

Envisioning scenarios in designs for Networked Learning: Unfolding value tensions between technology and social learning

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Abstract

This article presents an application of a design methodology to envision implicit value hierarchies in the design process of a digital learning platform meant to encompass learning processes and activities conducive to experiential collaborative learning (ECL). The authors argue that many technologies for the field of education fall short of their purposes and neglect intended underpinning pedagogy and didactics. Previous research efforts in networked learning have primarily focused on conceptual critiques of the implementation of EdTech and warned of technological euphoria undermining relevant caution. This means, that when a design team tries to conceptualize technological artefacts into a script the more ethical and value-oriented parts of the learning process tend to be ignored. While we agree with the conceptual critiques, our approach has instead been to engage with the design process and implement appropriate methodologies in an attempt to highlight implicit value hierarchies in the underlying learning theory. When using technologies in Networked learning we thus emphasize that both designers and stakeholders should engage in a systematic discussion and reflection of values and related judgements while constructing a value hierarchy.

Through a Value-based design methodology based on semantic zooming we thus present 7 interconnected envisioning scenarios developed in the UnFoLD project to demonstrate how it is possible to operationalize values into detailed design briefs or technological scripts. This article will through presented experiences from a design process, show how the methodology of envisioning scenarios can be applied to mitigate the risks of implementation technology in a learning situation. We argue that an awareness and mapping of values as a part of the design process is essential and that an increased focus on the ethical and moral responsibilities of designers and involved researchers are important as technologies should not be seen as isolated, value-neutral, or uncomplicated translations of analogue teaching activities. The purpose of the article is to inspire other researchers and designers to implement value hierarchies, envisioning scenarios, or other similar methods to ensure that pedagogical and didactic priorities are not lost in accommodating marketability, practicalities, or technological constraints.

Keywords

Values in design, Values hierarchy, Envisioning, Technology design, Design methodologies

Introduction

Networked Learning is an area of research that has historically been centrally concerned with values in relation to designing for and practicing teaching and learning (de Laat & Ryberg, 2018). This concern extends back to e.g. the early manifesto on Networked Learning (Beatty et al., 2002) where the centrality of educational values was emphasised, but equally encompassing wider societal or political values such as supporting democratic processes, diversity and inclusion. The role of values has over time been highlighted in different articles or chapters (Hodgson et al., 2012; Hodgson & McConnell, 2019; Jones et al., 2017) and most recently explored in the article 'Networked Learning: Inviting Redefinition' which was a collectively produced article following and extending discussion at a round table held as part of the Networked Learning Conference 2020 and leading to a suggestion for an updated description of Networked Learning:

“Networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media.” (Networked Learning Editorial Collective (NLEC), 2021).

Further, the collective article highlights three central and intertwined phenomena of particular interest within Networked Learning: Human/inter-personal relationships, Technology (especially digital communications technologies), collaborative engagement in valued activity (joint inquiry, knowledgeable action, etc). The focus on human relationships entails questions about e.g., trust, power, difference, solidarity. Technology concerns how digital technologies shape and are shaped by human activity and how “artefacts and infrastructure are assembled or reconfigured in complex ways” provoking questions about the socio-material, affordances, access, appropriation, ownership, etc. (Networked Learning Editorial Collective (NLEC), 2021, p. 314). Finally, collaborative engagement relates to questions about knowledge, values, shared projects, and engagement with social change.

The first and third point are dimensions that have, in our view, been much discussed in networked learning literature, and particularly discussions of values underpinning designs for learning or how to incorporate values and social change as part of networked learning processes have been approached theoretically, methodologically, and empirically. We would argue that values in relation to designs for learning are relatively well-explored, but when shifting the focus from pedagogical design towards designing and developing technologies for networked learning our knowledge and practice within networked learning are less developed. While there are great conceptual critiques and analyses of how technologies shape or are shaped by human activity, there is less engagement with the actual design and development of educational technology. This, as noted by de Laat & Ryberg (2018), is not surprising as the networked learning community leans more towards the pedagogical and conceptual side, more than development and design. However, as pointed out in Dohn et al. (2021) it does raise questions of how we can start to engage with for example AI, algorithms and learning analytics beyond the conceptual critiques and analyses.

The article is based on the research and development project 'Unified platform for the Future of Learning and Development' (UnFoLD), which aims to investigate and develop a new learning platform where 'Experiential Collaborative Learning' (ECL) forms the pedagogical foundation (Jensen et al., 2021; *UnFoLD*, n.d.). We will present experiences from a design process which is a part of the development of an online platform for experiential collaborative learning, in which the methodology of envisioning scenarios has been applied to mitigate the risks of implementation. Based on the above introduction, a general discussion of why an awareness of values in Networked Learning is important, is presented. Next, the use of technology in Networked learning is elaborated to challenges existing and embedded values in technologies. Then, the article presents a Value-based design methodology for creating envisioning scenarios specific to Networked Learning. Finally, the article is rounded off in a debating conclusion

Networked learning infrastructure

Goodyear (2021) writes about why educational infrastructure is a prerequisite for networked learning. Such an infrastructure provides a landscape of affordances with different possibilities of connections. He emphasises two perspectives, as (1) a set of objects to be designed, planned and managed and 2) as entangled and experienced in actual activities (Goodyear et al., 2021). An aspect of Networked learning is thus an educational infrastructure that aims to connect people and digital mediated interaction through a theoretical position of learning that

emphasises social, relational, and cultural aspects of learning, be they Actor-network theory (ANT), activity theory, communities of practice, socio-material, social constructionist, or constructivist perspectives (de Laat & Ryberg, 2018; Dohn et al., 2018). With this understanding of learning, networked learning builds on the idea that knowledge is constructed by the learners rather than transmitted to the learner. Connectivity and dialogue are therefore central pedagogical and philosophical principles of Networked learning (de Laat & Ryberg, 2018; Dohn et al., 2018)

The impact of mediated learning through digital platforms have made it clear that transferring analogue content to these new digital forms is never as simple as that (Williamson, 2019; Selwyn, 2011). The difficulties encountered only increase in complexity and become more pronounced when the learning approach is strictly contingent on connectivity, collaboration, and active participation. Many aspects such as how to translate content, work forms and practices, as well as considerations of how appropriate these actually are when the learner is experiencing them through the mediation from digital platform are in play. One aspect which often seeps through the cracks within the design process are the embedded values of technologies. The claim of value-neutral technologies has been thoroughly refuted and conceptualizing them as mere mediums of transfer only serve to blind us to the myriad of unexpected and unintended consequences of their use (Selwyn, 2011). There are many interests at play in the decision of whether or not to implement new EdTech, and besides the technological euphoria that threaten to soften essential critical concerns, the role of experts and networks seeking to profit from the implementations is growing (Selwyn, 2016). The realization that EdTech has become a political force which influences the future of education should not necessarily make educators afraid of their implementation, but rather entice them to engage in the much-needed critical reflection and design work required to align the technologies with the foundational values of their approach to learning (Williamson, 2019).

But we also need to develop a more critical appreciation of the contemporary political force of edtech, and the power networks behind it, on education at global and local scales. And that means getting up-close to the edtech experts who are building the apps, devices, platforms and infrastructures to understand how the technology gets produced, and up-close to the policy networks that are seeking to influence the future of education through those technologies and media (Williamson, 2019).

Unfortunately, while it is broadly acknowledged that specific technologies shape the practices and possibilities of engaged learners, critical reflections of the pedagogical and ethical implications of implementing learning technologies/edtech are few and far between (Williamson, 2019; Zawacki-Richter et al., 2019). As such this article argues that the implementation of further and maybe ever more encompassing technologies such as AI or machine learning in an education setting that build on Networked learning calls for a heightened focus on ways of envisioning and critically reflecting on the possible outcomes of implementation in the design process.

Why talk about values in networked learning

The philosophy behind “values in design” or “value-sensitive designs” (Nathan et al., 2008), stems from the fundamental assumption that interaction with products, digital systems or technologies have an impact or affect people’s behaviours and experiences. Responsible designers, therefore, must attempt to anticipate how users will interact with the products, digital systems, or technologies they are designing. It emphasises that design is not just about incorporating primary or secondary functionality, but it includes ethical considerations about what kind of behaviours and experiences are desirable and ethical to promote (Ross et al., 2012; Verbeek, 2006). Developing and using interactive technologies in learning design thus includes considering that ethical responsibility (Nathan et al., 2008).

If technologies are not value-neutral (Verbeek, 2006), what significance do these hidden values then mean when Networked learning is facilitated through technologies such as an AI system or machine learning? And how do we ensure that the theoretical and basic principles of learning are not ignored by a technology euphoria? Selwyn (Selwyn, 2016) in particular has been a critical voice in warning against technology fascination taking over the essential vision of a project. He writes, among other things; “our primary focus should not be on technological devices, tools and applications per se, but on the practices and activities that surround them, the meanings that people attach to them and the social relations and structures that these technologies are linked to” (Selwyn, 2016, p. 2). Frauenberger, Rauhala, and Fitzpatrick (2017) also talk about what impact technologies have on individuals or society/communities, and consequently what responsibilities their designers have. They emphasise the need for a new ethical discourse in the field. An underlying problem in the development of technologies like learning analytics, AI- and machine learning is, according to Selwyn (2016), a one-sided focus on design requirements that specify the criteria for what is technically feasible, thus limiting the freedom of designed learning processes, not

allowing for a sufficient inclusion of the social and cultural factors. It is especially the specific values the stakeholders bring to the table when designing technology that calls for a reflective practice that explicitly draws attention to a transparent process (Bos-de Vos, 2020; Frauenberger et al., 2017). Faurholt & Kofod-Jensen (2010) warn against the risk that programmers will set the agenda for how to understand the pedagogical processes of learning which do not necessarily correspond to a pedagogical set of values (Popenici & Kerr, 2017; Williamson, 2019). By explicitly recognizing the variety of ways in which a technology stimulates values it might be possible to avoid digital learning design based on different embedded technologies that cannot translate the complexity of the learning process into digital value-based and coherent ecosystems (Nathan et al., 2008).

The meaning of discussing values in designs

The research field of “Values in design” uses the interactional definition of values resulting from the interaction of users and other stakeholders with technology (Bos-de Vos, 2020). Value can thus occur in a variety of ways and can be understood as *lasting convictions or matters that people feel should be strived for in general and not just for themselves to be able to lead a good life or realize a good society.*” (Poel & Royakkers, 2011). If we want to understand the world today, we need to understand how patterns and shared symbols create cultural metaphors expressing different values (Lent, 2017). Therefore, there is a need to distinguish between value changes that primarily occur due to social developments and value changes that are induced by technology (Bos-de Vos, 2020; Verbeek, 2006). In all technology there are integrated value hierarchies that amplify specific aspects of reality while reducing others (Verbeek, 2006). The inlaid values are not fixed properties of designs; however, they shape a relationship between humans and technologies (Tromp et al., 2011; Verbeek, 2006). In this article we apply the term value hierarchy to discuss how overarching values can be operationalized into design requirements. If designers and stakeholders don’t engage in systematic discussion and reflection of values and related judgements while constructing a value hierarchy, existing and pragmatic values become dominant (Bos-de Vos, 2020; Williamson, 2019). And because of that, literature highlights that numerous attempts at technological designs fail because designers do not understand what factors lead to changes in behaviour (Fogg, 2009; Frauenberger et al., 2017; Hansen, 2016, 2018; Kight & Gram-Hansen, 2019).

Technology in networked learning

The downside of technology

Based on literature (Andersen et al., 2020; Caviglia et al., 2018; Kilińska & Ryberg, 2019; Laursen, 2020; Tahiru, 2021; Wistoft et al., 2020) it is evident that particularly collaborative and exploratory functions in Networked learning systems are poorly utilized as they are not built on basic pedagogical values and visions. Especially the collaborative and social processes, like those incorporated in experiential and collaborative learning (ECL), can be complicated to digitize since engaging in learning activities do not necessarily establish social learning communities. According to Nathan, Friedman, Klasnja, Kane, and Miller (Nathan et al., 2008) a majority of the design scenarios and methodology share two key characteristics: 1) describing the functionality of technology under development, and 2) the immediate use of the technology by its intended user-groups (Nathan et al., 2008). Although the systems enable semantic functions and compounds, that connect users' social needs and data as well as enable sharing of knowledge both synchronously and asynchronously, this is predominantly associated with basic information and communication (Caviglia et al., 2018). The result is often digital systems that foster a low connectivity between the students as well as low motivation as they constantly face a barrage of high-tech triggers – beeps, email alerts, bouncing icons etc. (Fogg, 2009). Likewise, Faurholt & Kofod-Jensen (2010) have previously emphasized that the systems primarily cater to teacher-driven and instructional teaching methods rather than more student-centred collaborative processes, where the learners are given the opportunity to collaborate in a social network and produce new knowledge. Finally, Kilinska and Ryberg (2019) have described how the learning platforms 'limited functions force the students to supplement their social learning activities with other resources or platforms (Kilińska & Ryberg, 2019).

To effectively encode experiences that change behaviours, there is a need for a much more practical understanding gained from value-based design activities. Without this understanding, designers are mostly guessing at solutions or maybe even imitating techniques that work without understanding why that is the case, which can lead to submerged and sustained value conflicts between system and users (Bos-de Vos, 2020; Davis, 2009; Davis & Nathan, 2015; Fogg, 2009). Zawacki-Richter et al. (2019) has uncovered what challenges are related to the use of AI in educational learning systems and conclude:

(...) a stunning result of this review is the dramatic lack of critical reflection of the pedagogical and ethical implications as well as risks of implementing AI applications in higher education (Zawacki-Richter et al., 2019).

This statement is supported by both Misiejuk & Wasson (2017) and Popernici & Kerr (Popernici & Kerr, 2017) where the latter point out that there should be ongoing awareness of education as a student-centred activity, which can't be replaced by technology-centred solutions (Popernici & Kerr, 2017).

Reevaluating our assumptions

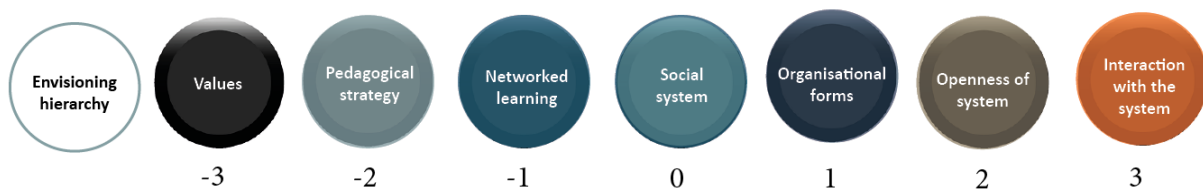
During the past decade, the concept of “script” as something that indicates how technologies can prescribe human actions, social networks and processes of collaboration that evoke certain kinds of behaviour has been dominant (Verbeek, 2006). Latour talks about it as a way to describe the “implicit manuals” that products embody, as well as a concept to clarify the specific relations between designer, product, and user (Tromp et al., 2011). According to Lent, Jeremy (2017), the combination of AI technology with experiential collaborative learning affords a re-examining of the assumptions about (1) what we are trying to accomplish and (2) how we are going about it. (Lent, 2017). The combination of the scientific with the ethical requires a design process that understands knowledge as something that can be experienced as esoteric where not all science is aligned and that it can be divided between different scientific traditions and paradigms - knowledge is not as clear cut as we sometimes imagine it to be (Lent, 2017). This means, that when a design team tries to conceptualize technological artefacts into a script it might be too limited to cover the more ethical and value-oriented part of a learning process (Verbeek, 2006). Scripting functions and actions of students thus contain a number of ethical questions regarding how technological designs can transcend and embody the quality and values embedded in the native visions and conceptual frameworks. There is thus a need for assessing technologies with respect to the role they play in a learning context. In a way, it reveals a specific responsibility of the designer, who can be seen as the inscriber of scripts (Frauenberger et al., 2017; Verbeek, 2006). Some of the previous assumptions and mindsets of past technological paradigms is, therefore, obsolete as the design of technology used in Networked learning is both explorative, situated, and responsive. Because the ethical and value-oriented processes have remained static and anticipatory, the technologies are now subject to what could be called a ‘value change’. Instead, design processes need to be able to support the emergence of new values in society (Bos-de Vos, 2020; Frauenberger et al., 2017). Differences between actors’ perspectives on values exist but unfortunately, it is often overlooked in a design process. Value is rarely explicitly discussed, or discussions are either very abstract or overly specific (Bos-de Vos, 2020). Nathan, Friedman, Klasnja, Kane, and Miller, (2008) therefore propose envisioning long-term effects of interactive and digital systems by encountering the following three intertwined challenges: (1) the complexity of socio-technical systems, (2) the uncertainty of future outcomes, and (3) the emergent quality of systemic interactions (Nathan et al., 2008). In the act of envisioning, it is thus possible for designers to acknowledge different potential outcomes when a new technology is combined with a specific cultural and societal milieu.

Envisioning as a Value-based design methodology in UnFoLD

Based on a Value-based design methodology, it is possible to create an awareness in the design process that can transform the conceptual visions into regular and detailed design briefs or technological scripts. This process involves sketching processes, including for example Envisioning Scenarios (Bos-de Vos, 2020; Frauenberger et al., 2017; Nelson & Stolterman, 2012). These scenarios are typically based on specific design requirements or design constraints that can substantially impact individuals, society, and the natural environment, now and potentially well into the future (Nathan et al., 2008). Envisioning is a design concept that aims to find out where the project is and whether it is moving in the desired direction, in accordance with the pedagogical intentions and values. The special thing about envisioning processes is that it happens through imaginative thinking that involves a clear articulation and understanding of the interaction between the learning theorist, the designer, and the programmers. The imaginative thinking can contribute to envisioning based on, for example, “beyond mainstream” lens of design noir or unintended use (Nathan et al., 2008). It is the different changes or perspectives on the scaling of a value-laden problem that illustrate new problems and opportunities to recontextualize the problem.

The shared understanding of networked learning entails a special focus in the UnFoLD project where the digital learning platform is to create a connection between both people and digitally mediated interactions. By this, networked learning, and thus the project of UnFoLD can not only be understood as random use of the chosen technology from a reductionist view in relation to organisations forms, content, learning activities, interactions e.g. UnFoLD wants to create a learning platform that contributes to a learning vision that neither consciously nor unconsciously supports instruction and training-based teaching with a low potential of learning

The design process in UnFoLD revealed that Networked learning can be visualized and discussed according to seven interconnected envisioning scenarios (see Figure 1). Each envisioning scenarios can be visualized through what Kolko (2011) calls a semantic zooming; semantic in the sense that the hierarchies are not given, but rather constructed by their perceived connections and linguistic meaning. It means that the overall digital Networked learning system in the UnFoLD project can be developed, analysed, or discussed from both an abstract level that describes values and ethical considerations in accordance with how users interact with the system, to a more concrete level consisting of what kind of activities are given to the students. Or it could be a movement from one kind of aspects or dimension to another kind. The point is, there is no right answers or way to shape these envisioning scenarios. It depend on the people participating in the discussion. Envisioning is, therefore, a methodology for how to discuss hidden values though a sketching process. Based on Selwyn (2016) and Goodyear's (2005) theoretical understanding of a learning system, the design process of the UnFoLD project result in seven different envisioning scenarios (see Figure 1).

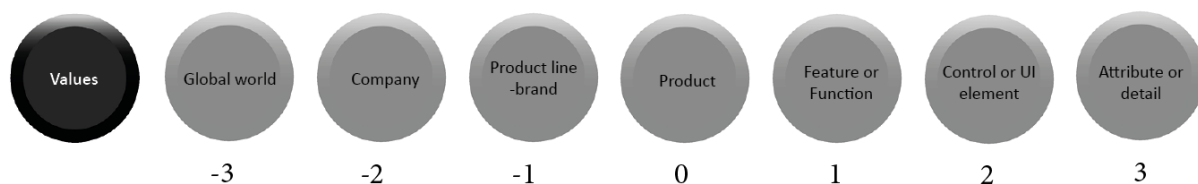


Figur 1 – Envisioning hierarchy

Also, the design process indicates that every single design element can either be seen as an element in a system or a system in itself, where more than one feature is interconnected and therefore part of the system's causal complications (Kolko, 2011; Nelson & Stolterman, 2012). In the following section, each envisioning scenario from the project of UnFoLD is presented separately. Here, the semantic zooming in relation to the analytical criteria that the design process has entailed for the UnFoLD project is elaborated.

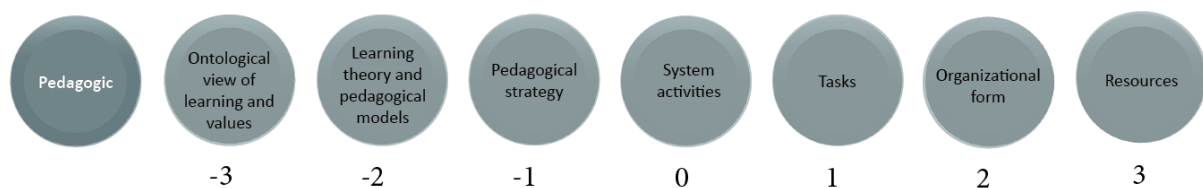
Envisioning scenarios through literal and sematic zooming

Envisioning 1 - Values in systems



The first system focuses on values. At a global level, it is important to have an ethical and value-based view. All products or systems affect the world we live in, so even though technology provides us with local opportunities, it does not necessarily help to create positive development on a global scale. So, in UnFoLD, how do we avoid creating a system where AI contributes to a view of learning that supports instruction and training-based teaching with a low learning potential? Here, it is important to clarify the values and areas of interest of all stakeholders. Through a stakeholder analysis it is possible to ensure that designers are not blindfolded in the design process. Without this mapping, it is not possible to find the values and interests.

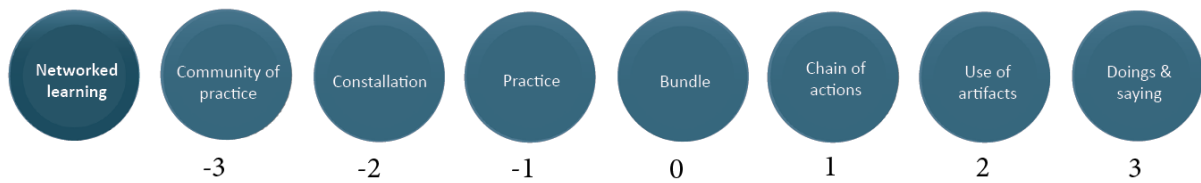
Envisioning 2 - Pedagogical strategy



The next system deals with the pedagogical aspects where an ontological view of learning and values must be supported through learning resources and forms of organization. In UnFoLD, it has therefore been vital to create one educational infrastructure that aims to connect people and digital mediated interaction through a theoretical

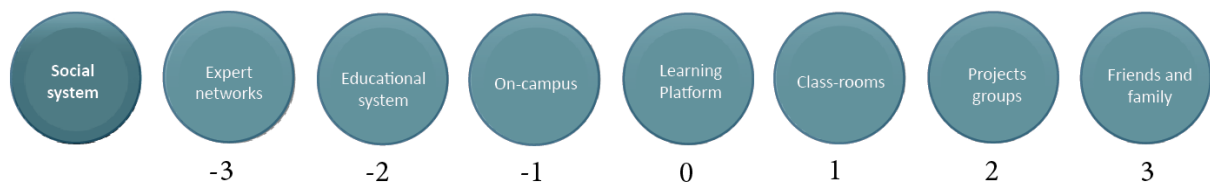
position of learning that emphasise social, relational, and cultural aspects of learning – in this case through experiential collaborative learning (ECL).

Envisioning 3 - Networked learning



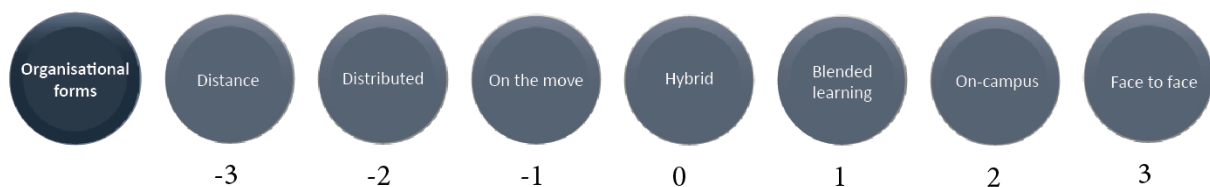
The third level focuses on the elements that makes up a community. In this envisioning scenario a community of practice will, for example, be constituted by the doings and saying created through a normative regulation of behaviour. Likewise, the use of artifacts will affect the professionalism that characterizes a practice. In that understanding, a digital system must be able to embrace the development of a community of practice by supporting, for example, doings and saying, whereby the system's normative intentions must be recognizable to the users in the learning situation.

Envisioning 4 - Social system



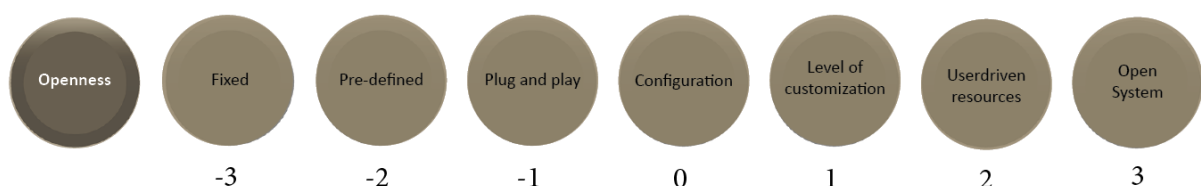
The social system deals with the perspectives that lie in both being able to activate an expert network in a learning situation while, for example, social media supports collaboration between students. Next, the system contains several considerations about how organizational forms of hybrid or blended learning can support the development of social learning through the inclusion of technology on a digital platform.

Envisioning 5 - Organisational forms



The social system is strongly supported by the organizational forms of the teaching activities, including the degree of physical presence. The pedagogical and theoretical considerations must be considered in such a way that the technology doesn't become a disturbance to reach the indented goals. The technological solutions must thus support the considerations of values that may exist. It could be, for example, letting the student learn “on the move” in relation to connectivity within a network.

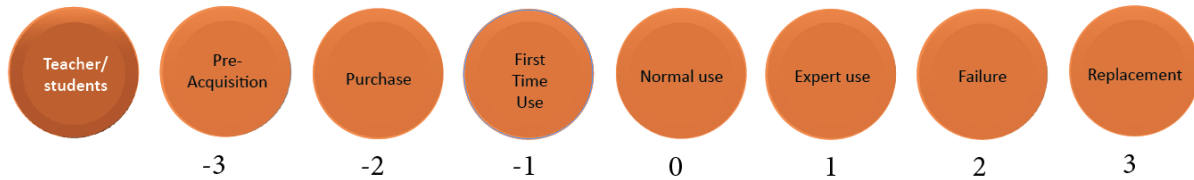
Envisioning 6 - Openness of systems



The next envisioning scenario focuses on the teacher and the students' opportunities to influence the system. Here, a semantic zooming can be described that goes from a system that has been determined and fixed to a system with a large degree of openness that makes it possible to define the use of the technology yourself. This level is

particularly interesting when it comes to translating the pedagogical values that characterize the social, relational, and cultural aspects of learning, including ECL. Likewise, the discussion contributes to networked learning through a focus on “open educational resources” to move courses beyond the confines of a particular university module or course.

Envisioning 7 - Interaction with the system



The last level deals with the interaction between teacher and the students within the system. At this level, all functions of the system that users encounter during the teaching situation are mapped. In this regard it is essential that the students' behaviour on the platform supports ECL.

Debating Conclusion

This article has, through presented experiences from a design process, shown how the methodology of envisioning scenarios can be applied to mitigate the risks of implementation technology in a learning situation. We argue that an awareness and mapping of values as a part of the design process is essential and that an increased focus on the ethical and moral responsibilities of designers and involved researchers are important as technologies should not be seen as isolated, value-neutral, or uncomplicated translations of analogue teaching activities. Therefore, while we agree with technology sceptical scholars like Selwyn (2016) and Williamson (2019) who have highlighted the pitfalls of technological implementations in education, we aim to contribute to the ongoing debate by highlighting design methodologies, like envisioning scenarios, which might help to mitigate said dangers if applied rigorously during the design process. This article has therefore presented a preliminary framework for 7 envisioning scenarios developed in the UnFoLD project to elaborate and challenge existing and embedded values in technologies used in Networked learning. We would argue that by applying the term value hierarchy, it is possible though an envisioning methodology to operationalize values into design constrains.

While we recognize that the networked learning community have extensively researched and explored values in design related to pedagogy, and as mentioned, sympathize with any reservations towards technological implementations in educations, we contend that engaging with actual technological design processes and developing methodologies for how pedagogical and didactic values can be brought into and protected in such an engagement, constitute an interesting and under-explored field of research. In this we agree with the notions of Dohn et al. who highlight the problems of how we can begin to work with technologies like AI, algorithms and learning analytics beyond conceptual critiques (2021).

When using technologies in Networked learning we thus emphasize that both designers and stakeholders should engage in a systematic discussion and reflection of values and related judgements while constructing a value hierarchy. Based on a Value-based design methodology, it is possible to create an awareness in the design process that can transform the conceptual visions into regular and detailed design briefs or technological scripts. This process involves sketching processes, including for example Envisioning Scenarios

The authors hope that this short presentation of envisioning scenarios from an ongoing design process can inspire other researchers and designers to implement value hierarchies, envisioning scenarios, or other similar methods to ensure that pedagogical and didactic priorities are not lost in accommodating marketability, practicalities or technological constraints.

References

- Andersen, M. H., Gerwien, R. G., & Kammer, A. (2020). Sammen, hver for sig: Universitetsstuderendes læringsstrategier under COVID19-nedlukningen. *Tidsskriftet Læring og Medier (LOM)*, 13(23), 18–18. <https://doi.org/10.7146/lom.v13i23.122032>
- Beaty, L., Hodgson, V., Mann, S., & McConnell, D. (2002). *Towards E-Quality in Networked E-Learning in Higher Education*. <http://csalt.lancs.ac.uk/esrc/manifesto.pdf>

- Bos-de Vos, M. (2020, August 11). A framework for designing for divergent values. *DRS Biennial Conference Series*. Synergy - DRS International Conference 2020. <https://dl.designresearchsociety.org/drs-conference-papers/drs2020/researchpapers/131>
- Caviglia, F., Dalsgaard, C., Davidsen, J., & Ryberg, T. (2018). Students' digital learning environments. *Proceedings of the 11th International Conference on Networked Learning 2018*, 165–172. <https://vbn.aau.dk/en/publications/students-digital-learning-environments>
- Davis, J. (2009). *Design methods for ethical persuasive computing*. 350, 6. <https://doi.org/10.1145/1541948.1541957>
- Davis, J., & Nathan, L. P. (2015). Value Sensitive Design: Applications, Adaptations, and Critiques. In J. van den Hoven, P. E. Vermaas, & I. van de Poel (Eds.), *Handbook of Ethics, Values, and Technological Design: Sources, Theory, Values and Application Domains* (pp. 11–40). Springer Netherlands. https://doi.org/10.1007/978-94-007-6970-0_3
- de Laat, M., & Ryberg, T. (2018). Celebrating the Tenth Networked Learning Conference: Looking Back and Moving Forward. In N. Bonderup Dohn, S. Cranmer, J.-A. Sime, M. de Laat, & T. Ryberg (Eds.), *Networked Learning: Reflections and Challenges* (pp. 1–20). Springer International Publishing. https://doi.org/10.1007/978-3-319-74857-3_1
- Dohn, N. B., Hansen, S. B., Hansen, J. J., de Laat, M., & Ryberg, T. (2021). Conclusion: Conceptualizing and Innovating Education and Work with Networked Learning. In N. B. Dohn, J. J. Hansen, S. B. Hansen, T. Ryberg, & M. de Laat (Eds.), *Conceptualizing and Innovating Education and Work with Networked Learning* (pp. 237–258). Springer International Publishing. https://doi.org/10.1007/978-3-030-85241-2_13
- Dohn, N. B., Sime, J.-A., Cranmer, S., Ryberg, T., & de Laat, M. (2018). Reflections and Challenges in Networked Learning. In N. Bonderup Dohn, S. Cranmer, J.-A. Sime, M. de Laat, & T. Ryberg (Eds.), *Networked Learning: Reflections and Challenges* (pp. 187–212). Springer International Publishing. https://doi.org/10.1007/978-3-319-74857-3_11
- Faurholt, L., & Kofod-Jensen, L. (2010). *Next generation—Nationalt e-læringsssystem byggende på Open Souce* (Nye Institutioner/DEFF. Hentet d. 08.07.2021 fra Next Generation (deff.dk), p. 25). https://www.deff.dk/uploads/media/Next_Generation_-_afrapportering.pdf
- Fogg, B. (2009). A behavior model for persuasive design. *Proceedings of the 4th International Conference on Persuasive Technology*, 40. <https://doi.org/10.1145/1541948.1541999>
- Frauenberger, C., Rauhala, M., & Fitzpatrick, G. (2017). In-Action Ethics. *Interacting with Computers*, 29(2), 220–236. <https://doi.org/10.1093/iwc/iww024>
- Goodyear, P. (2005). Educational design and networked learning: Patterns, pattern languages and design practice. *Australasian Journal of Educational Technology*, 21(1), Article 1. <https://doi.org/10.14742/ajet.1344>
- Goodyear, P., Carvalho, L., & Yeoman, P. (2021). Activity-Centred Analysis and Design (ACAD): Core purposes, distinctive qualities and current developments. *Educational Technology Research and Development*, 69. <https://doi.org/10.1007/s11423-020-09926-7>
- Hansen, S. B. G. (2016). *Persuasive Designs for Learning - Learning in Persuasive Design: Exploring the potential of persuasive designs for learning in complex environments*. Aalborg Universitetsforlag. <https://doi.org/10.5278/vbn.phd.hum.00057>
- Hansen, S. B. G. (2018). Might we learn from learning? *Proceedings of the 13th International Conference on Persuasive Technology*, 184–189. https://doi.org/10.1007/978-3-319-78978-1_15
- Hodgson, V., & McConnell, D. (2019). Networked Learning and Postdigital Education. *Postdigital Science and Education*, 1(1), 43–64. <https://doi.org/10.1007/s42438-018-0029-0>
- Hodgson, V., McConnell, D., & Dirckinck-Holmfeld, L. (2012). The Theory, Practice and Pedagogy of Networked Learning. In L. Dirckinck-Holmfeld, V. Hodgson, & D. McConnell (Eds.), *Exploring the Theory, Pedagogy and Practice of Networked Learning* (pp. 291–307). Springer Science+Business Media. https://doi.org/10.1007/978-1-4614-0496-5_17
- Jensen, C. G., Bertel, L. B., Ryberg, T., & Dau, S. (2021). Authentic assessment as a new approach to assessing experiential collaborative learning (ECL): 8th International Research Symposium on Problem-Based Learning, IRSPBL 2021. *8th International Research Symposium on Problem-Based Learning, IRSPBL 2021*, 163–173.
- Jones, C., Ryberg, T., & de Laat, M. (2017). Networked Learning. In M. Peters (Ed.), *Encyclopedia of Educational Philosophy and Theory* (pp. 1–6). Springer. https://doi.org/10.1007/978-981-287-532-7_129-1
- Kight, R., & Gram-Hansen, S. B. (2019). Do Ethics Matter in Persuasive Technology? In H. Oinas-Kukkonen, K. T. Win, E. Karapanos, P. Karppinen, & E. Kyza (Eds.), *Persuasive Technology: Development of Persuasive and Behavior Change Support Systems* (pp. 143–155). Springer International Publishing. https://doi.org/10.1007/978-3-030-17287-9_12
- Kilińska, D., & Ryberg, T. (2019). Connecting Learning Analytics and Problem-Based Learning – Potentials and Challenges. *Journal of Problem Based Learning in Higher Education*, 7(1), Article 1. <https://doi.org/10.5278/ojs.jpblhe.v7i1.2545>

- Kolko, J. (2011). *Exposing the magic of design: A practitioner's guide to the methods and theory of synthesis*. Oxford University Press.
- Laursen, R. (2020). Does the Combination of Professional Leadership and Learning Management Systems Signal the End of Democratic Schooling? *Research in Educational Administration & Leadership*, 5(2), 342–374.
- Lent, J. R. (2017). *The patterning instinct: A cultural history of humanity's search for meaning*. Prometheus Books.
- Misiejuk, K., & Wasson, B. (2017). *State of the Field Report on Learning Analytics*. Centre for the Science of Learning & Technology (SLATE), University of Bergen. <https://bora.uib.no/bora-xmlui/handle/1956/17740>
- Nathan, L. P., Friedman, B., Klasnja, P., Kane, S. K., & Miller, J. K. (2008). Envisioning systemic effects on persons and society throughout interactive system design. *Proceedings of the 7th ACM Conference on Designing Interactive Systems*, 1–10. <https://doi.org/10.1145/1394445.1394446>
- Nelson, H. G., & Stolterman, E. (2012). *The design way: Intentional change in an unpredictable world* (Second edition). The MIT Press.
- Networked Learning Editorial Collective (NLEC). (2021). Networked Learning: Inviting Redefinition. *Postdigital Science and Education*, 3(2), 312–325. <https://doi.org/10.1007/s42438-020-00167-8>
- Poel, van de, I. R., & Royakkers, L. M. M. (2011). *Ethics, technology, and engineering: An introduction*. Wiley-Blackwell.
- Popenici, S. A. D., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning*, 12(1), 22. <https://doi.org/10.1186/s41039-017-0062-8>
- Ross, P., Overbeeke, C., Wensveen, S., & Hummels, C. (2012). Designing for to kalon: How the unity of beauty and good inspires interactive product design. *International Journal of Product Development*, 16, 187–206. <https://doi.org/10.1504/IJPD.2012.049833>
- Selwyn, N. (2011). *Education and Technology: Key Issues and Debates*. Bloomsbury Publishing. <http://ebookcentral.proquest.com/lib/aalborguniv-ebooks/detail.action?docID=661054>
- Selwyn, N. (2016). *Is Technology Good for Education?* John Wiley & Sons.
- Tahiru, F. (2021). AI in Education: A Systematic Literature Review. *Journal of Cases on Information Technology (JCIT)*, 23(1), 1–20. <https://doi.org/10.4018/JCIT.2021010101>
- Tromp, N., Hekkert, P., & Verbeek, P.-P. (2011). Design for Socially Responsible Behavior: A Classification of Influence Based on Intended User Experience. *Design Issues*, 27(3), 3–19.
- UnFoLD. (n.d.). Aalborg Universitets forskningsportal. Retrieved January 11, 2022, from <https://vbn.aau.dk/da/projects/unfold>
- Verbeek, P.-P. (2006). Materializing Morality Design Ethics and Technological Mediation. *Science Technology & Human Values - SCI TECHNOL HUM VAL*, 31, 361–380. <https://doi.org/10.1177/0162243905285847>
- Williamson, B. (2019). New power networks in educational technology. *Learning, Media and Technology*, 44(4), 395–398. <https://doi.org/10.1080/17439884.2019.1672724>
- Wistoft, K., Christensen, J. H., & Qvortrup, L. (2020). Elevernes trivsel og mentale sundhed: Hvad har vi lært af nødundervisningen under coronakrisen? *Learning Tech – Tidsskrift for læremidler, didaktik og teknologi*, 7, 40–65. <https://doi.org/10.7146/lt.v5i7.120865>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 39. <https://doi.org/10.1186/s41239-019-0171-0>