

Improving Student Learning in Transport and Land Use Planning in Australia and in China: theory, concepts and ways forward

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Abstract: Transport planning is now a core subject in most undergraduate and postgraduate urban planning degrees in Asia and Australasia. But there is little guidance on what should be taught to urban planning students, or how learning is best achieved. This paper reports on research into best practice approaches, using a review of past research, a scoping of courses at Tongji University, China and at the University of Queensland and Griffith University in Australia, and the experiences of lecturers in these planning schools. Learning objectives for the field are advanced. Key concepts for transport and land use planning curricula are identified. Issues include better integrating planning theory, teaching a select set of key concepts, and imparting practical transport data skills. Innovative fieldwork exercises and assessment are introduced. Current guidance from education authorities and accreditation agencies in China and Australia are at odds with best practice, suggesting a need for reform.

Keywords: Transport planning education; pedagogy; planning theory; experiential learning

1. INTRODUCTION

Transport planning, or ‘integrated transport and land use planning’ (Krizek and Levinson 2005) is a core course in almost every undergraduate planning program in much of Asia, in Australia, and across the world. There are major challenges facing teachers of transport within planning schools. As will be shown, the subject is enormously wide in scope. Major employers such as transport agencies are seeking a diverse set of skills and knowledge (PIA 2009). Planners need not only be technical advisers to decision makers (Friedmann, 2008) but also facilitate communications in a critical manner (Friedmann, 2008; Ozawa and Seltzer 1999). Earlier this decade Handy et al. (2002a:69) found both the number of transport planning courses offered in US planning programs, and their content, to be highly variable. As will be shown, our research suggests this problem may also be apparent in Australia and parts of Asia.

Significant variation in the approach and the content of transport planning courses is understandable when the policies of key accreditation bodies and professional associations give negligible guidance on what they expect graduating planners to know. The UK’s Royal Town Planning Institute (2012:4) suggests transport planning as an area of specialization, but provides no further advice. The new US Planning Accreditation Board policy (2013) provides nil direction. The Planning Institute of Australia (PIA) is more prescriptive, effectively

making ‘transport planning’ one of the supportive knowledge areas of accredited programs, and has codified key aspects of what should be included within such courses (Planning Institute of Australia 2009). The Chinese Urban Planning Education Authority requests that road and traffic engineering be a key part of most courses. As such, courses in road and traffic engineering are still mainly provided to undergraduate students and in most case teachers are from traffic engineering, not planning per se.

The problem of what should be taught and how is magnified when planning educators come from diverse traditional disciplines, bringing their own theories and concepts. And they often lack practical transport experience when recruited to teach the subject. Lecturers may remain academics rather than practitioners, and are rewarded for being so in academic promotion, resulting in “academic and practice coexisting as separate cultures” (Baum, 1997). There are few holistic textbooks on which to base a course’s structure and lecturers often find themselves on their own. So what should be taught? And how?

This paper aims to share key learnings from experiences and changes in pedagogical approach and practice occurring in three large planning schools: Griffith University and the University of Queensland in Australia, and Tongji University in China. We attempt a document scan and critical analysis of current literature on transport and planning education, and a scoping of current transport and land use planning course curriculum conducted in 2012, to gain a better understanding of the preferred learning outcomes for such courses. Our intent is to highlight issues and challenges in contemporary transport planning education, to identify ways forward for those charged with teaching such courses, and to develop a research agenda to assist accreditation bodies and industry leverage what they need from planning education.

The paper is structured by first providing the methods for this work. Second, it examines the review material to identify multiple learning outcomes for the teaching of transport planning to planning students. Third, key aspects are highlighted in depth: the need to return planning theory to transport planning education; teaching of key transport and land use concepts; and, skills development and the ways these skills may be imparted. Fourth, the paper summarizes approaches being employed at the universities to translate these notions into better teaching and learning. Finally, the limitations of the approaches and some of the remaining challenges are explored, as are the research agenda this work opens up, and the implications for planning education.

2. METHODS

Systematic reviews of the literature were conducted in 2008 (see Burke 2009) and again in 2013 to identify what was already known in this area. Databases used included TRIS (now TRID – the Transport Research International Documentation database) and Google Scholar, using search terms such as ‘planning education’ and ‘transport education’. Though there was more attention given in the literature to transport engineering education, 14 key articles were identified that at least in part focused on transport planning education with relevance to planning programs.

A scoping of three key course outlines for transport (or in one case a ‘transport and infrastructure) planning courses in three planning schools was conducted in 2012/3, focusing on the learning objectives, content, approach, teaching activities and assessment used. No

comparative student surveys or peer evaluations were conducted across the courses at this stage of the research. This is then discussed in relation to current literature on curriculum design, transport planning education and requirements of accreditation bodies (e.g. PIA) to identify gaps and potential needs. Peer assessments and course student evaluation data for both the transport planning courses and the teachers themselves, at undergraduate and postgraduate level, was used to assist in evaluating the efficacy of these new approaches in improving student learning.

3. TRANSPORT AND LAND USE PLANNING EDUCATION

Within the academy, and especially in disciplines such as planning education, there is often a conflict between the demands of professional practice and skill training and the mandate to provide broader and more critical academic education (Ozawa and Seltzer 1999). This is certainly true in the key sub-discipline of transport and land use planning education. It is this intersection of the two disciplines of transport planning and land use planning that is where significant demand has emerged amongst employers in recent decades (see Handy et al. 2002a). Indeed, planner's 'soft' skills are increasingly considered useful for transport engineering projects (Frank 2006) and especially in government. Thus, planning educators are faced with the dual challenge of honing practical skills that are relevant to practice while being able to develop appreciation towards planning theories

1970s and 80s transport planning texts, such as Blunden and Black (1984) which was widely used globally, mostly ignore planning theory, and focus primarily on congestion and means to accommodate the car in cities, with a heavy emphasis on transport modeling. The practice of transport and land use planning today, especially in government, encompasses much broader concerns, including sustainability, equity, health and neighborhood amenity (Handy et al. 2002a:piii). Planning education, tied closely to the profession it serves, has adjusted to meet these demands, as it has with previous changes in professional practice (Poxon 2001). But only in the 2000s did the literature start to discuss the educational demands of teaching this new perspective, with contributions by Rodrigue (2003), Handy et al. (2002a; 2002b), Krizek and Levinson (2005), Averini (2007) and Balsas (2001) providing key insights, albeit often from different disciplinary perspectives (i.e. Rodrigue speaking from the discipline of transport geography).

Course curriculum design including its assessment must encourage "new ways of engaging" students so as to become more effective transport planners. Teaching and learning in higher education can support this overall goal by placing emphasis on learning activities that encourage student engagement and learning, encourage deeper approach to learning (Ramsden, 2003), constructively aligning elements of the course (Biggs, 1999) and achieve an integrated curriculum (Drake, 2007, Cowan, 2004) both at the course and program levels.

The first objective in synthesising the literature was to identify a set of objectives for teaching and learning in transport and land use planning. Key sources used were the contributions of Krizek and Levinson (2005) who conducted a broad review of US transportation course outlines, and Handy et al. (2002a) who surveyed employer groups in North America about their graduate needs. The multiple learning objectives suggested from this work are provided in Table 1.

Table 1. Multiple learning objectives for transport and land use planning derived from Krizek and Levinson (2005) and Handy et al. (2002a)

Objective	Key questions/attributes
1. Understandings of <i>planning theory</i>	<ul style="list-style-type: none"> • How does planning theory relate to transport and land use planning?
2. Understandings of <i>key concepts</i> in transport and land use planning	<ul style="list-style-type: none"> • How do planners conceptualise transport and land use problems? • How do planners conceive of and plan for the various modes of transport? • How do they conceptualise such notions as transport networks, accessibility and mobility, and levels of service?
3. <i>Practical skills</i> in transport data, analysis and forecasting	<ul style="list-style-type: none"> • How do planners capture information on travel? • How do they analyse that data? • How do they model and simulate to predict transport futures?
4. <i>Broader educational goals</i>	<ul style="list-style-type: none"> • Academic writing • Statistical skill development • Use of key software • Presentation skills • Translation of transport analysis (especially objective information) into policy advice

Objective 3 (‘practical skills’) may be limited in scope further using advice by Handy et al. (2002a:53) who interviewed a sample of transport employers and found they were seeking two technical skillsets in graduates: a) transport data analysis and the interpretation of statistics, and b) understandings of how to evaluate transportation models, which must not be confused with transport modelling skills per se. Graduate aptitude in empirical assessment remains a strong desire in industry, with planners who could ‘look at numbers and make sense out of them, for planning purposes and in order to explain them to the public’ (Handy et al. 2002a:53).

Industry needs are likely a little different outside the North American context, especially in parts of Asia. But how do these learning objectives relate to the content of actual undergraduate planning courses in the Asia-Pacific? How are courses structured and what are their learning objectives? To understand this, a scoping framework aimed at outlining the relevant course content and structure, as well as the overall education context at the three planning schools covered in this paper, is used to provide some insight. Table 2 provides summary information on the courses, to provide context.

Table 2. Australian and Chinese Summary Course Information

Indicators	Tongji University	The University of Queensland	Griffith University
Program/ Faculty or School	College of Architecture and Urban Planning	School of Geography, Planning and Environmental Management	School of Environment (Urban and Environment Planning Program)
Campus	Siping Road, Shanghai, China	St Lucia (Brisbane), Queensland, Australia	Nathan (Brisbane) and Gold Coast, Australia
Course title	Transport Planning	Transport and infrastructure planning	Transport Planning
Course aim	To learn road and bridge design, preliminary concepts of waterway, aviation and highway engineering and understand travel demand analysis, as well as the integration of land use planning with public transport and road network planning.	The overall aim of the course is to increase student competency in the production and implementation of transport and infrastructure plans in various context as well as prepare them for future leadership roles in the field.	Provide students with understandings of planning theory related to transport planning; explore the major policy issues that confront transport planners; explore the relationship between transport, land use and urban form; introduce key concepts in transportation and land use planning; develop practical skills in capturing information on travel behavior, in analysing that data, and in modeling and simulation to predict transport futures.
Course recruitment	Compulsory	Compulsory (core)	Compulsory
Course prerequisites	Completion of Introduction to Urban Planning course	Third year standing (until 2012) Second year standing (starting 2013)	120 Credit points
Student year level	Third year undergraduate students	Second year (starting 2013) and Masters students	Third year undergraduate and Masters students
Enrolment p.a.	70-90	80~90 (70 undergraduate and 18 masters students)	50-60
Structure/ typical study plan	1. Road design; 2. preliminary concepts of waterway, aviation and highway engineering; 3. public transport network design; 4. road network planning; 5. Urban transport policy	Learning activities consist of 3 modules taught across 6~7 weeks Module 1: Transport and development (transport planning process and transport & land use integration) Module 2: Modeling, Data and analysis Module 3: Transport for people	1. Transport & land use history; 2. Transport planning; 3. Modeling; 4. Transport and the Environment; 5. Public transport; 6. Walking and cycling; 7. Car Parking; 8. Freight and logistics; 9. Transport & land use integration; 10. Urban design; 11. Professional practice
Modes of delivery	Weekly lecture series; fieldwork and a report of an on-site survey	Weekly lecture series followed by problem-based tutorials	Weekly lecture series; 3 workshops including one day of fieldwork; tutorials for postgrad students only

Indicators	Tongji University	The University of Queensland	Griffith University
Special Learning activities	Guest lectures by external experts, studio in urban planning and design	The course integrates both transport and infrastructure components, thus synergies between these two aspects must be explicit in the learning activities including lectures, tutorials and assessments.	Interactive lectures involving key transport and land use planning professionals and radical planners reporting on their activities; fieldwork activities.
Assessment Tasks	Geometric design, traffic survey, travel survey; report on urban transport policy; examination	Critical essay of a transport issue/problem (individual) Transport project (group)	Workshop reports on travel diary data capture, survey implementation, traffic impact assessment and analysis; literature review essay; examination
Other courses in the university dealing with transport	Tongji's Traffic and Transportation College also provides traffic engineering and planning education for their students	School of Civil Engineering offers Advanced Transport Engineering (CIVL4411) and Transportation Systems Engineering (CIVL3420)	Griffith's School of Engineering offers courses in Traffic and Transport; Engineering Design Project; and, Transportation Infrastructure.
Student employment	Most graduates enter urban planning institutes, local urban planning bureaus, with much less to transport agencies	Most students are employed in local governments, industry, consulting firms and a few proceed to undertake PhD research.	Most graduates enter planning agencies or consultancies but around 10% entered transport agencies in 2011.

Table 3 provides the learning objectives used in these courses, highlighting possible gaps and omissions in comparing these objectives to those provided in Table 1.

Table 3. Australian and Chinese Course Learning Objectives

University	Actual learning objectives	Corresponding objectives (from Table 1)	Gaps or Limitations
Tongji University	Understand of planning theory in land use and transport through case analysis	1	More clear linkages should be developed
	Key framework in public transport network and road network planning	2	Mainly focused on engineering
	The concept of four step models, travel survey questionnaires	2, 3	Not enough time to cover this in sufficient depth
	Presentation skill, and basic statistical skill	4	-
	The fundamental capacity in road design	2,4	Possible excessive emphasis
The University of Queensland	Discuss the relationship and integration of transport and land use.	2	-
	Differentiate between transport modes and their operational characteristics.	2	-
	Demonstrate understanding of transport modeling, and the principles of transportation and infrastructure planning and policy.	3	-
	Integrate theory and practice of transport and infrastructure planning.	1	Difficult to achieve due to a number of challenges, including co-taught setup, differentiated student expectations and minimal experiential learning provided in class and large class size.
	Critique transport and infrastructure plans according to transportation and infrastructure theories and principles.	1	-
Demonstrate capacity to develop, produce and implement transport and infrastructure plans.	4	The transport project assessment potentially allows students to develop practical skills, if the transport planning process is also assessed. At present, only the product is being assessed.	
Griffith University	To learn what transport planning is, its theoretical underpinnings and its practice.	1	-
	To understand key concepts in transport, land use and urban form.	2	Insufficient attention given to key modes/themes
	How to conceive and operationalise travel behaviour and transport networks, evaluate schemes, and conduct basic accessibility and transport modeling.	2,3	-
	Working knowledge of policy options available to manage traffic and travel demand.	-	Not suggested by the literature as a core issue.
	Ethical practice in public engagement and information gathering.	3	-
	Critical research and problem solving skills	4	Insufficient introduction to key software (i.e. transport modelling); only limited statistical skill development.

Table 4 provides the course assessment items used in the three courses surveyed.

Table 4. Australian and Chinese Course Assessment Items

University	Item No.	Assessment Description	Weighting	Learning objectives	Corresponding Objectives (from Table 1)
Tongji University	1	Road and traffic engineering	50%	Develop fundamental skills in road and traffic design	2,3,4
	2	Inter-city transportation system engineering	10%	Understand basic concepts in design	2,3,4
	3	Travel demand	10%	Understand travel demand	2,3,4
	4	Road network Planning	15%	Conduct capacity analysis of road network with land use	2,3,4
	5	Public transport planning	15%	Understand fundamental concepts in public transport systems and the principles of public transport network planning	2,3,4
The University of Queensland	1	Critical essay of a transport issue	20%	Discuss the relationship and integration of transport and land use. Critique transport and infrastructure plans according to theories and principles.	1,2
	2	Transport project	40%	Discuss the relationship and integration of transport and land use. Differentiate between transport modes and their operational characteristics. Demonstrate understanding of transport modeling, and the principles of transportation and infrastructure planning and policy. Integrate theory and practice of transport and infrastructure planning.	1,2,3,4
Griffith University	1	Travel survey workshops: a) survey design; b) survey implementation; c) traffic impact assessment	32.5%	Design, conduct and analyse travel behaviour surveys, including the use of this information in development assessment decision-making	2,3,4
	4	Literature Review essay on transport topic	30%	Conduct literature reviews of high academic standard; consider one transport topic in depth	1,2,4
	5	End of year exam	37.5%	Well-developed understanding of what transport planning is, its theoretical underpinnings and its practice; understand key concepts; working knowledge of key policy options available to manage traffic and manage travel demand.	1,2

The Griffith course was altered in 2009 to conform more with the ideas of Krizek and Levinson (2005) so it is not surprising it closely adheres to the objectives put forth in Table 1. Yet beyond that there remains great variation between the three courses. In line with Chinese Urban Planning Education Authority guidance, the Tongji University course focuses very heavily on engineering and road design, to the exclusion of other significant issues. Yet the Australian courses, as with the North American courses, almost ignore such hard engineering concerns, with no geometric road design training included. The Australian courses include large essays that encourage students to engage with one major transport planning issue in depth, but do not generate the empirical skills produced by the Tongji course.

An attempt was made to explore whether the content (as opposed to the learning objectives) of the three planning courses matched the content of courses elsewhere. We know most about the content of transport and land use planning courses as currently being taught in planning schools in the US from research conducted by Krizek and Levinson (2005). They surveyed 15 North American transport planning courses in undergraduate planning programs for the year 2001-02. Drawing on their work and other literature surveyed one can identify seven ‘themes’ within the curricula (see Table 5).

Table 5. Key concepts in transport and land use planning curricula
(derived in part from Krizek and Levinson 2005: 309-12)

Theme	Concepts
Theory	The basics of urban and/or transportation economics; utility theory; travel behaviour; induced demand; planning theory
Process	Political institutions; decision-making frameworks
Policy	Plan content; key directions for transport and land use policy (i.e. travel demand management, transport and land use integration, intelligent transport systems); key debates (i.e. higher density vs. sprawl, road pricing)
Applications	Roads, public transport, environment
Models	the bid rent, gravity, or other models of urban form/travel; micro-simulation; impact analysis modelling
Design	Urban form and structure; transit-oriented development, the new urbanism, and neighbourhood design
Other	Understandings of travel behaviour

Road design is not on this list of key concepts, which is at odds with the Chinese authority’s guidance for planning education. But if we reflect on the long list provided in Table 5, there are two clear problems. First and most obviously, covering all this content would be a huge and unwieldy scope for a course, leading to the temptation for educators to deal with all of them but only superficially. Many transport and land use planning courses suffer from trying to teach as many concepts and issues as possible, at the expense of depth and with shallow student learning. Courses are often ‘inherited’ from previous lecturers with multitudes of course readings and ancillary materials provided, and which cover myriad issues with minimal themeing and coherence. Krizek and Levinson (2005: 313) themselves note the propensity for educators to assume a ‘survey-of-the-field’ nature to the course, precluding detail and, by inference, deep learning. Crammed subject content also relates to the lack of secondary ‘advanced’ transport planning courses, even as elective subjects, within most planning programs. Secondly, the courses surveyed in this paper suggest the Australian focus broadens to consider a few topics not noted by Krizek and Levinson, including pedestrian and cycle planning, car parking, and freight and logistics. These additions perhaps reflect the greater dominance of walking and public transport in Australian cities (or just their

growing policy importance of these modes in the later 2000s) and the need to train land use planners in issues of car parking and the management of freight, including planning for the deliveries of goods in the Australian context. In comparison with these North American norms, the Australian courses tend to deal less with transport economics. The Tongji University course spends much of its time on complicated geometric road design and features other technical elements, including the inter-city transport systems engineering component, and deals less with economic and social dimensions.

The problem of excessive breadth requires a tightening of the scope of a course and the exclusion of some issues within it. In doing so Rodrigue (2003:75) suggests transport educators should seek to provide coherence within this milieu – akin to what Biggs (1999:76) describes as ‘maximising structure’. Although speaking from the perspective of transport geography education, Rodrigue (2003:75) suggests there are three main challenges:

- *‘Theoretical and conceptual’*: including the theoretical and conceptual foundations that help explain travel behaviour, events and processes;
- *‘Methodological’*: including how transport information is analysed, with key methods used in practice, and which should ‘go beyond abstraction’. Students should ‘apply procedures to analyze the parameters of a problem’ and explore ‘paths towards a solution’; and,
- *‘Technical and technological’*: involving the development of specific technical skills.

With a focus on transport and land use planning, the dimension of planning theory and practice should be added to this list. Regardless, drawing together a curriculum that prioritises these ‘challenges’ means excluding issues that may be important, but that are not central to these concerns.

The second problem raised by Table 5 relates to the often mono-disciplinary approach taken to teaching these concepts, especially in student learning activities. This stems from the historical legacy of instrumental rationality within the profession and its previous narrow focus on the motor vehicle and its accommodation. Today’s transport problems are too complex and too difficult for resolution by mono-disciplinary approaches. Students should be encouraged to look for ways to either disaggregate problems into sub-problems, then solve them using the approach of a single discipline, to integrate and create truly multi-disciplinary approaches to seek a single coherent solution, or to take the approaches of one discipline to enhance and improve the potential of another (methodological triangulation) (Van Zuylen 2000:75). In transport and land use planning this means drawing from and across environment-behaviour research, traditional travel behaviour research, transport economics, transport modelling, land use planning, urban design, communicative planning and other approaches to solve transport problems, such as managing congestion.

4. APPROACHES FOR IMPROVED STUDENT LEARNING

In what ways can student learning be improved in transport planning courses, responding to this agenda? There is no simple or universally ‘correct’ answer, but we now explore ways that the surveyed courses are adapting improved activities to achieve better student outcomes.

4.1 Reintroducing Planning Theory

Many planning theorists see transport planning as the most resistant of all the sub-disciplines towards advances in planning theory and their implications for practice (Low, Gleeson and Rush 2003). Transport planners have often been ignorant of their theoretical bases in instrumental and scientific rationality. Transport planning has seen itself as a most objective science, based on its models and data. This rational planning model dominated planning theory for much of the 20th century (Ozawa and Seltzer 1999:258) such that at the time of the sub-discipline's dominance in the 1960s, planners were often portraying themselves a value-neutral-analysts providing advice to political decision-makers, detached from the political realm itself. Such notions of instrumental rationality have been subject to much critique including by the knowledge and action theorists such as Friedmann (1998) and by communicative planning theorists such as Healey (1997) and Forester (1999), amongst others. Direct assaults from planning academics on the methods and approach of transport planners include the celebrated works of Jane Jacobs (1961) and more recently Vigar (2002). To be fair, the transport planning fraternity is mostly aware of these problems with instrumental rationality, yet Willson's (2001:9) critique remains pertinent that they often continue to employ them 'in research, in practice and in teaching'. To the planning educator then, there is the challenge of realising and then conveying a richer understanding of planning theory, its contestation, and its application in transport planning, and exploring the implications of this for planning processes and decision-making.

Reintroducing planning theory is difficult when it has often been marginalised within the planning curriculum more generally (Frank 2002:321). Yet there is a need to provide the theory that informs and explains choices in methods and processes, as well as explaining empirical means of 'doing planning'. Teaching planning theory to undergraduates is especially problematic and until recently there has been a paucity of literature on planning theory written for such students (Frank 2002:326). This places additional pressure on teaching staff to enable student learning on key theoretical platforms and how they relate to practice, whilst students are also wrestling with the key concepts and problems of transport and land use planning. More useful primers on planning theory could be a very meaningful contribution to improved teaching across our schools. A primer that connects to key problems in transport and land use planning would be even more valuable.

At Griffith University theory was inserted into the course in systematic fashion. A set reading by Innes and Gruber (2005) was used as an introductory primer to explain four 'planning styles' (technical/bureaucratic, political influence, social movement, and collaborative) in relation to the transport and land use planning activities of the San Francisco Bay Area Metropolitan Planning Commission. This relatively simple framework was used to start the development of theoretical understandings and to help frame other voices. At Griffith and UQ guest lecturers and commentators have also been used, including the radical planner David Engwicht (1999) at Griffith, following the approach of Balsas (2001:321). Frank (2002:322-323) suggests guest lecturers can help:

- expose students to people with different values from their own;
- facilitate discussions between people who hold different values and conflicting world-views; and,
- help students understand power and political dynamics.

In this approach, the difference in values and world-views that are revealed help students integrate the knowledge developed, make real the key theoretical concepts, and allow for application. However, this also requires significant effort by a course convenor in

that a broad suite of such voices are difficult to gather, relying on the goodwill and availability of key individuals.

4.2 Improved skills development

How can teaching better impart to students understandings of and practical skills in the use of transport data? There is a large literature on pedagogical approaches to such skills training which are beyond the scope of this paper (see Conole et al. 2004:19-20 for examples) but student learning outside of the classroom, especially in hands-on experiences, has been associated with improved student learning (Elwell and Bean 2001). Particularly useful is situated learning, which may be defined as ‘a learner executing tasks and solving problems in an environment [that] reveals the various intended uses of the knowledge’ (Billett 1994:112). Situated learning provides one of the theoretical underpinnings for the practicum programs that are common within planning and is also a powerful theory for understanding the experiences of persons involved in planning projects (see Gberardi 2000). Students may:

‘come to understand the purpose of the knowledge they are learning; learn by actively using knowledge rather than passively receiving it; learn the different conditions under which their knowledge can be applied; and acquire knowledge in dual form, both tied to the contexts of its uses and independent of any particular context, thus promoting its transfer to new problems and new domains’ (Tabbert 1993 as quoted in Roakes and Norris-Tirrell 2000:102).

Such an approach was trialled by Geoff Rose (2000; 2006) who employed a series of ‘simulated consulting’ exercises to theme student transport data analysis and modelling activities, in a situated learning context for his engineering students (Rose 2006:2). This approach was adopted at Griffith University in 2009. A set of workshop assessment exercises were introduced that engendered:

- Survey development skills, including travel survey methods, formats, question development, and ethical considerations;
- Field survey administration skills, including team development and task assignment, co-ordination and management, health and safety awareness, and professional conduct of surveys with the public;
- Transport data cleaning, coding, editing and analysis skills; and,
- Basic knowledge of modelling and forecasting of future travel patterns, calculations of levels of service, and the use of forecasts for planning decision-making.

Three inter-linked workshops were used, with students:

1. Developing a two-page travel behaviour survey, forcing them to confront how transport data is simplified, coded and collected.
2. Collecting data in the field, using a form that may be considered ‘the right answer’ to the first task. Students entered the data and wrote a short administration report. They learnt the limitations of collecting transport data in real-world situations and identified problems that can affect data quality (see Figure 1).
3. Conducting a transport impact analysis (TIA) on the network using previously collected data. They calculate Levels of Service and forecast problems due to a new development, then make planning recommendations.



Figure 1. Student intercept surveys, Kedron, Brisbane, August 2009 (source: M. Burke)

The students had to go through a range of reflective, conceptualization, experimentation and practical concrete experiences as part of these workshop exercises – all of which are aspects of Kolb's (1981) learning cycle. As Rose (2000:57) found, the problem-based simulated consulting activities improved student motivation, involved students positively in collaborative group-work, and there were very positive interactions with real-world transport professionals. The approach also provided for the 'repeated and explicit nature of external reinforcement' (Billett 1994:121) with the students experiencing first-hand how to manage and conduct surveys, including explaining themselves clearly and actively listening to survey respondents, and receiving feedback from state and local governments officers who were clients for the data, about data quality and presentation. The limitations of the approach include the time and effort required in approval, in training and in provision of materials and the logistics of the fieldwork activities. Without funded research assistance such activities, however beneficial, are beyond the capacities of most over-stretched lecturers.

Tracking the effects of these changes is difficult. End-of-course student evaluations of the Griffith course have slightly improved for undergraduates on the key metric of 'Overall how effective was this course in helping you to learn?' rising from 5.0 out of 7 in 2006 to 5.2 in 2012. But evaluation scores have consistently increased for the mostly international postgraduates, rising from 5.7 out of 7 in 2006 to 6.2 in 2012. This suggests these changes may have been most beneficial to non-domestic Masters students, at least in terms of their own learning perceptions. A more experimental (control/intervention) study of students undertaking the previous and new approaches would be a better way to assess the efficacy of such improvements, as would formal peer assessments. But such studies have yet to be employed. These are avenues for further research.

5. DISCUSSION

There is a need to improve student learning outcomes in transport planning education. It is hoped that this paper will contribute to the small literature in this field, complimenting the work of Rodrigue (2003), Handy et al. (2002a; 2002b), Krizek and Levinson (2005), Averini (2007), Balsas (2001) and others.

Firstly, the literature reviewed raises questions about the content of current policies for planning education in the Asia-Pacific. The more codified draft PIA education policy for accreditation of planning schools (Planning Institute of Australia 2009) and the less prescriptive guidelines in the UK (Royal Town Planning Institute 2004) and the USA (Planning Accreditation Board 2006) do not require planning theory within transport and land use planning education. The attempt by PIA and the Chinese Urban Planning Education Authority to specify core requirements of transport and land use planning education may, in its present form, actually help continue the long cycle of theory-less transport planning education, which must be broken (Talvitie 2009). We have specific concerns about transport planning education in China, where urban planning more generally still quite focuses on site planning and physical planning, and where transport planning education, generally speaking, is still quite weak. Though China has witnessed a fast development in traffic engineering education, adherence to concepts such as road design and traffic flow theory in transport planning education is still very strong. These requirements from the education authorities may need review. As reported earlier, there are various options for achieving better learning outcomes, but some attempt to reintroduce theory as an important learning outcome, and considering the new range of issues confronting planners in China, Asia and elsewhere, seems necessary. Secondly, the experiences presented suggest that it is possible to frame a transport and land use planning course to create both increased academic legitimacy, improving student opportunities for deep learning, and yet still provide some of the key skills training demanded by employers. Careful construction of a course can help meet both agendas.

There remain many needs for the scholarship of learning and teaching in transport and land use planning. This preliminary research has included information on teaching in one prominent Chinese university. But no systematic review of either industry needs from planning graduates, or teaching and learning in planning schools, has yet been conducted either in East Asia or South East Asia. No research of the form Handy et al. (2002a) conducted with employer groups has been conducted outside the USA, where employer demands may differ. It appears timely to consider replication of this research across Asia and Australasia to better determine what current graduate needs are in these contexts, given the increased importance of transport and land use planning generally, and the growing recruitment of planners into the transport profession. Surveys of courses are needed across Asia to understand the learning objectives, content and activities used in other countries. And reviews are needed of the various national accreditation and education policies, to ensure they are up-to-date with best practice in this dynamic field. Further, there are few core texts that can be used for transport and land use planning courses, though some resources have started to emerge to help the planning educator that draw on the transport and land use perspective (most notably Levinson and Krizek 2008). Development of additional resources in regional languages to assist educators is desirable. To generate such improvements requires transport planning academics to both understand the limitations of their current approaches, and to think carefully on ways to improve their student's learning, and ensure effective assessment.

The authors hope to contribute to that research agenda in the near future.

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