Lessons for the profession: Teaching archaeological practical work skills to university students

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Abstract

This paper reports research into teaching and learning of archaeological practical work and professional practice skills through an undergraduate work placements course offered by the University of Sydney. One aim of the research was to improve course assessment through the development of criteria to measure competency and learning outcomes, based on ideas of educational theorists such as Biggs, Collis and Ramsden. Data from markers' comments on student notebooks and supervisors' comments on student performance were analysed in terms of scales of learning and competency. The results are discussed in the wider context of professional archaeological practice in Australia, to address the questions: What is good archaeological practice and how can archaeologists measure and promote it? Given the current and likely future state of the Australian university system, how can universities and professionals best cooperate to improve student learning?

The 'Field/Laboratory Project' course

The 'Field/Laboratory Project' course taught at the University of Sydney between 1998 and 2002 enabled senior level undergraduates to gain credit towards their degree for 35 hours of assessed participation in a supervised archaeological practical work placement. This was not a professional training course. It aimed to (1) provide students with a basic introduction to aspects of archaeological practical work and research practice in a professional setting; (2) expose students to ways that archaeological data are generated to assist their broader understanding of what archaeology is, what archaeologists do and how archaeological knowledge is produced; and (3) build positive links between students, the department and the wider archaeological profession.

Projects varied in content, form and timetabling. Activities covered a spectrum of field and laboratory work, archival research, heritage assessment and archaeological computing. Students were supervised on a goodwill basis by over 40 archaeologists including university staff, postgraduate research students and professionals employed in a variety of research, consultancy and heritage management positions. Projects were located on and off-campus in Sydney, elsewhere in New South Wales, interstate and overseas and covered a range of archaeological practices. Initial enrolments numbered around 25 in 1998, increasing steadily to around 40 by 2002. For reasons discussed below, the course was discontinued from 2003.

The role of coordinator, which I performed between 1999 and 2002, involved course design, management, participant consultation, assessment and review, and some face to face lecturing. The course built on a tradition of volunteer participation in archaeological fieldwork and informal links between the university and practising archaeologists. It was based on an agreement (formalised in 2002 into a Learning Contract – see below) between supervisor, student and course coordinator. The supervisor provided students with an opportunity to learn about aspects of practical archaeology in a workplace setting, in return for the time and labour donated by the student, as for any volunteer. In return the student was expected to provide practical assistance, and hopefully useful research or other outcomes. The course was carefully designed to minimise cost to the supervisor of formal teaching input, especially marking which was the responsibility of the course coordinator. Assessment was based on a mix of a project notebook, the supervisor's report form, and the student's compliance with course requirements. Teaching methods and learning outcomes varied between projects. The latter each had some component of *archaeological content* (knowledge and understanding of relevant facts, ideas and theories), *archaeological practice* (specific archaeological tasks, procedures and skills) and *generic attributes*. These include skills like time-management and teamwork which are now explicitly emphasised by universities as key general outcomes of undergraduate study.

The course was evaluated annually using course exit questionnaires and informal discussion with participants. A University of Sydney Faculty of Arts Teaching Initiative Award in 1999 funded collection and analysis of further interview and questionnaire data aimed at improving course design, while a 2001 research project examined assessment methods. In response the course was modified significantly between 1999 and 2002. Results from these investigations are also relevant to questions of wider interest to the archaeological profession, in particular, what do archaeologists need to know to do their job, how does such learning takes place, and how might it be measured?

The 3P model

The 3P model (Biggs 1999:18) conceptualises teaching and learning as an interactive system in which factors of Presage, Process and Product are closely linked. This is a useful framework for discussion of the Field/Laboratory Project course. *Presage* factors occur before learning takes place and are both student and teaching context based. These interact with the *Process* of student learning which according to Biggs and other educational theorists currently favoured in the Australian university system, should aim to promote learning which is 'deep and holistic' over that which is 'surface and atomistic' (Ramsden 1992:41-49). The third element of the 3P model is the *Product* or learning outcomes, which are closely linked to the learning process and should be measurable.

Teaching context and students attitudes and expectations

Most Australian archaeology is conducted for cultural heritage management purposes outside universities, which has significant implications for tertiary education, as

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discussed below. The advent of 'mass higher education' is also key. Ramsden (1998:13-30) notes that in Australia over the last 10-15 years a largely elite national system of higher education has been transformed into one of mass higher education in a global marketplace, with significant impact on the finances, organisational structures, purposes and governance of universities. Obvious outcomes include fewer teaching staff; increased casualisation of the academic workforce; larger class sizes; increased diversity of student attitudes, abilities and expectations; new management practices; changed public perceptions of higher education; and increased emphasis on standards and accountability. Lydon (2002) has discussed the impacts of such changes on archaeology and cultural heritage management teaching in Australian universities. These changes certainly apply at the University of Sydney where archaeology is taught in a humanities faculty and currently receives no additional nominated university funding for practical work teaching, which is particularly expensive. The Field/Laboratory Project course provided a mechanism through which the archaeological profession and outside-funded research projects could subsidise some of this shortfall. Unlike the department's other practical work courses where numbers were restricted by the limited availability of teaching staff, space and equipment, the Field/Laboratory Project course could accommodate as many students as could be found project placements, in theory at least. In practice the diverse expectations and attitudes of the students impacted heavily on the running costs and other aspects of the course.

As has been known for some time (e.g. McBryde 1980; Frankel and Gaughwin 1986), only a small minority of undergraduates enrolled in archaeology subjects ever intend to become archaeologists. This trend is even more pronounced in the current climate of a larger and more diverse student body and increasing emphasis on general Arts degrees. A course like the Field/Laboratory Project requires a much higher level of interest, commitment and responsibility from students than a more standard lecture-based course with, for example, a fixed weekly timetable. Finding suitable supervised project placements for up to 40 students each year, and making individual arrangements for students to attend all necessary pre-planning meetings, including compulsory government health and safety induction training for those participating in urban excavation projects, consumed a significant amount of staff time. When less self-directed and motivated students failed to show for compulsory meetings, dropped out of project placements or performed badly the cost was borne not only by the department and course coordinator but also by project supervisors and other students. This was an introductory course which required no prior practical experience. In response to a 1999 and 2000 survey questionnaire students were asked to rank their prior experience of a list of typical practical work activities (Table 1). Most regarded themselves as having no or very little prior experience of any kind, though some claimed moderate experience of documentary research (27%), photography (17%) and archaeological computing (12%). The same students were asked 'what main activities would you most like to do for your project? (Tick those which apply).' Of the 48 respondents, 71% wanted to attend an excavation, while slightly fewer were interested in Field-Survey (46%), Laboratory Analysis of Finds (46%), Site-Recording (34%), Documentary Research (31%) and Photography (31%). These survey results are ambiguous because the activity categories were ambiguously defined, but they do show that while most students expressed a desire to 'go on a dig', a sizeable minority did not. On the whole, attending an excavation or fieldwork project seemed to provide students with more learning opportunities than other types of project. Informal discussion with students indicated that some were discouraged by the physical aspects of excavation. Only some students had the resources and interest to attend extended periods of fieldwork away from Sydney. Many wanted to work only on projects on campus or nearby, with flexible part-time hours which fitted in with their other work, study and family responsibilities.

How would you rate your previous experience of the following activities

Activity	None/little	Moderate	Extensive
Archaeological excavation	98	2	0
Site-recording	100	0	0
Field survey	98	2	0
Photography	83	17	0
Laboratory analysis of finds	96	4	0
Archaeological computing	86	12	2
Documentary research	70	27	2

Table 1 Student responses to course registration questionnaire 1999-2000 (% respondents who ticked each category of practical skills, n=48).

Such factors contributed further to the cost of placing students in suitable projects, and were exacerbated by the increasing diversity of students and growing enrolments in a climate of continuing staff losses and funding cuts. Managing the course became increasingly costly in staff time as enrolments grew by approximately 60% between 1998-2002. In 2003 a pragmatic decision was made to cancel the Field/Laboratory Project course so that increasingly scarce resources could be directed elsewhere.

Learning processes and learning outcomes

Assessment is central to learning and, as discussed by Ramsden (1992:182), it is about several things at once: reporting on student achievements; improving teaching through clearer statement of curriculum goals; diagnosis of student misunderstandings to assist learning and measuring learning outcomes. It also 'involves us in learning from our students' experiences, and is about changing ourselves as well as our students.' A key challenge in designing the Field/Laboratory Project course was how to assess what students had learned in order to assign marks. Assessment was fine-tuned each year and by 2002 was based on a self-reflexive notebook worth 70% marked by the department, a supervisor's grade for performance worth 20% (based on departmental marking criteria) and satisfactory compliance with the requirements of a Learning Contract (worth 10%).

Notebooks

The notebook asked students to document what they had done and to reflect on what and how they had learned. As such it was both an assessment method and a tool which supported the students' own learning. In 2001 I conducted a small research project on assessment towards study for a Graduate Certificate in Tertiary Education through the

University of Sydney's Faculty of Education and Institute for Teaching and Learning. The aim was to develop better criteria for notebook marking. Existing criteria explained the general kinds of things students should include in their notebook, but more specific criteria were needed to guide award of grades. Given the diversity and complexity of activities and learning processes discussed in the notebooks, what exactly did we expect students to demonstrate they had learned? Were there common threads of learning regardless of the nature and circumstances of the particular project placement? More specifically, what made one student's notebook a clear High Distinction, while another barely scraped a Pass?

Some educational theory is relevant here, in particular the Structure of Observed Learning Outcomes (SOLO) taxonomy developed by Biggs and Collis (1982) to describe the structural organisation of knowledge, which has been shown to be widely applicable to a range of disciplines. The SOLO taxonomy is regarded as reflecting increasingly higher levels of understanding or knowledge, graded from less desirable atomistic and/or surface approaches to more desirable deeper and/or holistic approaches (Table 2).

I first aimed to evaluate the degree to which some observed learning outcomes of the Field/Laboratory Project course complied with the SOLO taxonomy. Data on learning outcomes were available in the form of comments previously written on marking sheets by myself and another independent marker to justify grades awarded for student notebooks in 1999 and 2000. General comments in support of the overall notebook grade, and comments on two key notebook criteria were selected for analysis: Does the notebook a) provide intelligent insight into the problems you encountered and how you tackled and resolved them? b) contain well-explained examples of your experiences and what you learned from them? A total of 110 free-form comments of between one and 100 words each from 58 notebooks related to 14 different projects were subjected to analysis. The aim was to identify any qualities consistently identified by the markers when assigning grades on a scale of Excellent (High Distinction), Very Good (Distinction), Good (Credit), Okay (Pass) to Poor (Fail). Table 2 presents examples of key features of students notebooks identified in the markers' comments for each grade. These have been interpreted from the original comments which were obviously more nuanced, but are too long to reproduce here.

The essence of the markers' comments indicate that some observed learning outcomes of the Field/Laboratory Project course do comply well with the SOLO taxonomy.

The qualities of notebooks listed in Table 2 primarily concern abstract elements of understanding and the individual student's ability to integrate the practical things they did on their project with archaeological theories, research and other outcomes in a workplace environment.

Other qualities of student performance do not fit the SOLO structure so clearly. These can be broadly categorised as 'taking responsibility and showing initiative'. Many of these qualities are generic attributes (see above). They are also about students starting to understand professionalism and ethics, and better ways of working with others to facilitate learning and other project outcomes. Table 3 lists some of these observed qualities in suggested order of increasing competency. In the context of a study on competency based assessment for speech pathology graduates, McAllister (1996:23) describes similar qualities in terms of development of *interdependent* learning where competent practitioners in a professional context need to 'continue to ask questions, seek input, share self-evaluation, share insights and information.' There are other scales for measuring performance and competency in a range of areas. For example, there are clear parallels in the

SOLO taxonomic level	Key qualities of notebook content	Grade
PRESTRUCTURAL Uses irrelevant information, meaningless responses	Wrote a descriptive essay, not a notebook. No commentary, discussion or reflection. Purely data recording without annotation or comment.	Fail
UNISTRUCTURAL Focus on one or a few relevant aspects only	Focus on basic description of a limited number of skills. No obvious awareness of the application of these skills within a particular archaeological or work context.	Pass
MULTISTRUCTURAL Focus on several relevant features but not coordinated together	Described and commented on a limited range of problems, but no obvious awareness of their relative significance within the context of the project.	Credit
RELATIONAL Several parts integrated into coherent wholes, details linked to conclusions, meaning is understood	Good balance of description and comment. Identifies and comments thoughtfully on a wide range of problems and experiences. Links and integrates archaeological background and context with many elements of the project, thought processes and learning experiences.	Distinction and High Distinction
EXTENDED ABSTRACT Generalises to structure beyond information given. Higher order principles are used to bring in a new and broader set of issues.	Describes unexpected insights into elements of archaeological theory way beyond the expected project outcomes. Notes extra work which could now be done to improve research outcomes. Makes an original and useful research contribution to the project.	High Distinction

Table 2 The SOLO taxonomy applied to some markers' comments on student notebooks.

Level	Behaviour and demonstrated understanding
1	Fails to show for meetings without notice or excuse. Fails to cooperate with staff. Unethical or inappropriate behaviour towards others on project placement. Drops out of course.
2	Fails to complete all hours without excuse. Fails to follow assessment guidelines. Merely applies existing skills. Blindly follows instructions.
3	Avoids supervision. Does not ask for help. Fails to distinguish their own project initiatives from those of others. No acknowledgment of supervisor or peer input. Overstates or overestimates what they learned.
4	Clearly distinguishes their own initiatives and acknowledges input of others. Discusses their frustrations as well as their successes.
5	Demonstrates or describes examples of ingenuity, initiative and perseverance in solving problems of all kinds related to the project (including organisational, ethical, interpersonal).

Table 3 Structured list of qualities of student behaviour and understanding related to 'taking responsibility and showing initiative.'

Field/Laboratory Project notebooks with a seven point framework for reflective thinking developed by Sparks-Langer et al. (1990) in the context of research into the way undergraduate education students articulated in written and verbal form their understanding of their own teaching practices in classroom situations. At lower levels, students provided simplistic, lay persons' descriptions of their activities. At higher levels, reflecting deeper understanding and a more professional approach, students increasingly used more appropriate terminology, incorporated broader principles and theories into their descriptions and explanation of events, and took into consideration the context within which they were working, including ethical, moral and political issues. Sparks-Langer et al. recommended the development of a dual system for measuring competence based on what they described as 'technical thinking' and 'ethical/moral thinking'.

Also relevant is work by Perry (1999) which documents increasing levels of intellectual and ethical awareness in young adult learners as they mature and move through their university study. Casual observation in my role as coordinator over four years suggests that students who performed poorly in the Field/Laboratory Project course were, on the whole, younger or less mature students in their second year of university with only limited experience of archaeology or a workplace environment. The validity of this observation could be tested against course data.

Results of the notebook research, combined with previous years' marking experience, were used to develop a more detailed set of notebook guidelines and specific marking criteria for the 2002 Course Outline, which are too lengthy to reproduce or discuss here. Issues raised about forms of competency based assessment of archaeological practice, professional training and standards are discussed below.

The role of supervisor and the supervisor's report

Marking as part of an overall assessment process is a core responsibility of university teaching staff and university policies now require marking to be demonstrably valid, reliable, transparent, fair and equitable (Race 2001:27-29). For such reasons, and to minimise the supervisor's workload, the course coordinator took responsibility for the final course marks. Notebooks counted most, but independent supervisor input contributed between 10-20% of marks. Supervisors were asked to give each student a mark for project participation and to write brief comments on the student's performance. Analysis of the supervisors' comments from 1999-2001 (75 reports for 32 projects) provides insight into qualities supervisors most valued when assigning a grade for contribution and performance. In Table 4 key qualities extracted from supervisors' comments are grouped by overall grade (High Distinction, Distinction, Credit, or Pass) for six categories of performance. These are quality of student work, student contribution to project outcomes, student approach to problem solving and approach to learning, student attitude to project work, and their attitude towards other project members.

The only data which fall along a clearly graded scale of competency (HD-D-CR-P) are the comments on students' contributions to project outcomes. Elsewhere there is considerable overlap between the qualities the supervisors associated with a better (HD-D-CR), and in other cases a worse (CR-P) mark. For some categories, seemingly contradictory positive and negative qualities are associated with the same grade and there are areas of ambiguity in some of the comments.

Some of this variation is likely due to differing standards between markers, differences in the nature of project tasks and particularly the extent to which students had opportunities to solve problems and take initiative, as demonstrated by some of the Table 4 comments, and results of a course exit questionnaire survey from 2000 (Table 5). Some of the data variation in Table 4 arises because the grade awarded by the supervisor was a composite drawn from all categories of performance. The instructions to supervisors invited them to comment on these categories, but there were no formal instructions on weighting marks for different categories. No data are available on how different supervisors balanced and ranked different elements of a student's performance to arrive at one overall grade. Again this presumably depends on the tasks the students performed within the context of the overall project. It seems reasonable to assume that most supervisors valued the quality of the student's work above all and this is borne out by some of the Table 4 data. In 'attitudes to project work' some positive qualities (keen to learn and participate, helpful, conscientious, pleasant) are associated with a low grade overall. This demonstrates that someone who is keen to learn and easy to work with is not necessarily competent and that these qualities were less important to overall grade of mark than others.

Some general patterns are apparent in the supervisors' comments linked to grade, however. The qualities used to describe student performance can be seen to fall mainly into two groups: positive comments (indicating varying degrees of competency) and negative comments (indicating sub-standard or incompetent work). Negative comments are nearly all associated with CR-P grades, while positive ones correlate with HD-D-CR grades. In some categories of performance a clearly ranked scale of competency is observable (e.g. student's contribution to project outcomes). Elsewhere (e.g. approach to problem solving, attitude to team members), there seems to be a sharper divide between 'competent' and 'incompetent' qualities, with less marked scaling or grading.

The Learning contract

a) Quality of student work

Excellent (HD)	Very Good (D)	Good (CR)	Okay (P)
• systematic • rigorous • accurate • precise • neat • efficient • worked quickly • trusted • achieved objectives • worked to high standard • showed good judgement • completed work on time • worked well to a brief	• meticulous • good eye for detail • competent • careful • exact • cautious • performed all set tasks to expected standard	• good performance when asked • adequate • accurate • completed work on time	• 'average' performance • competent at routine tasks • did what was required • slow at tasks, not very competent • frequently made mistakes • unable to 'get it together'

b) Student contribution to project outcomes

Excellent (HD)	Very Good (D)	Good (CR)	Okay (P)
• made a real and useful contribution • contributed more than expected • outcomes were greater than expected	• made some contribution to the project	• contributed less than they could	• unsatisfactory results • results not usable

c) Student approach to problem solving

Excellent (HD)	Very Good (D)	Good (CR)	Okay (P)
• showed initiative • contributed ideas to solve problems • showed leadership • created their own solutions • persistent	• showed initiative • showed ingenuity • lateral thinker • logical • methodical • lacked initiative • over cautious • project presented limited problem solving opportunities	• showed little initiative	• didn't work things out for themselves

d) Student approach to learning

Excellent (HD)	Very Good (D)	Good (CR)	Okay (P)
• willing and able to learn • had an enquiring mind • quickly learned new skills • produced good results with little supervision • responded well to instruction • asked for help and supervision when needed • asked questions • critically analysed results	• keen to learn • "took in" information • corrected mistakes • made an effort to improve	• learned less than they could • needed little supervision	• seemed not to understand explanation of tasks • did not understand field work procedures • avoided supervision • did not ask for help; produced poor results)

e) Student attitude to project work

Excellent (HD)	Very Good (D)	Good (CR)	Okay (P)
• interested • enthusiastic • keen • reliable • pragmatic • punctual • hard working • good communication • conscientious • good time management	• interested • enthusiastic • willing • pleasant • amiable • dependable • dedicated • applied themselves • did what was required (but no more)	• little initiative	• lazy • uncooperative • did the minimum • unreliable • pleasant • keen to learn • keen to participate • helpful • conscientious

f) Student attitude to other project members

Excellent (HD)	Very Good (D)	Good (CR)	Okay (P)
• a pleasure to work with • a pleasure to have them on the project • liaised well with others • good communicator • a team-member • I want to keep them!	• an asset to any archaeological team • made a useful contribution to team effort	• [no comments]	• would not help with housekeeping tasks • created tension among team-members • missed meetings

Table 4 Key qualities of students identified by supervisors in support of grades awarded for practical work participation.

Question	Never	Sometimes	Usually	Always
The work was routine and repetitive	13	13	4	0
The work involved following set instructions or standard procedures	2	10	13	5
The project involved doing lots of different tasks or jobs	1	9	7	13
The project provided opportunities for me to solve problems in my own way and take responsibility for tasks	0	12	13	5

Table 5 Opportunities for problem solving: student course exit questionnaire survey 2000 (n=30)

Question	Never	Sometimes	Usually	Always
I was given formal instruction and training about tasks I was required to perform	1	7	9	13
The reasons why something was being done in a particular way were explained to me	0	0	9	21
I was provided with feedback on how I was going	1	6	9	14

Table 6 Methods of instruction/student learning: student course exit questionnaire survey 2000 (n=30).

A formal Learning Contract between student, supervisor and course coordinator was introduced into the Field/Laboratory Project course in 2002, primarily to streamline course management. This covered matters of course administration, insurance, health and safety, intellectual property, acceptable conduct and likely project tasks, learning outcomes and learning methods. Results of a student course exit questionnaire suggested that in 2000 at least, the quality of teaching provided by supervisors was generally good (Table 6) but there was room for improvement. Some supervisors were experienced university teachers, while many had little or no teaching experience and none were being paid by the university for their teaching contribution. The Learning Contract listed basic teaching and learning methods and asked supervisors 'how do you anticipate students will learn? (Tick any which apply)', thus encouraging less experienced teachers to think more actively about this aspect of their role. Students were also expected to take major responsibility for their own learning by reflecting on this in their notebooks. The Learning Contract also reminded students they were expected to ask for help and take initiative in learning as part of the project.

Specific skills learned

What students learned about the specifics of archaeological practice is primarily recorded in their notebooks, in Learning Contracts (Table 7) and course exit questionnaires listing tasks performed. Unfortunately, space precludes further discussion of these data here. Skills acquired (e.g. stone tool identification, trowelling, accessing primary documentary records in state archives, using a computer to manipulate archaeological data) were numerous, varied between projects and students, and were always linked to the context and overall aims of each project (how to identify *these* stone tools in *this* way in order to do *this;* how to use *this* trowel on *this* deposit on *this* site in order to reveal *this*, etc). As noted above, many students also gained insight into wider theoretical and professional issues linked to these skills.

University learning and professional practice

A survey of Australian archaeologists and heritage

Excavation and fieldwork

general excavation	recording contextual information	interpreting stratigraphy
section drawing	planning/mapping	rock art recording
recording standing structures	photography	using survey equipment
on-site finds processing	environmental work	dating work
locating sites/surface survey	filling out site cards	use of maps/plans
use of special equipment	community liaison	other jobs

Post-excavation and laboratory work

general laboratory work	general finds processing*	identification/classification
data recording	data analysis	drawing finds
photography	use of special equipment	other

* washing, labelling, bagging, basic sorting

Archaeological computing

general data entry	word processing	web page design
spreadsheets	statistical analysis	mapping and GIS
other software	programming	use of special equipment
other		

Documentary and archival research

locating/using published work (e.g. via University Library)	locating/using unpublished consultancy reports/theses	locating/using primary documents and/or rare works in archives
use of site and heritage registers	use of maps/plans	use of photographs/images
collecting interview data	compiling data/information	filling out record cards, entering data into databases
sorting/ filing documents	photocopying	use of special equipment

Other archaeological and heritage work

assessing significance*	report writing for supervisor	supervisory duties
public education	general office work	other

* contributing input to a formal statement of archaeological significance under relevant heritage legislation

Learning situations:

formal lectures and training sessions
informal instruction and training as the need arises
direct and close supervision by a professional most of the time
supervision by less experienced project members
quality of student's performance will be monitored
student will be given feedback on their performance
student expected to work with minimal supervision
student expected to work with other students
student expected to learn some things for themselves
student expected to conduct independent research
student expected to ask for assistance if they need it
student expected to take initiative to solve problems
other (specified)

Table 7 Supervisors were asked to indicate which activities and learning situations should be involved in the project (2002 Learning Contract).

practitioners by Lydon (2002) showed that knowledge of heritage management practices and competency in highly specific practical archaeological skills were considered most essential for employment in the archaeological workplace. Similar results emerged from a questionnaire survey of delegates and a plenary discussion organised by Martin Gibbs (James Cook University) as part of the 2002 *Land and Sea* national archaeology conference in Townsville. Many conference participants, most of whom work in the cultural heritage sector, voiced strong opinions about what they perceived as the inadequacy of university graduate training in these key knowledge areas. As discussed above, such perceptions are not new, but are exacerbated by a situation in which most Australian university departments of archaeology are struggling to meet an increasing range of educational and other demands under conditions of mass higher education and government funding cuts. Universities alone cannot meet the archaeological training needs of the Australian cultural heritage management industry. Collaboration is needed between all relevant groups within the archaeological profession including universities, government heritage agencies and private consultancy companies. This implies the introduction of some national system of professional accreditation and the further development of standards and guidelines for archaeological practice (e.g. Crook et al. 2002, and see below). In response to similar pressures, such processes are already underway in the UK and elsewhere (Collis 2000; Carter and Robertson 2002; Stephenson 2002). The Australian Archaeological Association (AAA) recently formed a Teaching and Learning Sub-Committee, in collaboration with the Australian Association of

Consulting Archaeologists (AACAI), the Australasian Institute for Maritime Archaeology (AIMA) and other key Australian archaeological organisations, to further define such problems in an Australian context and canvas possible solutions (www.australianarchaeologicalassociation.com.au). Key considerations include

- the relatively small size of the Australian professional community;
- communication and other problems created by the 'tyranny of distance';
- the historical fragmentation of Australian archaeology into separate spheres of practice (e.g. prehistory, historical and maritime archaeology, academic research and cultural heritage management);
- the varying roles of government agencies in regulating archaeological practice under national and state legislation;
- the competitive commercial context of most heritage consultancy work; and
- the relationship between professional archaeology and the wider public, especially Indigenous communities (Colley 2002; Vinton 2002).

Experiences from the Field/Laboratory Project course are instructive for future collaboration between universities and practitioners in training students. The high number of consultants, researchers and government agencies who offered students project placements clearly demonstrates that much goodwill for such collaboration already exists. Unfortunately, practical and institutional problems, linked to cuts in university funding, made the course in its current form unviable beyond 2002. University teachers of archaeology have long argued that professional-type training is best delivered via postgraduate coursework programmes (Colley 2002:53-4; Lydon 2002:131). Under current funding models, Australian universities now charge full fees for such courses and frequently rely on them to fund shortfalls in their operating budgets (i.e. they need to generate a profit). Teaching hands-on practical skills is relatively expensive and, given the small size of the archaeology profession, the potential market for such courses is limited. Postgraduate programmes are only a partial solution.

The Field/Laboratory Project course also demonstrated why work placement programmes are best suited to more mature, academically able and self-motivated students with a genuine interest in learning more about archaeological practical work. To make best use of limited resources, entry to such programmes could be restricted to those students who have already completed a basic programme of volunteer participation on archaeological field and laboratory work projects. This would both demonstrate the requisite motivation, and provide students with an introduction to aspects of the archaeological work environment on which they could then build. Introduction of a nationally accepted standard fieldwork experience form, of the kind already used by La Trobe University to record student participation in consultancy and other archaeological projects (Richard Mackay, pers. comm.), seems a logical first step. This would allow students to collate a nationally recognised portfolio documenting their practical archaeological experience.

The research presented here also demonstrates why attendance and participation alone do not always produce clearly defined or desirable learning outcomes. Depending on circumstances, volunteers can clock up considerable experience of archaeological fieldwork and learn relatively little. University staff already encourage students to gain archaeological practical work experience and bring their attention to volunteer opportunities by advertising on departmental noticeboards, websites and in class. For such participation to count towards a student's degree, it must be part of a university approved unit of study which complies with an increasingly regulated set of rules on contact hours, staff and student workloads, credit point ratings, and teaching and learning methods. Assessment based on clear and explicitly stated criteria is central and essential. The research presented here is relevant to the development of such criteria and accords with discussion of competency-based approaches to education and training in Australia by Gonczi (1994). He outlines three different approaches to professional competency. A behaviourist model breaks competency into atomised tasks with assessment based on direct observation of performance. In the context of the Field/Laboratory Project course, for example, a student could demonstrate to their supervisor their competency in writing a label on a plastic bag, measuring an artefact in a standard way or correctly identifying a shell, stone tool or ceramic type. Such skills are essential to archaeological competency and many respondents to the Land and Sea conference questionnaire listed very specific examples of atomised tasks they would like students to know how to do. There are several problems with defining competency in this way. As Gonczi notes, there is no concern with connection between tasks, the role of professional judgement is ignored and an unambiguous 'satisfactory performance' does not always exist. Another way of approaching competency is to list attributes of professional practitioners crucial to effective performance. Many such attributes relevant to archaeology are listed in Tables 2, 3 and 4 and have already been discussed. Examples include the ability to solve problems, to link practice to theory, to work with accuracy, to meet deadlines and to demonstrate good communication skills. Gonczi argues that while such attributes more usefully reflect competency in a professional context, they are not specific enough for design of training programmes in particular professions. He prefers a relational model of competency which links atomistic behavioural competence with generic skills and attributes for specific professional practice. For archaeology, the aim would be to identify and list specific situations relevant to archaeological work and define 'intelligent performance' in each case, in a way which incorporates ethics and values, emphasises reflective practice and the important of context, and acknowledges there may be more than one way of practising competently. Given the complexity of archaeological practice, and the wide range of skills and knowledge potentially involved in archaeological work, this is no simple matter, as is clearly demonstrated by the large scale, scope and funding base of a UK initiative to define professional functions and standards in archaeological practice linked to university education and professional training (Carter and Robertson 2002; Stephenson 2002).

Some Australian state heritage agencies have already taken steps in this direction through their standards, guidelines and policies for archaeological practice in the

context of specific legislative frameworks, such as the *NSW Heritage Manual* (New South Wales Heritage Office) and the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (New South Wales National Parks and Wildlife Service). Details of such guidelines are now widely available via the Internet as are the membership criteria of the AACAI, AIMA, Australian Association of Professional Archaeologists (AIPA) and other organisations, which are also relevant. Students aiming to enter the profession clearly need to be aware of the existence and broad requirements of such guidelines, but they don't solve the problem of how to train graduates for entry into the profession.

Analysis of student learning outcomes from the Field/Laboratory Project course in terms of the SOLO and other taxonomies shows that students' approaches and attitude were more important to learning than the highly specific practical content of their project. A key component of deeper and more holistic approaches to learning (reflected, for example, in the Relational and Extended Abstract levels of the SOLO taxonomy) is an ability to integrate a range of experiences into a coherent whole and to extrapolate from one situation to another. No archaeologist can possibly be competent in every practical skill they might encounter in their work, and expecting universities to provide students with such training is patently absurd. The key to training students is to provide them with access to a sample of practical work and professional experience which is both large and representative enough to provide a solid base for competent extrapolation. Defining such a sample is a central task of the AAA Teaching and Learning Subcommittee. Students equally need to be encouraged and supported to learn *how to learn* through teaching and learning and assessment methods such as the notebook and Learning Contract used in the Field/Laboratory Project course, and perhaps a system of coaching and mentoring as suggested in the UK (Stephenson 2002:25-29). Guiding students towards what they need to learn, providing them with access to appropriate experience, providing a framework to support students in their own learning, and assessing learning outcomes should be responsibilities jointly shared by universities and the profession as a whole.

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