LEARNING SPACES REVISED

BASE FOR EXPLORATION

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Graduation project | Explore Lab 31

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FACINATION

"Learning then, is a way of creating space in one's head"
(Hertzberger, 2008, p.67).

Learning and architecture are two processes that share common ground: 'creating space'. By applying order and forming new structures, where ones was nothing or chaos, new meaningful places are created (Hertzberger, 2008).

'How can physical space attribute to learning processes?', this question has always been something that intrigued me. Architecture offers beautiful conditions for combining space making physically and mentally. It is up to the architect to shape spaces so learning processes within them can reach their full potential. Therefore, as future architects, we should be aware of the opportunities but also the responsibilities we have when designing space for learning.

INTRODUCTION

Just as architecture, learning is strongly dependent upon culture, social values, and personal attributes ﹙Hertzberger, 2008, p.10﹚. Differentiating perspectives towards learning demand various approaches as to how space should facilitate and support learning. Therefore, over time and among different contextual settings, many variating learning spaces have been developed.

Many theories regarding learning have been developed. Between them, much variation, and sometimes even contradiction, can be distinguished. Learning in the past for instance has often been described as an incremental process of collecting and absorbing autonomous partials of knowledge ﹙Hein, 1998, p.21﹚. However coinciding with our society rapidly changing into a much more inclusive, diverse, and innovative society ﹙Caso & Kuijpers, 2019﹚, theories have emerged which advocate seeing learning as a process of construction through active participation of the individual with its environment ﹙Hein, 1998, p.6﹚. These theories include a much broader and more socially oriented spectrum of learning behaviors, other than solely absorbing autonomous facts. Learning spaces, such as schools, museums, and libraries are adjusting themselves to this development. Traditional configurations are let go. The traditional classroom that comes to mind when schools are mentioned no longer sketches a representative image of current schools ﹙Hertzberger, 2008﹚. As schools are implementing learning behaviors, which originally are more associated with types as the museum, distinction within the field of learning spaces decreases as well.

In light of this context, architects are faced with the question of how to design distinct learning spaces within all this inclusiveness and merging. Since recent perspectives towards learning seem to transcend traditional typologies, one could wonder whether the distinction between typologies such as the school, the museum, and the library still holds true﹖ Perhaps institutionalized labels do not align with our current society﹖ Perhaps a changing society asks for redefinition within the field of learning spaces. We are arriving at a point in time where reflection upon the way learning spaces are transforming is in place. Reflecting upon the influence that different perspectives towards learning have on the characteristics of learning spaces, will help to understand the variety present within this field. Then a critical examination can make distortion explicit and may lead to possible solutions on how to best re-align spatial configuration with distinct learning processes.

This research focuses on those aspects of learning spaces upon which architects can insert influence through their design. The main research question is therefore posed as followed: how can an architect attribute to the quality of a learning process, while being considerate of the current societal context?

METHOD

The goal of this research is to comprehend the complexity existing within the field or learning spaces, to comprehend how an architect can attribute to the quality of a learning process. As this research concludes with a position towards the task laid before the architect, considerate of the current societal context, this research has adopted the form of an essay.

First of all, the field of learning spaces is explored through a typological study, including the present, as well as the past. This study does not restrict learning spaces solely to the type of 'the school' but includes museums and libraries as well. 'Types' are understood within this research as, described by the Cambridge Dictionary, "things that share similar characteristics" (Cambridge Dictionary, 2021). Thus concerning learning spaces, places that share similar functional and spatial characteristics. The study is based upon literature, case studies, and transcriptions of interviews. It analyzes how the characteristics of these types have developed over time and what has been the instigator of this change. It focuses on the transformation of those characteristics which constitute learning as well as belong to the field of architecture. The study is organized per type. First background information is given on

how a type is traditionally defined and has developed over time. Secondly, progressive changes within a type, affecting its traditional perception, are pointed out. To conclude, a transcription is included in which progressive change is discussed with somebody related to the field of the particular type. Per stage, the characteristics of the space influencing learning are made explicit through diagrams as well.

Secondly, a comparative study of these results is made to relate the three types of learning spaces to each other. By taking on an overarching attitude, the findings of the typological study are placed within a broader, societal context, in which the transformation of learning environments are viewed upon in its entirety. Attempted is to overcome oppressive systems. The goal of this comparison is to define the underlying change occurring within learning spaces and how specific characteristics of learning spaces can be linked to different perspectives upon learning. First, a theoretical description is given upon different existing perspectives towards learning. Secondly, to make the correlation between these perspectives and spatial characteristic explicit, a framework is constructed. In this framework, three generic themes: educational vision, internal orientation,

and contextual inclusion, are discussed through the use of a continuum. The themes represent the field of characteristics that relate to the interface between architecture and learning. The continuum represents the different perspectives existing towards learning. The two most extreme and opposite perspectives towards learning form the boundaries of this continuum and frame the variety within them. This research has taken on quite a comparable approach as George Hein (1998) applied in his research on epistemological theories, introducing a similar continuum to enable comparison among perspectives. Per theme, the influence of opposite perspectives upon space is made explicit. Not only through words, but through visualization as well, applying images and sketching. The framework that emerges through this approach maps the field of tension surrounding learning spaces, instigated by all these different perspectives circulating within this field.

At last, conclusions can be drawn from the comparative study, as well as the theoretical study on learning theory, conclusions concerning current developments occurring within the field of learning spaces. Then, through the use of the constructed framework, can be explained how space can support the quality of learning processes, considerate of the current societal context.

R E S U L T S

The results of this research are organized according to three segments. The first segment concerns a theoretical description of the different perspectives existing towards learning. It explains the theoretical context surrounding the term learning and introduces a continuum that helps to structure and compare variating perspectives. The second segment represents the comparative study among types of learning spaces. A framework makes the influence of perspectives towards learning upon the spatial configuration explicit. The continuum introduced in the previous segment helps to structure and compare variating perspectives. The continuum is deployed to discuss the following themes: educational vision, internal orientation, and contextual inclusion. These themes represent the different fields of characteristics that relate to the interface between architecture and learning. In the third segment, conclusions are drawn concerning current developments within the field of learning spaces. It discusses the role of the architect within these current developments by answering the question; 'how can an architect attribute with their design to the quality of a learning process with their design, while being considerate of the current societal context?

I. THEORETICAL CONTEXT

Learning theories form an influential part of the theoretical context surrounding learning space. However, to fully comprehend learning theories, epistemological theories cannot be excluded. They are entangled with learning theories. Differentiation between learning theories can, to a certain extent, be related to a different position towards the term 'knowledge'.

In the book 'Learning in the museum' (1998) George Hein classifies epistemological theories by introducing two extremes. One end of the spectrum is defined by the idea that 'the real world' exists on its own, independently. A vision often dominating in the past. On the other end of the spectrum, theories are built upon the notion that knowledge is made by individuals and only exist in their minds. The distinction between these two extremes is otherwise indicated as the realist vision versus the idealist vision (Hein, 1998, p.17). In principle, and not entirely coincidentally, these contrasting extremes, the realist vision versus the idealist, can be recognized within theory on learning as well. One end of the spectrum of learning theories, which strongly correlates with a realistic vision upon knowledge, is represented by learning theories that consider learning to be an incremental process of absorbing facts. It is referred to as 'the transmission-absorption notion' by Hein (1998) since knowledge is ought to exist independently of humans and can be transferred from the source to the student. These sources try to clarifying a subjects' underlying structure through a 'logical' and comprehensive organization. This indicates that there is one fundamental order underlaying a subject. Opposite, correlating with an idealistic vision upon knowledge, learning theories promote learning as a process of active construction. Those theories are built upon the notion that knowledge is something that is being made rather than already present. It is not contained within an object itself but created through interpretations. The static vision that realists apply towards knowledge, as something existing 'on its own', is questioned by those who believe knowledge to be a construct and therefore can appear in various shapes (Hein, 1998).

Over time a transition has occurred in which society has become more accepting of perspectives leaning towards the idealist side of the continuum. A rising acceptance of constructive learning theory correlates with the emerging of theories that advocate the importance of the context in which knowledge

is constructed. Donna Haraway (1988), sociologist and philosopher of science, advocates the term 'situated knowledge', although many terms exist today that in principle try to capture the same meaning, such as 'situated cognition' (Brown, Collins, Duguid, 1989), 'authenticity' (Doyle, 2000) and 'social cognition' (Vygotsky, 1978). With the term situated knowledge Haraway indicates the notion that knowledge is always influenced by its specific context. The vision of those observing, as well as the subject observed, are subordinate to culture and language and cannot be seen as pretheoretical entities (Thompson in Benefield & Patterson, 1990). Intellectual tools that help to stimulate somebody's personal development thus are derivatives from the socio-cultural settings as well (Rogoff, 1990, p.140). Haraway declares "...objectivity is about limited location and situated knowledge, not about transcendence and splitting of subject and object. It allows us to become answerable for what we learn how to see." (Haraway, 1988, p.583). Objectivity is thus explained rather as a tool to communicate about a subject than an actual representation of a fundamental order or 'essence'. Therefore we all are our own perceptual systems, according to Haraway.

"...all eyes, including our own organic ones, are active perceptual systems, building on translations and specific ways of seeing, that is, ways of life"." (Haraway, 1988, p.583). Theories upon learning which include quite similar approaches towards knowledge thus are more in favor of including and understanding multiple points of view in education, rather than accepting one as dominating.

The method applied by George Hein (1998), defining two opposites and thus constructing a continuum, offers the possibility for comparison among variating perspectives upon learning. In reality, perspectives are of a much more nuanced nature. Through using a continuum those perspectives can be compared concerning their position upon this continuum.

The perspective of Benjamin S. Bloom (1956), an American educational psychologist who introduced the idea that learning is a process that can evolve, but which is based upon fundamentals, balances somewhere in the middle of the realist-idealist continuum. According to Bloom (1956) behaviors of students are categorizable in a hierarchical order. The taxonomy constructed by Bloom describes how the cognitive processes that 'thinkers' apply and use when
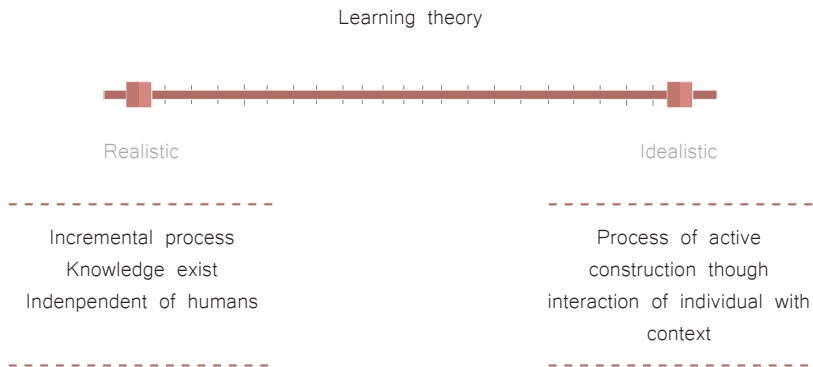
Learning theory

Realistic   Idealistic

- - - - - - - - - - - - - - - -   - - - - - - - - - - - - - - - -
Incremental process   Process of active
Knowledge exist   construction though
Indenpendent of humans   interaction of individual with
                                             context
- - - - - - - - - - - - - - - -   - - - - - - - - - - - - - - - -

Figure 1: Realist – Idealist continuum applied on learning theory

they encountering knowledge, increase from simple to more complex cognitive skills: 'remembering', 'understanding', 'applying', 'analyzing', 'evaluating' and 'creating'. The more complex behaviors build upon the preceding ones, as an integration of lower cognitive behaviors. In principle, the theory of Bloom builds upon a realistic approach since it does not exclude the notion of certain fundamental orders. Through remembering and understanding partials of knowledge can be learned. However, the introduction of the idea that when one has obtained a valuable amount of 'base knowledge', they are capable of then constructing their own knowledge through skills such as applying and creating does not fit with a realistic approach. This notion seems more fitting to an idealistic approach. By appointing behaviors such as 'exploring', 'applying' and 'creating' as forms of learning, the production, and consumption of knowledge are becoming inextricably linked and the individual is becoming actively involved (Caso & Kuijper, 2019). With incremental learning theories, the distinction between 'the producer' and 'the consumer' of knowledge is clear since knowledge is ought to exist independently of humans. This distinction is less applicable to constructive learning theories, where knowledge is seen as something constructed through its consumer.

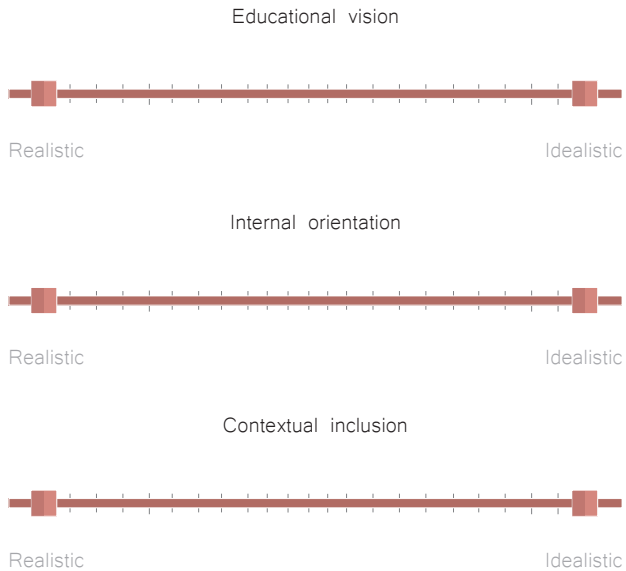# II. THE INFLUENCE OF PERSPECTIVES UPON LEARNING ON SPATIAL CHARACTERISTICS

Educational vision

Realistic   Idealistic

Internal orientation

Realistic   Idealistic

Contextual inclusion

Realistic   Idealistic

Figure 2: Framework constructed by generic themes and realist-idealist continuum

This chapter discusses the influence of perspectives on learning upon the characteristics of learning spaces. It builds upon the continuum introduced in the previous chapter, where a realistic vision and an idealistic vision towards learning are defined as two opposites. The continuum is deployed to discuss three generic themes: educational vision, internal orientation, and contextual inclusion. These themes represent the different fields of characteristics that relate to the interface between architecture and learning, thus (socio-)spatial characteristics of learning spaces. Per theme, the influence of the two opposite perspectives of the continuum, the realistic versus the idealistic, are made explicit. These characteristics are elaborated and placed within time through examples gained from the typological study on 'the school', 'the museum', and 'the library'.
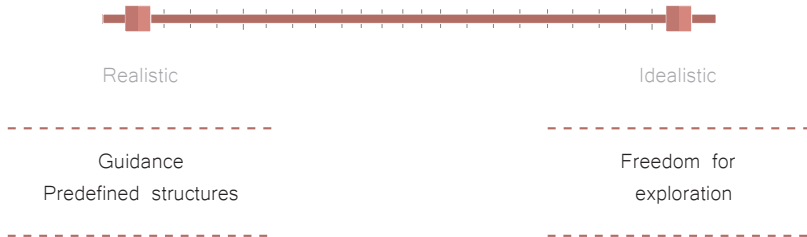
Fig. 3: Continuum applied on the theme 'educational vision'

Realistic   Idealistic

- - - - - - - - - - - - - - - -   - - - - - - - - - - - - - - - -
Guidance   Freedom for
Predefined structures   exploration
- - - - - - - - - - - - - - - -   - - - - - - - - - - - - - - - -

This topic relates to the educational method applied within a learning space. It concerns the form in which guidance is given and the amount that is ought to be necessary. The side of the continuum represented by realistic perspectives toward learning is dominated by an educational vision in which guidance is strongly present, given through predefined structures. On the other side of the continuum, associated with idealistic perspectives, stands an educational vision that favors the allowance of total freedom for individual exploration.

Strongly related to this topic is the matter of 'formality'. Within learning spaces, a distinction can be made between spaces offering formal and informal education. As George Hein indicates, these terms relate to the "administrative attributes of educational settings" (1998, p.7). The terms 'formal'

and 'informal' do not indicate a distinction between the characteristics of educational methods. Both formal and informal education can be based upon realistic notions towards learning, as well as idealistic ones. Though this seemed to be less apparent in the past, where a correlation can be discovered between formal learning spaces and a dominating realistic attitude.

Realistic

"Schools provide primarily formal education; they teach a specific, hierarchical curriculum, and they usually have rules about attendance, time spent in classes, classmates, and requirements for successful completion (Hein, 2009, p. 7). Today, schools are appointed as the dominating institutes for formal learning, although in history this distinction has not always been so apparent. When in

the second half of the nineteenth-century governments in western Europe made it their responsibility to offer more social services and (cultural) education, not just schools also museums were deployed to educate the masses. An ample amount of museums developed into institutes of great educational significance. However, at the same time school systems started to develop themselves. By establishing reflection tools and assessment systems, they made it possible to test the impact of their education. Museums did not develop such approaches to measure their impact on their visitors. "It was assumed that people would learn, be enlightened, and be entertained by their visits to museums without any reference to the study of visitors' experiences" (Hein, 1998, p.5). Partly because there was no hard evidence, the role of the museum as "the advanced school for 'self-instruction" (Hooper-Greenhill, 1991, p.25) was questioned and lost a big part of their educational purpose (Hooper-Greenhill, 1991). Schools started to dominate the field of education and therefore became known as formal learning institutes.

The educational methods applied in schools at that time often derivatized from realistic visions upon learning, therefor the appointing of formal learning spaces seems to have correlated with realistic educational methods being able to make their influence explicit. Education was often regulated according to hierarchical orders. Methods such as 'learning through instruction' and 'teacher fronted education' were the most accustomed forms of education. These forms embody incremental-based learning. Through organized structures, material is explained step by step, in small absorbable pieces (Hein, 1998). With predefined learning paths set up to be followed, guidance forms an important element of those methods. Although, the matter of 'realist-extremeness' of these methods depends as well on the teachers' individual believes and the educational method applied within corresponding educational books.

In between

Libraries and museums have always been more dependent upon personal curiosity. Dr. Samual Johnson, author of 'A Dictionary of the English Language' (1775, in Simmons, 2016) gave the word 'museum' the following meaning: "repository of learned curiosities". Interesting about this description is how the term 'learned curiosities' relates the existence of the museum to the curiosity of humans. It points to the notion that the interaction

with objects appealing to people, or which they ought to be of value, is what produces knowledge（Simmons, 2016）. Thus museums resting upon curiosity indicates a more idealistic nature of this typology.

Although a visit to a museum may be instigated by personal interest, the arrangement of exhibitions and thus the amount of guidance given depends mainly on the vision of the curator. A realist curator tries to clarify the underlying structure of the subject at display through a 'logical' and comprehensive organization（Hein, 1998）. An idealist curator, who sees knowledge as something that is being made rather than something already present, is more considerate of multiple perspectives towards a subject. "Thus, a curator who ascribes to an epistemology towards the right of the continuum might more likely consider showing multiple perspectives, or arranging an exhibition so that it allows visitors to draw various conclusions from their interactions with it "（Hein, 1998, p.19）.

The same accounts for libraries, though the bilateral character of exhibitions here can be found in books. Libraries are defined as a cultural knowledge institute that offers the public the opportunity to access relevant cultural knowledge, this makes them, similar

to the museum, dependent upon personal interest. One can enter these spaces and indulge themselves with the knowledge they desire to obtain, derived from books. Yet books, which traditional define libraries （Caso & Kuijper, 2019）, can be used by both realists as well as idealists as tools to constitute learning, similar to exhibitions. In books facts and principles can be summed up through realistic methods, however, an idealist believes meaningful knowledge can be constructed out of stories and experiences, which may as well be described in books.

Due to their dependence on personal curiosity, the typologies of the library and museum are positioned more towards the right side of the realist-idealist continuum, offering more freedom to explore than schools. Schools by nature are more related to formal curriculumsand thus to more guidance. However, this does not exclude that museum, libraries as well as schools can host educational methods based upon an incremental approach to learning as well as a constructive one.

The growing acceptance of learning behaviors based upon personal curiosity has brought along more variety in educational methods. Around the end of the 20th century, and

the beginning of the 21st terms such as 'individual-based learning' and 'personalized learning' were introduced. These terms advocate looking more closely at what an individual needs for their personal development (Hertzberger, 2008). As a result, schools started to experiment with implementing forms of learning into their curriculums that usually only occurred outside of the classroom. The Montessori schools of Herman Hertzberger are a good example where the school building has been subordinated to change to incorporate individualized-education and stimulate curiosity. In these schools, the spatial complexity has increased. First of all the traditional classroom has obtained a more articulated shape, to create more differentiation in learning spots, for individuals as well as group work. Secondly, the focus has shifted from the classroom to the entire school building. Spaces in the school have been redefined and added to the traditional configuration of the school. The collective space no longer has the typology of a rigid corridor but rather that of a 'learning street' and threshold between the classroom and this collective space has become a space on its own. This threshold zone functions as a mediator between the classroom and 'the outside world', as an extension of the

classroom. It offers familiarity but also guides children towards exploration. (Hertzberger, 2008). Technasium schools form another example. Techansia are Dutch high schools which educational vision is strongly in favor of personalized forms of learning, mainly through curiosity-based experiences and exploration. They emphasize the importance of student-initiative and try to stimulate students to obtain an active and curious attitude. Along with a new technique-subject called O&O, a Dutch abbreviation for 'research and design', a large open workplace is added to the school. (Benedictus, 2011).

Both Montessori schools and Technasia actively try to encourage children to explore, more so than realistic educational methods. However, they differ in regard to the actual amount of freedom and guidance given during this exploration. Montessori schools are set up around a balance of offering structure as well as allowing space for individual exploration. In Montessori education, the classroom fulfills an important role in offering structure. It is a recognizable entity within the 'exploration space' that the rest of the building resembles. Hertzberger labels it as a 'home base', from where children can step outside, to experience new things and gather information, but can always return

to. Technasium schools however are more extreme in their allowance of freedom. Here the classroom is the exploration space. To allow curiosity to dominate, guidance and instruction are barely given in this space.

Idealistic

The modern library tries to reinforce even more extensively the library's identity as an institute for curiosity. The recent integration of 'makerspaces within libraries is a good example of such attempts. Makerspaces are performative spaces where people get the opportunity and the freedom to explore their creative skills and are stimulated to express themselves through 'making'. They reconsider the approach towards learning in libraries by stimulating 'learning by doing'. Since amusement and leisure are part of the library's program, makerspaces suit this type well. (Caso & Kuijper, 2019). Olindo Caso, assistant professor of the Delft University of Technology, and Joran Kuiper, researcher and lecturer at the Delft University of Technology, have researched the functioning of these recently established makerspaces within libraries. They emphasizes the importance of informal learning within these spaces and to be aware of not transforming the library in a school. Caso suggests since strict learning curriculums are not obligated, to use this as an advantage, as it suits better with the unexpected nature of 'exploration' (personal communication, 26 October, 2020).

The growing awareness towards curiosity-based learning has also brought back the interest to reevaluate the potential of the museum as a substantial educational institute. It has made museums aware, again, of their educational ability, since the forms of learning they naturally offer are now seen as enrichment to regular school programs. The process processes of learning that occurs when visiting a museum is one of informal or free-choice learning, qualitatively different from that in schools (Falk and Dierking, 2000). According to Emeritus Eilean Hooper-Greenhill, professor of museum studies who reviewed the learning process of British students when visiting a museum, museums function as the connectors between abstract knowledge and practical examples. "The chance to use their prior knowledge, to have unique experiences, and to learn in active ways increased their achievements" (Hooper-Greenhill 2004, p.435). The museum can function as an outside world that students normally wouldn't be confronted with. It offered new and unusual possibilities and an unfamiliar environment with much sensory stimulation.

Comparison

In the past, the distinction between formal and informal learning spaces seems to show much correlation with the distinction between realistic and idealistic functioning learning spaces. Yet through the implementation of a broader spectrum of learning behaviors within formal education, this correlation no longer upholds. Formal learning spaces such as schools are applying methods borrowed from informal learning spaces, such as museums and libraries.

Methods of an idealistic nature offer less guidance than methods constituted by a realistic vision. There has always been much debate about the effectiveness of limited guidance during education, not just recently. As John Dewey, philosopher, sociologist, and pedagogue, also explains in his book 'Experience and Education' (1938), not every experience is educative. Educative experiences should be somehow organized, so they not only stimulate active participation but also mental participation. Paul A. Kirschner, John Sweller, and Richard E. Clark have published a paper in which they explain the lack of research that proves limited guidance is efficient as educational methods. However educational visions favoring limited guidance seem either not interested or not aware of this evidence, resulting in many recurring variations. "This pattern produced discovery learning, which gave way to experiential learning, which gave way to problem-based and inquiry learning, which now gives way to constructivist instructional techniques" (Kirschner, Sweller & Clark, 2006. p.79). Perhaps libraries, formally not having the responsibility to prove their educational relevance, offer better settings to implement museum-based learning behaviors such as 'learning by experiences', more so than schools?
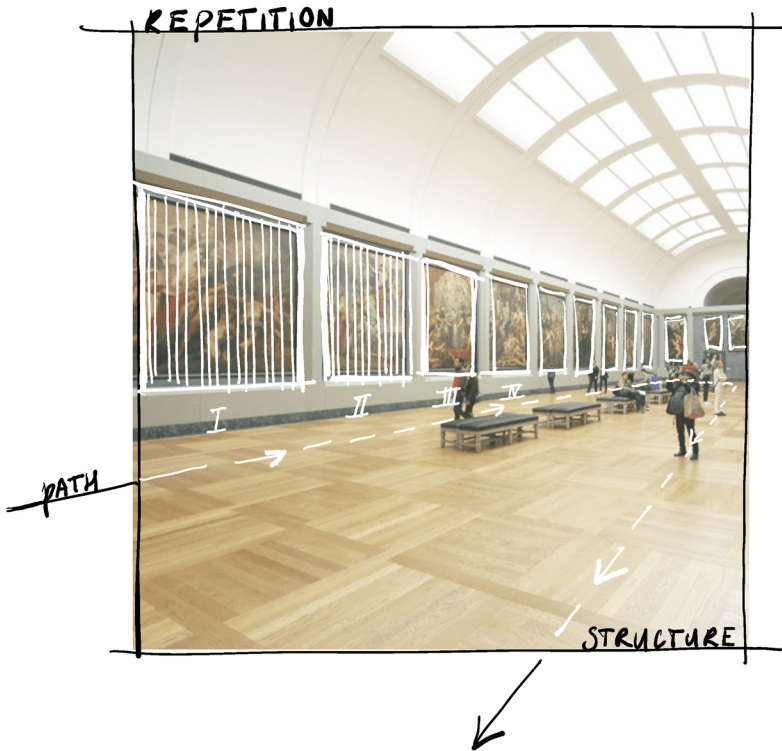
Realistic

Fig. 4: Spatial characteristics of a realistic defined educational vision

Idealistic

Fig. 5: Spatial characteristics of an idealistic defined educational vision
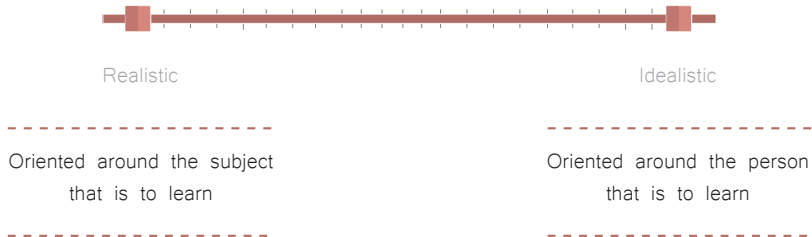
Realistic

Idealistic

- - - - - - - - - - - - - - - -
Oriented around the subject
that is to learn
- - - - - - - - - - - - - - - -

- - - - - - - - - - - - - - - -
Oriented around the person
that is to learn
- - - - - - - - - - - - - - - -

Fig. 6: Continuum applied on the theme 'internal orientation'

This topic discusses the way learning spaces orient themselves internally. Different perspectives towards learning ask for spaces to organize themselves around different center points. Spaces designed by a realistic perspective upon learning are oriented around the subject of what is to learn. Whereas opposite, spaces applying an idealistic perspective, focus upon the person who is to learn.

Realistic
Learning spaces of realistic nature, apply educational methods built upon a transmission-absorption notion. Space plays a facilitating role by housing information and making it accessible. Therefore, the space is mainly oriented around knowledge-containing sources.
"...The teacher at the blackboard passes on knowledge. So the spatial conditions of the classroom should mainly serve to aid the pupils' concentration, which should be distracted as little as possible, while the teacher should have the best possible overview" (Hertzberger, 2009, p.23). 'The traditional classroom' illustrates how knowledge containing sources can become the focal point of space. The classroom is very much frontal oriented towards the teacher in front of the class. The teacher is the source containing knowledge. All tables are positioned in rows facing this source. Seen in a very abstract matter, knowledge transfers through space, and for this process to function best, people are accepted to stay put. These spaces try to limit distractions that are not related to the subject at hand. School buildings from the past were often build up by a sequence of these frontally oriented

classrooms. Classrooms were connected hrough a corridor alongside it. This corridor purely functioned as a traffic zone or storage. No attention was devoted to learning within this space, as learning stayed limited within the boundaries of the classroom, where it could be regulated. (Hertzberger, 2008). When knowledge is made visible through exhibitions, often applied strategies by realist curators are to organizes exhibitions by arranging objects chronological or according to a certain style or type to which they 'naturally belong' (Hein, 1998). "For example, many of the world's older science museums were designed to illustrate the "true" structure of science" (Hein, 1998, p.19). People are expected to move along a specific route, which, if done correctly, can communicate knowledge according to a hierarchical and incremental structure. A process quite similar as occurs within traditional classrooms, yet three-dimensional. Movement has been added to create a route through the material.

Idealistic

Spaces supporting learning as a constructive process, no longer solely focused on specific knowledge sources but center around users and their personal experiences (Hein, 1998). Christopher R. Marshall, senior lecturer at the University of Melbourne, specialized in Art history and museum studies, has defined a difference between projective spaces and reflective spaces. Projective spaces arrange objects to communicate a coherent message. This arrangement correlates with learning methods based upon a realistic notion of learning. Reflective spaces are more focused upon the contemplation of individual objects and their interaction with the observer. These spaces can be appointed as spaces supporting constructive learning, an idealistic approach. Marshall states that traditionally museums are more defined by projective spaces and galleries are more characterized by reflective spaces. Nowadays though museums seem to incorporate more of these reflective spaces. Museums have gone from 'creating object-oriented exhibitions' to 'thinking about the experience of the observer'. Spatially, this means that linearity and repetition make place for more open spaces where evocative objects are placed individually. "Here, art-inspired elements open the space of the museum up to a more evocative and experiential form of communication" (Marshall in Macleod, 2005, p.4). So, even though one object is placed in the middle of the space, demanding attention, the intention of the spaces is not necessarily directed upon the object itself. It is concerned

with the confrontation, the interaction, and the exchange it instigates with the people observing it. Quite similar, Hertzberger (2008) mentions that experiences are the results of social interaction, exchange, confrontation, and surroundings that provoke and raise questions. Therefore idealistic learning spaces are obliged to facilitate and stimulate these experiences. Then rigid setup of learning spaces based upon a transmission-absorption notion does not fit with the intention to instigated interaction. The added workspaces in Technasium schools are an example of extremely idealistic learning spaces. The setup of the traditional classroom has changed into a large open workplace in which clusters of activities are situated concerning specific themes such as designing, brainstorming, discussing, and experimenting. Since they try to stimulate the individual curiosity of students, the teacher is no longer considered the most important source that contains knowledge. Students can construct their own knowledge. Spatially this has resulted in the lack of a specific spot defined for the teacher. The space has no clear defined focus point at all since the students using and moving through space are considered the center of attention (Benedictus, 2011, p.7).

The entire space is organized to support students in their exploration of possibilities.

Comparison

Overall, a shift can be seen in the changing attitude of learning spaces, from facilitating towards stimulating. Like Stephen Weil said, "From being about something to being for somebody" (1999, p.229). Instead of centering space around objects related to specific learning topics, now space is more centered around the person who is expected to learn. Again, within this theme, a debate can be held on the topic of guidance, but now in the form of 'spatial focus'. When creating a stimulating and diverse environment, in which lots of artifacts trigger incentives, chances are that people get lost within all the possibilities or are not assertive enough to find their way. However, very rigid and fixed environments, which try to keep out distractions as much as possible, eliminate personal interest as a stimulus for learning.
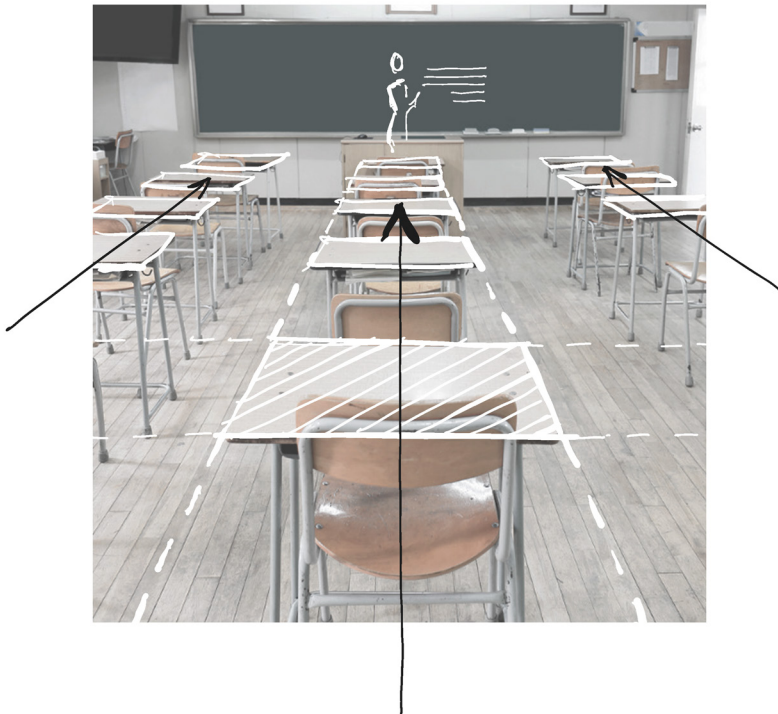
Realistic

Fig. 7: Spatial characteristics of a realistic defined internal orientation

Idealistic

Fig. 8: Spatial characteristics of an idealistic defined internal orientation
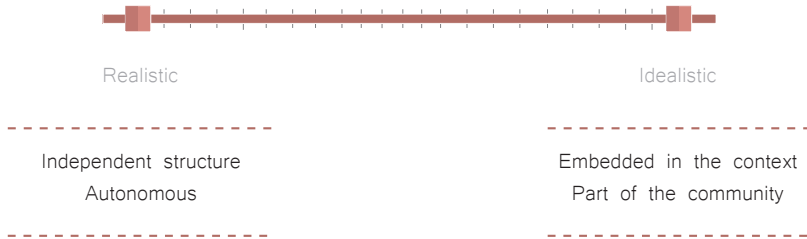
Fig. 9

Realistic   Idealistic

- - - - - - - - - - - - - - - - -   - - - - - - - - - - - - - - - - -
Independent structure   Embedded in the context
Autonomous   Part of the community
- - - - - - - - - - - - - - - - -   - - - - - - - - - - - - - - - - -

Fig. 9: Continuum applied on the theme 'contextual inclusion'

This topic discusses how learning spaces position themselves towards their surroundings. It includes themes such as social inclusion, relation to its local context, and physical appearance. On one side of the continuum stand realistically defined learning spaces, which function as independent institutes within their context. They are autonomous entities, functioning according to their own methods. Opposite stands the idealist side, where learning spaces actively try to be as inclusive as possible. They are embedded within the territorial setting in which they are positioned.

Realistic

"As long as learning goes no further than conveying the officially accepted basic knowledge, all you need is a fixed spatial program that follows the curriculum as painstakingly as possible..." (Hertzberger,

2008, p.68). As this quote of Herman Hertzberger indicates, learning spaces functioning according to an extreme realistic perspective can, in principle, function anywhere. The sole intention of the place is to provide space that effectively supports the curriculum. Thus all attention is devoted to the internal functioning of the place and less to its context.

"Many museums were designed to overwhelm visitors. The classical columns and pediments, the banks of steps, the ornate iron gates – these are devices that convey numerous messages, all quite conscious, about what an entry to this grand edifice will lead to. Museum architecture has always been, and still is, an area where pomposity and vainglory can run riot" (Flemming, in Macleod, 2005, p.53). Many public museums of the early nineteenth-century, although defined as 'public',

were intentionally designed as structures to stand out from their surroundings as large imposing objects, conveying the images of housing precious valuables. "The intention of the architecture is usually to make a grand statement, to illustrate the mighty quality of the museum and the importance of what it contains. Unfortunately, this is not necessarily the most accessible image for many visitors and potential visitors" (Thompson, in Hein, 1998, p.4). So rather than being trying to include the context in which they were placed, the architecture of the museum was to inform the context about the value it housed. Their proud and inward-oriented attitude points to the realistic nature of these learning spaces, being oriented upon objects containing knowledge, or in this case value. Besides, although the purpose of these nineteenth century museums may have been driven by a desire to collect, informs, and educate, only a limited group of people was privileged enough to enter these places. For the average civilian the museum was unreachable. Although politics and economic reasons were mainly responsible for this matter, the architecture of these places reflected this elite attitude.

n between

Around the late 20the century, the ability of the museum to instigate urban change was recognized. As an often occurring phenomenon, museum buildings were deployed as social and economic regenerators in deteriorated neighborhoods. For example, the Guggenheim in Bilbao by Frank Gehry or the Jewish Museum from Daniël Liebeskind in Berlin. "As museums have come to be consciously recognized as drivers for social and economic regeneration, the architecture of the museum has developed from its traditional forms into often-spectacular one-off statements and architectural visions" (Macleod, 2005, p.2). In their pursuit to instigate change, these buildings often became objects which stood out from their surroundings, intentionally trying to provoke. Although these buildings may have become beautiful icons in their context, the splendor and dominant presence of the architecture does not always blend well with inclusive agenda's. Often very trend-related visions and esthetic of the architect define its architecture. The risk of such "statement architecture" (Flemming, in Macleod, 2005), is that it may overshadow the actual content of what the museum is about, as well as threaten the inclusive narrative of the building within the city.

A debate can be held about whether these museums have a real connection to their

(social) context. On one hand, the argument can be made that these museums have been built to generate particular locations. Their method to do so is through instigating cultural tourism and thus economical profit for its context. Applying provoking or iconic architecture is part of this approach. The architecture itself can be seen as an object trying to instigate interaction or reaction, a 'statement' piece to instigate change. Yet, on the other hand, their attribution to the local community can be questioned (Macleod, 2005). The architecture is not designed to radiate an inclusive image, but rather to stand out. The outer shell of the space intentionally stands removed from its outer context. It is part of a strategy to attract people from abroad.

Idealistic

When learning is seen as a construct of active participation with the environment, the context becomes inextricably involved (Hein, 2009, p.6). The identity of learning spaces is no longer solely related to its internal functioning since the social context is very much defining for the learning process. The dominating social values in the local context define how interactions should best be shaped. Olindo Caso (2019) explains, relating to his research upon makerspaces in Dutch libraries, how local relevancy is increasing in combination with more constructive learning methods. "Accordingly the spatial assignment is to discover and materialize the genius loci in the design and layout of the makerspace as a specific place in a specific library building conceived for a specific community with specific ambitions" (Caso & Kuijpers, 2019, p.143). Makerspaces are good examples of how learning spaces are "...moving from collections to connections in order to serve their local communities" (Hermans in Caso & Kuijper, 2019, p.6). Herman Hertzberg (2008) introduces the idea that schools should function as microcities. They should offer an environment just as rich in variety and diversity as in the real world. "We are just going to have to accept the idea of another kind of school, one that is less of an institution where you are robbed from your freedom, if only temporary, and fed with knowledge. We need to look for a form of learning space with a wider range of experience, as is found in the city..." (Hertzberger, 2008, p.69).

The LocHal, the public library of Tilburg, is a good example of a place embedded in its context and which identity is therefore defined by it. The LocHal, is designed very

considered of its history and its location. What once was an old locomotive hall in the textile oriented city of Tilburg, has now become a new living room for the city (LocHal, n.d.). Many elements in the interior refer to its specific history and its context, giving the building a unique, relevant, and representative identity. For instance, the old rail tracks still visible in the floor function as tracks for flexible table arrangements or bar elements and the curtains that form division walls in the middle of the space, refer back to Tilburg's history with textiles. The LocHal has won many awards for its innovative and progressive character, like the 'World Building of the Year' award, of whom the jury described the building as followed: "The result has created a physical facility in which a variety of users can meet for a variety of purposes, in this sense the building has become a social condenser" (LocHal, n.d.). The PLAN emphasized how the LocHal has attributed to redefining today's modern library. "The LocHal redefines the library typology. It has already been coined 'the next big thing in public libraries' by experts. While keeping traditional 'book consumer' facilities, the new library also provides ample opportunity for the creation of new knowledge" (LocHal, n.d).

The idealistic vision towards learning show much preference for social inclusion. This makes that idealistic learning spaces are more active in lowering their threshold to become more accessible. With the term threshold, the amount of effort is indicated that visitors are expected to put in, to make use of the space. The architecture of learning spaces plays an important role in radiating an inclusive image. It has become part of a bigger collection of means, all in favor of making these spaces an anchor for interaction in its context (Macleod, 2005). Yet a low threshold is not only achieved through adjusting physical appearance. The term 'soft power', introduced by Gail Dexter Lord and Ngaire Blankenberg (2015), indicates the social force that learning spaces possess and can address. It describes a force not related to politics or economics, but which is an influence of behavior. "Where the resources of "hard power" are tangible—force and finance—soft power resources are intangibles, such as ideas, knowledge, values and culture" (Lord & Blankenberg, 2015, p.9). Soft power thus relates to social behaviors and interaction. It can be reinforced by adjusting the program of a learning space to its local context. By actively reaching out, beyond the physical walls of the place,

people are made aware of the presence and potential of the space. Collaborating with other cultural and local institutes helps to connect with its social context. This way spaces become more embedded within the narrative of the community. Modern libraries in particular, of which the LocHal is a good example, are showing such developments in which they are expanding their program with different sorts of activities to increase social inclusiveness. "... a new generation of public libraries is gradually appearing in which sociality, co-creation and collaborative learning become important keywords" (Case & Kuijper, 2019, p.8).

Comparison

Learning spaces with a realistic approach to learning are less bound to their context and can function independently of their context. Since their focus is upon knowledge containing source and their purpose is to house and facilitate a fixed curriculum, they are characterized by a very inward oriented approach. Learning spaces functioning according to an idealist approach are more embedded within their context since local relevancy is increasing as a result of more constructive learning behaviors. The cultural values dominating within this context are defining the form of interaction and thus learning processes. These learning spaces are part of the narrative of the community and have adapted their program accordingly.
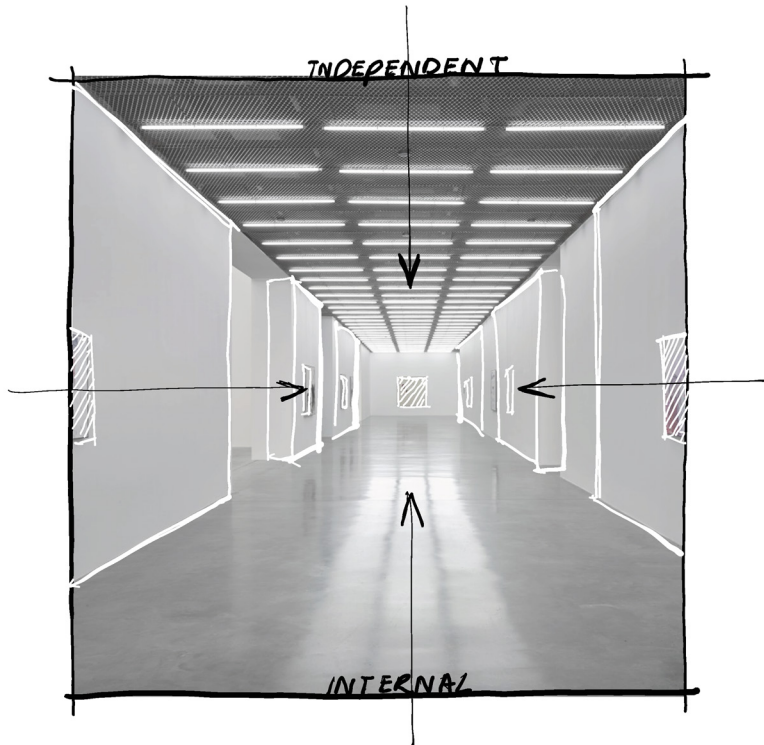
Realistic

Fig. 10: Spatial characteristics of a realistic defined contextual inclusion
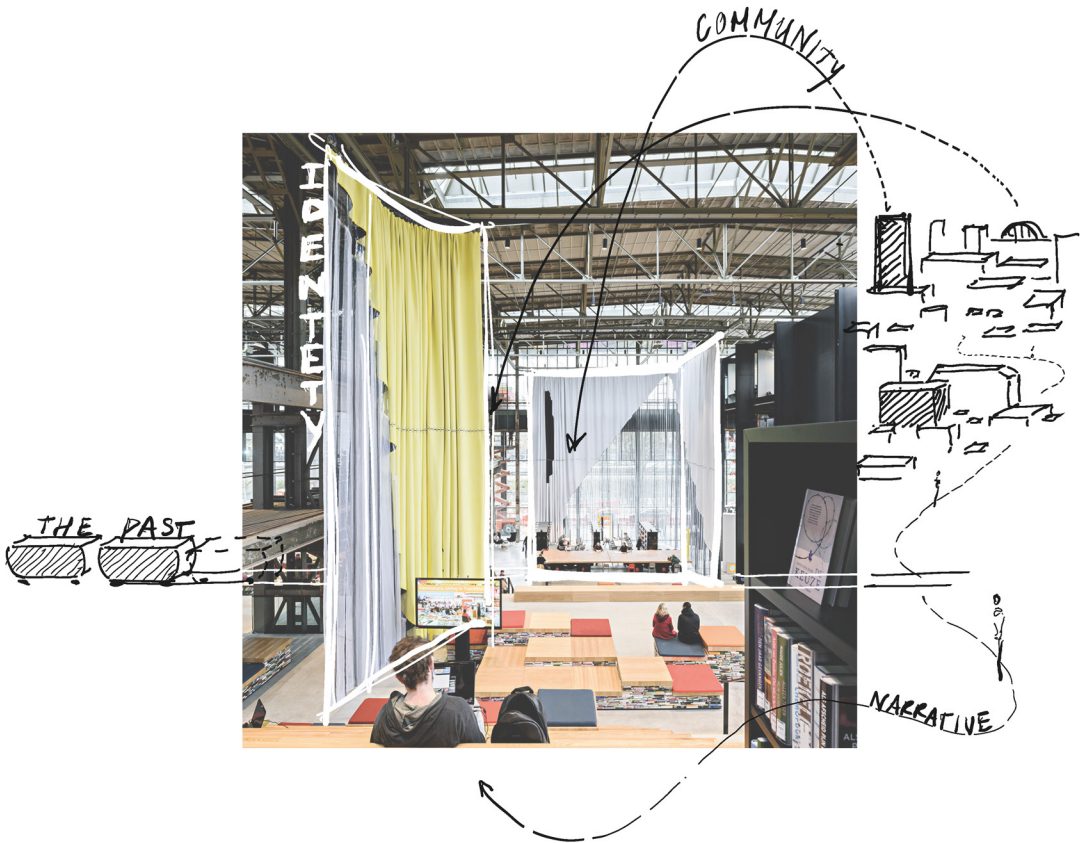
Idealistic

Fig. 11: Spatial characteristics of an idealistic defined contextual inclusion

III. THE ARCHITECT WITHIN THE FIELD OF LEARNING SPACES

The field of learning spaces

Excluding the aspect of time, concluded can be that the (socio-)spatial characteristics of realistic and idealistic defined learning spaces differ much, even contradict each other at certain points. A realistic vision towards learning can be held responsible for incremental educational methods and rigid spatial characteristics. Consecutive structures, source-oriented spaces, and a pragmatic attitude define realistic oriented learning spaces. Since social behaviors are not ought to be part of the process of learning, less attention is paid to socio-spatial characteristics during the construction of these spaces. Within idealistic defined learning spaces interaction forms the essence of learning, interaction between people as well as between people and their environment. Freedom of preference, people-oriented spaces, and contextual embedding are characteristics defining idealistic learning spaces. Learning is envisioned as a process in which the individual is able to construct their own knowledge, therefore space is oriented around people rather than knowledge sources. Individuals however have different personalities and preferences. For space to support personalized forms of learning, it has to offer a certain amount of diversity.

Including the element of time, a transformation has occurred from constructing learning spaces according to practical, typological oriented approaches towards more praxeological approaches. The attention to socio-spatial practices has increased. This transformation can to a large extend be explained through society becoming more accepted towards idealistic notions.

In the past a realistic visions towards learning dominated. Therefore the facilitation of knowledge sources and settings in which the transfer and absorption of knowledge could unconstructively take place were desired. These spatial configurations have instigated 'types', such as 'the school', 'the museum', and 'the library'. Noticeable among this categorization is how types functioning according to strong realistic educational visions obtained the status of a 'formal learning space'. However, as society became more accepting of idealistic notions, a shift occurred among learning spaces in general, in their understanding of learning. The ability of space to not only facilitate learning-objects but to enable learning as well was recognized. Learning spaces took on more social-spatial oriented approaches. Not only informal but also formal learning spaces stimulated more applied, socially, and curiosity-driven learning

behaviors. Formal learning behaviors were no longer limited to cognitive skills such as understanding and remembering, but include skills such as analyzing, applying, reflecting, and creating as well. Through the implementation of idealistic notions, thus social-spatial practices, boundaries between formal and informal learning spaces became distorted. It has instigated the merging of traditional typological configurations.

As social-spatial approaches, methods of idealistic nature, transcend typological configurations, the field of learning spaces is in need of redefinition. The merging of types has consequences for the quality of formal education. Formal learning space must be able to make their influence upon students explicit and measurable, something which is more difficult with idealistic defined educational methods. Freedom for exploration and individuality form important key elements of these methods however, their outcome is harder to predict. As types are becoming more alike, a clear distinction between formal and informal learning spaces becomes even more important. Thus rather than distinguishing learning spaces according to types, the field of learning spaces should be defined through the educational responsibility of a place. Formal learning spaces have the responsibility to make their influence explicit and measurable, something informal spaces have not. Through constructing learning spaces according to the educational responsibility they have to fulfill, implementing more idealistic educational methods within formal learning spaces can still occur, but the quality of education can be ensured.

The architect within the redefined field of learning spaces

The question remains; 'how can an architect attribute to the quality of a learning process, being considerate of the societal context in which it takes place?' As accounts for the societal context; the previous chapter indicated that the field of learning spaces is in need of redefinition. A different attitude, one that is less concerned with typological configurations and their associated learning behaviors, but more with educational responsibility, must be taken on when constructing learning spaces. An architect thus has to be considerate of the difference in educational responsibility a place has to uphold when designing learning spaces in current times. As Herman Hertzberger (2008) points out, exploration can only occur in the presence of familiarity, a notion applicable to physical settings, as well as mental processes. Without knowing

certain facts, one cannot comprehend new understandings and without a defined physical 'base' one cannot position themselves towards the unfamiliar. So whether the context is a formal or informal learning space, the evolution of learning skills can only occur when at least some structure is offered. Thus offering total freedom, an extreme idealistic approach, will not prevail in any case.

For formal learning spaces, a limit accounts for the amount of freedom they can offer. Informal learning space, not obligate to function according to verifiable methods, know more freedom. Using the framework that has been constructed within the previous segment, the spatial characteristics supporting the balance between structure and freedom within formal learning space will be elaborated. It sketches the outlines of how an architect can attribute to the quality of education within a formal learning space, in our current society.

· Educational vision

Learning should not be restricted to learning through instructions only, but the opportunity should be offered to apply, reflect upon and explore knowledge as well. "Indeed the space is more than ever a means of showing pupils and especially teachers what the possibilities are, of inspiring them and opening itself up to changes and increments" (Hertzberger, 2008, p.70). Thus a balance between the familiar and the unfamiliar should be present within educational methods as well as the physical settings of schools. The educational vision of Montessori schools correlates strongly with this position. Here guidance and stimulation are very well balanced and delicately shaped within the spatial configuration. Through the use of zones grading from public to private, from offering shelter to exploration, guidance is physically created. The transformation of the threshold between the classroom (the home-base) and the rest of the school (the exploration space) into a space of its own has constructed a spatial mediator. The classroom has obtained an articulated shape and offers different learning spots to suit individual preferences as well as those of groups. Not so much the actual presence of a 'classroom' is to be subtracted from this example, but rather the idea of explicitly framing a space as a 'home-base'. A defined spot that one can claim as its own is to be facilitated to be able to position yourself towards the unfamiliar.

· Internal orientation

The internal orientation of the space should search for a balance between being oriented

towards the students using the space, yet offering enough structure through physical configurations. Students should experience enough freedom to express and explore individual preferences. Curiosity-based learning behaviors by nature are more constructive and thus spaces supporting behaviors such as applying, reflecting, and creating, center around users and their personal experiences（Hein, 1998）. They provoke and raise questions and instigate exchange and social interaction.（Hertzberger, 2008, p.9）. A rigid setup, such as the traditional classrooms, won't comply to constitute this form of learning. The orientation of the space is too limiting by its rigid and fixed, frontally oriented set up. Yet opposite, when space has an open character, no orientation at all, and an unlimited amount of options is displayed, too much freedom is offered. Then too much is relied on students being highly developed. A more open spatial configuration is desirable to allow confrontation to occur, but some structure to the space should be applied（Hertzberger, 2008）. It is too easy to 'simply let the students be'. Besides, offering guidance does not have to prevent students from exploring their interests. On the contrary, it may even have very stimulating effects. The very independent student will

explore in any setting, yet those students who may not be so adventurous will be included sooner when some stimulation is given. Spatial focus can be given to space by very simple and small spatial innervations. For example by creating zones through the use of division elements or height differences. In Montessori schools, space is arranged in such a way that the desk of a teacher does not become the 'front stage' of the classroom, but is rather placed somewhere towards the side. Guidance then is still present, yet not apparent.

· Contextual inclusion

To create relevant learning experiences, learning spaces should be aware of the social and physical context in which they are situated. In doing so, the experiences space instigates are based upon cultural values corresponding to those dominating within the context of the learning space. Besides, through implementing practical examples and situations from the outer world within a learning space, abstract knowledge can be made more comprehensible and tangible. Herman Hertzberger for example advocates that schools should represent microcities. "We need to look for a form of learning space with a wider range of experience, as is found

in the city..." (Hertzberger, 2008, p.69).
In principle, the learning space functions as
a laboratory in which the real world can
be experimented with as well as reflected
upon. Local relevancy thus is important. It
can be achieved firstly through architecture
radiating an inclusive image, secondly by
physically referring to historical and cultural
elements that define the context, and lastly
through stimulating 'soft power', by facilitating
space where collaboration can occur with
other learning spaces present in the context.
Nevertheless, confronting somebody with the
unfamiliar or the unexpected should not be
excluded entirely. As the research of Hooper-
Greenhill (2004) pointed out, museums for
example offer valuable learning experiences
through their ability to make somebody aware
of new and unusual possibilities.

CONCLUSION

Different perspectives towards learning ask for different approaches on how to support learning, therefore resulting in different spatial characteristics of learning spaces. The realistic and idealistic perspectives are appointed to represent the two most opposite perspectives towards learning. Realistic defined learning theory explains learning as an incremental process of absorbing facts, otherwise referred to as the 'transmission and absorption notion'. It builds upon the notion that knowledge exists independently. On the contrary, idealistic learning theory believes learning to be a process of active construction and interpretations, which differs per individual. Knowledge is ought to be constructed by the individual, and thus non-existing outside of the mind. Learning spaces defined by an extremely realistic attitude, function according to incremental learning methods in which guidance is very much present. Space, supporting these methods, is characterized by consecutive and pragmatic structures, an internal orientation towards knowledge containing sources, and an independent attitude to its context. Idealistic learning spaces represent the total opposite of realistic learning spaces. They apply methods that favor freedom for interactions and personal exploration. Space,

therefore, has a versatile character to suits individual preferences, is to a large extent oriented around social processes and the people using the space, and is inextricably linked with its context, socially as well as physically.

Over time, society has become more accepting of idealistic notions towards learning. As a result, the approach towards learning spaces has transformed from being typological and pragmatic oriented, towards praxeological approaches, emphasizing the importance of social-spatial practices. In the past, quite a clear distinction prevailed between formal and informal learning spaces, as formal learning spaces were mostly characterized by realistic defined educational methods, and informal learning spaces leaned more towards idealistic methods. However, as idealistic notions have become more accepted, formal learning spaces are implementing socio-spatial practices as well, resulting in the distortion of boundaries between types of learning spaces. The merging of types has consequences for the quality of formal education. Formal learning space must be able to make their influence upon students explicit and measurable, something which is more difficult with idealistic defined educational methods. As types are becoming more alike, the

difference within the educational responsibility of a place should be emphasized stronger. Thus the field of learning spaces must be redefined by a clear distinction between formal and informal learning spaces. Then both formal, as well as informal learning spaces, can implement idealistic educational methods, but the quality of formal education will be ensured.

Within current society, an architect can attribute to the quality of a learning process, by being considerate of the difference in educational responsibility a place has to uphold. As exploration can only occur in the presence of familiarity, referring to mental as well as physical processes, designing a learning space in general concerns a delicate balance between offering structure and freedom. However, within formal learning spaces, the educational responsibility brings along more limitations to the amount of freedom. Thus, within formal learning spaces, the architect can attribute to the quality of education by designing space supporting an educational vision that is considerate of these limitations to idealistic notions. First of all, guidance to exploration can spatially be arranged, by facilitating zones that gradient from private to public and through defining a demarcated territory within an exploration space. Opening up space and displaying various materials offers the possibility to be confronted with unfamiliar possibilities. By offering a secured base, a place is defined from where to start exploration, as well as a point for return and reflection. Secondly, relating to the internal orientation, space should be oriented around social interactions and personal experiences, yet prevented should be that the space is lacking definition. Small spatial interventions, as division elements or height differences, will help to comprehend space and give it a lenient focus. Lastly by embedding a learning space within its context, learning processes will align with the social values dominating in its context and abstract knowledge becomes more comprehensible. Local relevancy can be achieved firstly through architecture radiating an inclusive image, secondly by physically referring to historical and cultural elements that define the context, and lastly through stimulating 'soft power', by facilitating space where collaboration can occur with other learning spaces present in the context.

DISCUSSION

To comprehend the field of learning theory, which forms an influential part of the theoretical background of this research, this research uses the realist versus idealist continuum. This dichotomy is not understood to be a representative image of the actual field of perspectives upon learning, rather functions as a tool to schematize this complex field. Theory may be able to indicate fundamental orders or pure forms, the reality however is more nuanced. A pure 'realistic' or 'idealistic' learning space probably does not even exist. Besides, the assumption that this applied polarization can capture the diversity among perspectives towards learning, is influenced by my epistemological position. Other perspectives may refute the notion that fundamentals orders exist or can be indicated, or would construct a different continuum. The debate about 'knowledge' is ever-evolving. Nevertheless, applying a continuum has offered me, operating from my particular point of view, the guidance to understand the complexity existing within the field of learning spaces and therefore enabled me to respond to it.

Through this research, I developed my own understanding of what 'learning' implies. Although this research uses opposites to comprehend the complexity existing within the field of learning spaces, my perspective upon learning lays somewhere in the middle of a realist and an idealist perspective, leaning somewhat to the latter. My perspective towards learning can be positioned upon the realist-idealist continuum, somewhere between Benjamin Blooms' (1956) notions regarding learning and Donna Haraway's theory concerning 'situated knowledge' (1988). I envision learning as a process in which cognitive skills have the ability to evolve into more complex skills, but which can only occur when a certain amount of fundamental understandings regarding a subject is known. These fundamental understandings I do believe to be time-framed and defined by specific cultural settings and thus, in a bigger picture, are of constructive nature. When new knowledge is derived, the definition of these fundamentals can change. Thus, I envision learning as a constructive process, but one that does not exclude realistic notions.

Furthermore, this research has been based upon typological research which has been limited to three typologies, within a restricted period. Therefore, a discussion can be held concerning the three generic themes this research appoints as representatives of the characteristics related to the interface

between architecture and learning. The typological research has formed the base for the comparative study from which conclusions have been drawn that resulted in the construction of these three themes. Had the time-period had been extended, perhaps other results would have been found, thus other generic themes would have been indicated. However, to make any research explicit, at some point research must be framed and translated into conclusions.

If this research were to be continued, specification would be valuable. This research has taken on quite a general approach and therefore its conclusions still contain a certain amount of abstraction. Through including matters of age or the influences of different cultural settings, this abstraction can be reduced. Further specification may help to provide even more valuable and applicable approaches on how to align the spatial configuration of learning spaces with its societal context. Furthermore, this research has mainly operated in a social-theoretical field. The direct influence of economics, politics, and cultural norms has been left untouched, due to time constraints. It could be interesting, for further research, to include these themes as well.

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