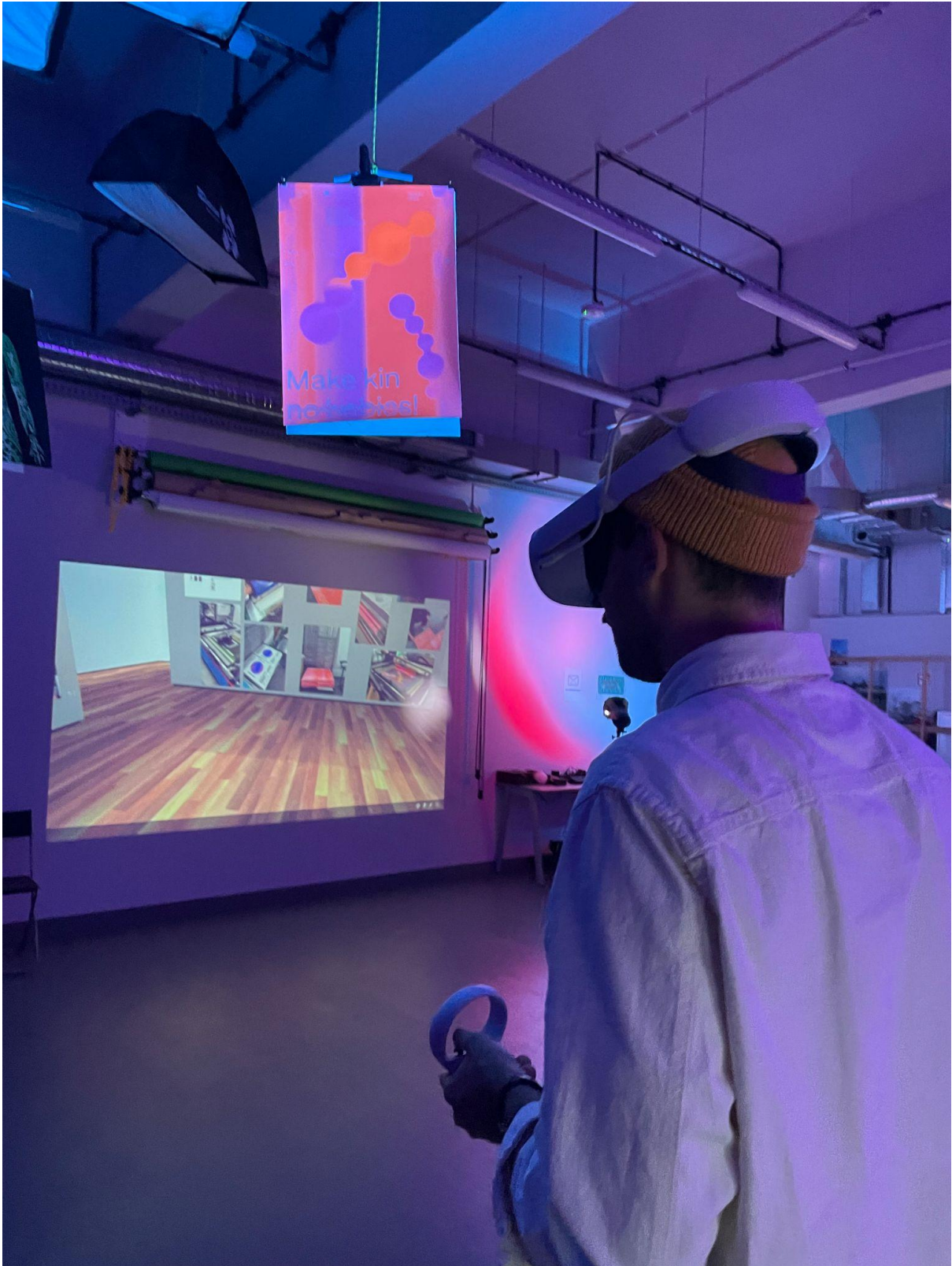
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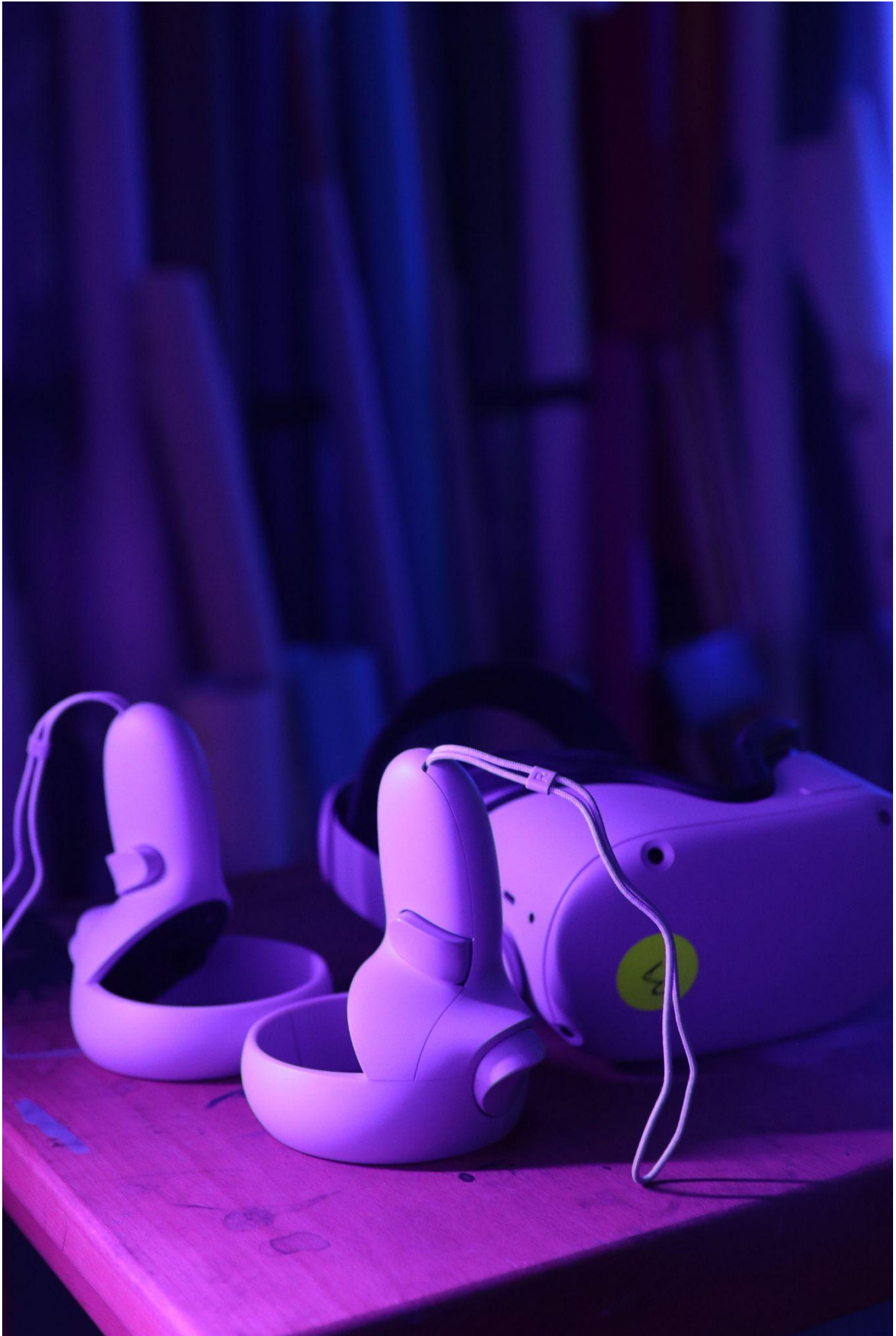
School of Form Bionics outcomes

School of Form VR Exhibition

School of Form VR Exhibition

School of Form VR Exhibition

VR Headset and handset School of Form Exhibition

School of Form Exhibition