

Enabling Settings for Learning: Observations Related to Design Communication

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Abstract

The paper addresses (re)design of educational premises. As *learning situations* diversify along with advancing ICT practices, an ever more challenging question for spatial design is: *what provides enabling settings* for learning? Apart from understanding the user requirements, the question is also about how well the settings are embedded into the local practices, and how various constraints, trends and potential opportunities are taken into account. In a (re)design process, multiple stakeholder perspectives are involved, each constrained in their expertise, way of articulating the topic area, and terminology used. That poses a challenge to design communication. Dialogue is a key for different stakeholders to learn from others' points of view, and to establish a common ground. Yet, if participants of the process do not properly understand other stakeholders' contributions, communication remains inefficient. The authors of this paper focus on a methodological question: how could different stakeholder perspectives be brought together to best capture information relevant to the spatial design of the educational settings? Could an articulation tool help to focus attention on relevant issues in terms of spatial design and thereby, to map contributions within a bigger picture of the project? The authors of the paper take *learning situation* as a core concept as they seek to compose a simple articulation tool to aid dialogue in a (re)design process between key stakeholder perspectives.

Keywords: learning situation, education, learning setting, design process, stakeholder perspective, dialogue, learning environment, learning space

Diversifying learning landscapes

Over the past few decades, learning environments have diversified along with the influx of educational technology² and digitalisation. In formal education, curricula have been updated to meet emerging requirements. The 21st century skills, which has been partly criticized, include a) ways of thinking³, b) ways of working⁴, c) tools for working⁵, and d) living in the world⁶; these have been regarded as part of the change (Binkley et al., 2012; Griffin et al., 2012). Digital skills are seen as a prerequisite to survive in the midst of an accelerating technological change. As a result, new content such as programming has been included into school curricula (Finnish National Board of Education, 2014; Voogt et al., 2015). Furthermore, there seems to be a growing digital influence within test sessions

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² Educational technology has been defined as 'the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources' (Januszewski & Molenda, 2008)

³ Creativity and innovation; Critical thinking, Problem solving, Decision making; Learning to learn, Metacognition

⁴ Communication; Collaboration

⁵ Information literacy; ICT literacy

⁶ Citizenship; Life and career; Personal & social responsibility

and examinations; to mention the Finnish digital matriculation examination fully implemented in 2019 as an example.

Focusing on the settings associated with these changes, a traditional classroom has been replaced in many places with more open learning spaces (Osborne, 2013). The methods of instruction have developed accordingly; the role of a teacher has been shifting towards a facilitator of learning, and the phenomenon-based curriculum has been promoted (e.g. Finnish National Board of Education, 2014; Lonka et al., 2018). The student population again has become more multicultural. In addition, multiple digital learning resources have emerged worldwide (e.g. MERLOT <https://www.merlot.org/>, MITX <https://www.edx.org/school/mitx>, and a new Finnish Library of Open Educational Resources (OER) <https://aoe.fi/>), and mobile devices are used in many learning sessions. During breaks again, students may focus on their smart phones rather than real-life person-to-person communication. All in all, a rapid change is taking place in the daily practices at school – and who knows what practices may be lurking just around the corner. Concurrently in business life, the role of innovation and competitive advantage is pointed out. Technological tool developers and service providers promote their products and services emphasizing their benefits also to the educational sector.

Educational researchers have been investigating, among other things, the usage and impacts of novel tools. Topics have included effectiveness in attaining learning goals as well as tools and techniques for assessment (Bull et al., 2016). The researchers also discuss the roles of pedagogy, technology and content knowledge, and how these are linked to each other (e.g. Kohler & Mistra, 2008; Kontkanen et al., 2016; Kyllönen, 2020). There have been also critical tones concerning the rapidly changing practices and the intensifying information flow (e.g. Moisala et al., 2016). In addition, there have been worried comments by teachers about the attention span among learners: students of today appear to have more of a challenge focusing e.g. on longer texts than those observed a decade or two ago.

The question of what provides enabling settings and functional affordances⁷ for learning in the 21st century, is ever more complicated for the designers of the settings for learning.

In education, students and teachers traditionally represent the two key perspectives in their complementary roles. They are the ones these settings are designed for. Even though design is focused on the future, the transition always starts from the 'here and now' of a specific case: people whose work patterns and settings are concerned/affected, a local community and its spatial conditions and needs, as well as its social and cultural features. Due to a rapid contextual change, effectively matching student with complementary settings is an increasingly difficult issue to address in 21st century spatial designs (Lievonon & al., 2016; see Lievonon & Vesisenaho, 2013).

Many stakeholder perspectives are involved in and contribute to a (re)design process. Each of them has a different focus of interests and field of expertise, experience and knowledge background. Furthermore, each of them has their particular way of articulating and conceptualizing the topic area. People who have different expertise may actually have no proper common language to communicate their positions successfully. A problem is therefore, how such information that is relevant to spatial design could be captured from different actors' and experts' perspectives, pooling it best into the process. Attention should be given to the methods:

1. How could different stakeholder perspectives be coordinated in a way that supports spatial design in an optimal way?

⁷ We refer by functional affordances here mainly to what becomes possible to do in a learning situation through the use of ICT tools and systems.

2. What is the best approach in order for the outcome of design to meet user requirements, satisfy multiple constraints⁸ & potentials and adhere to local practices?

We have participated in several redesign processes⁹ where educational premises were updated to meet the 21st century educational practices. Reflecting on our observations and learning from those cases, we seek to find out how communication between different stakeholder perspectives could be aided to benefit spatial design. As an outcome of reflection, we compose a simple articulation tool to support dialogue between stakeholder perspectives in the course of a (re)design process. A bigger picture on learning, in a generations' perspective, provides underpinnings for our construction. In the instrumental consideration, human beings of today are equipped by evolution with sensory faculties and motor capacities similar to those past generations had. Yet, present and future generations use such natural apparatus for navigation in a hybrid environment that is filled with a plethora of technological systems and tools.

Theoretical background

When seeking to grasp learning situation from a spatial design perspective, we employed multidisciplinary theoretical sources, described in the next paragraphs.

In regards to formal education, learning goals are defined in the curriculum which shifts accordingly with cultural and societal development (e.g. National board of education, 2014). There has been a lot of discussion concerning the construction of the so called 21st century skills (Binkley et al., 2012; Griffin et al., 2012).

Dewey's 'learning by doing' (1938) already pointed out the role of interaction and communication with our surrounding world: with its material, social, and informational aspects. We consider Dewey's view on learning to be still valid in the 21st century. The approach is well linked to e.g. collaborative learning and personalized and collaborative problem-based learning (e.g. Dillenbourg, 1999; Koschman, 1994).

Drawing from Goffman's views on *situation* (1964), we focused on a *learning situation* as a unit of analysis to get of an overall picture of its features of relevance¹⁰: A learning situation implies availability of particular material and informational resources to the learner. Whatever the cultural context, it is always the person's life situation where learning takes place, that is, *in the interface of the learner and his/her setting*: through observation, tool use and object manipulation, interpersonal communication and reflection.

Furthermore, we drew from Tversky's (2008) investigations into spatial cognition and navigation. In an instrumental sense, *human body* is the origo of the egocentric perspective: it is a sensor/motor unit capable of executing intentional actions through spatial behaviour, such as turning to look at something interesting. A person's spatial position also coordinates with temporal aspects of his/her situational knowledge – including backgrounds, views, aspirations, emotions and affect state¹¹. In spatial terms, formal learning could be considered a goal-oriented situational activity that employs spatial, social and instrumental (natural and human-made) resources in proceeding towards defined goals.

Clark's investigations pointed out the role of contributions in conversations (Clark & Brennan, 1991). In Clark's approach, a conversation is a joint effort of party members on a joint topic: they coordinate their perspectives and contributions in an orderly manner by taking turns as the speaker / the addressee, when

⁸ Including unforeseen risks and vulnerabilities.

⁹ More about the cases in e.g. Lievonon & Vesisenaho, 2013; Lievonon, 2015; Lievonon, Vesisenaho & Lundström, 2016

¹⁰ Goffman's view has a lot in common with the views of situated learning (Brown, Collins & Duguid, 1989; Lave & Wenger, 1990).

¹¹ Compare also with von Wright's views in v Wright, 1998.

requesting and providing information. That is the way to establish and maintain a shared understanding – a common ground – in the course of communication.

Diessel's (2003) investigations helped to recognize e.g. the role of demonstratives in their orientational role in language use. Other helpful sources were Tomasello's (2009) profound views concerning human communication and collaboration, Turner's contribution to affordance discourse (2005), and Burke's (1945) dramatic pentad.

Some observations and reflections

When composing an articulation tool for a (re)design process, we also draw from our observations made in the context of redesign processes, mainly in the 2010's. In the following, we describe some observations concerning particularly the two key stakeholder perspectives, the teacher and the student perspective.

For instance, in a day-long workshop for vocational teaching staff, we asked the participants to illustrate their current teaching practices on a structured A3-size form in which they described spaces used, tools applied, modes of teaching (e.g. individual, pair, group), and pedagogical goals. On the other side of the form, we asked them to illustrate, in similar terms, their assumed/wished teaching practices in the years to come. Once they had completed their descriptions, they had to communicate the outcomes amongst themselves discussing them around a round table. Thereafter, they had to move on to work on their shared views: how the settings ought to be converted to meet their future requirements. At the end of the workshop, the discussions were summarized into statements and illustrations. The information collected in the workshop (and with other methods), was later summarized into a draft report and brought back to them for feedback and confirmation. The outcome, in the form of a work report, then provided specific background information from the teacher perspective for the architect of the project.

Another way to map teachers' views was to pose them two simple questions concerning sufficiency and limitations:

What there has to be enough?
What there must not be in excess?

As to the teachers' workshop, we found that it was particularly helpful to start from the participants' individual teaching practices before addressing future trends in their field. The teachers have a deep knowledge of their work, and the researchers' task was to help them to communicate what was relevant in their practices from the spatial design point of view. Once the data from the workshop was analysed, it was important to communicate the outcome to the informants for two reasons. First, the outcome provided them with an overview of the situation – especially in regards to the design process. Second, it was important for the researchers to get their interpretations confirmed by the informants.

Making any changes to the settings not only means a spatial change but also practical changes. When people are asked to alter their familiar means of carrying out daily tasks, resistance tends to occur (Dillon et al., 2013; Vesisenaho et al., 2017). It is therefore important to carefully map local practices and try to obtain related information that only the users can provide. Without such data, it may be difficult to embed new solutions into the local practices successfully: concerned people may find the proposed changes unnecessarily stressful. If they have a say early on in the process, a gradual reorientation process takes place.

It is not always easy for different professionals/users to express their standpoints, practices, and requirements in terms of spatial design. Therefore, a person who understands a spatial designer's mindset can help them to spell out their views in the way that best informs spatial design. However, such mapping method has

to be constructed in close collaboration with those who are proficient in teaching practices.

To map the students' perspective, we used multiple ways to probe issues of relevance. One way was to map learning activities on a typical school day, asking individual students to describe learning situations in terms of venue, time, study-related content, and tools and resources used. This was also a way to map a diversity of individual learning practices among a group of a student cohort. Another way to map the students' perspective was to ask *what* in the learning settings supports their learning and what makes it difficult. Thereby, we could find out also individual preferences. Later on, we compiled a list of criteria for investigating the students' perspective on learning settings. It contained four different types of criteria:

1. concept & dimensions (10 criteria),
2. aspects of aesthetical¹² surrounding (8 criteria),
3. social setting (11 criteria), and
4. tools available & methods used (7 criteria).

Another redesign process took place in the context of higher education¹³. In it, a traditional lecture theatre was converted for video-mediated lecturing: part of the audience was due to attend lectures in the lecture theatre, and the rest was attending remotely over a video link. The question was, how to orchestrate the hybrid settings properly, not only from the teacher's and the local audience's but also from the remote audience's points of view. Before starting to figure out the arrangements for a hybrid setting, lecturing patterns were observed in the traditional lecture theatre to gain a better understanding of what was important from the lecturer's and from the audience's point of view. Attention was paid to the following aspects in the lecturer's performance:

1. How was the space used?
2. How was the content communicated? (What kind of information packages were there?)
3. What kind of resources were used?
4. How and when did the lecturer interact with the students?

The notes of the observations were summarised, and their interpretations were refined by discussing the summary with the observed lecturer, making clarifications where needed.

One approach to understand the students' perspectives was to attend lectures, alongside the students in the lecture theatre, and communicate with them afterwards¹⁴:

1. What could/could not be seen; what could/could not be heard?
2. How was the presentation organised? (Presentation / interaction phase etc.)
3. What was important in the lecturer's performance from the audience's point of view?

The findings from the teacher/student observations later influenced the conversion process. It became apparent early on that communication between teaching staff and technical staff had also a crucial role in order to avoid basic mismatches in the spatial arrangements. Therefore, a kind of role-play scenario was arranged. In it, the head of technical staff (audio-visual expert) played a teacher's role in the lecture theatre in various lecturing scenarios. The researcher

¹² both sensory and other qualitative aspects of their experience

¹³ for more information see Lievonen, 2015

¹⁴ In a later phase, a survey for a showcase audience was conducted addressing both the technical and the communicative aspects of the hybrid settings.

again was playing the role of the student posing the audio-visual expert questions such as:

1. How would you arrange the cameras if you were a teacher delivering a lecture and trying to monitor whether or not your audience (local and remote) follows what you explain?
2. How would you position the camera(s) focused on you in order for the remote audience to feel you are talking to them (and not to people somewhere else)?

The aim was to make it easier for a technical expert to take into account communicative requirements from the teacher's and from the local/remote student's point of view. Based on such understanding, it would be easier for him/her to seek the best possible functional solutions within the technical constraints of that particular case.

When designing hybrid learning settings, both communicative and functional aspects of human communication have to be carefully taken into account. The designers have to consider complementary role perspectives (speaker / addressee), modes of human communication (such as ways of providing social cues and indicating in a nonverbal way), and ways of coordinating perspectives and contributions. Understanding these issues is paramount in the orchestration of the hybrid settings.

To give some examples, the lecturer's attention has also a motivational role from a student's point of view: a sleepy student may get a bit more attentive if the lecturer casts a glance in his/her direction. If the remote student sees the lecturer speaking to them, not sideways to some unseen audience, s/he may feel like being properly taken into consideration. Furthermore, it is important both to the local and the remote student to see the object of presentation clearly, and to properly hear what the lecturer is explaining. The lecturer's gestures provide beneficial cues and guide the audience's attention to particular points, supporting in 'getting the point'.

An articulation tool

Articulating *issues of relevance* in terms of what contributes to enabling settings and at the bottom, functional affordances for learning, is one way to aid discussion between relevant stakeholder perspectives. Thereby, people can develop a shared view of the goals and what may be feasible to attain through a redesign process. Our assumption is that keeping the learner, learning process, and learning outcome in the focus, enhances

1. opening up views from different angles in the negotiation workshops, and
2. bringing different stakeholder perspectives together.

It bridges different approaches, helping clarify the user requirements on one hand and various constraints that have to be taken into account on the other hand. Furthermore, in order for the negotiations to be smooth and effective, it is important to identify what is relevant to focus on for the given level of analysis and communication, whether individual, group or population level is addressed.

The scope of the participants' observations tends to shrink to aspects that are specific in relevance to them. As the scope and the focus of one perspective is always limited, it is important to relate each perspective to other ones and to locate their roles within the big picture. What can each of them contribute, and what are their constraints? Also, the considered time span tends to shrink: instead of considering an over-generations view, people tend to stick to their own time. Even so, each stakeholder should keep in mind the bigger picture of the world: when developing solutions for the future, sustainability and flexibility are criteria to be taken into account.

Spatial design involves a diversity of learning situations – a whole learning landscape. In the ecological approach (Vesisenaho & Dillon, 2013), learning takes shape in the learner's interaction with the material and social environments. Spatial features include concepts such as layout, connection, and spatial dimension. The features of spatial setting and situational resources – along with the learners' skills and capacities, background knowledge, motivation and emotional tuning, school atmosphere, educational culture, and interpersonal interaction of students and staff members – provide the platform for learning.

Based on the available research literature and our observations, we classified four different sets of criteria for describing these settings: physical, aesthetical, social, and instrumental. We then determined focal issues between stakeholder perspectives by converting three approaches to (formal) learning and its outcomes. They were formulated into four basic questions:

1. Who is acting with whom?
2. Where do these activities take place?
3. How do these activities unfold? (What methods/tools are used?)
4. >>> What / What for is the outcome?

The bottom of the tetrahedron links

1. user perspective (who),
2. facilities provider's perspective (where), and
3. instrumental perspective (how).

The top of the tetrahedron represents learning outcomes (what).

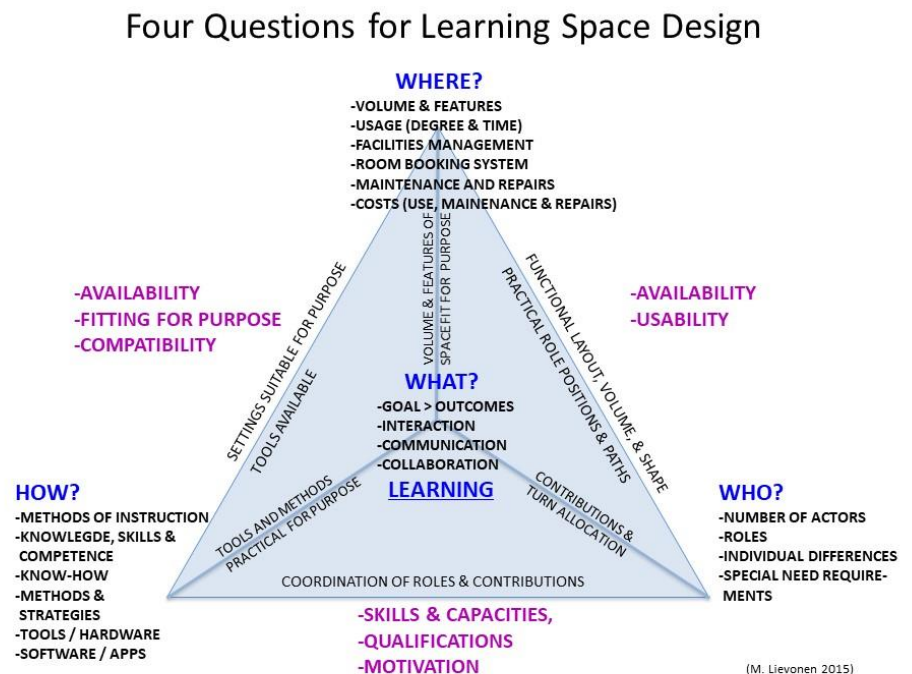


Figure 1. A simple framework for articulating issues of relevance between different stakeholder perspectives in a redesign process.

The bottom of the tetrahedron links

1. user perspective (who),
2. facilities provider's perspective (where), and
3. instrumental perspective (how).

The top of the tetrahedron re-presents learning outcomes (what).

In other words:

The figure illustrates learning process and its outcomes based on three perspectives:

Who is acting? Activity takes shape through coordinated contributions by interacting participants. Each participant brings along his/her history of experiences, background know-ledge, skills, qualifications, and emotional tuning. Where does activity take place? Learning takes place in the learner's life situation; in its local and cultural setting.

How does learning occur? The ways and means of learning rely on material and immaterial re-sources: tools, methods, pat-terns, preferences, strategies, human communication and reflections.

What is the outcome?

In formal learning, the goals and outcomes are defined in a curriculum. The outcomes also depend on one's motivation: any joint activity is based on the participants' shared 'mission' – whether it is playing football or having a conversation.

We composed the illustration (Figure 1) to aid dialogue between stakeholder perspectives. It is based on four cognitive categories and their interrelations. The illustration helps determine relevant questions between different perspectives. For instance, when discussing interrelation between the setting and the user (where – who), usability and availability are among key concerns from the user point of view: whether the layout, volume and shape of the setting meet the criteria (e.g. group of students and their teacher(s) working there). From the settings (and facilities management's) point of view again, the number and diversity of the users, their role positions and paths of their practical performance are among important questions. Through such questions, the participants of communication bring forward issues of relevance from the spatial designer's point of view. At the same, the participants establish a common ground, by pooling shared background knowledge and understanding in the course of the project.

Learning situation implies the goal and the modes of learning, instructional methods applied, and the task at hand. The learning situation is illustrated above as a tetrahedron (Figure 1).

Learning outcomes appear as completed assignments, registered deliverables, passed exams, and degrees, but above all, they appear in the new skills and capacities attained for life: in the personal development and maturation of the learner.

In the following, we describe the articulation tool in more detail:

Who? represents the user. (In design discourse, actors are often referred to by the term 'user'). Users are fundamentally spatial: they occupy a specific space at each point in their lifetime. Therefore, layout and dimensions are among basic design questions regarding functionality. In spatial design, users can also be considered, in a technical consideration, specific spatial perspectives and interlinked fields of activity. Each user perspective implies a particular situational knowledge background (world view), set of skills, capacities and aspirations (motivation). In their joint efforts, users coordinate their mutual perspectives and collaborate by bringing in their contributions¹⁵ Human interactions and communications include a wealth of cultural patterns and regularities (e.g. hand shaking); these patterns help moderate communications between people by making it (conventional and) more predictable.

Where? represents in this framework the venues and their features (arenas for learning) – the perspective of the facilities provider and management, as well as maintenance and renovation/updating. Educational providers are in charge of these premises in terms of volume and features. Also, the location of the premises within a community is in their interests.

How? represents the instruments within this framework: the tools and methods applied in the learning situation. Methods of instruction, pedagogy, strategies, and procedures belong to this category. Even teachers play an instrumental role from the student's point of view. Any archaic tools are classified in the same category with modern human-made systems: thereby, it is easy to grasp the very basic human questions that apply to any cultural or temporal setting. Digitalisation

¹⁵ The Finnish expression 'kantaa kortensa kekoon' referring to behaviour in the ant colony (collecting needles to an ant hill) would illustrate it in an excellent way.

also belongs to this category: without hardware, servers, and networks there would be no digital communication. A relevant question related to this category is whether there are suitable tools/equipment available to students to attain particular learning goals.

What? represents both the learning process and its outcome. The learning process is articulated in the curriculum into different levels and subject matters. The learning goals have been defined accordingly. Recently, there has been a shift towards an integrated, cross-disciplinary approach (phenomenon-based teaching / learning). Traditionally, tests are used in the assessment of learning. Learning methods utilizing a host of educational technologies require novel toolkits in order to conduct assessments.

In the following, we give examples of the questions that may help participants of a (re)design process to articulate their views concerning spatial design, to feed them into the design process, and to relate them to other stakeholder points of view within the whole of the project.

The connection between venue and tools/methods (Where? — How?) implies suitability and availability. What kind of tools are needed? If there is a required tool, is it available where and when it is needed? If not, is it possible to acquire it without extra effort? Which methods best match a particular given setting? For instance, is it possible to do group work in a lecture hall? As to the facilities provider's point of view, questions concern the volume and features of buildings/tools that are required. Additional questions concern their maintenance, repairs, renovations and updates.

The connection between venue and user (Where? — Who?) implies availability and usability / usefulness. Does the user find the place usable for his/her task? And is the place available when needed? Are its size, furniture, and spatial arrangement user-friendly and ergonomic? What kind of booking system there is? User perspective also implies values and individual preferences: what kind of setting do people prefer if they have a choice? In what type of setting does a student, teacher, or staff member perform at their best? An unavoidable budget-related question is whether the usage of particular space justifies the related expenses.

The connection between venue and activity (Where? — What?) implies above all availability and suitability: does the venue/setting/equipment fit well with the spatial and functional requirements of the activity in question? Is it available when needed? Is the building/room designed for some specific use, or is it flexible enough to modify and accommodate other purposes? If multi-site communication and collaboration is in question, is there a platform, hardware, and protocols that enable a smooth interaction between the local and the remote sites? Only then can a joint effort be carried out over distance.

The connection between user and activity (Who? — What?) implies the role allocation and coordination of communication. In addition, it implies the participants' skills, qualifications, motivations and preferences. The traditional roles at school are the student and the teacher, with their specific responsibilities and tasks. The teacher role traditionally entails the preparation of lessons, delivering lectures, tutorials, and assessment. When learning is active and collaborative, there is a lot of student-student interaction and communication. The motivation and attitude again vary from person to person and from situation to situation.

The connection between user and tools (Who? — How?) implies roles, procedures, and processes. What kind of / how many tools are required? Do different roles require role-specific tools, and are they available when needed? Has every user a toolkit required in his/her role? Is there a match between the tools and their users? Do the users adopt the required tools or do they avoid using them? Is there any authorisation procedure / licence to use specific tools?

What kinds of skills / qualifications are required in order to use them? Is training necessary before being able to use these tools? Are the tools usable for a disabled person? Are the users equal in terms of acquiring / using particular tools?

The connection between activity (learning) and method (What? - How?) implies a (good enough) match between tasks and the corresponding toolkits. Furthermore, it implies spatial arrangement and temporal availability of the toolkits. For instance, are the tools easy-to-use and easy-to-learn? Are they reliable in use, do they last long, and are they affordable and easy to maintain? In particular, are they available for the task at hand? What is the way around if there is a glitch or a signal failure? Do their instructional materials match the learning goals and the learners' preferences?

Discussion

In this article, we emphasized the participatory approach and an over-generation view, which we found important for a sustainable and meaningful learning space design. While it is important to approach the redesign project from many different angles, it is equally important to bring the contributions together to focus on *learning situation*. We build on four basic categories when articulating the topic area: Who?, Where?, How?, and What/What for?

Writing this paper was motivated by a need for a practical tool to support design communication between different stakeholders in redesign processes of educational premises. Responding to such need, we contribute by presenting a basic tool described in Figure 1. Yet, it would require validation in further (re)design cases.

The 21st century learning landscape challenges spatial design in many ways: in terms of learning situations, learner population, tools, methods, and contents of learning. We are daily surrounded by commercials and consumeristic effects, and reminded of competitive advantage and views of economic growth. At the same, there is a risk for people to be marginalized if they do not follow the digital development. Furthermore, climate change and any new type of risks and vulnerabilities call us to rethink choices carefully, pondering their long-term consequences as well. A sound approach would be to focus on reliable cornerstones for new developments, keeping in mind sustainability, flexibility, and profound human relatedness.

As the whole learning landscape is changing fast, it is difficult to figure out which trends in education are for the better or worse in the long run. There is therefore a need to focus research on impacts that new types of setting have on the learners' development. It may be that those who have been teaching for over a decade (or several) have the best hands-on experience in regards to ongoing trends. Regardless of the events to follow, it is obvious that spatial settings will play an important role and will need to be addressed with care.

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