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Invited Commentary on the paper
***Architects or builders; scaffolding or duck tape?* by Russell Beale**

The new reality: Thinkers or Makers?

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1. Introduction

In *Architects or builders; Scaffolding or duck tape?* the author Russell Beale [1] discusses HCI education and its integration, or the lack there of, in computer science programs. R. Beale highlights some interesting points, which expose difficulties in balancing curricula and in dealing with shifting student profiles.

He observes that HCI has changed focus, and is looking at more *abstract* and *esoteric concepts*. He attributes this trend to two factors: the intention to attract a larger audience to HCI education, and the second, and more important one, the need of making the complexity of HCI comprehensible to students.

The goal of academic undergraduate programs is to disseminate disciplinary 'know-how' and teach students to engage in professional practice once they have completed their studies. However, technological and scientific progress contribute continuously to a significant increase of knowledge. In consequence, theoretical information keeps augmenting, while time for assimilation and application exercises diminishes. The duration of an undergraduate program remained the same, while class sizes have increased. To update, to equip and to run programs require resources that many schools are lacking. This indeed leads us to the question: How to incorporate new content in the already crammed curricula, and how to assure the assimilation of that knowledge?

Some schools propose further specializations, while others instate graduate programs. In fact, these two opposite trends can be observed:

1. Disciplines continue to specialize, favoring in-depth investigation and *esoteric knowledge*.
2. Multidisciplinary programs and hybrid-degrees are being offered.

Canadian schools, for example, propose specialized degrees: Game design, Ecodesign, etc., while at the same time, they instate new graduate programs, in which design and complexity, and transdisciplinarity play a central role.

This confirms Beale's [1] point that "educators embrace change and adjust approaches to suit". However, he also observed some downsides of these changes. Some students complain about the substantial increase of theoretical material and the lack of time for application or exercises. Others worry not being sufficiently proficient to tackle the professional reality. These trends have pressured many academic institutions to reassess their curriculum and adjust teaching methods and overall content.

R. Beale [1] introduced new teaching strategies for the undergraduate level by tailoring course content to students' interest, or by treating certain topics more in-depth than others. These approaches are comparable to project-based teaching methods and have indeed revealed themselves as interesting alternatives. They allow teaching in-depth approaches and theoretical notions while focusing on a specific case or problem situation.

Some Canadian schools took another approach in order to deal with the growing pressure. They try to incite students to pursue a graduate degree by diminishing the duration of their undergraduate programs, for instance. This measure allows schools to compress content at the lower levels and to address complexity and interdisciplinarity at a higher level. What may have been also a motivating factor is the fact that Canadian universities profit from better government funding for higher-level education. With the additional funds, schools are able to renew their expertise and employ better-qualified personnel.

Of course, it is expected that companies learn to appreciate the higher qualification and ultimately seek to employ more students with master degrees. Taking into consideration the complexity society is facing, this may be one way of solving a problem. However, the effectiveness of these strategic measures remains to be seen.

2. Architects or builders?

The University of Montreal, for instance, took a position with respect to that very question. The labels we used were rather *thinker* or *maker*. Our school's position is that critical thinking and creative problem solving are of utmost importance; especially since responsible, ethical and sustainable design solutions are needed more than ever. Therefore, the design program focuses on methodology,

phenomenology and critical thinking. Students are being taught a variety of methods and tools, rather than the technical aspects of a specific one.

However, the downfall is that students have to learn how to manipulate these tools on their own. Certainly, this is a cause for critique. Nonetheless, our position is that tools and techniques are subject to continuous change and the ability to think logically should not depend on any tools.

In professional practice, some companies will favor certain approaches, systems and software, while others make use of completely different methods and tools. Therefore, we should encourage students to discover and adopt appropriate methods and tools rather than prescribing them.

Without a doubt, we see design students as the *architects of the future* who know how to look at problems from a holistic perspective and who are capable of envisioning the future and addressing the real user's needs. However, we need *builders* and *experts* as well, who make those ideas happen. The question remains: Should we contemplate the notion of incorporating both qualities within a single discipline?

Disciplinary expertise is critical for addressing a specific problem. Teaching only fragments of Java, for instance, does not make someone an efficient programmer. However, knowing notions of java may be quite sufficient for those who need only to know when and where to seek expertise.

3. Converging knowledge

According to Edgar Morin, considered a specialist of the non-specialization, "disciplinary prevalence makes us lose our ability to reconnect and to contextualize, which means to place the information or knowledge in its natural context". [2]

For this reason, transdisciplinary thinking (also referred to as out-of-the-box thinking) and interdisciplinary teaching approaches are inevitable if we wish to make the intricacy of HCI comprehensible. This requires teaching students abstraction, and how to merge *esoteric concepts* in a logical manner without ignoring the predominant role of the user and stakeholder. In fact, the very idea of systemic thinking is to explain such phenomenon by connecting related subject matters into a holist view.

Design, no matter in which domain: HCI, industrial design, architecture, engineering, visual communication, etc., has emerged in the past years as a field of practice that seeks to take on the role of navigating among other disciplines and interrelating their knowledge.

HCI education needs to cover a great number of subject matter: user-sensitive approaches, perception and cognitive processes, visual communication, tangible intuitive design, systems approaches…(only to name a few). If standard computer science curricula do not provide sufficient space to cover these topics, the question arises, should HCI follow the same trajectory or should a deviation and a redesign of the HCI curriculum be considered?

4. Student profiles

Another observation, Beale has pointed out was the changing student profile. In design education this issue is less of a concern. In fact, many academic institutions offer students the possibility to switch programs or schools. Hence, students from a variety of backgrounds join our undergraduate design program. Some of them are more technically inclined, while others show more creative or reflexive skills. It definitely changes a group dynamic. Students' dossiers are being evaluated on an individual basis, and individual curricula adjustments proposed accordingly. International exchange students are also individually accommodated.

Graduate programs are affected differently. Our game design program, for instance, is a specialization option in which graduate students from a great variety of fields (cinema, computer science, engineering…) academic institutions and even countries are reunited. This mix contributes to an interesting multidisciplinary culture. Although for some students it means discovering a completely new domain, it does not imply that "master students need to start from scratch", as Beale [1] has observed in HCI. Compulsory courses and seminars address fundamental notions of player experiences and the associated emotional, cognitive and behavioral components, but also related narrative aspects, design methodologies and project management. All these theoretical components were adapted for the graduate level. Students learn to consolidate and apply them in various projects during multidisciplinary workshops, involving students from computer science programs as well as professionals.

5. Concluding remarks

Disciplines need to diverge and expand their investigative fields on a micro and macro level, but also converge their knowledge through transdisciplinary thinking. As suggested, design thinking does not belong to a discipline in particular. In professional practice, design thinking and design approaches have become an integral part in many businesses. Designers get involved in such a large variety of areas, thus confirming that design is a mode of creative thinking, a process using a transdisciplinary approach that can be adopted by others as well.

6. REFERENCES

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[2] Morin, E. 1977. In International Congress "Quelle université pour demain? Vers une évolution transdisciplinaire de l'Université" (translated: "What is the university of tomorrow? Evolving towards a transdisciplinary university) in Locarno, Suisse, 30 april to 2 mai 1977; published in Motivation, n°24, 1997 by the *le Bulletin Interactif du Centre International de Recherches et d'Etudes Transdisciplinaires*. CIRET, n°12, february 1998.