A CASE STUDY FROM RMIT: INTRODUCING PROPERTY UNDERGRADUATES TO THE IMMEDIATE ISSUES OF HOUSING SUSTAINABILITY AND AFFORDABILITY WITHIN AUSTRALIA AND NEW ZEALAND

CAROLYN S HAYLES[1], KATHRYN ROBSON[1] AND SARAH E HOLDSWORTH[2]

[1]SCHOOL OF PROPERTY, CONSTRUCTION AND PROJECT MANAGEMENT, RMIT UNIVERSITY, MELBOURNE, AUSTRALIA
[2]SCHOOL OF SOCIAL SCIENCE AND PLANNING, RMIT UNIVERSITY, MELBOURNE, AUSTRALIA

ABSTRACT

Sustainable housing is about creating a better quality of life for home owners now, and importantly, in the future. Sustainable housing approaches take into consideration building design including orientation and fabric, as well as energy and water efficiency measures to improve the running of the home with least detriment to the environment. Sustainable housing is also concerned with the long term cost of running that home, in other words its affordability up front and down the line.

Housing sustainability and affordability are inextricably linked and it is not possible to teach one without covering the other. Energy efficient construction, as an example, will reduce the long term costs of owning a house as it not only increases the lifespan of the building fabric but it reduces the cost of heating and cooling that house. This paper describes a new approach to teaching sustainability (and thus affordability) to undergraduate property and construction students at RMIT University, an approach which asks the students to think critically and work out for themselves appropriate approaches to tackling these issues.

Students who elect to study housing sustainability and affordability participate in a study tour where they are given an opportunity to consider examples of housing initiatives both in Australia and New Zealand, and can experience, at first hand, the complexities of planning and designing for sustainability and affordability. In addition to site visits, the students take part in workshops where practitioners share their skills and experience. Embedded within the curricula is the concept that sustainability requires an ethical position to be developed by both educator and student.

Students must complete an assignment to demonstrate an understanding both in wider sustainability and affordability issues as well as looking at best practice in housing development now. They are asked to produce house plans for a specific location taking into consideration issues that may impact on sustainability performance and long term affordability of that house. To complete the course, students are invited to present, in an open forum, the key challenges they experienced in planning for sustainability and critically explore whether, in their opinion, housing sustainability must be driven by the house builder or the consumer. It is hoped that this hands-on approach will mean students are better equipped to tackle complex issues in their own professional practice.

KEYWORDS: Affordability, best practice, housing, sustainability, self-directed learning

1. INTRODUCTION

Sustainable construction is said to be "changing the way buildings are designed and built" (Nobe and Dunbar 2004). It is no longer a 'fad', but a 'mega-trend' (Freemantle 2002). Sustainable construction is having an impact across the board, from residential to commercial, industrial to institutional; and encompassing both the public and private sectors. It can therefore be argued that it is essential for both real estate academics and students to understand what this emerging paradigm is. The question is whether it is possible to understand what sustainable housing is without understanding the deeper concepts of what sustainability is, and whether property professionals can apply sustainability concepts to building and construction if they do not understand the ethics and implications of sustainability as individuals.

In this paper the authors explore the concept of sustainable and affordable housing and the current push factors driving a change in working practices. This informs a discussion surrounding the feasibility of teaching the concepts of residential sustainability and affordability in an active student centred manner, with a minimum of interference, but with very clear direction from teaching staff and industry experts. This course (Study Tour) has been developed from the premise that the most successful way of engaging students and enhancing their awareness of the issues is to personalise the experience, allowing them to take ownership of the notions of housing sustainability and affordability. As a result there is a move away from the traditional lecture to a more hands on approach, one which makes it easier for the students to deepen their understanding of the issues and recognise the importance and complexity of the decisions they will be asked to make in their professional lives. It is felt that this philosophy of delivery suits the International Study Tour format, which will be the driver of the experience and will create an exciting environment for learning. The tour will run for the first time in July 2006.

2. SUSTAINABILITY AND AFFORDABILITY

The complexity of sustainability makes it difficult to provide one key definition and consequently it is generally defined by its three inextricably linked core components; environment, society and economy. The ambiguity of the different definitions of sustainability is often a result of the different perceptions of the variety stakeholders involved. Sustainable construction is best described as a series of sustainable or 'best practice' decisions, which start well before construction (in the planning and design stages) and continues long after the construction team have left the site: a process that takes in the design, construction and on-going maintenance of a building (Hayles and Holdsworth 2005). A shared understanding of the objectives in building and occupying the home is essential (Hayles 2003) as is a life cycle framework; one which recognises the need to consider all of the principle of sustainable housing at each and every stage (planning, assessment, design, construction, and operation of the development).

As the concept of sustainability becomes increasingly more prominent, the impact of housing on human health and housing developments on the health of ecosystems has received increased attention. Climate change, diminishing forests, water contamination, air pollution and foreign oil dependence are concerns associated with building construction and operation. Housing development is of paramount importance. Housing is a critical element of community character and liveability, affecting land use, crime, transportation, urban design and other key facets of community life. As homeowners increasingly spend the majority of their leisure time indoors, the quality of our housing also significantly affects human health by way of indoor air quality and exposure to toxic materials (Goldstein and Rosenblum 2003).

Due to growing health concerns and higher operational costs, questions have begun to emerge about whether the property sector can produce houses that are both affordable and sustainable, minimising adverse impacts on the environment and public health, whilst reducing operation and maintenance costs.

In addition to their environmental benefits, sustainable housing provides direct value to the consumer, including lower operating costs, improved comfort through energy efficiency and better design, as well as improved health through selection of non-or less toxic materials and improved ventilation systems. By making energy saving improvements to homes energy bills can be reduced by approximately 30%. In addition, awareness of common problems, coupled with proper use of existing technologies and management practices, can reduce utility bills significantly at a relatively low initial cost, thereby greatly increasing housing affordability for low income families (U.S. Dept. Housing and Urban Development, 2004) and first time buyers.

Whether located as part of a mixed–use development, on a Brownfield site, or an infill project, the benefits of sustainable housing in terms of affordability, liveability and promotion of public health address the fundamental needs of residents of low-medium income families, purchasing entry-level housing (Goldstein and Rosenblum 2003) and the wider necessity of promoting sustainable practice. This is why both housing developer and consumer awareness of the issues is of paramount importance; for developers to understand why they are required to build to a certain standard; and for consumers to understand how best to operate (control and manage) the indoor environment of their new home for maximum comfort and affordability.

3. DRIVERS FOR CHANGE

On-costs are most felt in energy costs and energy efficiency is a key driver for affordable, sustainable housing. As a result, in agreement with the building sector, the Australian Government has resolved to eliminate worst energy performance practices through a national standard approach to minimum performance requirements for building. For the housing industry this meant minimum energy performance standards being introduced in to the Building Code of Australia [BCA] for detached and semi-detached dwellings as of 1 January 2003, and Multi-Residential Buildings as of May 2005 (Australian Building Codes Board 2003 2005).

Since the BCA is a performance based code, builders and designers have the option for meeting these new standards either by following the 'deemed to satisfy' prescriptions in the code or by achieving the required house energy performance rating using an accredited software tool. The stringency of this standard equates to an energy efficiency measure of 4 Stars. Given the importance of the energy performance of buildings to the overall abatement of national greenhouse gas emissions, the development of the energy efficiency measures for inclusion in the BCA has been undertaken jointly by the Australian Greenhouse Office [AGO] and the Australian Building Codes Board [ABCB].

The Victorian Government have gone one step further, and as of the 1 July 2005, all new homes (houses and apartments) in the state had to meet the 5 Star energy rating system, which considers building fabric (including house orientation, design, insulation, window size and orientation) and water conservation measures. In addition all homes must now incorporate a rainwater tank or solar hot water system (Building Commission 2004). RMIT's property students need to understand why this legislation has been passed and the impact these changes will have on the property industry now and in the future.

4. SUSTAINABILITY EDUCATION

The property industry is complex and fragmented with many of the decision makers working for different organisations and being of different professions. The ability to design and build housing which reflects an holistic appreciation, requires working closely with other professions (Cotgrave 2005). Sustainability teaching requires a multi-disciplinary approach; one which encourages students to look beyond a particular topic and see the bigger picture (Jucker 2002).

Sustainability education must explore the intersecting relationships between the biophysical, cultural, economic, financial, institutional, aesthetic and spiritual within a context relevant to the dominant area of learning, in this instance the field of construction and building. A holistic vision of education for sustainability ensure students are able to explore the complexity and implications of sustainability and the economic, political, social, cultural, technological and environmental forces that foster or impede it (Fien 2000).

Learning why it is important to design and construct housing with sustainable attributes and therefore why it is important to be a sustainability-literate property professional is as important as learning how. In order to empower students to successfully achieve sustainability literacy they need to understand the difference between current practice, resource efficient approaches and new systems thinking. One way of achieving this is to use a problem solving approach. There is a need to teach approaches to design and management decision making as well as the tools and techniques for solving problems and finding solutions.

Orr (1992) described the concept of environmental literacy as: the knowledge necessary to comprehend inter-relatedness; an attitude of care or stewardship; and the practical competence required to act on the basis of knowledge and feeling. These skills can extend beyond the realm of environmental literacy to encompass the principles of sustainability. A student that has grasped the concept of sustainability will understand that human actions have complex environmental and normative consequences. The student has the motivation and education to investigate and pursue courses of action that contribute to a more sustainable future (Strauss 1996). Understanding the problem is fundamental to constructing the solution, and not prescribing solutions is fundamental to encouraging creativity, a key component of the integrated design approach (Hayles and Fong 2005).

Academics can provide input through the use of case studies to demonstrate the concepts and tools that have led to unsustainable as well as sustainable solutions, and that lead the students through investigations of processes of procurement, project management and the role of the end user. It is also important for students to understand teamwork and the role they and others will play in relation to each other in the development of sustainable practices. Course electives in university degrees are seen as a way for students to broaden their experiences beyond that of their major study area. This International study tour will be offered across the university as a general elective. The aim was to develop a course with a robust curricula first and to offer the added dimension of an overseas experience.

Furthermore academics will encourage students from the different disciplines (Property, Valuation, Construction and Project Management) to participate in project work together, in order to simulate possible future working conditions and help identify, through practice, how each discipline contributes to problems and solutions (Graham 2000). It is believed that by bringing together disciplines and focusing efforts on, for example, a common project, the students prepare to better meet the needs of the (property) industry (Robson *et al* 1996). Indeed this particular study tour has been opened up to students from across RMIT, not just those students study in the School of Property, Construction and Project Management, to encourage cross disciplinary teamwork and participation.

5. EMBEDDED PRACTICE

Embedding housing sustainability and affordability into education is fundamental to the philosophy of sustainability. Mead (2001) contends that sustainability or 'green' education can easily be integrated into programmes either by incorporating ideas into existing courses such as materials and methods or mechanical/electrical courses or by creating new courses focussed primarily on sustainable ideas. A coherent, integrated approach to teaching sustainable principles is required. Sustainability has to be introduced across the board if it is going to be understood by students as a key concept and the future of the building and construction industry.

Furthermore, as emphasised by Graham (2000), when considering environmental literacy, academics must own the notion of sustainability for themselves and integrate it both in research and teaching practice. For academia to be prepared to teach sustainability, it is necessary that academics are actively researching the impact sustainable housing has (and will continue to have) on the property management process. It warrants further research into the role this trend will play in curriculum development and real estate education (Nobe and Dunbar 2004). For this particular course (Study Tour) the relationship is with residential construction and housing affordability, within Australia and New Zealand.

6. STUDY TOUR APPROACH

Alvarez and Rogers (2004) suggest that the current practice of sustainability education focuses the learner on the 'how to' or implementation of sustainability; reducing, the complexity and conflict of the concept, rather than framing its variety of meanings and values to the world around us. Sustainability education needs to openly challenge the learner allowing for discussion of its complexity in place so that the learning experience is participatory and respectful of others differing perspectives and that this requires 'space' for students to reflect and critique sustainability and a concept in place (Alverez and Rogers, 2004).

This study tour provides students with an opportunity to experience how decision making, during the lifespan of a housing development, has social, economic and environmental implications. This approach

takes students into the field where they can see and hear from the stakeholders themselves; thus providing the students with an opportunity to develop their own understanding and formulate informed opinions.

The study tour is offered across the university to undergraduates from all discipline areas and all stages of education. It sits within the elective programme that operates across RMIT, a legacy of RMIT's 'context curriculum' programme (disbanded in 2002), where students were required to take an elective that ran across the university providing a multidisciplinary learning experience.

Currently, within the university, students must undertake three electives. Many of these are from the old 'context curriculum', but new courses can be introduced to the system, of which this is an example. The multidisciplinary nature of its participation will allow the students to share, discuss and experience different perspectives of sustainability and ultimately recognise that 'sustainability' is not an easily defined term with one best fit approach to solving our problems. This allows them to develop skills and insights that will help inform their own personal and professional practice.

Study tours and filed trip courses have historically been successful at RMIT, as they allows students who are required to undertake year-long work placements to complete their final year of study by replacing a semester-long subject with an intensive week of study.

7. FIRST STEPS

The Study Tour has been set up in a way that enables students to readily embrace the concept of sustainability in all its guises, by allowing them to reflect on their own lives, the decisions they make (particularly in the home) and the impact or consequences these decisions have on others, as well as the environment; before considering the impact of decisions they may make in their professional lives. This course introduces the personal concept of sustainability and then applies it to housing and at the same time integrates the concept of housing affordability. This approach mirrors that of a new 3rd year compulsory course for property undergraduates, 'Sustainability and Research'.

Graham (2000) in his paper 'Building Education for the Next Industrial Revolution: Teaching and Learning Environmental Literacy for the building Professions' proposes a model for teaching and learning environmental literacy for tertiary students of building professions. He describes one of the successful methods applied to property and construction students at RMIT, namely the teaching of sets of principles that describe both the personal attributes of the student and the nature of their actions. This approach enables them to describe their professional approach and the reasons for the decisions they make as construction professionals. The degree to which a student has embodied these principles will be demonstrated through their understanding of a number of key concepts. Students must also learn tools and methods that allow them to demonstrate that they understand the concepts, and apply them in problem contexts to solve resource and environmental problems (Graham 2000). By personally examining and discovering the material this removes the stigma that it is very expensive and only for the wealthy. By being aware of their own place in the environment, students will form a personal bond with the concept of sustainability and hence its application in their own lives.

By allowing the students to critically question their own views of sustainability, they can examine the way they interpret the world and how their knowledge and opinions (morality and ethics) are shaped by those around them. Discussing sustainability in this context allows an exploration of the concept within society as a whole and the property industry as a focus; how these influence current personal and current/future professional practice. This provides an opportunity to evolve beyond a reductionist approach to a more dynamic way of educating, an approach that explores the real complexities faced by society within the context of housing development. Reconstructing these ideas provides a deeper understanding of the issues faced and ways to begin to educate others around them.

8. STUDENT ENGAGEMENT

Consequently the most successful way of engaging students and enhancing their awareness of the issues has been to personalise the experience, allowing them to take ownership of the notion of sustainability before looking at the property industry's current response.

This has involved measuring their ecological footprint, annual energy consumption, how they consume, reuse and recycling. These can then be directly related back to decision they may make regarding the reuse and recycling of existing building structures and materials, jobsite waste management, choosing and educating suppliers for environmental purposes, and building commissioning and monitoring, to name but a few.

As a result there is a move away from the traditional lecture to a more hands on approach, one which makes it easier for the students to foster values and behaviours, deepening their understanding of the issues, and to recognise the importance and complexity of the decisions they will be asked to make in their professional lives. This approach involves challenging preconceptions. In teaching sustainability it is necessary to challenge that way of thinking and convince students that they can make a positive difference to the state of the world and that there is hope for a sustainable future (Graham 2000).

The students enrolled on this Study Tour will attend seminars and site visits in Melbourne and in New Zealand where they will be given the opportunity to compare 5 Star with the Building Regulations Association of New Zealand [BRANZ] Green Home Scheme (BRANZ, 2005) as methods of eco-assessing domestic building designs. They will also look at key environmental issues and adaptive housing designs.

Students must complete an assignment to demonstrate an understanding both in wider sustainability and affordability issues as well as looking at best practice in housing development now. They are asked to produce housing plans for a specific location taking into consideration issues that may impact on sustainability performance and long term affordability of that housing. To complete the course, students are invited to present, in an open forum, the key challenges they experienced in planning for sustainability and critically explore whether, in their opinion, housing sustainability must be driven by the house builder or the consumer. It is hoped that this hands-on approach will mean students are better equipped to tackle complex issues in their own professional practice. They are expected to present this work in front of their peers and a panel of experts. They must also keep a diary of events and 'student' experiences.

9. SUMMARY

It has been said that achieving a sustainable society requires a reappraisal of the way we live, and that fundamental social, political, cultural and economic change is required. If this is the case then the property/construction industry cannot be insulated from this change. Property and construction professionals can play a vital role in re-thinking the way the built environment is constructed, not only in terms of materials, processes and design, but also in management structures and styles (Hill *et al.*, 1994). Housing is an integral part of the built environment and an area where definitive change can be made.

As the real estate industry embraces sustainability principles, property developers are starting to transform their work and practices. It is certain that all property graduates will work on a sustainable housing project. Accordingly, there is not only a social and economic responsibility to educate property undergraduates in sustainability issues but an ethical and moral one. Leading developers are becoming increasingly involved in sustainable construction. They will be looking for graduates who are knowledgeable and experienced in the application of sustainability principles.

10. CONCLUSIONS

With this increased demand for knowledge on sustainability issues from government, the growth of integrated design, and the increasing need for environmental initiatives by all businesses; it is imperative that property programmes start including sustainability courses or adding sustainability topics to existing course in their curriculum. Indeed it is the responsibility of academia to ensure that future property professionals are knowledgeable about current and significant future trends within the industry, and sustainability is revolutionising the way housing development is approached. When considering the employment futures of these students and the success of programmes in placing students, it is imperative that they have the skills necessary to compete in this new job market (Tinkler and Burt 2004). The School of Property, Construction and Project Management at RMIT is in the process of doing just that, and the Study Tour described is one such course. By the time the current first year students enter the workforce as graduates in 2009, building sustainably will be the establish way to construct.

The holistic nature of sustainability necessitates an ethical position to be developed by both educator and student. As a result this project includes an exploration of the personal attributes as well as the professional knowledge and skills required to teach the principles of sustainability and its many guises, and in a way that will encourage students to strive for the objectives of housing affordability and sustainable construction. Only then will property graduates engage with the sustainability paradigm that has dominated debate in the 21st century and move into their professional roles, equipped to make a positive difference to the environment and most importantly to the lives of the people who live in the homes they develop.

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