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Design and Learning in Higher Education: A Perspective from Finland

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ABSTRACT (ENG)

Meaningful design and valuable learning are processes with many similarities. In both, change is central. Design attempts to change the world around us. Learning changes us. In the article I explore the role and purpose of a university as community tackling humanity's greatest challenges. I claim that the task requires design thinking. Approaching the world with design thinking should not be left for designer and engineers only. It should be central throughout the entire university. If taken seriously this means that we will rethink and redesign our ways of teaching and learning. If we aim to educate change makers, learning in a university should be knowledge building. I conclude by emphasis how in a university we should pay a lot of attention to have processes, practice and social structure that encourage innovation and creation of new knowledge.

KEYWORDS: *Higher education, Universities, Design thinking, Teaching, Learning*

RESUMEN (ESP)

El diseño significativo y el aprendizaje valioso son procesos con muchas similitudes debido a que en ambos casos el cambio es lo central. El diseño intenta cambiar el mundo alrededor y, a su vez, el aprendizaje nos cambia. En este artículo se explora el rol y propósito de la universidad: ser una comunidad que estudia los mayores retos de la humanidad. Se afirma que la tarea requiere de un pensamiento de diseño. De manera que, aproximarse al mundo de esta forma no debería dejarse solo a los diseñadores o ingenieros, sino que debería ser central en toda la universidad. Pensar en esto seriamente significa repensar nuestras formas de enseñar y aprender. Si queremos educar a quienes hacen cambios, el aprendizaje debería ser la construcción de conocimiento. Se concluye que la universidad debería enfocarse más en los procesos, práctica y una estructura social que promueva la innovación y creación de nuevo conocimiento.

PALABRAS CLAVE: *Educación superior, Universidades, Design thinking, Enseñanza, Aprendizaje*

RIASSUNTI (ITA)

Il design prezioso e l'apprendimento significativo sono processi con molte somiglianze, poiché nei due casi il cambiamento è la cosa centrale. Il design cerca di cambiare il mondo intorno e, a sua volta, l'apprendimento ci cambia. Questo articolo esplora il ruolo e lo scopo dell'Università: una comunità che studia le maggiori sfide dell'umanità, e si regge che questo compito richiede di un pensiero di design. Pertanto, questa forma di avvicinarsi al mondo non dovrebbe lasciarsi soltanto ai designer o ingegneri, ma dovrebbe essere qualcosa di centrale in tutta l'università. Riflettere su questo significa seriamente ripensare le nostre forme di insegnare ed imparare. Quindi, se vogliamo ottenere un cambiamento attraverso l'educazione, l'apprendimento dovrebbe essere una costruzione dinamica della conoscenza. Si conclude cosi, in questo articolo, che l'università dovrebbe focalizzarsi più nei processi, nella pratica ed in una struttura sociale che promuovano l'innovazione e la creazione di nuova conoscenza.

PAROLE CHIAVE: *Istruzione superiore, Università, Design thinking, Insegnamento, Apprendimento*

RÉSUMÉ (FRA)

Le design significatif et l'apprentissage utile sont des processus partageant plusieurs points communs, dû au fait que dans les deux cas, le changement est central. Le design cherche à changer le monde autour de nous, l'apprentissage nous change nous-même. Dans cet article, on explore le rôle et le but de l'université : être une communauté qui étudie les défis majeurs de l'humanité. Il affirme que la tâche exige le « design thinking ». Ainsi, se

rapprocher du monde avec le design thinking ne devrait pas s'adresser seulement aux designers ou aux ingénieurs, mais ce doit être central dans toute l'université. Penser à cela sérieusement signifie repenser notre forme d'enseigner et d'apprendre. Si l'on veut éduquer ceux qui réalisent les changements, l'apprentissage devrait être la construction de connaissance. L'article conclue que l'université devrait se centrer davantage sur les processus, pratiques et une structure sociale qui promeut l'innovation et la création de nouvelles connaissances.

MOTS-CLÉS: *Enseignement supérieur, Universités, Design thinking, Enseignement, Apprentissage*

RESUMO (POR)

O design significativo e a aprendizagem valiosa são processos com muitas semelhanças dado que ambos os casos a mudança é o valor central. O design pretende mudar o mundo que lhe rodeia e, por sua vez, a aprendizagem nós transforma. Nesse artigo é explorado o rol e o propósito da universidade: o fato de ser uma comunidade que estuda os maiores desafios da humanidade. É afirmado que a tarefa precisa pensamento de design. Assim, se aproximar ao mundo a partir desse olhar não deveria estar reservado unicamente aos designers ou engenheiros, mas deveria virar numa forma de proceder em toda a universidade. Pensar seriamente a questão significa repensar as nossas formas de ensinar e aprender. Se querermos educar àqueles que mudam a realidade, a aprendizagem deveria ser a construção de conhecimento. É concluído que a universidade deveria se focar mais nos processos, práticas e uma estrutura social que promova a inovação e criação de novo conhecimento.

PALAVRAS-CHAVE: *Ensino superior, Universidades, Design thinking, Ensino, Aprendizagem*

INTRODUCTION

A university is not a temple of knowledge. A university is a place of living knowledge. We do not worship knowledge; we tend to it, and we hammer it.

At Aalto University we bring together art, science, business, and engineering. This was started by merging three leading Finnish universities in 2010. All three, Helsinki University of Technology (founded in 1849), the University of Art and Design (1871), and Helsinki School of Economics (1911) have made, partly separately but often together, a remarkable contribution to the modern world. The list of innovations that have their roots in these universities includes, just to mention a few, mobile technology, the first graphical web browser, the world's most popular open source database, world-class architecture and design, art masterpieces, the world's most successful video game companies, as well as a number of other sustainable and responsible businesses. Although the output of these three universities has been great, we also see that the world around us is changing at increasing speed.

While the founding of the original universities in the late 19th and early 20th centuries primarily served industrial society in Finland, nowadays we operate internationally, and with the Aalto University we aim to contribute to the global network society. This means that we tackle humanity's greatest challenges.

The name Aalto University is a tribute to the architect, designer and professor Alvar Aalto (1898 – 1976). Aalto was always forward-looking and interested in new technologies and trends in the modern world. Still, his underlying philosophy of life and living was strongly humanistic. According to Alvar Aalto as scientists, engineers, architects, designers and businesses we should first serve humanity. The same principles are still evident at Aalto University today. The aim is to make the world a better place for all.

The name of the university is also a tribute to Alvar Aalto's wife, partner and designer Aino Aalto. Her own works are not as well known internationally as her husband's, although their architecture office was a common endeavor between the couple. For instance, Aino Aalto's own designs, such as her drinking glasses, are used and loved every day in homes across Scandinavia. We could say that the Aalto ideals were co-designed by Alvar and Aino in their office.

On the one hand, tackling humanity's greatest challenges requires design thinking. On the other hand, when promoting design thinking throughout the entire university, we are rethinking and redesigning our ways of teaching and learning at the university. In education, the focus must be on learning.

In this article I will introduce the similarities and connections between design thinking and contemporary theories of learning. I start by exploring the concept of design and design thinking. I continue by introducing the idea of learning as knowledge building, and conclude by presenting the implications of design and new ways of thinking about learning for higher education.

DESIGN: FRAMING, PARTICIPATION, PROTOTYPING, AND DEPLOYING

Universities have always served and shaped the world around them. At the predecessors of universities - Christian cathedral schools and monastic schools – nuns and monks taught classes. In medieval universities, religion and the study of theology were central. Later, the universities focused strongly on science, providing the foundations for the industrial revolution.

Design theorists Nelson and Stolterman (2003) claim that design thinking is a very different approach to the world than classical scientific thinking. Science aims to study the world to achieve universal explanations. Design always attempts to change the world deliberately. Engineering, as a discipline, is close to design, although there are differences too. Design relies on humanities, arts and aesthetics, whereas engineering is classically a way to apply science. The humanism in design makes it a practice that aims to serve another. The art tradition, with its emphasis on self-expression, is also behind design, but it should never be the leading force.

As a cultural activity, design is as old as humankind. We are humans because we design. Design can be located somewhere between art, science, engineering, and handicraft. In design there are methods, like in science, and the emphasis is on imagination and creativity rather than on an attempt to follow a strict method, as is the case in science.

FRAMING WICKED PROBLEMS

Designers love wicked problems – those that are complex, incomplete and often contradictory (Buchanan, 1992; Nelson & Stolterman, 2003; Rittel, 1972; Rittel & Webber, 1973). In design thinking, a problem that may look initially like it is clear and well-defined can be reframed and redefined so that it becomes a wicked problem. In response to the problem of people needing to cross a river, an engineer proposes a bridge. A designer will initially ask why people need to cross the river. In design, this is called framing and reframing. By questioning, the designer aims to understand what the real issue is. In design thinking it is also important to recognize that in framing and reframing the issue, the formulation of the problems are at the same time attempts to solve them. Framing is also important because solving some problems may, and often does, create other, more complex problems (Rittel, 1972).

Bruno Latour (2008) has written about changing matters of fact into matters of concern. The idea resonates well with design thinking. A designer needs empathy, the ability to care for other people and an interest in serving them. She aims to think and feel what people encountering her design will think and feel.

Framing things is also a way of making them visible. When we frame a piece of art, we do it because we want to display it. The frame emphasizes the importance of the piece of art. Similarly, framing in design means that designers lead us to think about certain issues in the context of design. Framing is inviting people to discuss the things being presented. This leads us to my second point: Participation in design.

PARTICIPATION AND DELIVERY IN DESIGN

When design is seen as an attempt to frame and reframe a context according to people's thinking and feeling, it leads us to ask how this can be done. In the Scandinavian tradition, the answer has been involving people in the design process (Ehn & Kyng, 1987 & 1991). In participatory design, the design challenges are raised by the people: Problems and solutions are not imposed from outside but from the individuals' everyday lives (Muller & Kuhn, 1993; Spinuzzi, 2002).

In order to practice participatory design I have developed and introduced (Leinonen, Toikkanen, & Silfvast 2008; Leinonen 2010) a research-based design process. The process is divided into four iterative phases which take place partly in parallel. These are:

> (1) Contextual inquiry - qualitative research operations where the aim is to frame the situation by defining the context and preliminary design challenges;
> (2) Participatory design - workshops with people with the aim of defining the preliminary design concepts;
> (3) Product design - work in the design studio with the aim of defining use cases and basic interaction;
> (4) Production of prototypes - work in the design studio with the aim of delivering artifacts.

Even though the phases are numbered, it is important to understand the continuous iterations and jumps between them. At different times, although being worked on in parallel, the different phases receive more attention. We may see that they all start at the same time, but at the beginning the contextual inquiry receives two-thirds of all the attention, while the other three phases share the remaining third equally between them. This happens with each of the phases, so that the main focus of attention changes over time. The process can also be described as a hermeneutic circle, where all research and design operations increase the designers' understanding of the whole.

Design is not design if it does not deliver concrete artifacts. Nelson & Stolterman (2003) write:

> ". . . bringing parts, pieces, functions, structures, processes and forms together in a such a way that they have a presence and make an appearance, particularly of unity."

In design, hypotheses and proposals are presented in a form of prototype. The prototypes are handled as something one is ready to throw away. They are artifacts that are subjects for discussion with the participants: to criticize, to improve, and finally to take into use.

LEARNING AS KNOWLEDGE CREATION

In her seminal paper "*On two metaphors for learning and the dangers of choosing just one*" Anna Sfard (1998) recognized two metaphors for learning that dominate

our understanding of and discussions about learning. These are the acquisition metaphor and the participation metaphor.

Sfard believes that the theories of learning talk about "knowledge acquisition" and "concept development", and define the human mind as a container that is filled with materials. The concepts are seen as basic units of knowledge that can be accumulated and used to form rich cognitive structures. The knowledge acquired is then owned by the mind and can be applied in different situations. In the practice of teaching where there is a reliance on the acquisition metaphor, the teacher's job is to help students achieve their goals by delivering content and facilitating the students' own attempts to form concepts and cognitive structures.

In the participation metaphor, we pay attention to activities and things we do together. While the acquisition metaphor stresses the individual mind, the participation metaphor is interested in bonds and links between individuals. The ideas of communities of practice (Lave & Wenger, 1991) and socialization in social sciences see learning occurring mainly in participation in the activities of different social groups.

In 2004, Paavola et al. built on Sfard's two metaphors and introduced a third: a knowledge creation metaphor. The metaphor is related to the model of knowledge building (Bereiter, 2002), the model of knowledge creation (Nonaka & Takeuchi, 1995), and the model of expansive learning (Engeström, 1987). Unique to knowledge creation are processes, practices and social structures that encourage innovation and the creation of new knowledge instead of aiming to transmit existing knowledge (acquisition metaphor), or existing cultural practices (participation metaphor). Knowledge creation is a collaborative effort of some community to enhance their understanding of some subject matter.

In a similar way to design, knowledge creation asks participants to create concrete results. The aim is that the results of their inquiry will serve not only their own learning but that of others too. Publishing results will partly change the nature of learning when the results become common, owned by all (Paavola, Lipponen & Hakkarainen, 2004).

CONCLUSIONS

Design is a process for gaining meaningful results, as is learning as knowledge creation. In design, the results are artifacts that will improve our lives. Similar objectives are present in learning as knowledge creation, too. Both are future- and progress-oriented.

When we see design and learning this way, what are the practical implications for higher education? What would a university that wants to emphasize design thinking and knowledge creation look like?

Universities have always been places where new knowledge is created. They have relied heavily on scientific thinking that has worked well in the world of industrial production. Science has not lost its centrality. The most important innovations are always strong in terms of science. What a design thinking approach in science can do is to ask better questions by framing and reframing the world. It can also bring the participation of people and rapid prototyping to research. Storytelling, a crucial design skill, can also take the results of science to new frontiers.

In the everyday work of a university, design thinking and knowledge creation can be visible in various ways. The focus is to create: New discoveries, new research results, new designs. In a design thinking-driven university, students do not spend all their time sitting in lecture rooms listening to a lecture; instead they are participating in the research and design work in laboratories, workshops, and studios.

In 1927, Alfred North Whitehead wrote: "The task of a university is to weld together imagination and experience".

He continued:

> "Imagination is a contagious disease. It cannot be measured by the yard, or weighed by the pound, and then delivered to the students by members of the faculty. It can only be communicated by a faculty whose members themselves wear their learning with imagination." (Whitehead, 1927)

Imagination and experience in a university must be balanced. The practice of standing on the shoulders of giants and discovering by building on previous discoveries represents the experience when design thinking and learning as knowledge creation promote the imagination.

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