

The Walkshop: a tool to integrate research on human aspects of sustainable urban design in teaching

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Teaching in higher education should be based on research findings. Urban design and architecture are ‘making disciplines’ and their link to formal research is described as tenuous. This paper reports on a collaborative educational workshop, the Walkshop, designed to bridge the gap between the multidisciplinary research project Urban Walking and the master’s programme in sustainable urban design and city planning. The need for understanding of differences regarding knowledge competence and cultural skills between disciplines for successful multidisciplinary communication was addressed in the Walkshop design through theoretical input, acquaintance with methodology, design task, and presentation of design solutions. The Walkshop facilitated the students’ learning process towards a close-up perspective in analysis of the environment. Students’ design proposals integrated new perspectives and key facts from research, and provided inspiration and concrete suggestions for the analysed urban area. Collaborative educational workshops seem to be a useful component to include in a Master’s course syllabus, to strengthen the link to research in practice-based education, and to disseminate current research results directly into practice.

Keywords: higher education, master’s programme, making disciplines, collaborative educational workshop, multidisciplinary, urban design, environmental psychology, traffic engineering

INTRODUCTION

Teaching in higher education must be based on relevant research findings. To obtain a Swedish Master of Science degree the student needs to “*demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialized knowledge in certain areas of the field, as well as insight into current research and development work*” (The Higher Education Ordinance, 1993:100). This requirement may pose a challenge to practice-oriented subject areas.

Urban design and architecture are *making disciplines* (Dunin-Woyseth, 2001), which implies that the professional competence base consists more of acquired practical skills than scientific knowledge. Architectural education is based on studio work and ‘learning by doing’. An emphasis on research might be seen as irrelevant or even a threat to achieving excellence. Despite decades of discussions on the potential benefits of a research-teaching link to the quality and outcomes of the students learning experience in higher education (e.g. Schapper & Mayson, 2010; Malcolm, 2014), the link to formal research in urban design and architecture has been described as tenuous (Forsyth, 2007). Moreover, sustainable development, especially in transport, suffers from an ‘implementation gap’, meaning that the translation of research-based understanding into policy measures and practice is weak, further stressing the need of urban designers and

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architects that has achieved the skills to apply research from various academic fields in their design work (Banister & Hickman, 2013).

From an educational point of view the questions are *how to integrate* architectural education with research, and *how to disseminate* the latest research results directly into architectural education and urban design practice.

This paper reports on the development, implementation and outcomes of a collaborative educational workshop, the Walkshop, designed to integrate research in teaching, and to communicate and disseminate research results into practice. The Walkshop would thereby serve as a provider of new scientific methodology and research findings on how to design urban environments supportive of walking as a sustainable mode of travel.

The Walkshop was arranged as a joint event involving the multidisciplinary research project Urban Walking, led by the Environmental Psychology Research Group (Dept of Architecture and the Built Environment, Lund University), the City of Malmö, and the international master's programme SUDes, Sustainable Urban Design, at the School of Architecture, Lund University.

The tentative workshop is discussed here as an educational effort to strengthen the research-teaching link and extend the theoretical knowledge base of master's level students in a practice-oriented field of study. The workshop was designed to communicate research from an adjacent scientific discipline, environmental psychology, to the professional field of urban design which has, traditionally, a relatively weak link to research.

The international master's programme SUDes

Architecture and urban planning are multidisciplinary and action-oriented professions (Després, Vachon & Fortin, 2011). From this follows that sustainability in a spatial context can be achieved only through an inter-disciplinary planning process, where perspectives from different fields of competence interfere and interact (Petrişor, 2013). The two-year master's programme aims to prepare students to manifest social, economic and environmental intentions through spatial planning and design. Pedagogical strategies and educational practices in SUDes are based on the conviction that sustainable urban development results from the creative and innovative merging of ecological, economic, cultural and social aspects of sustainability into urban form. Students learn to re-design and transform neighbourhoods, city districts and regional landscapes. Graduates from SUDes are expected to take active roles in the development of inclusive, healthy, and attractive cities. To achieve this, the programme needs to provide the students with current research on different aspects of sustainability while also developing their contemporary urban design skills through studio-based training. A relatively large share (about 10 %) of the SUDes students continues in research and a closer link to research has been called for.

The human perspective emphasised in the programme syllabus focuses on designing inclusive neighbourhoods, where inhabitants' everyday experiences are as important as visitors' impressions. This makes research on the experiential aspects of urban environments a particularly important part of the students' intended learning outcomes, and an area where the students could benefit from input from contemporary research in the field of environmental psychology (Lund University, 2010; 2012).

The research project Urban Walking

The Urban Walking (UW) research project aimed to identify urban physical features, transport system characteristics and urban design qualities that encourage or hinder walking. Its second aim, for which the Walkshop was developed, was to discuss new urban design strategies for pro-

moting walking as a mode of transport. The UW-project was carried out by a multidisciplinary research team, comprising expertise in environmental psychology, architecture, urban design and traffic engineering, in close collaboration with the city of Malmö.

Urban form has an inevitable impact on how people carry out their everyday lives. Environmental problems are largely the result of human action; therefore urban design that supports sustainable behaviour is a key to sustainable urban development. An important assumption for the project was that lay people's experience of the design of urban environments is essential to promote walking as a travel mode in relation to other modes, such as the private car. Pedestrians' perceptions at a micro-level of complexity and aesthetics, upkeep and order, as well as well-maintained greenery, seem particularly important to a positive affective experience of walking. Also the design of a complete walking route must be considered, while taking into account both macro-level structures and micro-level design features when designing walkable environments (Johansson, Sternudd & Kärrholm, 2015).

The pedestrians' affective experiences will, in turn, guide the walking intention. In order to design urban environments that support walking, users' experience must be considered. The UW-project drew on mobile methods (de Laval, 1998; Kelly, Tight & Hudgson, 2011), and used a structured walk on-site in the urban environment combined with self-reports, to capture users' perceptions and affective experiences (Johansson, Sternudd & Kärrholm, 2015). This was the research design and methodology that the students elaborated on through the Walkshop.

The City of Malmö

The city of Malmö in southern Sweden, where the empirical part of the UW-project was carried out, has earned an international reputation of being committed to sustainable urban development. The Western Harbour with the BO01 exhibition area and the Augustenborg Eco-City are well known as successful examples of sustainable urban design.

Walking seems to be a commonly used mode of transport by the inhabitants of this city, at least in the central areas (RVU Malmö, 2009). Malmö has a flat and dense urban structure and a well-organised transport network system. The Streets and Parks Department in Malmö has worked extensively with walking as a sustainable travel mode, and has developed particular strategies and planning documents to improve the pedestrian environment in Malmö (City of Malmö, 2012). The well-established policies with regard to walking make Malmö an interesting partner with regard to real-world outcomes and the city authorities of Malmö have collaborated with the research group from the start.

The Walkshop

The idea of a collaborative educational workshop was first raised in a discussion between the UW researchers and the City of Malmö. Representatives from the Streets and Parks Department expressed a need for fresh urban design approaches, firmly based on contemporary research findings, that could support walking and accord with the City of Malmö's work to improve the environment for pedestrians. The research team proposed collaboration with the SUDes programme with the two-folded aim to integrate the current research on urban walking in the master's programme, and to directly transform research results into urban design proposals. The collaboration would thus simultaneously benefit teaching, research and outreach.

In a dialogue with the SUDes programme it was decided that environmental psychology, a multidisciplinary research field in itself, would constitute the overarching theoretical and

methodological perspective of the Walkshop, and serve to scientifically anchor the urban design students in the wider research regarding people's experience of the urban built environment and walkability. The pedagogy of the Walkshop should aim to integrate the knowledge competence and culture of environmental psychology with the teaching practice of architecture and this approach should be systematically followed-up.

The final programme of the three-day Walkshop comprised: i) lectures based on the outcomes of the UW-project, ii) students testing the research methods together with the researchers, iii) students' interventional urban design work, and iv) students' presentations held at the City of Malmö (Appendix I: Walkshop Programme).

PEDAGOGICAL FRAMEWORK OF THE WALKSHOP

Integrating research in higher education

It has been argued that students of today should be prepared to meet the super-complex society and therefore will need to be able to critically evaluate knowledge (Brew, 2010). The integration of research and teaching has been proposed as way to tackle this challenge. Four main approaches to this integration have been defined: i) learning about others' research, ii) learning to do research, iii) learning through the research process and iv) pedagogic research (Brew, 2006). The evidence base for the relative success of the different approaches are still weak (Malcolm, 2014), but the third approach, learning through the research process have based on empirical studies been suggested to be most successful (Turner, Wuetherick & Healey, 2008). There is however no universal solution and disciplinary variations in the relation between research and teaching should be acknowledged and valued (Schapper & Mayer, 2010).

Teaching in architectural education

Professional architectural and urban design skills are expressed through a working process where a multitude of aspects, knowledge and information are continuously assessed, synthesised and merged into a design proposal. The development of sustainable urban designs is a particularly complex task that requires a readiness to adopt different worldviews and perspectives. The architectural method has been described as "experimental visualisations [...] critical evaluation and analysis of proposals in part and whole from human needs and preconditions and with consideration to function, resources, technical solutions and formal expressions"¹ (Swedish Association of Architects, 2012). The design process engages what has been referred to as 'tacit knowledge' – a non-articulated set of understandings that the agent carries with him/her as a suppressed background to actions (Dunin-Woyseth, 2001; Kaiser 2000). Learning in the field of architecture hence involves achieving the skills and abilities to perform this synthesising and creative design work – an act that builds more on intuitive than logically induced analyses and is inherently different from the scientific approach of gaining knowledge within environmental psychology. Architectural theory is often taught through the reading and discussion of selected texts in separate theoretical courses or during seminars complementary to the design courses, an approach that could be described as *learning about others' research* (Turner et al., 2008). A focus on users' and inhabitants' needs constitutes a fundamental basis for sustainable urban design processes, so teaching in the field of urban design is aimed at supporting the students' interna-

1 The authors' translation from Swedish.

lised awareness of user perspectives. The SUDes students need to be able to experience urban environments as users, to put themselves in the walkers' shoes. The approach *learning through the research process* fits well with these requirements (Turner et al., 2008). This approach also agrees with the research culture of environmental psychology and the aims of the UW-project.

Communicating research in multidisciplinary contexts

A major challenge for the workshop was to support the students' learning on research design, methodologies and findings in a multidisciplinary context, while also engaging their synthesising and creative design skills. One part of this challenge was to facilitate the dialogue and collaboration between practice-based urban design and planning, architectural education and research-based disciplines. Successful communication between disciplines requires understanding of differences in terms of knowledge competence, and cultural skills between disciplines (Woods, 2007).

Becher and Trowler (2001) suggest that disciplines and various sub-disciplines differ greatly both in cognitive and cultural aspects. The cognitive aspect relates to the discipline's scientific content and is described as the territory of the discipline. The territorial aspect could vary in two dimensions: hard – soft and pure – applied. The cultural aspect relates to the social culture developed within a discipline or sub-discipline, such as values, attitudes and behaviours that are taken for granted and generally applied within the discipline, known as the tribes of the discipline. The cultural aspect could vary according to the people-to-problem ratio, describing how intensively a specific research question is studied and the convergence-divergence in the problems approached and studied, referring to the variation of research topics within a research field.

Integration of the cognitive aspect

The cognitive aspect of environmental psychology deals with *interrelationships between individual human beings and the surroundings*, with a focus on features of the built and natural environment. Researchers address specific environmental factors, such as light and colour, small-scale environments such as the design of a home or workplace environment, as well as large-scale environments such as urban neighbourhoods and cities. Environmental psychology research has a *problem-oriented and real-world approach to the environments of study*. In the UW-project research project the focus was upon neighbourhood level and the analysis and results were also discussed in relation to architecture and traffic planning. The research territory of environmental psychology is, in a social science perspective, relatively *hard and applied including experimental research designs and quantitative data*.

The characteristics of environmental psychology differ essentially from the tradition of architectural theory, especially with regard to the use of experiments and analysis of quantitative data. These disciplinary differences had to be communicated in the Workshop in the dialogue between researchers, teachers and SUDes students during lectures and seminars, to bridge the gap between the content of scientific results and design solutions. Similar, on-site experimental courses in environmental psychology have shown the importance of bringing students into contact with the (natural) environment; this enables greater acknowledgement of the main concepts in the field of environmental psychology through its real application on-site, using distinct research methodologies commonly used in the field (Mace, Woody & Berg, 2012; McMillan, 2012).

Integration of the disciplinary culture

It is often the cognitive aspect of a discipline that is directly communicated, whereas the cultural aspect is implicit. However, an understanding of the research culture may be essential in order to retrieve, interpret and evaluate the cognitive aspects. Four core factors in the culture of environmental psychology research have been identified (Johansson, 2008). These factors also had to be addressed in the Walkshop. The first two, ‘*Research problems are identified in real-life situations*’ and ‘*Research questions should have a theoretical base*’, were specifically illustrated in lectures. The third, ‘*Learning is achieved by experiencing and analysing real human-environment interactions*’, was addressed through students’ participation in an on-site activity in the city of Malmö. The fourth factor, ‘*Research results are communicated in scientific peer-review journals, and new knowledge must be sought in this literature*’, was high-lighted by the reference material for the students’ design task.

THE WALKSHOP

The SUDes courses at Lund University are taught in an international atmosphere, where students following the master’s programme study alongside students from the School of Architecture and exchange students from within and outside Europe (Table 1). In addition to the master’s students, three researchers, two research assistants, two SUDes teachers and three representatives from practice (the City of Malmö and the Swedish Transport Administration) participated in various phases of the Walkshop.

Table 1. Students participating in the Walkshop

Student participants	
Gender	Female 8 / Male 16
Age	21-37, mean: 26, median: 25
Nationalities	Sweden (6), Austria (2), Singapore (2) and one each from Bangladesh, Brazil, Colombia, Czech Republic, UK, France, Iceland, Lebanon, Netherlands, Norway, Portugal, Romania, Russia and South Korea.
Educational Programme	Architecture (5) SUDes (10) International exchange (9) Other (1)

Phase I – Theoretical and practical basis

The introductory part of the Walkshop intended to provide a common ground for the participants’ regarding urban walking. The specific objective was to stimulate the students’ interest in research, thereby contributing to real-world outcomes through research-based urban design practices. Four lectures introduced the students to the ideas behind and outcomes of the UW-project:

- Planning for walking: City of Malmö presented its pedestrian planning (Engineer from Malmö City Planning office).
- Walking and urban design: The design perspective; lecture on practice-based architectural theories and examples (SUDes teacher/UW researcher from Architecture).
- Walking from a transport perspective: The transport planning perspective; lecture based on knowledge in the field of traffic and roads (UW researcher from Traffic and Road Department).

- Walking and perceived environmental qualities: The user perspective; lecture based on environmental psychology research (UW research leader from Environmental Psychology).

The theoretical part of the introduction aimed to develop students' understanding of the cognitive aspect regarding central theories, concepts and results from the UW-project. The cultural aspect communicated were that research problems are identified in real-life situations' and the students were therefore also introduced to Malmö city's development of a pedestrian plan. It was also stressed that 'Research questions should have a theoretical base' both departing from environmental psychology theory and walkability attributes in urban design theory.

Phase II – Acquaintance with methodology

The specific objective of the empirical part of the Walkshop was to further develop the students' methodological understanding, including both cognitive and cultural aspects of environmental psychology, as a way to support their internalised awareness of user perspectives. This part was carried out in the field, along two walking routes in the city of Malmö. The task enabled students to become familiar with scientific methods of capturing users' experiences of urban environments. The empirical part of the Walkshop was also expected to facilitate learning, as teaching that promotes students' direct experience of the studied environment will engage the students as well as provide opportunities for meeting their individual needs, for supporting learning by discussing variations of the basic content, discerning the critical aspects, and changing the focal interest of the human-environment interrelations (Bowden & Marton, 2004). Implicitly the cultural aspect in environmental psychology of 'Learning is achieved by experiencing and analysing real human-environment interactions' was communicated by the students' participation in the walks.

The procedure employed was the same as the one used in the research project² and included assessment of *Affective experience*: The students were instructed to individually walk an assigned walking route towards a specified destination, stopping at three sites to rate their affective experience at these places; Report on *Intention to choose/avoid the route and background variables*: the students completed a questionnaire; *Place-based assessment of perceived urban design qualities*: Participants walked the route a second time, individually completing scales assessing perceived urban design qualities and *Focus group discussion*: the participants were asked to elaborate on their experience of walking the route.

Phase III – Design assignment

The Walkshop assignment aimed to stimulate the students' integrative design skills by supporting the research based, transdisciplinary and collaborative character of urban design practice. The assignment was intended to help the students use their acquired knowledge and understanding of how urban spaces can influence the way individuals experience and move through the city, and to explore how urban design tools can help to improve the urban walking experience. Students were divided into groups and each group was assigned a study area in Malmö. They were instructed to use input from the lectures and the on-site test of the methodology, and transform these insights into urban design proposals. The students were also provided with scientific papers about environmental support for walking, as reference material and for further study. The choice

² The procedure and instruments used are described in detail by Johansson, Sternudd and Kärholm (2015)

of literature reflected the fourth core aspects of environmental psychology research culture e.g. 'research results are communicated in scientific peer-review journals', and 'new knowledge must be sought in this literature'.

The design task assignment was divided into three sub-tasks:

- *Spatial analysis* where the students identified unique spatial characteristics of their site and its major challenges for urban walking. The groups were to come up with a vision for more pleasant and sustainable public realm to move through on their sites. They were then to develop a design strategy for transformation of a sequence of public spaces on their site.
- *Individual sketching* as a way to explore design possibilities for transforming the site in line with the group's vision.
- *Group preparation of presentation*: Finally, the students put together a group presentation of 10 to 20 slides showing how the groups' intentions in terms of vision and strategy were implemented in the individual design proposals.

Phase IV – Presentation of design proposals

The students' design proposals were presented and discussed at a seminar at Malmö City Planning Office on the third day of the workshop. Urban designers from Malmö, researchers from the UW-project, representatives from the funding agencies, and the SUDes students participated in the event. The students presented their group work, describing and analysing the current situation, and presenting their creative suggestions for improvement of the walking environment. The audience commented on each proposal in relation to the multidisciplinary field of urban walking research, cognitive and cultural aspects of this research as well as practice and implementation. A final discussion concluded the collaborative workshop.

ASSESSMENT OF THE WALKSHOP

The Walkshop was designed as a tentative educational model. A critical evaluation was therefore performed to identify successful as well as less valuable elements and to find out whether the intended mutual learning processes actually took place.

On the first day of the Walkshop, before the lectures, students were asked to consider "*What factors would you today take into consideration if you were to design for urban walking?*" for five minutes; the responses were written in their own words on blank sheets of paper and handed in immediately. At the end of the final Walkshop session, students were asked the same question and to comment about what they had learned with the activity ("*What was the most important thing(s) you learned from the workshop?*") and their opinion about whether the workshop should be arranged again in the future ("*Do you think we should run the workshop for the new SUDes students next year? Why or why not?*"). The answers were again written and handed in to the teachers. Practitioners and SUDes teachers also reflected on their experience of the Walkshop and what students had learned. The reflections were written in the form of short notes and followed up in a discussion with the researchers.

The content of the responses to the above questions were analysed on the basis of three relevant issues: i) did the workshop develop the students' cognitive understanding by adding new factors to take into account in design for urban walking? ii) did the workshop develop the students' cultural understanding in their perspectives and/or processes? iii) was the relevance of developing collaborative educational workshops in general and Walkshops in particular

confirmed? The students' responses were entered into a data base. Teacher and practitioner notes and the information from the follow-up discussions were merged in text files. The material was individually read and interpreted in relation to the main issues by the three authors. The interpretations were then jointly discussed and relevant examples identified.

Lessons from the Walkshop: The cognitive aspect

The responses to what students reported as important to take into consideration "if you were to design for urban walking" before and after the Walkshop were compared. In terms of the cognitive aspect, students mentioned several facts to take into account when designing an urban space for walking such as the condition of the walking path, accessibility, presence of features that make the walk interesting and pleasant, safety, variation and diversity, microclimate, human scale, materiality, and presence of places for social interaction and rest. The facts referred to before and after the Walkshop were largely the same, even though presented slightly different.

In general, at the end of the Walkshop, students emphasised the relevance of considering the subjective experience – how people consider and experience multisensory stimuli in the environment – when designing a place rather than basing it on mere assumptions of what people need to walk there. This was expressed through a general shift towards the focus on environmental qualities perceived at micro-level. After the Walkshop, the natural conditions were stressed as a separate factor rather than a general allusion to the pleasantness of the place, which was emphasised before the Walkshop. Time of day and seasonal changes were also added as factors to take into consideration for urban walking design, mainly in association to safety. We believe these changes reflect an awareness of, for the students, a new disciplinary territory that directly links to the results from the UW-project.

Before the Walkshop, the students were able to label some walkability attributes such as *pleasing aesthetics*, *mixed use* and *presence of greenery*. After the Walkshop, the students mentioned more urban design properties and features supportive of walking, such as *permeability* and *transparency*, but they were now to a larger degree described from a user's perspective and in terms of *desired lines* – *where to connect*, *where do people want to get to* and *variety, things to look at (active facades)*, rather than as a labelled phenomenon. This indicates a deeper insight into interpretation of the notions. At the end of the Walkshop, several students stressed the importance of thinking in terms of moving along a route as a sequence of spaces, which had not been mentioned at the start.

The majority of the students reported that the Walkshop increased their understanding of the subjective (perceived) dimension of a place. The Walkshop made them realise how the design of a place can influence people's perception of the pleasantness of the place for walking, as well as the distance of a certain route. In line with this, some students stressed the perception of a place from different perspectives, considering more the perspective of the layperson rather than the designer as the main lesson learned. We interpret the stronger focus upon the route and users' perspective as cognitive aspects internalised by the methodology introduced the structured walk.

The cultural aspect

The design projects revealed a major improvement in the students' understanding of the importance of theory and research findings in the process of redesigning the urban space. This was expressed as an increase in their cognitive understanding of environmental psychology theory as well as the multidisciplinary research results in general as described above. Scientific

peer-reviewed literature was however not explicitly referred to. It was however clear that the students had grasped the ideas of using real-life situations as a departure, and experiencing and analysing real human-environment interactions as tools for learning

The students emphasised positive aspects of increasing their experience of and contact with research (e.g. “(...) *it [the Walkshop] gives us a lesson in how we can set up a methodology to evaluate a site and the systematic way of getting research results.*”). Others referred to the relevance of acquiring useful knowledge to apply in future planning in general (e.g. “*It enriches the ideas for the studio work (...)*”) and specifically for the course design projects (e.g. “(...) *students can use this knowledge in their design proposals.*”). Furthermore, some referred to the Walkshop as a good way to get an insight on users’ perspective of the urban space, rather than just the designers’ (e.g. “*It is good to think from the perspective of the user instead of the designer*”), when designing useful urban spaces.

Participants’ evaluation

All students except one were satisfied with the Walkshop, but some improvements were suggested, including more in-depth discussion of research findings for specific groups (e.g. people with disabilities), stronger emphasis on the design perspective (e.g. scales and materiality to be used) and on the environmental psychology approach. More contact with the public at the sites analysed and a longer Walkshop were also requested.

The SUDes teachers recognized that the Walkshop helped the students with the process of moving from the overall planning strategy for the urban environment to a close-up scale. This promoted their understanding of the need to always build their design on a thorough analysis of the spatial situation at hand rather than applying generic models and patterns. A learning process that is crucial, yet hard to force.

The teachers also appreciated that the research methods strengthened the theoretical framework of the course by bridging the gap between research and urban design practice, as well as by drawing attention to the social life of urban spaces. They even suggested that students could go deeper into the environmental analysis by trying more fieldwork methodologies. From the teachers’ point of view, the Walkshop could be improved by a stronger focus on the multidisciplinary character of urban design and planning by the involvement of traffic engineering and safety in the scientific component.

The practitioners saw the Walkshop as a great way to combine study with research and the work of the city. The City of Malmö representatives found the design proposals to be a great source of inspiration and said that individual elements in the solutions presented might well be implemented.

The format of the tentative workshop was considered to have promising potential with regard to integrating research results in teaching and feeding them forward to design practice. The overall evaluation was very positive and most participants, regardless of whether they were student, teacher or practitioner, agreed that it had been an enriching experience and that it should be repeated.

DISCUSSION AND CONCLUSIONS

Higher educational studies at master’s level need to be anchored in relevant and contemporary research. It is a great challenge for *making disciplines* such as architecture and design, characterised by studio work and learning by doing, to integrate research in teaching and to get the latest

research results to feed into practice. The collaborative educational workshop, the Walkshop, was designed to serve two purposes: i) integrate research results in teaching, and ii) communicate and disseminate research results into practice, in this case promoting the implementation of urban design that supports walking.

The result revealed a change in the students' cognitive and cultural approach of analysing the urban environment. The students' responses indicate that the aim of strengthening the students' integrative design skills in general and their capacity to integrate research results in their design in particular have been achieved. The students embraced a new complementary disciplinary territory and used the scientific results from surveys and quasi-experimental studies in the UW-project as a basis for their design solutions. Here, we believe it was important that the students tested the methodology used in the scientific study and were given hands-on experience of the environmental meaning of the research results, i.e. that they learned through active participation in the research process (Turner et al., 2008). However, the design solutions were to a lesser extent based on results from other peer-reviewed scientific papers i.e. the process of learning from others research (Brew, 2006). This is consistent with that direct environmental experiences have a stronger impact than indirect experiences on knowledge, attitudes and behaviour (e.g. Duerden & Witt, 2010), but may also simply reflect that the scientific papers were less attended to by the teachers.

Core elements of the culture in environmental psychology supported students in their design work. The real-world problem addressed gave direct experience of the environment studied and the methodology of the structured walk most likely facilitated learning by allowing for variation of the walking environment and the repeated assessments of perceived qualities and hence the discernment of critical features (Runesson, 2006). This approach, according to the teachers, also facilitated the move towards close-up scale.

The localisation of the Walkshop to Malmö (the city studied in the Urban Walking research project) facilitated the students' understanding of research in relation to site-specific application. The environments analysed in the fieldwork did not allow for simple solutions, since the routes investigated by the students did not comprise ideal walking environments in their current state. This prompted more creative efforts by the students, which served to develop their understanding of urban design measures intended to support walking.

It is a challenge for research to break down scientific outcomes to communicable units that can be understood and applied in practice without over-simplifications. The close dialogue between researchers, teachers and representatives from the City of Malmö was crucial for the integration of research and teaching, but also for the interdisciplinary bridging between research, education and practice. The involvement of the SUDes students provided a very short path between research and practice, since these master's students represent an advanced level of study and are close to a professional degree, so will very soon have the opportunity to introduce the findings into their practice. Recent research results were explained and communicated through the use of perspectives and tools from research as well as practice.

Research also benefited from the Walkshop. The discussions on results with students with a wide diversity of cultural backgrounds and urban experiences, and their implementation in sketches during the final presentation of design solutions raised several research questions that could help further develop the research agenda in the field. Our experience of the Walkshop strongly suggests the mutual benefits of linking teaching and research.

The achievement of a sustainable urban development requires an integration of ecological, economic, cultural and social aspects of sustainability into urban form. The SUDes education

throughout the curricula integrates all these aspects. This also includes an understanding of different groups of people's needs and preferences in the urban environment. Architecture as an artistic discipline generally integrates experimental design. This is also the case in the design studio courses at the SUDes programme and the students are trained to apply an artistic approach to sustainable urban development. The Walkshop did not aim to abandon or override the use of contemporary experimental approaches. Rather the Walkshop served as a complementary preparation, aimed to deepen students' understanding of the underlying human psychological processes activated by urban features; processes that ultimately may guide people's behaviour in urban space.

Nevertheless, the Walkshop had some weaknesses that should be addressed in future development of the educational workshop format to bridge between research and practice. One is that the scope might have been too extensive in relation to the time available, and a solution may be to narrow the focus. Another would be to add theoretical discussions between the design assignments or preparatory text seminars to stress the use of peer-reviewed scientific results and to support in-depth learning during the design process.

The collaborative integration between research, teaching and practice would also have been facilitated by cross-participation of teachers, practitioners and researchers in the different stages of the workshop. In this case, if SUDes teachers and urban designers had actively participated when the students tested the methodology of the structured walk, and if practitioners and researchers had been present during the students work with design assignments, such integration would have occurred. Some first attempt towards a more integrated approach has recently been carried out in Walkshop Campus LTH and Walkshop Lindängen.

Collaborative workshops such as the Walkshop seem as a useful and pedagogically well considered way of including in a master's syllabus, strengthening the link to research in practice-based education, disseminating current research results directly into practice, and defining practice-based research questions for further theoretical understanding.

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