How could future forms of learning environments look like?

How do these relate to learning cultures and what processes do they emerge from?

Speculative Co-design of Future Learning Environments

A workshop format for speculative visions

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Abstract

Digital transformation in higher education depends on a bottom-up approach, in which both educators and learners share a common vision of a future learning culture. To initiate the process of developing such visions, we propose a playful and hybrid approach that counteracts social hierarchies and thematic boundaries. The outcomes we elaborate on are generated through a game called *The Classroom of the Future*, which we used for our structured workshop format. Our central concepts and development process, as well as the workshop results, are presented here.

Introduction

Hybrid formats of communication and education are becoming a new reality and consequently changing how we teach and learn. After the corona pandemic, professors and students alike are looking for further digitally-enhanced education, either through blended or hybrid learning (CHECK, 2022). However, hybrid learning, which allows participants to connect on-site or digitally, means greater logistical and cognitive effort for educators, as well as an active, participatory contribution by students. Far beyond a mere technical ability, this hybrid realm fosters new learning cultures. While still at their eve, it is vital to design these learning cultures sustainably and to critically reflect on their impact.

Since 2021, the digital transformation within arts education is explored via the practice-based research project, *InKüLe*, at the *Berlin University of the Arts*. This paper is situated within the larger scope of the *InKüLe* project - facilitating and reflecting digital and hybrid educational design. The presented project offers a playful and hybrid visioning approach, seeking to challenge social and thematic boundaries. This approach was executed and tested in a 90-minute workshop at the *Bits & Bäume Conference 2022* in Berlin with a transdisciplinary audience of 11 educators, students, and education personnel. The *Bits & Bäume Conference* advocates for the convergence of digitalization and sustainable design, attracting experts and an audience that is actively engaging with a sustainable digital transformation.

Students, educators and third-space personnel interact simultaneously in analog and digital space

The presented project offers a playful and hybrid visioning approach, seeking to challenge social and thematic boundaries.

Exploring the different roots of the 'Classroom of the Future' game

Hybrid and digital learning formats are changing the way we teach and learn

Exploring the Themes

1. Digital Transformation in Higher Education

In 2007, Yves Punie published a theoretical model for future learning spaces enabled through information and communication technology (ICT) arguing that a new proactive vision for learning with technology is needed to consider the change in how people work, learn, and interact with the world through technology (Punie, 2007). Though emphasizing the importance of technology, ICT needs to be thought of within the social and organizational context of learning to realize its impact. Rather than a technical artifact, these digitally-enhanced and hybrid learning spaces should, therefore, be understood as a figurative space hosting social, analog, digital, and epistemological processes and systems (Bygstad et al., 2022).

The digital evolution of higher education after the Covid-19 pandemic was fueled by bringing together a top-down strategic approach and a bottom-up approach, which was previously missing. Therefore, the covid-19 pandemic facilitated a digital transformation in higher education by enabling a bottom-up approach to technology implementation. To realize such a bottom-up approach, a holistic shared vision is required and will allow professors and students to redefine their roles in the shared learning spaces (Bygstad et al., 2022).

> „Information & Communication Technology needs to be thought of within the social and organizational context of learning to fully realize its impact."
>
> Yves Punie

2. Participatory Design for Sustainable Learning Cultures

The impact of a shared vision and bottom-up approach on facilitating new learning cultures is also evident from the perMA project. This project was initiated by students of the *Hochschule Anhalt* in Dessau, where they applied participatory and transitory design methodologies to create a sustainable learning culture for the Masters of Design program. In weekly seminars that invited inclusive students, professors, and administrative staff, project-based design methodologies were applied to redesign the learning system ("perMA," n.d.). Contributing to the success of these workshops was a flattened hierarchy, where responsibilities and decisions were shared within the group of participants in contrast to the traditional top-down hierarchy that exists in a classroom or educational setting.

3. A Gamified Approach to Flatten Hierarchies

In another project called *SILLA*, by the practice-based researcher Asma Derouiche, social hierarchies and unconscious bias were challenged and addressed through a gamified approach to collaboration. By gamifiying the ideation phase of transdisciplinary design projects, members of the project team felt empowered to contribute with their respective expertise and to initiate discussions around core ideas of innovation (Derouiche, 2020). The gamified approach, therefore, offered a clear structure to the transdisciplinary collaborations, which fostered idea-driven teamwork beyond social hierarchies and resulted in innovative design outcomes.
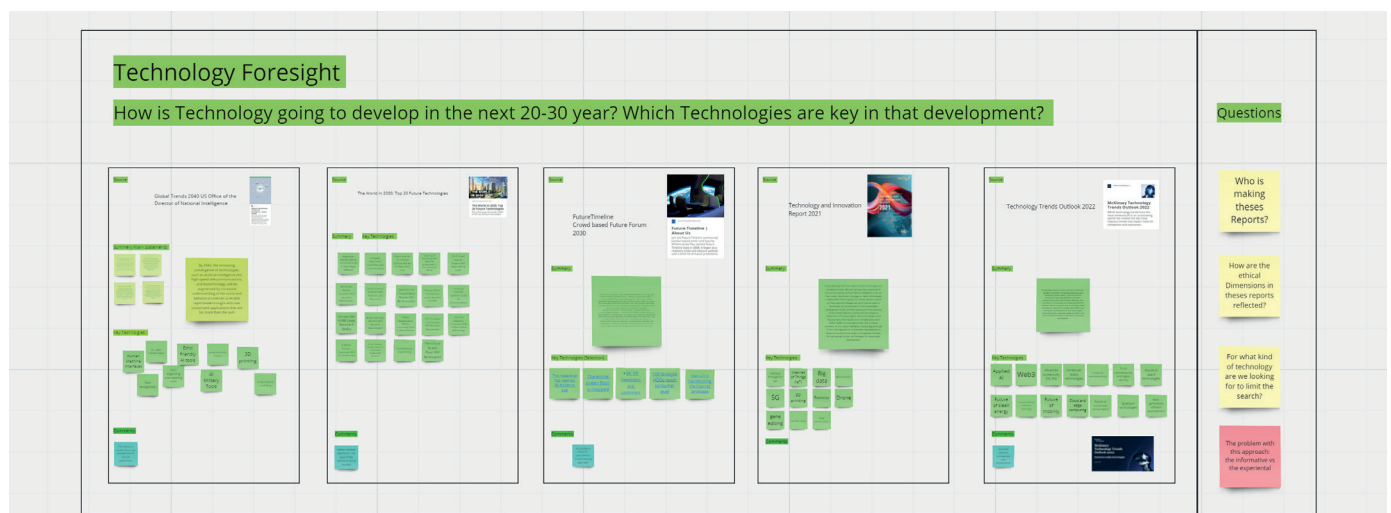
The playful and hybrid visioning approach was informed by research of the literature and technology forecasts

4. The 'Classroom of the Future' Game

The workshop proposed in this paper serves as a precursor to the co-design process for a sustainable learning culture, by inviting a mindset of malleability and innovation to the long-standing tradition of teaching and learning. The main aim is, therefore, to counteract the social and disciplinary hierarchies in education and to expand the creative re-imagination of learning environments.

For this purpose, the award-winning imagination game *The Thing From The Future* by *Situation Lab* was adapted to the context of education. *Situation Lab's* game challenges players to work collaboratively in imagining objects from a range of alternative futures ("Situation Lab," n.d.). For this purpose, the card game helps generate prompts, which outline "the kind of future that the thing-to-be-imagined comes from, …culture it belongs to, …the type of object that it is, and …an emotional reaction that it might spark in an observer from the present" ("Situation Lab," n.d.). *The Classroom of the Future* game incorporates this aspect of generating creative prompts from cards to collaboratively imagine a future object. However, the categories and content of these cards have been adapted to consider the epistemological processes, technological developments, and future skills emerging from and contributing to an educational environment. By working collaboratively with the student assistant Jonny-Bix Bongers, several adaptations of the card categories and content were created based on research and tested in gameplay. As a result, *The Classroom of the Future* game prompts participants to imagine an artifact or tool for education in the future and consists of the card categories:


Several card categories and content were created and tested in gameplay

- •• Object *(referring to objects found in a classroom or on a person)*
- •• Material *(combining digital and analog materiality)*
- •• Practice *(a pedagogical activity, functionality or use of the object)*
- •• Future Skill *(skills as a consequence of using the object and, which have been defined as necessary future skills in the literature)*

The content of each card category was further informed by research of the literature, with a particular focus on educational psychology, as well as anticipated futures in technology. In the Object category, for example, items, such as "Prosthetics" are offered for creative prompts, signifying the developments that are being foreseen in wearable devices, as well as human-machine- and brain-machine-interfaces (Mikhail A. Lebedev et al., 2011; "IFTF: Future Now Inaugural Issue," 2023). The Material category features content based on projected technological developments, such as "Holograms," as well as the possible marriage of technology and nature ("Office of the Director of National Intelligence - Global Trends," 2023; "The World in 2030: Top 20 Future Technologies," 2023). The Future Skills category is largely based on the work of educational researcher Angela Duckworth, who founded the Character Lab, an organization that identifies and advocates for skills and character traits that enable students to be successful in the future ("Playbooks," 2023). These future skills are based on cognitive, volitional, and social abilities that can be acquired in a learning process. The content presented in this card category, therefore, are the skills a student should develop to solve complex world problems that aren't always at the thematic center of an educational journey but can significantly impact its course.

The game was developed digitally for a hybrid workshop format and invites participants to engage in playful collaboration and creative imagination to challenge social hierarchies and the traditional classroom setup. The workshop format within which *The Classroom of the Future* game was hosted is described in further detail in the following sections.
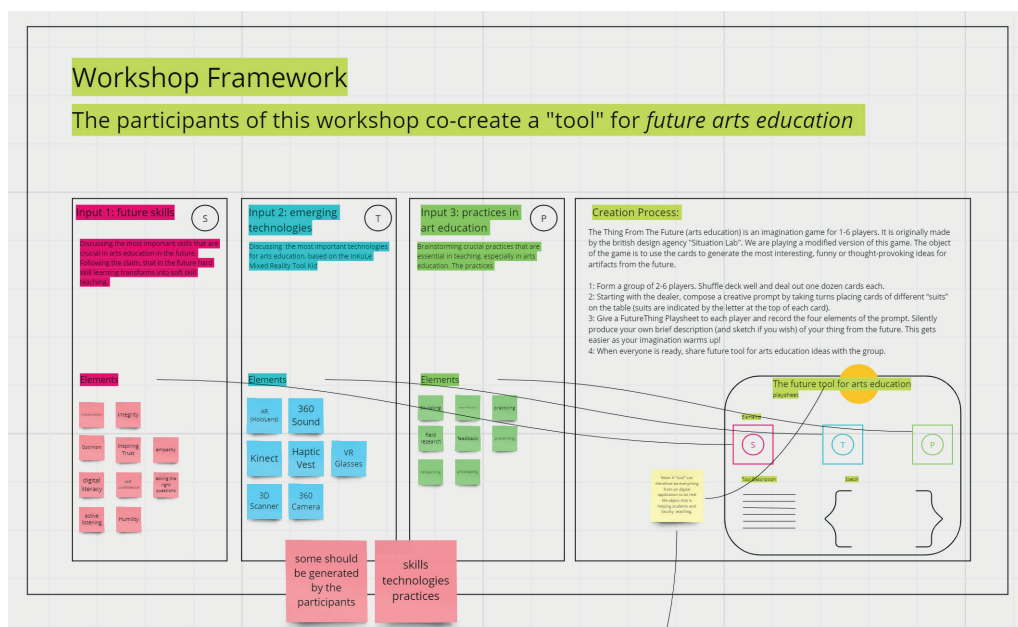
Gameplay tests evolved from paper to digital experiments

Defining the Workshop as a Speculative Co-Design Format

It is through the interweaving of these varied design- and learning approaches that the workshop was gradually formed. Despite the divergent references, forming the workshop was an act of convergence, where specific aesthetic, conceptual, and technical choices were made. Each of these sets of choices had a major impact on the development of this workshop as a speculative co-design format, and they will be described as follows: starting with the choice of platform and visual identity, the transcription of concepts into processes/templates will be explained. This will then be followed by a playful way of forming teams, and then finally the selection and use of equipment will be defined, particularly concerning the conceptual and procedural approach that this workshop pursued.

1. Core Medium & Aesthetic Approach

Perhaps the most impactful choice in defining this workshop was designing it around an online, visual collaboration platform. We worked with *Miro*, a commercial product that offers free educational licenses, making it thus financially sustainable for overall use in our project. Far beyond a simple tool, the platform in this case became a vital, digital companion to the physical space that we shared with the participants on site. It functioned as a space, in the sense of organizing our collective experience in time, and was the main medium through which we channeled our process. Crucial elements here were that collaboration among all participants could take place in real-time, as well as the fact that the platform could support different forms of visual expression (1).

Miro functioned as a space, in the sense of organizing our collective experience in time, and was the main medium through which we channeled our process.
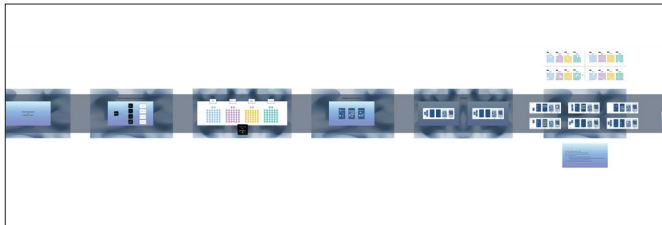
(1) Overview of the environment that was created in *Miro*: https://miro.com/app/board/uXjVPScsULg=/?share_link_id=757546828451

The ability to express ideas visually became a central factor as we started to formulate the workshop in a gamified format. Not only the rules and the functional elements of the game but also the templates and their visual characteristics became central parameters of the workshop's experience. As an overall approach, all different phases of the workshop were organized under a common visual identity, sharing graphic elements and a color theme. Here, the choice of lines and colors was far from an arbitrary preference. Through fine white lines and shades of blue, the visual identity of the workshop sought to merge two very different creative practices: the subtle blue hues of cyanotypes and the fine accuracy of construction blueprints. The aesthetic fusion of these two visual references was a nod towards the fusion of the epistemological realms that they are more readily associated with – namely, the fusion of the artistic

with the technical. The visual format of the workshop templates sought to underline its overall goal: enabling innovative, speculative visions beyond disciplinary hierarchies or limitations (2), (3).
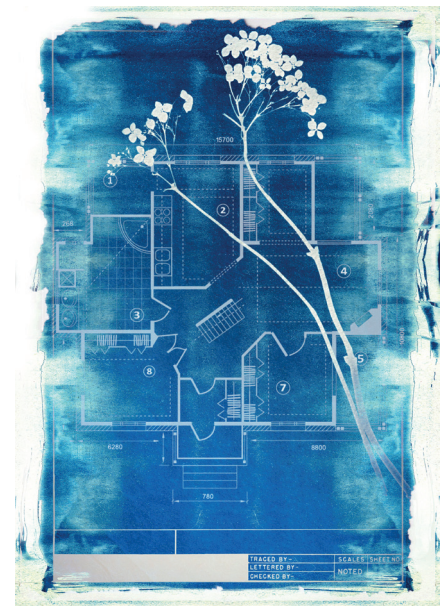
(2) Conceptual collage on the workshop's visual identity. All graphic images & templates by Maria Kyrou.

(3) Overview of all templates created for this workshop.
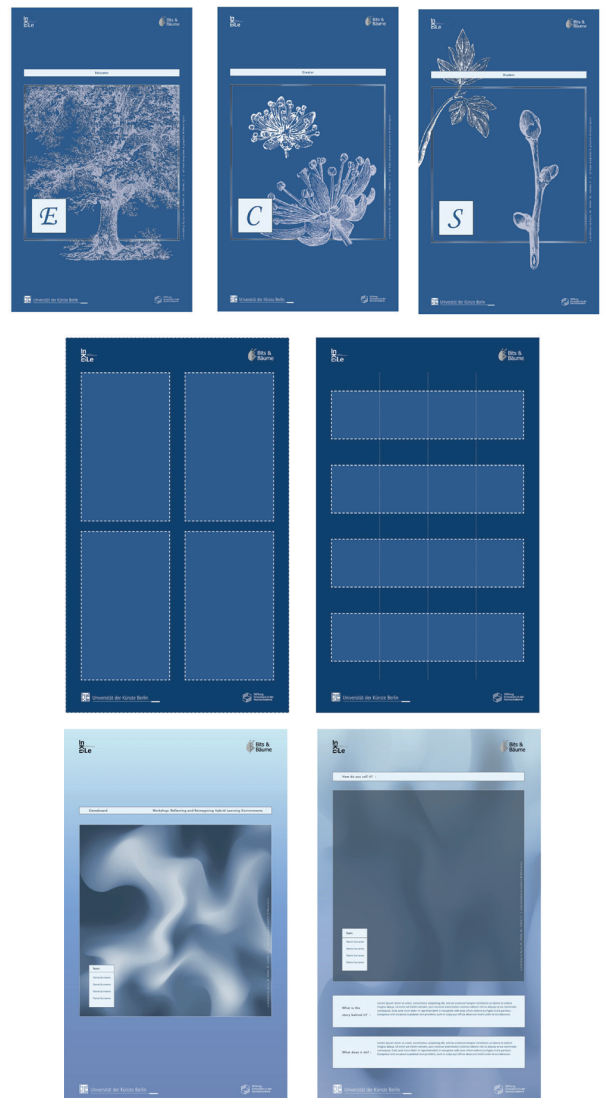
## 2. Transcribing Concepts & Processes into Templates

On the basis of these first choices, the workshop was structured in three clear stages, which guided the participants through a speculative thought- and co-creation process. These were: (i) Analysis, (ii) Reflection, and (iii) Synthesis. In each of these stages, a conceptual aspect of the workshop's theme was transcribed into a process, and it was in parallel visualized as a game template.

Analysis:

The speculative future artifact should be defined through four aspects:

- Form / Function → what is it and what for?

- Materiality → what is it made of?

- Mediation / Agency → how will it help us do what?

- Future Skill / Learning process → what kind of skills will it activate?

Conceptually, this mapping of different possible characteristics offered a speculative perspective of what this future learning artifact may be & traced specific pathways for a speculation and co-design process to begin.
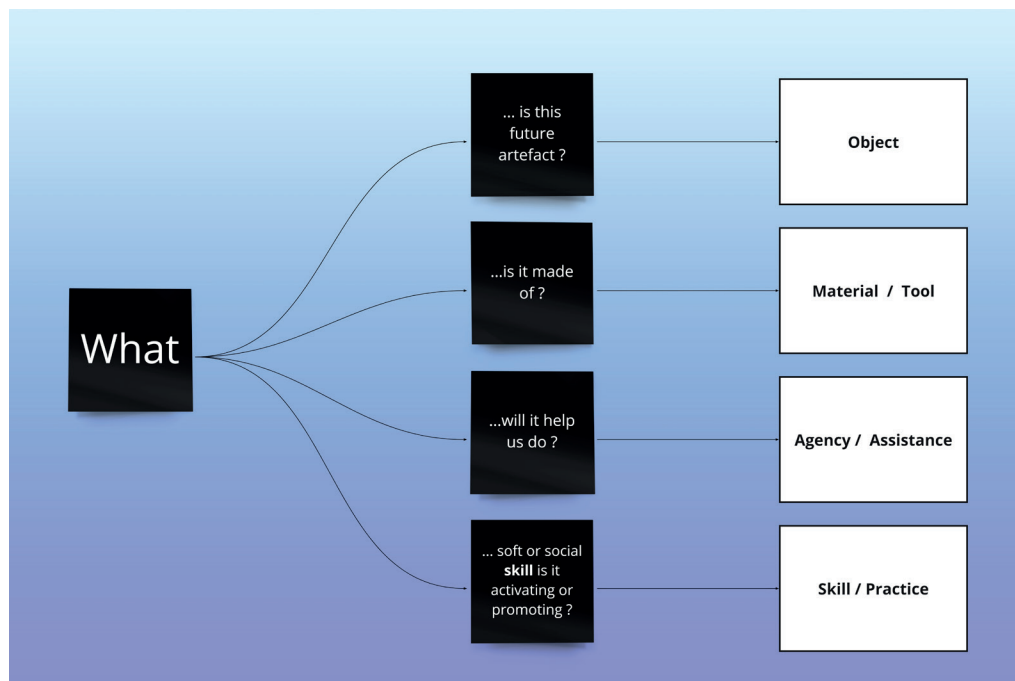
(4) Analysis: The four kinds of What

These aspects and questions brought the participants' attention to different qualities of the future learning artifact, addressing respectively its potential Form or Function, its Materiality, its Mediation or Agency as part of a learning process, and finally the Future Skills that it's encouraging. Conceptually, this mapping of different possible characteristics offered the participants a holistic perspective of what this future learning artifact may be and traced specific pathways for a speculation and co-design process to begin. Visually, these qualities were expressed as a diagram of digital 'post-it' papers. Finally, as a part of this first phase, it was important for us to communicate that this diagram of qualities is not closed, but malleable and open-ended. Therefore, each 'what' category was further explained through a template of examples, which offered for each case a wide variety of possible interpretations. A big part of these post-it papers was consciously left empty, encouraging the participants to fill in new ideas or possibilities that might be missing (5).
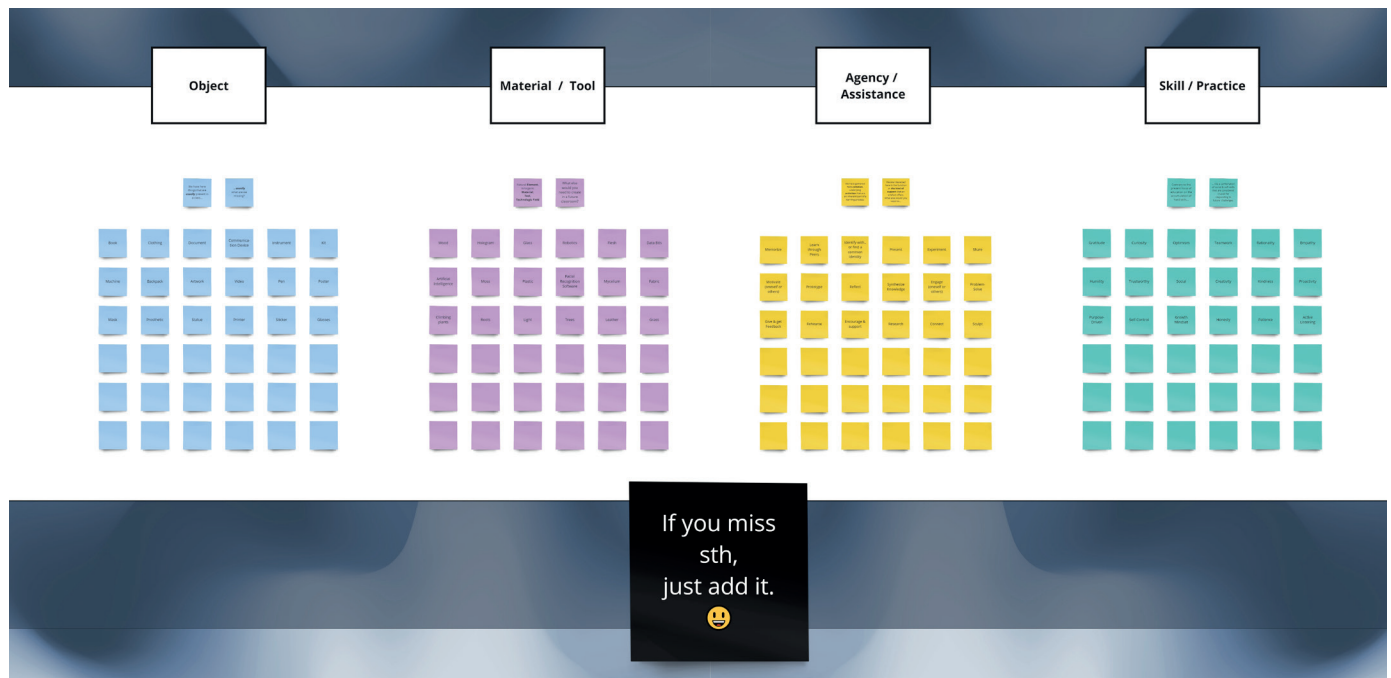
(5) Analysing the four categories into examples

Reflection:

Following this analytic process, the participants were invited to a phase of self-reflection. They were asked to consider from which personal viewpoint or role they want to examine this future learning artifact. In order to attune their perspective to a learning process, they were asked to choose among a Student, an Educator, or a Creator role for the context of the workshop. The addition of this last category sought to highlight the multiplicity of processes that are associated with teaching/learning, as well as roles that exist beyond hierarchical dipoles. Additionally, the participants were invited to interpret these roles as serving them best, being literal (I am studying, so I will select 'student') or imaginary (I am curious about teaching, so I will act as a future 'educator' version of myself). Conceptually, this phase sought to render clear that not only the characteristics of a future learning process but also our own identities, mindsets, and learning profiles are speculative and evolving. In praxis, discussing roles and perspectives also invited the participants to know each other better, which in turn facilitated the next steps of the co-creation process. Visually this stage was expressed through the design of 3 different role cards. Following the overall cyanotype/blueprint aesthetics, the cards incorporated the 'Bits & Bäume' theme, visualizing each role type as a different element of a tree. A dedicated base template was also provided for this step, where each participant placed the card of their chosen role (6).

(6) Reflection: Potential roles & mindsets

We sought to render clear that not only the characteristics of a future learning process but also our own identities, mindsets, and learning profiles are speculative and evolving.

Synthesis:

Initially, each participant was invited to choose one element for each of the four aspects, defining in this way the specific qualities of an imaginary learning artifact of the future. Each participant collected their chosen post-it examples in one row of an assigned base template in order to combine their ideas into a common vision. Additionally, two dedicated game-boards were created: 1. 'a collecting draft,' which process-wise, it functioned as the space for brainstorming and exchange. Visually, this was expressed through an abstract landscape, whose fluid and organic form offered a unifying base to the diverse, emerging ideas (7). The 2. 'presenting draft' guided the process of the previous step into a more concrete result. Here, the participants were challenged to finalize their concepts, and to come-up as a group with one common description or illustration of their proposed artifact. Dedicated parts of the board, invited the participants to name their artifacts, or to write down the story that lies behind it. A legend was included in the board, where the participants' names were collected. The goal at this point was to filter their initial, individual selection of elements as a group, seeking to find common elements and to set priorities on what kind of future artifact they would like to further develop. To assist this synthesis of ideas, we invited them to think of the selected elements as 'building blocks,' which they can then re-combine to form a common artifact narrative (8).

(7) Synthesis: Template as collecting Draft

(8) Synthesis: Template as presenting Draft

This technical setup allowed us to combine social and embodied communication in the physical space with the affordances of digital collaboration tools.

(9) Tablets with keyboard & pen formed the basic hardware interface of the workshop

3. Associating Process to Equipment

A large part of the workshop's process was expressed visually over a digital platform. However, this was complemented by an analog part, as both facilitators and participants shared a common physical space, turning this workshop into a hybrid co-designing process. Our technical setup and selection of equipment played therefore a central role, as it bridged the physical with the digital experience of the workshop. Our main equipment consisted of a fleet of 15 Microsoft tablets, each of them including a keyboard and digital pen. The *Miro* board was projected onto a wall in the workshop room. While in the physical space, the groups worked around their separate tables, one could also see their collective process evolve in the digital space of the platform. This hybrid setup sought to both facilitate and inspire the participants, as they contemplated a learning artifact of the future. During the co-creation process, this setup allowed us to combine social and embodied communication in the physical space with the affordances of digital collaboration tools. Meanwhile, the use of equipment that is modular, portable, and scalable in its application is part of an overall ethos that we have been developing since the beginning of the *InKüLe* Project. We seek to closely combine media didactics with media techniques, and the use of innovative media is always filtered critically and process-driven (9).

4. Enabling Transdisciplinary Teams

Making space for diverse skills

As mentioned at the beginning, a core aspect of why this workshop took partly place in an online platform, was that this enabled the visual expression of ideas. Combining the digital pen and the keyboard of the tablets with the platform's built-in digital tools, the participants were encouraged to develop their ideas in any medium they felt more comfortable with – typing in post-its, sketching small illustrations, handwriting notes, and/or creating diagrams. We sought thus to create a welcoming space for diverse forms of expression, mind- and skillsets, as the participants had diverse disciplinary backgrounds and roles. In turn, this resulted in a rich variety of visual expressions and ideas. Offering an individual device to each participant further facilitated this process of expression, as they could organically switch between personal development of ideas and collaboration within the group.

We sought to create a welcoming space for diverse forms of expression, mind- and skillsets, as the participants had diverse disciplinary backgrounds and roles.

Match-making and playfulness in the physical space

We chose to use an experiential game for speculation on potential futures. Based on the work of Dutch historian, Fred Polak, Peter Hayward and Joseph Voros invented a game named *Polak Game*, alternatively known as *Where do you stand?*. The game aims to make its players aware of their assumptions and perspectives of the world, as well as to sensitize them to the perspectives of others. It is described as a 'standing' game, an interplay between a player's worldview and their literal location in the game and workshop room (Hayward & Candy, 2017).

In the following, an overview of the game steps is given, and this is also how the game was led during the workshop. The participants were invited to align themselves along an invisible line that crosses the room. This line represented an optimistic or pessimistic perspective on the overall state of the world in a specific time frame in the future (e.g. one generation forward) ("Polak Game, Sarkar Game, and 2x2 Scenario Exploration System: Top Three Futures Games Explained, Critiqued, and Compared," 2022). If the participants felt that things as a whole would be better, they were invited to move a bit more towards the one end of the line. Conversely, if they thought that the state of the world would probably be worse, they were instructed to move proportionally toward the other end of the invisible line. With the participants thus aligned, a second instruction was given; this time they were asked whether they felt empowered or had influence on this future state of the world. If they thought that they had agency and that they could change the world's state, they were invited to move more toward the front. If they felt that change is beyond their ability or power then they were invited to move proportionally toward the other direction (10).

It is described as a 'standing' game, an interplay between a player's worldview and their literal location in the game and workshop room.
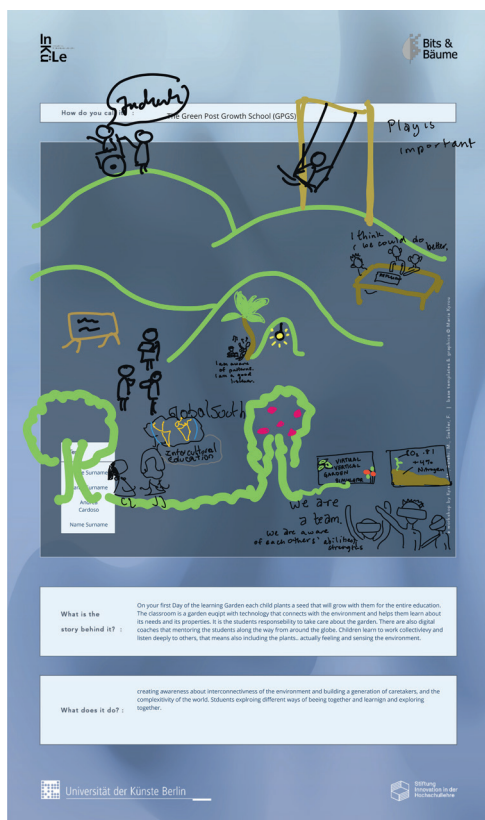
The resulting positions were an initial mapping of the players' worldviews and dispositions. In the context of the game, this served not only as an ice-breaker but also initiated an in-depth discussion on a problem or theme. In our case, limited to a total workshop duration of 90 minutes, the resulting mapping served mainly as the basis for the formation of teams. Seeking to enable the participants to exchange ideas and co-create within a very limited amount of time, we chose to form four groups in which members were of similar world perspectives.

(10) Playing the *Polak Game*

Workshop outcomes and final reflections

Despite the differences in discipline and educational role, the Classroom of the Future game enabled the attendees to work collaboratively and envision alternative learning spaces. As will be briefly presented in the following, these differences were transformed into a fertile collaboration, offering a surprising variety and diversity of proposals.

Expressing an empowered and optimistic approach, the first group envisioned the future classroom as a complex learning garden enriched through technology. It aims to raise awareness regarding the interconnectedness of the environment and to cultivate a generation of individuals who will perceive themselves as its active caretakers. In this future classroom, students are encouraged to explore diverse methods of collaboration and learning, fostering a sense of inclusion as they embark on their explorative and individualized educational journeys (11).

(12) Group 2 – 'parallel System' vision

(11) Group 1 – 'Garden' vision

A common thread among all visions was an expanded perception of technology and its role in the future educational context.
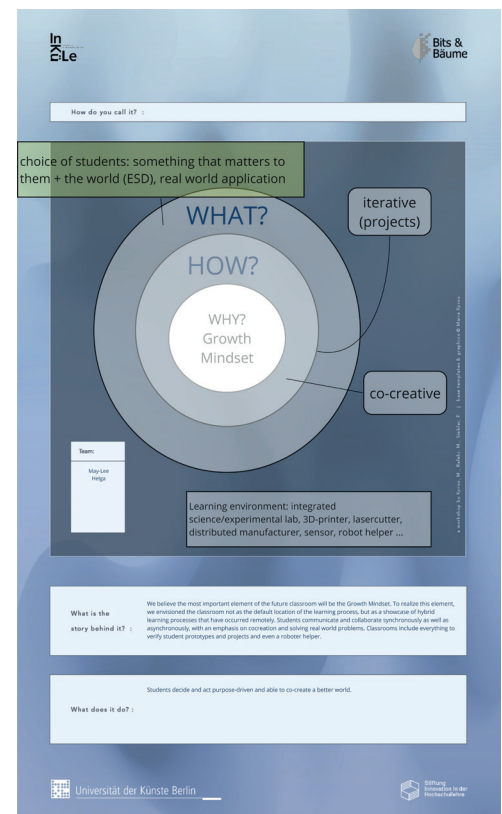
This interplay between individual and collective ways of learning formed the focus of the second group. They proposed a hybrid system that enables two parallel learning processes – an individual learning path, driven by each unique student and a social learning journey that addresses collective goals (12).

In the third proposal of a future classroom, students are envisioned to engage in project-based work on real-world problems. Growth Mindset is seen as the most important skill that is both fostered by and enabling this learning process. Instead of a traditional layout, the future classroom presented here is a laboratory, equipped with prototyping technology and robot assistants. The aim of this lab is to support the purpose-driven work of the students and to encourage the development of collaborative projects (13).

(13) Group 3 – 'FabLab' vision

Finally, the fourth group identified a concrete problem and then focused its vision on a specific solution. In anticipation of the students ever diminishing attention spans, the group developed a device described as a '2-way mirror'. This interactive platform would allow learners and instructors to provide real-time feedback on a personalized learning journey, considering the learner's history so far and learning dynamics. The device could further assist students with learning challenges that they face, for example by helping discern what is important within a flow of data (14).

Regardless of whether the future learning environment will be a garden, an educational FabLab, a learning-style mirror, or an expected combination of them all, it is exactly the multiplicity of these end-results that illustrates the potential of speculative co-design processes. A common thread among all visions was an expanded perception of technology and its role in the future educational context. Along with the individualization of learning processes, technology was also associated with learning mindsets, and endowed with the ability to mediate new ways of acting and thinking, both on the individual and the collective level. Above all, the resulting visions radiate with a desire to radically expand the conventional perception of learning spaces and processes, making the *Classroom of the Future* a fascinating emerging milieu (15).

(14) Group 4 – '2-way Mirror' vision in its preparation phase

(15) Overview of complete *Miro* board

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