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Introduction

Since the early 1990's, the Deakin University School of Engineering has offered accredited undergraduate engineering courses by distance education (Long, Joordens, & Littlefair, 2014). (In recent, years, "online learning' has replaced the term 'distance education' in common discourse.) Fully accredited by Engineers Australia, the original undergraduate engineering courses offered by Deakin were in manufacturing (Wong & Ferguson, 1996), mechatronics, computronics, and environmental engineering (Baker, 1991). Currently Deakin offers undergraduate courses in mechanical, mechatronics, civil, and electrical/electronics engineering. Utilising the distance-education model as developed at the University of New England (Arger, 1993), the Deakin's undergraduate engineering course programs are identical, for curriculum and structure, for all student cohorts – both off-campus (distance education based or online based or cloud based) and on-campus (campus based) enrolments.

The key term describing the undergraduate engineering courses at Deakin in the initial years they were offered was "flexible delivery" (S. Palmer, 2001a). One of the original goals of Deakin's distance-education enrolment option for engineering courses was to offer an accredited engineering course for students located in any location within Australia and indeed the world where the student could interact with the School from a remote location, study and complete the course to become eligible to practice domestically as professional engineer with minimal-to-no requirement for the student to attend the university campus (Briggs, 1995). The intention was to accomplish this by means of available information and communications technologies and experimental control techniques (Ferguson & Wong, 1995b), deliberate design of course materials (Martin, 1995), prompt communication responsiveness between academic staff and students, and appropriate use of the Internet (Elgueta, Martin, & Briggs, 1995; Palmer, 2002).

Considerable effort was expended towards achieving this goal (S. Palmer, 2001a; Palmer & Tulloch, 2001; S.R. Palmer, 2001). Early initiatives included the introduction and use of Internet-enabled learning-management systems (S. Palmer, 2001b; Palmer, 2003), online chat rooms, and online noticeboards. Students studying engineering management units within the courses were extensively surveyed and interviewed to determine both how they learned and what educational practices they preferred in comparison to their on-campus counterparts (Palmer, 1999).

To emulate laboratory-based experiments as typically undertaken using campus-based facilities, for students undertaking the course in distance education mode a number of methods were used. These included the development and use of computer simulations for laboratory skills and techniques (Ferguson & Wong, 1995a; Joordens, 1998; Long & Baskaran, 2004), experimental kits for students learning electronics and microprocessors (Jones & Joordens, 2003; Long, Florance, & Joordens, 2004), at-home projects (Joordens & Jones, 1998), two of the first remotely controlled lab experiments (Ferguson & Florance, 1999; Lemckert & Florance, 2002), and fundamental physics experiments using materials

that could be locally sourced by the student (Long, Stannard *et al.*, 2012). These methods were found to be particularly successful for the distance education students undertaking the mechatronics-engineering course. By 2004, the off-campus student cohort had grown to nearly half of all full-time-equivalent enrolments for the offered undergraduate engineering courses.

At that time, off-campus students were directed to self-manage their learning activities in a primarily asynchronous mode with study materials typically provided to the students via postal mail in the form of hardcopy study guides and student assignments provided by the student for marking in the same manner. Although at the time, some study resources and information was also provided online for off-campus Deakin engineering students the use of electronic communications technologies (email, telephone calls) was primarily for *ad-hoc* communications and discussions with lecturers and tutors. An obvious element of the community of inquiry missing at the time was peer-interactions amongst students (within the on-campus cohort and amongst both on-campus and off-campus cohorts). Moore defined this as learner-learner (or inter-learner) interaction and a valuable, if not essential, form of interaction to adequately exist in distance education (Moore, 1989). Palmer considers these issues as they relate to the domestic (Australian-based) distance education student and states that the key to successful learning and teaching is to create flexible systems (a sustainable online content development model) that can accommodate changes in content, technology, and student needs (S.R. Palmer, 2001).

Teaching an off-campus (distance education) student cohort requires a new role for academic staff and administrators in order to support the off-campus students with their administrative and learning needs. This new role is typically in addition to providing support to the traditional on-campus (campus based) student cohort. Research indicates that, for various reasons, off-campus students have higher withdrawal rates than on-campus students and that undergraduate engineering students have one of the lowest course completion rates. Palmer suggested in his literature (Palmer & Bray, 2003) that for those students who complete an undergraduate engineering course, off-campus students tend to exhibit better academic performance than on-campus students.

Engineers Australia and distance education in engineering

From 2000 onwards a significantly revised domestic engineering undergraduate program accreditation system, as managed by Engineers Australia, increased the scrutiny of accredited domestic undergraduate engineering courses that were provided in distance-education mode. This led to the development of specific policies and recommendations for Australian universities that offer accredited engineering courses in distance-education mode (Bradley, 2007): one of the key recommendations being that off-campus enrolled engineering students should periodically attend some campus-based activities throughout the course.

In 2003, following an accreditation review conducted by Engineers Australia of engineering courses at Deakin University, the accreditation panel requested that mandatory campus-based activities be incorporated into the course program for off-campus students. The panel's report was also critical of some of the 'at home' experiments offered for off-campus students, in lieu of campus laboratory-based experiments, as being either based too much

on computer simulation or not being ‘engineering’ enough (in the sense of providing the same experience as corresponding campus-based activities). For instance, some of the review panel members expressed the opinion that experiment kits supplied to off-campus students had a toy-like appearance and were thus not worthy of use in engineering studies at a higher education level. The panel requested that Deakin include a mandatory requirement for all off-campus students enrolled in an accredited undergraduate engineering course attend two-week residential school per year of equivalent fulltime study load at the campus where the Engineering School is based. The panel’s recommendation was that Deakin develop this mandatory course component by adopting the residential school component of accredited undergraduate engineering courses as offered at the time by the University of Southern Queensland (Morgan, Fulcher, & Ku, 1999).

The 2003 accreditation panel in its report specified the following goals for inclusion in the new mandatory campus-based activities for off-campus students:

- Physical interaction between off-campus students and the University in general and with the teaching staff in particular.
- Interaction and networking with fellow students, both off-campus and on-campus.
- The opportunity to complete on-campus practical activities.
- The opportunity to see real engineers in action.
- The opportunity to visit some engineering and manufacturing workplaces.

In particular, the outcome of the 2003 accreditation process for undergraduate courses offered by Deakin had a clear message: the almost complete reliance on asynchronous teaching and learning methods and the absence of campus-based activities in the course program needed to be addressed. In essence, the panel found that there needed to be a greater diversity of interactions experienced by distance education students during the engineering course and perhaps unknowingly at the time, the panel reflected Biggs’ proposal on learning and interactions (that enable learning) that, “Learning is thus a way of interacting with the world,” (Biggs, 1999).

Evolution of the first-year residential schools

The 2003 panel recommended that the residential schools to be introduced by Deakin in the undergraduate engineering program include:

1. Student attendance at on-campus lectures and tutorials
2. Completion of most practical activities required by the course
3. Teamwork-building exercises and group work
4. Guest lectures by practicing professional engineers
5. Engineering industry site visits
6. Joint sessions for both off-campus and on-campus students, including project presentations
7. Final-year project presentations organised as a conference to be attended by all students in third and fourth years.

In 2004 the undergraduate Bachelor of Engineering course program at Deakin consisted of eight equally weighted academic units for the first year (level 1):

1. Fundamentals of Technology Management (introduction to engineering, research skills, communication, and teamwork).
2. Engineering Physics
3. Introduction to Design and CAD
4. Mathematical Methods
5. Engineering Materials 1
6. Electronics and Electrical Systems
7. Calculus
8. Introduction to Computer Software and Programming.

The first four units were offered in semester one and the second four in semester two. At that time, off-campus students typically undertook a 50 percent study load for the course such that the first level of the course was attempted and completed over two consecutive academic years.

The first engineering residential school at Deakin was conducted during the second semester of 2005. Held over two weeks, it was administered as a zero-credit-point unit (SEP199 Engineering Professional Practice) and attendance was compulsory for all off-campus students enrolled in any first level units of the course during that semester.

To help make adequate space for the attendees, it was held overlapping one week of the mid-semester break. During this week practical sessions were held in physics (held over from semester one), electronics, and materials. During the second week guest lectures and a site visit were held. All students completed a team-based mini-project that culminated with a written report and oral presentations at the end of the second week. Students were also given free time to work on assignments, attend on-campus classes, and meet their lecturers, and opportunities to collaborate and socialise with their peers. The first-year (level one) residential school proceeded in the same form in 2006.

In 2007 the course program included residential schools, one per year (level) of the course. For administration purposes the residential schools were attached to the corresponding engineering management unit for each year (level) of the course. For example, the first year (level one) residential school was conducted during the same trimester as the first year (level one) engineering management unit (Fundamentals of Technology Management) so that all off-campus students enrolled in that unit were required to attend the associated two-week residential school during that semester. The structure of the course program thus consisted of four compulsory residential schools, each of two week duration, to be undertaken by off-campus students progressively as they advanced through the course and for most, a requirement to participate an residential school at the campus at least once every two years (for a student enrolled part time on a 50% equivalent full time student load basis). This practice and format continued through to 2012.

Results and Discussion

With some very rare exceptions, virtually all (97% or more) off-campus students in first-year have been attending the residential school each year. Off-campus academic marks in all units were comparable to the corresponding on-campus marks. A detailed analysis of student attendance, perceptions, and marks will be presented in a forthcoming paper. From

anecdotal evidence and discussions with attending students, the largest difficulties these students faced in attending was travelling long distances (including interstate), and the need to take time away from work and family. One unfortunate immediate result was that off-campus numbers in the Bachelor of Engineering dropped from nearly half of the total enrolment in 2004 to less than 25% by 2008 (Long *et al.*, 2014). This result is not surprising, and is consistent with other studies (Cameron, Davidson *et al.*, 1991; Herrmann, Cameron, & Davidson, 1991; Palmer & Bray, 2005).

In 2013 the engineering course programs were revised so that the on-campus attendance requirement no longer existed within the four two-week residential schools. Instead the on-campus attendance requirement by off-campus students was linked to specific activities for all academic units in the course: a shift from a multi-activity multi-week residential school per year (level) of the course that required on campus attendance to unit-specific learning and/or assessment activities that required one to two days of on campus attendance. Two significant impacts from this change immediately occurred: the first was to increase the frequency of campus attendance by off-campus students (typically from once every two years to every trimester in which academic units were being attempted) and the second was to reduce the period of time that the student was at the campus during the trimester (since the duration depended on the number of academic units being studied and the corresponding on campus activities for that unit).

Desai states that when designing and implementing online education, providing a sense of community with constructive feedback and providing an open forthcoming communication as well as recognising membership and feelings of friendship, cohesion, and satisfaction among learners is one of the greatest challenges for learning institutions and instructors (Desai, Hart, & Richards, 2008). Desai's recommendations comply with the proposition that in higher education a 'community of inquiry' should exist (Garrison & Cleveland-Innes, 2005) and that it must include 'various combinations of interaction among content, teachers, and students' (Anderson & Garrison, 1997).

Hall, Jones, and Palmer (Hall, Jones, & Palmer, 2006) in their research discuss a number of critical issues faced by off-campus students in distance education modes. These issues are:

- Student access to course teaching and learning materials;
- Student access to university teaching staff;
- Student access to general course-related information;
- Student access to university facilities (library resources etc.)

The later change to on-campus attendance requirements in accredited courses has, as would be expected, impacted with causation the off-campus student experience. Some of the impacts were immediately observable such as the increased frequency of campus attendance by off-campus students so that a majority of this cohort now attend the campus two to three times per year (at least once per trimester whilst enrolled in academic units). This change has resolved an issue that has existed with the accredited course program to align with the preferences of Engineers Australia's accreditation board (and review panels) since 2003 to ensure all students studying an accredited engineering undergraduate course participate in on campus activities in every semester/trimester which they are actively studying.

However the unit-based campus attendance requirements has also resulted in a reduction of course-related on campus activities requiring attendance (as provided in the residential school program) to the on campus attendance requirement being solely for assessment-related activities such as laboratory experiments and oral presentations. Although other activities are offered during the trimester week that these unit specific mandatory on campus assessment-related activities occur, the shift from mandatory to voluntary attendance for these often-considered 'optional' activities has resulted in a lower participation rate by the off-campus students in forms of interaction that rely on a physical presence to provide a particular experience, e.g., attending lectures (asynchronous interaction controlled by the teacher), attending tutorials (synchronous interaction between tutor-students and students-students), attending formal and informal social activities with peer students (from different student cohorts and possibly across different courses, age groups, cultures, etc.), and attending presentations by staff, students, and guest speakers.

Considering the development and improvement of the learning performance of off-campus students, the current on-campus requirements of off-campus students enrolled in an accredited undergraduate engineering course at Deakin involved a missed opportunity to identify, evaluate, and address deficiencies in a student's thinking abilities. Especially as observed in a student's ability to articulate knowledge and ideas to others (such as participating in a live oral presentation or interactive discussion with others present in the room) and the ability to identify weaknesses or deficiencies in their thinking abilities from these observations (Herrington, Reeves, & Oliver, 2014).

The student's own perceptions of the learning environment also demands consideration in this context. Traditionally the typical off-campus student studying an undergraduate engineering course at Deakin has been mature age, qualified and working in a trade or technical occupation, and experiencing life as a university student for the first time. Furthermore a significant proportion of this cohort consider, apply, enrol, and commence studies in distance-education mode without having visited any of the university's campus or even any university campus. It follows that a significant opportunity exists to alter or reinforce an off-campus student's perception of the located learning environment while visiting the campus (or campuses) relevant to the institution and to their enrolled course. If the student's experience of being on campus is limited or restricted to only a few types of activities and interaction types then errors and deficiencies in their perceptions of the located learning environment (and also possibly of the online learning environment) may remain and may lead to lower learning performance and/or motivation and retention issues (Lizzio, Wilson, & Simons, 2002). For example, an off-campus student whose lack of awareness of the formal (institution-provided) and informal (peer-provided) support available to them as a student attempting to incorporate tertiary studies into their established lifestyle may lose the motivation to engage, or remain engaged, in their studies or may fail to find and exploit opportunities to develop and improve their cognitive and learning abilities (Devlin, 2002).

The issues of interaction (academic and social) and of inclusiveness of the student role into lifestyle was considered and a peer-assisted learning initiative developed at USQ or their off-campus engineering students (Huijser, Kimmins, & Evans, 2008). One specific aim of providing peer assisted learning for the off-campus engineering students was to enhance the "college socialisation process, with peers providing role models and instilling enthusiasm for learning," (Watson, 2000).

Considering the entire student cohort studying undergraduate engineering (on- and off-campus students), Brodie *et al*. identify another potentially missed opportunity in not incorporating adequate located learning activities and interactions involving off-campus students: considering that a majority of off-campus students studying undergraduate engineering are at the same time employed in an engineering-related industry occupation then an opportunity exists to enhance 'learning in the classroom' through the involvement of these students in the learning activities (Brodie, Brodie, & Lucke, 2014). This proposition also broadens the potential to include all student cohorts for improved learning development and outcomes through appropriate design and implementation of blended learning in engineering courses and further justifies a need for further research of blended learning for engineering courses that have on campus and off campus student cohorts.

It is now common, if not the default, in higher education for many courses including engineering undergraduate and graduate courses to employ a mixed-mode learning environment where students are supported in their learning during the course by a combination of technologies and methods so that both located and online learning modes exist and are experienced simultaneously. For distance-based education Huang *et al.* define this as a mixed-mode *e*-learning environment (MMEL) where the deliberate mix of modes seeks to address issues often encountered with online learning (such as learning performance and online participation) by including advantages of located learning (such as synchronous communication in close proximity with peers and teachers and physical environment) (Huang, Lin, & Huang, 2012).

Recently the term 'blended learning' has emerged to describe the use of a mix of located learning and online learning modes. As a more generic term, as compared to MMEL, it can be applied equally to both on-campus and off-campus students and across the spectrum of online and located learning mode composites. 'Blended learning' also offers a term to incorporate the temporal dimension of learning, in particular, synchronous (predominant in located learning activities and interactions) and asynchronous (predominant in online learning activities and interactions).

From our experience, we recommend to other institutions starting residential schools of their own that they exploit the mandatory on-campus-presence requirement to enhance learning outcomes, well publicised timetables be available to students before trimester begins (certainly before census date), a standardised academic week during trimester be set for all residential schools, encourage student feedback on the program, and apply a practice of uniformity and consistency in how the programme is managed, especially mandated student attendance. We also believe that a minimum amount of social interaction among all students and their lecturers should be incorporated into the residential schools as a mandatory attendance requirement for all students, off-campus as well as on-campus.

CONCLUSION

This paper describes the development of the mandatory residential school component of accredited distance education undergraduate engineering courses at Deakin University with a particular focus on how the residential school program has been implemented at level one (first-year full-time equivalent level) of the course. Our residential schools for off-campus-mode students have been running for over 10 years. We have found that the educational

and social advantages to the student outweigh the disadvantages. We also argue that the social aspects of the residential schools should not be overlooked when designing an off-campus residential programme.

References

Anderson, T, & Garrison, DR (1997). New roles for learners at a distance. *Distance learners in higher education: Institutional responses for quality outcomes. Madison, WI: Atwood Publishing*.

Arger, G. (1993). Australia. In G. Arger, J. LaBonte, S. Y. Wong, C. Brahmawong, T. Kariya & A. Yoshida (Eds.), *Distance Education in ASIA and the Pacific: Country Papers* (Vol. 1, pp. 1-13). Japan: National Institute for Media Education.

Baker, L.E. (1991). Engineering/Technology Programs by Distance Education. In J. B. Agnew & C. Cresswell (Eds.), *Broadening Horizons of Engineering Education* (pp. 120-125). Adelaide: Australiasian Association for Engineering Education and the University of Adelaide.

Biggs, John (1999). What the Student Does: teaching for enhanced learning. *Higher Education Research & Development* **18**(1), 57-75.

Bradley, A. (2007). *Engineers Australia Policy on Accreditation of Programs Offered in Distance Mode*. Canberra: Engineers Australia.

Briggs, H. (1995). Towards Student-Centred Engineering Education at Deakin University: a Case Study in Implementing Flexible Learning Philosophies. In F. Nouwens (Ed.), *Distance Education: Crossing Frontiers*. Rockhampton, QLD: Central Queensland University.

Brodie, Lyn, Brodie, Ian, & Lucke, Terry. (2014). CDIO–can it be adapted for Distance Education? Paper presented at the Proceedings of the 2014 Australasian Association for Engineering Education Conference.

Cameron, J., Davidson, G., Herrmann, H., Dekkers, J., Livingston, K., Warner, L., & Wilkinson, J. (1991). *On Campus Activities in the Nationwide Provision of Distance Education*. Canberra: Australian Government Department of Employment, Education, and Training.

Desai, M.S. , Hart, J. , & Richards, T.C. (2008). E-Learning: Paradigm Shift in Education *Education* **129**(2), 327-334

Devlin, Marcia (2002). Taking Responsibility for Learning isn't Everything: A case for developing tertiary students' conceptions of learning. *Teaching in Higher Education* **7**(2), 125-138.

Elgueta, D.A., Martin, T.B., & Briggs, H.C. (1995). Using the internet and the world wide web to deliver engineering education. In Z. J. Pudlowski & P. L. P. Darvall (Eds.), *Proceedings of the International Congress of Engineering Deans and Industry Leaders* (pp. 229-235). Melbourne: Monash University.

Ferguson, C., & Florance, J. (1999). Internet Access to a Flexible Manufacturing Cell. *Proceedings of the International Symposium on Manufacturing Systems, Second World Manufacturing Congress*, Durham, U.K.

Ferguson, C., & Wong, K.K. (1995a). Issues in Using Computer-Aided Learning Programs to Enhance Engineering Teaching – a Case Study. In Z. J. Pudlowski & P. L. P. Darvall (Eds.), *Proceedings of the International Congress of Engineering Deans and Industry Leaders* (pp. 198-203). Melbourne: Monash University.

Ferguson, C., & Wong, K.K. (1995b). The Use of Modern Educational Technologies in the Flexible Delivery of Engineering Degree Programs *Internationalisation of Engineering Education* (pp. 261-265). Melbourne: Australasian Association for Engineering Education.

Garrison, D. Randy, & Cleveland-Innes, Martha (2005). Facilitating Cognitive Presence in Online Learning: Interaction Is Not Enough. *American Journal of Distance Education* **19**(3), 133-148.

Hall, W., Jones, J.T., & Palmer, S. (2006). Providing a practical education for off-campus engineering students. *British Journal of Engineering Education* **5**(1), 49-57.

Herrington, J. , Reeves, T.C. , & Oliver, R. (2014). Authentic learning environments. In J. M. Spector, M. D. Merrill, J. Elen & M. J. Bishop (Eds.), *Handbook of Research on Educational Communications and Technology* (pp. 401-412). New York: Springer.

Herrmann, H. , Cameron, J., & Davidson, G. (1991). On-campus requirements in remote area Australian distance education. *Open Learning* **6**(2), 21-27.

Huang, Eugenia Y, Lin, Sheng Wei, & Huang, Travis K (2012). What type of learning style leads to online participation in the mixed-mode e-learning environment? A study of software usage instruction. *Computers & Education* **58**(1), 338-349.

Huijser, Henk, Kimmins, Lindy, & Evans, Peter (2008). Peer assisted learning in fleximode: Developing an online learning community. *Australasian Journal of Peer Learning* **1**(1), 7.

Jones, J.T., & Joordens, M. (2003). Distance Learning for Laboratory Practical Work in Microcontrollers. *International Journal of Engineering Education* **19**(3), 455-459.

Joordens, M. (1998). Programmable Logic Controller Simulator for Distance Education. *Proceedings of the 10th Annual Convention and Conference of the Australasian Association for Engineering Education*, Central Queensland University.

Joordens, M., & Jones, J.T. (1998). Multi-disciplinary Design-and-Build Projects in Mechatronic Engineering Degree Courses *Proceedings of the 11th Australasian Conference on Engineering Education*, Adelaide, 26-29 September.

Lemckert, C., & Florance, J. (2002). Real-Time Internet Mediated Laboratory Experiments for Distance Education Students. *British Journal of Educational Technology* **33**(1), 99-102.

Lizzio, Alf, Wilson, Keithia, & Simons, Roland (2002). University Students' Perceptions of the Learning Environment and Academic Outcomes: Implications for theory and practice. *Studies in Higher Education* **27**(1), 27-52.

Long, J.M., & Baskaran, K. (2004). Engineering education down under: Distance teaching at Deakin University, Australia. *Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition*, Salt Lake City.

Long, J.M., Florance, J.R., & Joordens, M. (2004). The use of home experimentation kits for distance students in first-year undergraduate electronics. *Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition*, Salt Lake City.

Long, J.M., Joordens, M.A., & Littlefair, G. (2014). Engineering Distance Education at Deakin University Australia. *Proceedings of the IACEE 14th World Conference on Continuing Engineering Education*, Stanford University, California, 24-27 June 2014. http://iacee2014.stanford.edu/papers.php.

Long, J.M., Stannard, W.B. , Chenery, K., & Joordens, M.A. (2012). Physics Practicals for Distance Education in an Undergraduate Engineering Course. *Proceedings of the 2012 Australasian Association for Engineering Education Conference*, Melbourne, 3-5 December.

Martin, T.B. (1995). Using the Internet and the World Wide Web to Deliver Engineering Education. In Z. J. Pudlowski & P. L. P. Darvall (Eds.), *Proceedings of the International Congress of Engineering Deans and Industry Leaders* (pp. 229-235). Melbourne: Monash University.

Moore, M.G. (1989). Editorial: Three types of interaction. *American Journal of Distance Education* **3**(2), 1-7.

Morgan, M.J., Fulcher, R.L., & Ku, H.S. (1999). Innovative residential schools for engineering degree courses. *Quarterly Journal of Singapore Institute of Engineering Technologists* **18**(4), 53.

Palmer, S. (1999). Engineering management studies as part of continuing engineering education. *International Journal of Continuing Engineering Education and Life-Long Learning* **9**(2), 128-137.

Palmer, S. (2001a). Engineering flexible teaching and learning in engineering education. *European Journal of Engineering Education* **26**(1), 1-13.

Palmer, S. (2001b). On- and off-campus engineering student usage of a computer conferencing system. *Journal of Research on Computing in Education* **33**(3), 280-298.

Palmer, S. (2002). A review of strategic issues in using the internet for teaching and learning. *Australasian Journal of Engineering Education* **1**(1), 1-11.

Palmer, S. (2003). Evaluating on-line technology to support students studying engineeering management in summer semester. *Summer Academe: a Journal of Higher Education* **4**, 59-70.

Palmer, S., & Bray, S. (2003). Comparative academic performance of engineering and technology students at Deakin University, Australia. *International Journal of Continuing Engineering Education and Life-Long Learning* **13**(1), 132-147.

Palmer, S., & Bray, S. (2005). Assessing the likely impact of mandatory residential sessions for engineering and technology students. *Proceedings of the 2005 ASEE/AaeE 4th Global Colloquium on Engineering Education*, Sydney, September 26-30 2005.

Palmer, S., & Tulloch, W. (2001). The evolution of on-line teaching and learning in engineering at Deakin University. *Journal of Computing in Higher Education* **13**(1), 91-109.

Palmer, S.R. (2001). *An Evaluation of Australian Undergraduate Engineering Management Education for Flexible Delivery.* (Doctor of Technology thesis), Deakin University, Geelong.

Watson, Judith. (2000). A Peer Assistance Support Scheme (PASS) for first year core subjects. Paper presented at the Fourth Pacific Rim–First Year in Higher Education Conference: Creating Futures for the New Millennium, July.

Wong, K., & Ferguson, C. (1996). A Flexible Model of Delivering Degree Courses in Manufacturing Engineering *International Conference on Education in Engineering: Manufacturing Education for the 21st Centrury - Preparing World Class Manufacturing Professionals* (Vol. 3, pp. 43-46). Michigan: Society of Manufacturing Engineers.

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