Abstract: The Faculty of Health Sciences at the University of Sydney has recently undertaken significant undergraduate curriculum reform aimed at reducing the number of similar, overlapping units of study and increasing the opportunities for disciplinary mingling at an undergraduate level. This paper presents some preliminary findings concerning the impact of curriculum change in the context of a single cross-disciplinary unit of study in introductory research methodology that replaced five similar units taught in a mono-disciplinary format. The findings indicate that a significantly higher proportion of students reported satisfaction with the cross-disciplinary unit, although the student outcomes in terms of grades were not significantly different. Within the revised unit, a significantly higher proportion of students who carried out group projects with students from disciplines other than their own reported that they had developed their ability to work with people enrolled in other degree programs. These changes occurred in the context of reduced staff time required for administering several versions of similar units of study.

Keywords: curriculum change, interprofessional learning, student perception
More specifically in the health sciences, the need for an interdisciplinary focus in curriculum has been recognized as an international imperative for graduates who will eventually work together with similar (or the same) clients using professional processes directed to achieving broadly similar outcomes (Lavin et al., 2001). Adamson, Harris and Hunt (1997) surveyed graduates from five Schools of the Faculty of Health Sciences at the University of Sydney, along with academics from these Schools and workplace supervisors of graduates. The findings suggested that the curriculum was not equipping graduates with a shared understanding of professional roles, or communication skills necessary for working in the multidisciplinary environments graduates enter, and it was recommended that these shortcomings be addressed. The faculty graduate attributes also recognize the importance of a multidisciplinary perspective, noting that all graduates should be able to “represent professional and personal values within multidisciplinary teamwork context” and to take a “multidisciplinary, and biopsychosocial perspective on health and wellbeing” (Faculty of Health Sciences, 2004). Wrightson and Cross (2004), discussing the National Health Service in the United Kingdom call for teamwork to be enhanced in health professional workplaces and suggest that “outdated demarcations and barriers between health and social care must be broken down through increased interprofessional working” (p. 133). O’Connell and Pascoe (2004) note that while teamwork is an acknowledged competency for medical practitioners methods for embedding teamwork and leadership in curriculum are diverse, not easily transferable, and not well evaluated presently.

A range of educational practices variously known as “multi-professional”, “multi-disciplinary”, “inter-professional”, “inter-disciplinary”, and “trans-disciplinary” that involve academics, health professionals or students from different backgrounds teaching, working or learning together have been proposed to facilitate the development of a multidisciplinary approach (e.g. Graham & Wealthall, 1999; Pirrie, Hamilton, & Wilson, 1999). Apart from imparting skills and knowledge in a particular area, shared learning experiences have the potential to increase understanding of the roles of other professionals and promote future teamwork and cooperation between professional groups (e.g. Barr, 2003). Many interprofessional initiatives are designed with later year undergraduates or post-graduate students in mind (e.g. Leaviss, 2000; Freeth, Hammick, Koppel, Reeves & Barr, 2002). However, as Leaviss (2000) concluded from responses of final year medical, radiography, nursing, dental, occupational therapy, physiotherapy and orthoptic students following a multiprofessional workshop, negative attitudes towards other professional groups may have become “ingrained” by the final year of undergraduate study.

The Faculty of Health Sciences at the University of Sydney has taken a structural approach to the need for improved interprofessional learning opportunities by undertaking widespread undergraduate curriculum reform to increase the opportunities for disciplinary mingling at an early undergraduate level. In the first stage of undergraduate reform 29 cross disciplinary units of study in which students from a range of disciplines have the opportunity to work together were introduced to replace 100 units of study unique to individual disciplines (see Harris & Viney, 2003). The units of study were from the Biomedical and Behavioural Sciences and were generally undertaken in the first or second year of undergraduate study. A further aim of the curriculum reform process was to allow more efficient use of staff time in administering a smaller number of larger units of study.

Inquiry-based approaches to learning place greater emphasis on student autonomy, in areas such as identifying learning objectives, identifying, acquiring and using resources, and assessing their own progress than traditional approaches to curriculum delivery. Inquiry based learning accords with constructivist models of learning, where knowledge is understood to emerge when an individual actively engages with learning experiences and integrates them with existing knowledge (Hendry, Frommer, & Walker, 1999). Inquiry based learning approaches include a range of strategies that may be implemented throughout an entire curriculum, throughout a single unit of study, or in part of a unit of study, in large
and small group teaching settings, (e.g., Bebb & Pittam, 2004; DiPasquale, Mason, & Kolkhorst, 2003; Magnussen, Ishida & Itano, 2000). Inquiry based learning may therefore be understood as a broad umbrella that includes a range of learning approaches including problem-based learning and learning communities.

Everingham and Harris (2000) argued that interdisciplinary inquiry is at the forefront of a recent movement to consider knowledge creation through shared intellectual endeavour. These approaches, collectively known as ‘mode 2’, bring together multidisciplinary groups to solve problems collaboratively. This is contrasted with more traditional, discipline based ‘mode 1’ knowledge generation that may give rise to ‘compartmentalised’ perspectives (UNESCO, 1998, p24). Everingham and Harris (2000) suggested that mode 2 approaches that draw on expertise from different professional paradigms would be most suited to solving problems in health professional fields (see also Stark, 1998), and that such approaches would be facilitated by interdisciplinary and interprofessional problem solving in undergraduate curriculum. Thus it is suggested that inquiry based learning strategies appropriate to the stage of educational development can engender generic skills required by university graduates in the 21st century (e.g., IRDAC, 1990). Evaluations of projects designed to increase the likelihood that students will acquire a multi-disciplinary framework prior to graduation are relatively few (e.g., Graham & Wealthall, 1999) and Harris and Viney (2003) suggested that this was due to both the complexity of educational interventions and their proposed outcomes, and because funding for developing and evaluating educational initiatives is often limited. Harris and Viney proposed cost-consequence analysis for evaluating the impact of curriculum changes, as this requires that resource use be measured in dollar terms, but a range of measures of outcomes (consequences) are allowed. This approach is appropriate to the present context, as the curriculum reform process had the dual aims of improving the preparation of graduates for the workplaces and reducing the resource costs associated with teaching overlapping course material to multiple streams of students.

This paper presents a preliminary evaluation of the usefulness of one of the new units of study in developing a multiprofessional perspective and teamwork skills. The unit of study introduces students to research design and is taught to students from nine undergraduate programs annually (five in semester one), and most students undertake the subject in the first or second year of their programs. The revised unit of study retained the characteristic of teaching students in large lecture groups. However, the seminar program in the revised program incorporated the use of an inquiry based learning-oriented research project that was carried out in small teams of three or four students, rather than the series of individually-based exercises designed to expand lecture content areas used in the earlier units of study. Student teams carried out data collection, recording, evaluation, and report writing with the support of regular meetings with a tutor who raised issues to be considered at appropriate stages of the project. These meetings also allowed issues associated with working in teams to be discussed at the outset of the project and regularly revisited until its completion. Students were also provided with timelines for the project to ensure that milestones were completed.

The findings presented below are derived from comparisons of student perceptions of the unit of study from semester one 2004 to student perceptions of the five units of study that it replaced from semester one 1997, and from comparisons of the responses of 2004 students who, due to timetabling constraints, either had the opportunity to carry out the group project with students from their own program only (“monodisciplinary”) or in mixed groups (“interdisciplinary”). It was predicted that students who undertook the revised unit of study would report higher overall satisfaction with the unit of study. It was further predicted that while all students in the new unit of study would report that the unit of study facilitated the development of teamwork skill, those in the interdisciplinary group would be more likely to endorse the statement that the unit had developed the ability to work with people from other degree programs.
Method

Participants

Participants were 213 students from the Schools of Physiotherapy, Communication Science and Disorders, Occupation and Leisure Sciences, and Health Information Management who undertook the cross-disciplinary unit in 2004 and 282 students who undertook one of five roughly equivalent units of study (PRECDUs) in 1997 from the Schools of Physiotherapy, Communication Science and Disorders, Occupation and Leisure Sciences, Health Information Management and Applied Vision Sciences.

Procedure

1. Comparison of cross-disciplinary unit (cross disciplinary unit; 2004) and units from which the cross disciplinary unit was derived (PRECDU; 1997)

Perspective and timeframe for the evaluation. Ideally the perspective should be societal, so that the impact on resource use and consequences for all stakeholders would be identified, measured and valued (Drummond et al., 1997). Here, most of the resource costs fall within the university, and so arguably the assessment of consequences should be limited to stakeholders directly associated with the university, that is, university staff and students. As the evaluation is limited to a single unit of study, the timeframe will also be limited to the immediate time surrounding the delivery of the unit of study. Harris and Viney (2003) argued that although the new units were introduced initially in 2002, 2004 would be the earliest time at which they could be evaluated because by then they would have been taught several times, a situation congruent with that of the units of study from which they were derived.

Identification, Measurement and Valuation of Costs. The major resource costs associated with the provision of the PRECDUs and cross disciplinary units is staff time. Development and/or maintenance costs should be similar between the two alternatives. As the number of students is similar between the units of study to be compared, both time spent in the provision of lectures and seminars, and time spent on assessing student work should be roughly equivalent. However, there will be differences in the time spent on the preparation of multiple versions of unit of study outlines and multiple versions of student examinations where in all cases, the cross disciplinary unit should require fewer resources.

Measurement and valuation of consequences. It is possible to identify a range of predicted consequences of the curriculum changes that can be measured in the short term. Here, the percentage of student agreement with the following statements about the unit of study were compared.

- The workload was too high
- Overall I was satisfied with the unit of study

In addition, to verify whether student responses were affected by changes in the difficulty of the unit between 1997 and 2004 the failure rates in 1997 and in 2004 were compared.


Within the 2004 semester one cohort all students carried out a group research project as part of their learning in the unit of study. Because of scheduling constraints, it was possible to allow about half the students to carry out their research project in interdisciplinary teams, while the remainder carried out the project in monodisciplinary groups. These two sub-groups were compared in terms of their agreement with the following statements about the unit of study.
• (the unit of study) developed my ability to work as a team member
• (the unit of study) developed my ability to work with people enrolled in other degree programs
• Overall I was satisfied with the unit of study

Results


Table 1 compares responses from students in the cross disciplinary unit and from the PRECDUs. From Table 1 it is evident that while fewer students from 2004 agree that the workload in the unit of study is too high \( (X^2(2)=32.14, p<0.05) \), a higher percentage of the 2004 cohort agree that they are satisfied with the unit of study overall \( (X^2(2)=74.03, p<0.05) \). Importantly, the higher satisfaction with the unit of study was not due to changes in the grading of the unit of study. There was no significant difference between the failure rates in the unit of study in 1997 (3%) and 2004 (5%; \( X^2(2)=2.03, p>0.05 \)).

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree or Disagree</th>
<th>Neutral / Unsure</th>
<th>Agree or Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The workload was too high</td>
<td>1997 (n=213)</td>
<td>49.1</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>2004 (n=282)</td>
<td>44.1</td>
<td>35.7</td>
</tr>
<tr>
<td>Overall I was satisfied with the unit of study</td>
<td>1997 (n=213)</td>
<td>45.8</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>2004 (n=282)</td>
<td>13.2</td>
<td>40.4</td>
</tr>
</tbody>
</table>

Table 1. Percentage of students who agreed with statements concerning workload and satisfaction with the unit of study in 1997 and 2004


Table 2 presents responses of students from interdisciplinary and monodisciplinary teams to statements about acquisition of teamwork skills, working with people from other professional groups, and overall satisfaction with the unit of study. There was no significant difference in the distribution of responses to the statement about teamwork skills between the two groups \( (X^2(2)=2.94, p>0.05) \), but there was a significant difference in the distribution of responses to the statement about working with other professional groups \( (X^2(2)=18.38, p<0.05) \). As can be seen in Table 2, those in the inter-disciplinary groups were more likely to agree that they had developed their ability to work with people enrolled in other degree programs. There was no significant difference between the satisfaction with the unit of study between the two groups \( (X^2(2)=2.00, p>0.05) \).
Table 2. Percentage of students from monodisciplinary and interdisciplinary seminar groups who agreed with statements concerning teamwork, working with other professional groups, and satisfaction with the unit.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mono-disciplinary</th>
<th>Neutral / Unsure</th>
<th>Inter-disciplinary</th>
</tr>
</thead>
<tbody>
<tr>
<td>(the unit of study) developed my ability to work as a team member</td>
<td>17.9</td>
<td>28.3</td>
<td>13.5</td>
</tr>
<tr>
<td>(the unit of study) developed my ability to work with people enrolled in other degree programs</td>
<td>43.4</td>
<td>29.2</td>
<td>20.4</td>
</tr>
<tr>
<td>Overall I was satisfied with the unit of study</td>
<td>15.0</td>
<td>44.9</td>
<td>20.4</td>
</tr>
</tbody>
</table>

Summary and conclusions

This paper presents an evaluation of the impact of curriculum changes undertaken in the University of Sydney’s Faculty of Health Sciences on one unit of study that was introduced to take the place of five similar units of study. The changes aimed to improve the multi-professional learning experiences for health science students while also reducing staff workload associated with administering a range of similar units of study. The findings presented here indicate that a greater proportion of students reported that they were satisfied with the new, cross-disciplinary unit of study, and fewer perceived the workload to be too high, although the likelihood of students failing did not change.

All students in the cross disciplinary unit had the opportunity to carry out a group project and there were no differences between those who worked in monodisciplinary and interdisciplinary teams in responses to the question about development of teamwork skills or in overall satisfaction with the unit of study. However, a higher proportion of those who worked in interdisciplinary teams endorsed the statement that the unit of study had developed their ability to work with people enrolled in other degree programs.

Clearly, there are methodological limitations to the conclusions that can be drawn from these findings. Firstly, the comparison of 1997 and 2004 data involves very different cohorts of students undertaking their studies at very different times. Many factors, apart from the changes to the way the research methods curriculum was taught may have affected students responses on these two occasions and it is not intended to imply that this data can indicate a causal relationship between the changes in the curriculum
and the changes in response to items concerning workload and satisfaction with the unit. It could be argued, for example, that the curriculum was less difficult in 2004 compared to 1997, accounting for the responses to the workload and satisfaction items. However, contrary to this explanation, the failure rates were not significantly different between 1997 and 2004. Every effort was made to ensure that the groups compared in 1997 and 2004 were as similar as possible in terms of professional area of study, year of study, and overall size of the group. It must be accepted, however, that this data is not experimental, and is subject to alternative explanations (e.g., see Harris, 2004).

The data comparing sub-groups of students in 2004 is less open to alternative explanations. The allocation of the students to monodisciplinary or interdisciplinary seminar groups could be regarded as random, as it was based solely on constraints associated with the timetable. The findings clearly indicated that a greater percentage of students who carried out the group research project with students from other professional backgrounds endorsed the view that they had learned to work with students from other degree programs. This does not appear to be a halo effect, due perhaps to students in the interdisciplinary seminar groups feeling that they were receiving special treatment, as responses to satisfaction with the unit and the question about teamwork did not differ between the groups.

As noted previously skills in collaboration, teamwork, and an understanding of other disciplinary perspectives have been identified as essential for university graduates generally (IRDAC, 1990) and health science graduates in particular (Adamson et al., 1996). Graduates in health sciences typically work collaboratively in multi-professional health and community settings and generic interprofessional communication skills should arguably be at the heart of the undergraduate health science experience. Despite this, undergraduate health science students may seldom have opportunities to engage in interprofessional collaboration prior to graduation. These findings suggest that opportunities for shared learning experiences can have an impact on perceived ability to work with those from other discipline groups and the foundations of collaboration and teamwork may be laid early in the curriculum through the incorporation of peer-learning experiences. Arguably, peer-learning experiences during foundational units of study provide a basis for later, more substantive, interprofessional collaboration.

According to Bines (1992) interdisciplinarity is the use of the knowledge and inquiry methods of various disciplines to investigate or understand a problem. This, combined with a perspective of informed criticism would enable objective evaluation of multiple sources of evidence (Everingham & Harris, 2000). While a multiprofessional health sciences faculty may seem to offer a natural setting conducive to interdisciplinary and interprofessional collaborative inquiry and learning, Klein and Newell (1996) argue that decisions about the implementation of interdisciplinary approaches should be made with benefit to learning in mind, rather than advocating multiprofessional learning environments at any cost. This paper presents some preliminary findings suggesting that very simple strategies designed to bring together students from different professional groups to complete a common project have potential for bringing about changes in student experience at a very low cost.

References


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