

Road-ready paramedics and the supporting sciences curriculum

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Abstract

The curriculum for health professional education in the university sector draws on disciplines of direct practical relevance to clinical performance such as anatomy and physiology, evidence based knowledge, and the supporting sciences. The supporting sciences include interpersonal skills, counselling, ethics, law, psychology, sociology, management and politics. The relevance of these knowledge domains is often called into question by students and in some cases practitioners. Drawing on qualitative data from interviews

and focus group discussions with paramedics that identified lack of graduate maturity and road-readiness as a major gap in university based education we make two arguments based on Benner's pedagogical theories. First, that universities can only produce novices; and second, that a more overt integration between clinical skills, clinical evidence and the supporting sciences would facilitate the transition from novice to beginning practitioner.

Keywords: novice; advanced beginner; paramedic, curriculum

Introduction

The discipline of paramedic education is relatively new in Australian universities. In 1994 Australia's first university based degree qualification for paramedics was established at Charles Sturt University

in NSW (Lord 2003). Tertiary level paramedic courses are now available in all states of Australia with formal accreditation provided by the industry Council of Ambulance Authorities. With less than fifteen years experience tensions between service providers and universities over whether graduates should be work-ready or require industry based internships have not yet been resolved to the satisfaction of either party, despite the fact that these questions are not new, but form part of the debates conducted in nursing and other health professions. One of the issues in this debate put forward by industry is that university applicants tend to be younger school leavers, while

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the previously industry-based paramedic programs offered within the Vocational Educational Training system attracted and employed an older population group with considerable life experience. Differences in maturity between these two cohorts obscure what is understood by road-ready; is it facility in the performance of clinical skills or is it the capacity to respond appropriately to the social and interpersonal issues that arise during challenging cases, such as complex emergencies or confronting social situations?

This paper reports on educational research relevant to these debates. Drawing on the work of Benner (2001) we make two arguments. First, industry expectations for an expert practitioner run counter to educational theory, and second, much of the knowledge and skills required to move from novice to competent novice or advanced beginner practitioner comes from the supporting sciences of sociology, law, ethics, psychology and communication skills, with the focus of these disciplines on producing a well educated reflexive citizen. We argue that what is required is a more solid integration between clinical theory, skills and the supporting sciences. The paper is divided into three sections. The emerging body of knowledge relating to paramedic pedagogy precedes a discussion outlining Benner's educational theories on the transition from novice to expert practitioner. This is followed by an outline of the methodology of the research project. The third section provides an analysis of the focus group discussions and our reflections on the issues raised by participants.

A review of the paramedic educational literature

The major pre-occupation of researchers in paramedic education falls into four categories. The first three are determining the most effective process for facilitating student skills acquisition, and road readiness, and debates over how and where the apprenticeship period ought to be conducted. (O'Donnell 2006; Waxman & Williams 2006). Discussion of these concerns include student perspectives (Boyle et al 2008), along with the debate over competency versus theory informed practice (Margolis 2005; Raynovich 2006). The fourth area deals with research in teaching methods such as the value of web-based technologies (Brightwell, Stewart, & Pask 2003; Mackway-Jones, Carley, & Kilroy 2007; Hubble & Richards 2006; Williams 2007), teaching for cultural insight (Williams & Upchurch 2006), the use of simulation, and what ought to be the framework for course accreditation (Queensland Ambulance Association 2004; British Paramedic Association 2006). Underlying most of this research is the vexed question of work-readiness.

Work-readiness of paramedics graduates

The work-readiness of graduates has been identified as a key concern for paramedic academics and industry employers (Gibson & Brightwell 2006). Many other health professions share this concern. For example, Bowman (2007 p.1) states: 'Few medical students are prepared for the challenges that await them after completion of formal training.' The challenges Bowman describes are related to social awareness,

and the need to give leadership in improving community health care in remote regions. He describes the *best students* as those who often come through back-doors into the university, may have relatively low formal entrance qualifications, and come from the 70 per cent of the population on middle and lower incomes. Those achieving medical leadership, however, are more likely to come from elite families and schools, and are poorly equipped to understand the needs of middle and lower income population groups (Bowman 2007).

Bowman's research suggests that health professional graduates require a range of life experiences that assist them in understanding the struggles and misfortunes of people differently placed from themselves. Where this is absent, graduates are defined as lacking maturity or capacity to cope with the stressful social realities of their patients (Gibbs 2001). This common complaint about work-readiness across professions indicates that it may not be tied to skills so much as workplace culture and the more subtle attributes of resilience, teamwork, maturity and the ability to communicate with compassion and without prejudice. Commenting on the Australian situation Waxman and Williams (2006) note that the lack of maturity among pre-employment paramedic graduates is often conflated with lack of life or work experience. For this reason some university paramedic programs in Australia do not regard graduates as work-ready until the end of a one year internship (Flinders University 2008).

Enter the social sciences

The incorporation of the social sciences into university paramedic programs in Australia is well established (e.g., Flinders University Bachelor of Health Sciences Handbook 2008; Monash University Handbook 2008; Charles Sturt University Handbook 2008). Australian based paramedic degree programs provide a theoretical base in the supporting disciplines, for example psychological theory on grief, or the impact of the social determinants of health on call-out patterns.

Benner and work-readiness

One of the most significant contributions to our understanding of work-readiness comes from the writings of Patricia Benner (2001), a contemporary nurse theorist. Drawing on the functionalist work of Dreyfus (NurseScribe 2007), Benner categorised professional nursing into five levels of competence. She argued that there is a natural progression of skills and competence from novice, to advanced beginner, to competent, proficient and finally expert nurse. Universities at best produce an advanced novice. Novice nurses focus on the performance of technical skills in a way that is both clumsy and often oblivious to the humanness of the patient or other social aspects of the situation. It is only when technical expertise is achieved, and anxiety abates through familiarisation in the field, that the young nurse moves to integrate the interpersonal and social aspects of care with the performance of clinical skills. In Benner's terms a *competent* nurse needs 2 to 3 years experience, but it is not until the nurse reaches the fourth stage of

proficiency that she or he understands nuanced differences between each case independently of rules, protocols and regulations. At the final stage of expert, the nurse appears to operate from intuition. This is not some magical sixth sense, but a deep understanding based on sound scientific and social knowledge grounded in extensive experience (Benner 2001). Applying these ideas to paramedic practice makes it clear that graduates are at best advanced novice beginners and it is from this perspective that the term 'road-ready' needs to be understood.

Recent research linking Benner's theories to paramedics conducted by Wyatt (2003) argued that expertise could only be developed through *practice in the paramedic context* over a number of years. The paramedics interviewed by Wyatt also highlighted a variety of sources that allowed them to move from competent to expert practitioner that should not be overlooked. These included reflective observation of a range of experts such as doctors and nurses, their own colleagues, and discussion with patients and relatives, along with a range of life experiences, and general knowledge other than that directly associated with their role as a paramedic. In this paper we argue that the supporting sciences provide a theoretical basis for the general knowledge associated with paramedic practice. For example, this might include theoretical knowledge on stigma and prejudice gained from studies in psychology, ethics, law and sociology. Such knowledge would alert the novice paramedic to poor practices, but more importantly provide them with the theoretical basis for working effectively with patient groups such as 'frequent

flyers', the chronically ill, and other stigmatised groups.

Methodology and study design

Data for this study comes from semi-structured interviews with a small number of senior paramedics in New Zealand and Britain that the research team met with over the project time frame, and eight focus groups. The focus groups of approximately one hour each were held in South Australia, New South Wales, Western Australia, Queensland, Victoria, Tasmania, Victoria and Canada in 2008. Each group comprised approximately twelve participants and was drawn from a standardised group of union officials, academic staff, students and industry personnel. The project was presented to the Flinders University Social and Behavioural Research Ethics Committee in September 2007 and received ratification by the Ethics Committee at Charles Sturt University in early 2008.

The project covered nine university-based paramedic programs. These are all three year undergraduate programs with curriculum content divided roughly one third/two third between the supporting sciences and paramedic specific topics that include clinical practice. Clinical practice ranged from approximately 500 hours over the three years to one course where students are employed from their second year or did their final semester on-road. Discussion in the focus groups dealt with two major themes; what distinguished paramedic curriculum, and what was a best practice relationship between industry and the university programs? The data was manually coded initially by the researcher who conducted the focus group, then checked by three

other members of the research team and a thematic analysis was employed (Grbich 2007). No attempt was made to achieve saturation as interviews were held in all states in Australia where there are university-based paramedic programs, however, responses were very similar across the 7 Australian focus groups and interviews with international paramedics. The focus group in Canada, interviews in New Zealand and the United Kingdom were conducted for purposes of comparison with the Australian data.

Results of interviews

Interviews with paramedic practitioners, students and academics identified nine themes relevant to work-readiness and the supporting sciences. These can be divided into two categories; defining work-readiness and identifying the gaps, and themes dealing with the solutions, including considerations of the supporting sciences. The first set of themes was; confusion over expectations between universities and industry; difficulty in identifying the precise nature of the gaps in student/graduate knowledge; graduates lack maturity and life experience; and graduates lack of empathy. These are discussed below.

The conflict and confusion over expectations between universities and industry

The first theme identified focused on differences in expectations between industry and academic staff over graduate attributes. Discussion focused on the assumption that universities should supply work-ready candidates. Differences between the two groups highlighted confusion over the term

‘work-ready’. While participants from ambulance services were quick to point out how much the work was now non-emergency social health care, they were equally quick to emphasise the need to retain protocol driven approaches for emergency situations where students would be expected to follow instructions. Graduate ability to function well in both situations was seen as lacking. The quote below by a practicing paramedic working with first year students makes a recommendation for students to work as ambulance transport officers in order to gain the necessary pre-employment skills:

...we’re trying to educate those people that have got no idea what the back of an ambulance looks like, give them just some tiny little bit of insight as to what they’re going to face next year, in induction school and out on the road... we think an important breakthrough would be to have people operate as transport officers, physically operate part of the practicum in the first year as transport officers (Paramedic).

Another participant commenting on university programs noted:

...look, the bottom line is, is that, you get the piece of paper, they’re not work-ready. It takes them 18 months to 2 years to get anywhere near being paramedics, so that’s a 5 year program to create a paramedic, an advanced life support paramedic anyway (Paramedic).

Difficulty identifying gaps in graduate competency

Criticism of student competence was common regardless of the number of hours devoted to clinical practice. While many focus group participants reported clinical competency among graduates, it was generally believed that more skills were needed than a university education could supply. However, focus groups participants often had difficulty defining the missing skills. In some instances they were described as intrapersonal and interpersonal issues. Intrapersonal skills are the self-awareness that enables clear judgment, allowing an individual to focus outside of their own needs and emotions. Interpersonal skills enable individuals to communicate an open and co-operative attitude, and to ensure the smooth operation of a team. Without these skills the paramedic may become an obstacle at a critical incident. At other times students were said to lack commitment, the right disposition or a willingness to take up the demands of the job such as shift work as the quote below illustrates:

...well I was 21 once, but you know, they don't want to work nights, they don't want to work weekends, they don't want to work public holidays, you know... (Paramedic).

Novice graduates lack maturity

In other focus group discussions the missing factor was identified as maturity and given as a common reason for the non recruitment of graduates. Some thought the skills shortfall was related to a lack of life and work experience and the youth of graduates. Many wanted further education to equip students with

life skills, or a program that enabled older students to do the university training.

Student graduates lack empathy

Non-clinical or soft skills were identified as a problematic area for graduates entering internship programs. In one focus group it was suggested that around 50 per cent of graduate applicants to the service were rejected on the basis of a recruitment process using a mixture of psychometric evaluation and behavioural interviews, which target behaviours in the supporting skills categories, rather than clinical competence. As one focus group participant noted:

A lot of people we would not progress in the recruitment process because of their lack of team work, lack of communication skills, because we think...they wouldn't fit into an environment where there is pressure...where you've got to be mature (Paramedic).

Chauvinistic and non-inclusive attitudes and poor empathy with the elderly were identified as a problem among students as well as inappropriate questioning of officer's decisions at critical incident scenes. The two quotes below illustrate these points:

I had a gentleman [student] tell a 60 year old Italian lady with a broken arm that she should chill out! (Paramedic).

We handle 300 new recruits a year... when people don't succeed it's ...rarely academically or clinically... it's the interpersonal areas that lets them down and

for some, it leads to termination (Paramedic).

It is important to note that empathy is considered a core competency in most health professional programs, although it may be framed in more indirect terms. Examples include competencies linked to understanding the social determinants of health or principles to do with tolerance and equity (Council of Ambulance Authorities 2009). How empathy might be taught remains a moot point. It is likely any research would identify high levels of empathy among paramedic students, however, the issue is not the level, but the capacity and maturity to exercise it appropriately with patients who differ in age, gender, racial, ethnic, class or life-style from the practitioner. The themes dealing directly with the social sciences are discussed in the next section.

Themes dealing directly with solutions to road-readiness

Participants offered a range of solutions to the problem of graduate road-readiness. These can be summarised under the following thematic headings; the use of psychometric testing to weed out unsuitable applicants; teaching more applied knowledge; teaching more supporting sciences and contextualising the teaching of the supporting sciences.

Identifying lack of maturity: use of psychometric testing

An area of tension between industry and universities closely linked to social maturity was the use of psychometric testing as a method for filtering out graduates with poor social skills. In a number of states ambulance

employers require graduates to undergo psychometric testing prior to an offer of an Internship. University staff are skeptical of the capacity of these tests to identify graduates with personality disorders as distinct from those who simply lacked life experiences, social maturity or needed support to deal with the stressful situations that are part of paramedic practice. Paramedic academics pointed out that despite psychometric testing, unsuitable candidates were recruited and quickly left, or lost their jobs due to the kinds of poor interpersonal skills that psychometric testing is said to target. Closely aligned with this theme was a desire by local industry to have more control over those students accepted into degree programs. Some programs have been designed with this in mind as the following quote illustrates:

...There are always issues in terms of getting the right people into the course ...and that's one of the reasons why the ambulance service here didn't go with an open degree as has occurred in the eastern states, because they've always been concerned about having an open degree, getting the right people in, so that they can employ them and not, not have a big group of people walking around with paramedical science degrees who are not going to be employed (Academic).

Clearly the value of psychometric testing for predicting a graduate's suitability for the work is a rich area for future research.

The solution is to teach applied knowledge

Focus group participants also offered a range of solutions in order to move graduates beyond the novice practitioner stage. These included more hours on road, employment as ambulance transport officers, and hybrid courses that had students working while studying. An additional suggestion was to teach clinical skills in context:

I think the challenge for universities...is in the rationalisation of the basic anatomy and physiology development. Most of our work occurs away from controlled environments, so the applied anatomy and physiology has got to be quite situational. The critical issue I am talking about is developing a judgment in the practitioner so that the judgment is relevant and effective. If they get the diagnostics wrong at the start they're flying blind (Paramedic).

The solution is to teach more supporting sciences

A more nuanced solution to graduate road readiness and social maturity was identified in topics known as the supporting sciences. Practitioners felt the universities were failing in their role to supply graduates who were work-ready in non-clinical areas. The quote below identifies topics such as communication skills and those dealing with prejudice and stigma as relevant:

Soft skills development it is something that is missing, and maturity will play a part in it, but

if the universities can actually start to develop those soft skills and by that I mean things like being able to communicate, being able to talk and listen appropriately [for] the uniform you're wearing, not get judgmental, and things that they might not be expecting (Paramedic).

Some focus groups participants discussed ways in which the university could better prepare students in the area of supporting sciences. Recommendations included exposing students to broader clinical experiences beyond paramedic practice such as work in hospitals, nursing homes, community centres or with other marginal groups. However, there was a feeling that students would be resistant to alternative placement sites such as clinics and hospitals, and that there was a need to change expectations of student paramedics. Most groups, however, reported difficulty in finding adequate alternative placements for students.

Despite student resistance to non-paramedic work experiences the capacity to respond with compassion to patients from other cultures was identified by students in one focus group as an area for further development. These students suggested that opportunity to interact with this clientele could be gained from placements in non-emergency transport, nursing homes and voluntary work among the aged. Of course students with the insight to recognise their own interpersonal shortfalls are already demonstrating strong intrapersonal skills that make possible the transmission of further supporting skills.

Despite an awareness of the importance of the supporting sciences to student road readiness and maturity there was a recognition that it competed with technical aspects of the discipline. This was aptly stated by participants in the Canadian focus group. They suggested that there had been a steady, but specific move away from acquiring what they referred to as ‘humanistic’ or ‘nursing’ skills by the paramedic profession in vocational courses and hoped that any university based programs might remediate these shortcomings. Reflecting on current vocational courses one paramedic noted:

We have changed our emphasis from the time I started to a much more technical orientation where we are now teaching paramedics all kinds of wonderful toys and tools and in my view, missing some of those essential hands-on human skills...I don't think we teach the judgment skills well...that teaching of the grey of medicine. I don't think we talk about culture well, I don't think we talk about the sociology of what we are. I don't think we prepare the paramedic in any way other than just to do the technical. I think that is a bad thing and I think it lets the technician think they are coming out perfectly prepared to embrace a professional approach to life... (Canadian Paramedic).

The solution is contextualizing the teaching of the supporting sciences

What is also suggested from the focus group discussion is that those academics teaching the supporting sciences topics

could position content more readily in practice. This does not necessarily mean in paramedic practice; but it does mean providing some experiential component whereby students come into contact with disadvantaged population groups and come to some respectful appreciation of difference. Too often the non-clinical/underpinning sciences are spared the challenge to ground theory in experience. Increasingly, paramedic programs, along with other health professional groups are taught the supporting science topics, such as psychology or health policy in multidisciplinary groups. Contextualising theory in these situations is difficult on two fronts. First, it is difficult to illuminate for students how the theory applies directly to their discipline be it paramedic or any other health profession; and second, it is a highly complex exercise to provide students with pedagogically nourishing experiences and contact with cultures and social groups other than their own.

Discussion: is the novice beginner road ready?

An analysis of the thematic issues discussed above raises the need for further clarification on what is meant by road-readiness. Participants ranged from those who were not clear what the missing skills were, to those who saw it as clinical competence, or social maturity, attitude, a capacity to commit to the organisation, facility in communicating with elderly patients, to sound clinical and social reasoning skills. The recommendation outlined in the first theme, that students work as ambulance transport officers while still training, highlights the need

for extensive on-road experience; a prerequisite for moving from novice to expert. While we would agree that students need a maximum number of on-road opportunities to put the theory and skills they learn in the classroom into practice, we would also argue that graduates are by definition novice practitioners. To move from novice to advanced beginner or advanced life support officer requires extensive experiences that are not possible, nor the role of university programs to provide. If graduates are achieving advanced levels of practice in the five years beyond graduations, this suggests university programs and industry internships are achieving the desired outcome. We alert the reader's attention to the fact that five years to produce an advanced practitioner is consistent with educational theory (Benner 1984). It is also important to point out, that under the previous vocational model, it also still took 5 years to achieve the level of advanced life support paramedic.

Discussion: the place of supporting sciences in achieving social maturing

Dealing with gaps in graduate maturity is approached differently by industry and universities. Industry uses psychometric testing as a way of determining suitability, while universities make claim to education in supporting sciences that presumes to provide students with the necessary theoretical and skill development for road-readiness. For industry paramedics the use of psychometric tests is linked to the desire to get the right people for the job and is seen as a reliable technical solution to the risk of employing socially

immature or unstable graduates. While academic paramedics might argue that psychometric testing is unreliable and point to examples to demonstrate the point, such testing is widely used in many industries requiring dangerous or highly charged emotional labour (see for example Qantas 2009).

Industry paramedics also argued for clinical topics to be taught in context. This often means the practical application must be of immediate relevance to the local service. For university paramedics getting the right balance in the curriculum between clinical experiences in context, and theoretical knowledge is difficult. A curriculum without theory would fail in its aim to produce a novice paramedic able to fit into any service in Australia, or any enhanced roles taken up by ambulance services in the future. University paramedic academics also argue that students who lack knowledge of the underpinning theory may have difficulties moving from novice to expert since competent practitioners need to engage in high levels of analytical and abstract thinking and integrate this into practical situations (NurseScribe 2007). We would argue that education in theory is one of the key areas that will enable paramedic to move from an occupational group to a profession (Ambulance Employees Association 2009; Australian College of Ambulance Professionals 2009).

As the discussion above highlights there are considerable tensions between practitioners, industry, paramedic academics and those academics teaching the supporting sciences. Industry participants readily identified the need for soft skills/supporting sciences,

but here, discussion focused more on contextually-based experiences such as working directly in clinical venues with culturally diverse groups, than in identifying the theoretical bases of this knowledge. Conversely, academics teaching the supporting sciences exhibited a lack of contextual knowledge on two fronts. Many of these academics admitted to not knowing how to provide examples of the relevance of theory to paramedic context, and beyond this, had not considered the possibilities of an experiential component to theories of culture, stigma, prejudice, race, class, or other social determinants of health that impact on graduate practice. Currently, this is a major gap in paramedic curriculum.

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References

- Ambulance Employees Association (2009) *Professional rates case*. Available from URL: http://www.aeasa.com.au/current_issues.html (Last accessed 15 September 2009).
- Australian College of Ambulance Professionals (2009) *Submission to the Health and Hospital Reform Commission*. Available from: URL: http://www.acap.org.au/NHHRC/NHHRC_ACAP%20Submission_Executive%20Summary%2029%20May%202008.pdf (Last accessed: 16 September 2009).
- Benner P (1984) *From novice to expert: excellence and power in clinical nursing practice*. Menlo Park, California, Addison-Wesley Publishing Company.
- Benner P (2001) *From novice to expert*. Upper Saddle River, New Jersey, Prentice Hall.
- Bowman R C (2007) New models or remodeling students or both? *Rural and Remote Health* 7, 722: 1-7.
- Boyle M, Williams B, Cooper J, Adams B, Alford K (2008) Ambulance clinical placements – A pilot study of students' experience. *BMC Medical Education* [serial on-line] 8, 9. Available from: URL: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2330039> (Last accessed: April 2008).
- British Paramedic Association (2006) *A Curriculum Framework for Ambulance Education*. British Paramedic Association, UK. Available from: URL: http://www.britishparamedic.org/downloads/Published_version_1_02_2006.pdf (Last accessed: 18 March 2008).
- Brightwell R, Stewart A, Pask S (2003) *The influence of multimedia resources in and out of biomedical studies*. Paper presented at the Proceedings of the Improving Learning Outcomes Through Flexible Science Teaching Symposium, University of Sydney.
- Charles Sturt University (2008) *Paramedic Handbook*. Available at: URL: <http://www.csu.edu.au/courses/undergraduate/paramedic/index.html> (Last accessed: 20 November 2008).
- Council of Ambulance Authorities (2009) Home page. Available at: URL: <http://convention.ambulance>.

- net.au/content.asp (Last accessed: 16 September 2009).
- Flinders University (2008) Bachelor of Health Sciences, Topic Booklet, HLTH1302 and HLTH1303 *Understanding the Australian Health Care System and Reforming Care*. Flinders University, Adelaide.
- Gibbs J (2001) Pre-service education and qualifications – the impact on recruitment and retention in rural child protection. *Rural Social Work* 6, 2: 19-28.
- Gibson B, Brightwell R (2006). *The developments in paramedical science and the implications of national and international accreditation and registration in alliance with ambulance authorities*. Paper presented at the EDU-COM 2006 Engagement and Empowerment, Thailand.
- Grbich C (2007) *Qualitative data analysis: an introduction*. London, Sage.
- Hubble M W, & Richards M E (2006) Paramedic student performance: comparison of online with on-campus lecture delivery methods. *Pre-hospital disaster medicine* 21, 4: 261-267.
- Lord B (2003) The development of a degree qualification for paramedics at Charles Sturt University, *Journal of Emergency Primary Health Care* [serial on-line] 1,1-2. Available from: URL: <http://www.jephc.com/uploads/9900011.pdf> (Last accessed: 12 February 2009).
- Mackway-Jones K, Carley S, Kilroy D (2007) Advanced training in emergency medicine: a pedagogical journey from didactic teachers to virtual problems. *Emergency Medicine Journal* 24, 10: 696-698
- Margolis G (2005) The role of Bachelor's degree emergency medical service programs in the professionalisation of paramedics. Unpublished Doctor of Philosophy, University of Pittsburgh, Pennsylvania.
- Monash University (2007) *Bachelor of Emergency Health (Paramedic) Handbook*. Monash University.
- NurseScribe (2007) *Nursing Theorists: Patricia Benner*. Available from: URL: http://www.enursescribe.com/nurse_theorists.htm (Last accessed: 23 September 2008).
- O'Donnell M (2006) A study of the congruence between a baccalaureate paramedic program and industry competency expectations. Unpublished Education thesis, Flinders University.
- Qantas (2009) *Qantas pilot psychometric test practice leaflet*. Available from: URL: <http://www.qantas.com.au/infodetail/about/employment/QTests.pdf> (Last accessed 15 September 2009).
- Queensland Ambulance Association (2004) Paramedic Science Benchmark Statements. *Quality Assurance Agency for Higher Education* [serial on-line] Available from: URL: <http://www.qaa.ac.uk/> (Last accessed: 20 October 2007).
- Raynovich W (2006) *Transition of a vocational-technical program to an academic degree-granting program: an action research case study*. Unpublished Educational Administration Doctorate (Ed. D.) University of New Mexico, Albuquerque.

- Waxman A, Williams B (2006) Paramedic pre-employment education and the concerns of our future: What are our expectations? *Journal of Emergency Primary Health Care* [serial on-line] 4, 4. Available from: URL: <http://www.jephc.com/uploads/Waxman990213WebVersion1.pdf> (Last accessed: 15 September 2009).
- Williams B (2007) Students' perceptions of prehospital web-based examinations. *International Journal of Education and Development using ICT* [Serial on-line] 3,1. Available from: URL: <http://ijedict.dec.uwi.edu/viewarticle.php?id=292> (Last accessed: 12 February 2009).
- Williams B, Upchurch J (2006) The internationalisation of pre hospital education: a merging of ideologies between Australia and the USA. *Emergency Medicine Journal* 23, 7: 573-577.
- Wyatt A (2003) Paramedic practice - Knowledge invested in actions. *Journal of Emergency Primary Health Care* [serial on-line] 1, 3-4. Available from: URL: <http://www.jephc.com/uploads/990057.pdf> (Last accessed: 15 September 2009).