

A broad based, grass-roots, community of practice achieving curriculum reform in first year biology

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Research scientists in higher education are accustomed to working in groups to solve scientific questions, but when dealing with learning and teaching issues, they often find themselves working alone. In response to concerns about poor student performance in a large first year biology student cohort at La Trobe University, a small group of academic staff consisting of five first year biology lecturers, a first year practical coordinator, a faculty librarian and a faculty Academic Language and Learning lecturer voluntarily formed a “community of practice” (CoP) in order to implement curriculum reform across the four first year biology subjects. Traditionally, these subjects were taught in isolation by staff from different departments, even though the student cohort was common between subjects. A lack of cohesion was not an issue for the discipline-specific knowledge; however, generic and laboratory skills such as scientific writing and microscopy were being taught using different methods, on multiple occasions, to the same students. These considerable inconsistencies caused great confusion amongst the first year students. The First Year Biology Learning and Teaching Group (FYBLTG) aims to streamline the teaching of generic and laboratory skills by working collaboratively on a whole-of-program-approach. With the benefit of a diverse range of members’ expertise, the FYBLTG has achieved considerable curriculum reform, including the development and implementation of an integrated program of training, tasks and assessment which teaches and builds the skills of scientific writing, numeracy, information literacy, practical techniques and independent study, throughout first year. A key factor in the group’s success is the sense of collegiality that comes from a grass roots CoP, working together to achieve common aims. In this paper, FYBLTG members reflect on their experiences of working collaboratively. Student perceptions of some of the interventions implemented by the group are also reported.

Key Words: community of practice, case study, curriculum reform, higher education.

1. Introduction

Australian higher education is experiencing a period of rapid change in terms of the size and diversity of the student intake, an increasing vocational focus in many courses, increased

competition between providers, and a re-thinking of the pedagogical foundations of curricula (Biggs, 2003). Many universities are in the process of overhauling their curricula in response to these changes. Determining how best to achieve meaningful, wide-reaching curriculum reform is a complex problem, requiring a coordinated effort from a range of staff. This paper presents a case study of a group of staff who voluntarily formed a “community of practice” (CoP), the First Year Biology Learning and Teaching Group, in order to streamline and develop the teaching of generic and practical skills in four first year biology subjects. The reflections of the group regarding their achievements and the benefits of working as a CoP provide an insight into the valuable contributions such groups can make to the improvement of teaching and learning in higher education.

2. Communities of practice

The concept of a *community of practice* was first introduced by Lave and Wenger in 1991 and was later further developed to describe “groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis [and becoming] informally bound by the value they find in learning together” (Wenger, McDermott, & Snyder, 2002, p. 4). While CoPs are well established in business contexts, their value as an approach to addressing learning and teaching issues in higher education is only just starting to be recognised (McDonald & Star, 2008). The 2008 HERDSA conference theme, *Engaging Communities* attracted many papers about CoPs, indicating a growth of interest in this type of collaborative practice in higher education.

CoPs vary widely in terms of their size, formality, levels of organisation and administration. In the higher education CoP literature, organisation ranges from department level (e.g. Laksov, Mann, & Dahlgren, 2008; Quinlan, 2000; Adlong et al. 2006), to faculty based (e.g. McDonald et al., 2008; Green & Ruutz, 2008) and cross-faculty groups (e.g. Ingram & Goody, 2002; James, Lefoe, & Hadi, 2004), a combination of these (e.g. Wisker 2005) and even cross-disciplinary groups from different universities (Falkner et al., 2008). While positive outcomes can be achieved at any level, a group which works with a reasonably uniform student cohort can effectively coordinate and directly target curriculum reform in a way that provides immediate benefits for students.

CoPs were originally conceived by Lave and Wenger (1991) as grass-roots organisations formed voluntarily by their members, but the potential for organisations to take a more “intentional and systematic” role in promoting and supporting CoPs is now recognised (Wenger, McDermott, & Snyder, 2002, p. 6). While some CoPs, such as the group described in this paper, form voluntarily in response to a mutual desire to address a common set of problems, there are several recent examples in the literature of a more systematised approach to the formation and administration of CoPs in higher education (see e.g. Ingram & Goody, 2002; Laksov, Mann, & Dahlgren, 2008; Wisker 2005). In some cases, they are instigated by academic developers in centrally based university Teaching and Learning Centres as part of academic staff development.

Given the increasingly volatile nature of Australian university environments, it is not surprising that the success of CoPs in higher education has been mixed. While there are some examples of successful higher education CoPs in the literature (see Adlong et al., 2006; McDonald et al., 2008; Quinlan, 2000; Sankey & Lawrence, 2008) others have been less successful or unsustainable. External factors have been cited as a cause of tension in CoPs. For example, King and Churchman (2008) describe the “devaluing and disestablishment” of a once successful CoP due to the management directed abolition of the Problem Based Learning curriculum that instigated the CoP’s establishment. A bottom-up approach, where academic staff take ownership of the process and responsibility for coordinating their own activities, is a critical element of successful CoPs (Quinlan, 2000). In the following section, we present our approach to curriculum reform and our reflections on the achievements and benefits from working in a diverse CoP.

3. The First Year Biology Learning and Teaching Group – A diverse community of practice

At La Trobe University's Bundoora campus, staff teaching biological sciences at the first year level were faced with many challenges resulting from an increasingly diverse student cohort. In response to this, the coordinators of the four first year biology subjects decided to form a CoP, which they called the First Year Biology Learning and Teaching Group (FYBLTG), and to include not only the unit coordinators, but also a practical coordinator, a faculty librarian and a faculty Academic Language and Learning (ALL) lecturer. Being accustomed to working in research teams on problems in the biological sciences, the unit coordinators saw this type of collaboration as a natural way to tackle learning and teaching problems too.

Underlying the FYBLTG's approach to teaching and learning was a shared commitment to critically reflect on the current curriculum and explore different options that would achieve better learning outcomes for students. Individual reflection on teaching serves as "a mechanism for turning experience into knowledge about teaching" (McAlpine & Weston, 2000, p. 364). When improving the quality of teaching and learning is viewed as a collective responsibility (Biggs, 2003), the sharing of these critical reflections becomes a powerful driver of curriculum reform, especially when these reflections come from diverse teaching perspectives. Collaborations between ALL advisors, faculty librarians and discipline lecturers usually occur on a small scale, for example one ALL lecturer and one discipline lecturer (e.g. Brackley & Palmer, 2002; James, Skillen, Percy, Tootell, & Irvine, 2003; Catterall, 2008), with a focus on a single subject. The unique feature of the FYBLTG is the composition and diversity of the group members. We believe this is one of the critical reasons for the success and effectiveness of the group. Each member of the group brought along their specific expertise and contributed to the functioning of the group in different ways.

Drawing on experience from one-to-one teaching, the ALL lecturer brought insights into the aspects of study with which students struggle, along with a broad knowledge of academic language and study skills. Both the ALL lecturer and the librarian assist students from across the faculty (not just biology students), and so have a broader view of faculty-wide issues and curriculum. The librarian also brought a knowledge of how students locate and evaluate different types of information, as well as a knowledge of the diversity of library programs. The discipline lecturers brought an overview of the curriculum of subjects and an understanding of the logistics of implementing curriculum reform. Discipline lecturers also had an understanding of faculty and university teaching and learning policy and the authority to make changes within individual subjects. One of the practical coordinators was responsible for trialling new FYBLTG initiatives in one of the biology subjects and provided evaluative feedback to the group. One discipline lecturer also took on the role of organising and chairing the regular meetings and produced minutes to keep track of progress made on discussion items and projects.

3.1. A process-focused "skills-based pedagogy"

The FYBLTG adopted a process-focused "skills-based pedagogy" (Star & Hammer, 2008) which goes beyond the false dichotomy of skills versus content. All too often, generic skills are seen as isolated from content, and thus not the responsibility of discipline lecturers (Star & Hammer, 2008). There is also the perception that students will somehow pick up these skills without explicit teaching, so that by the time they graduate, they will have the desired outcomes of discipline content knowledge and graduate attributes. This skills/content dichotomy assumes not only that skills can be taught in a "content vacuum" (Huijser, Kimmins, & Galligan, 2008, p. 24) but also that the learning of content does not require the development of these skills. Many of the skills students require at first year level are those that enable further learning. These enabling skills include academic literacy and language skills, information literacy, discipline specific practical skills, and independent learning skills. In first year, teaching content without attention to the skills needed to grasp it may hamper students' ability to develop an adequate understanding of the key foundational concepts in a discipline.

Traditionally, the four first year biology subjects were taught in isolation by staff from different departments (biochemistry and genetics, botany and zoology), even though the student cohort was common between subjects. A lack of cohesion was not an issue for the discipline-specific knowledge, however, generic skills such as scientific writing, and laboratory skills such as microscopy were being taught using different methods, and on multiple occasions to the same students. These considerable inconsistencies caused great confusion amongst the first year students and inadequate development of these skills was identified as a barrier to student success. The FYBLTG recognised the need to embed the teaching of skills within the curriculum. The group took a whole-of-program approach and worked together to streamline and embed the teaching of generic and laboratory skills.

3.2. Curriculum reform achievements

The FYBLTG has achieved considerable curriculum reform, including the development and implementation of an integrated program of training, tasks and assessment which teaches and builds the skills of scientific writing, numeracy, information literacy, practical techniques, and independent study, throughout first year. Curriculum changes and the provision of support material has been coordinated, so that students are introduced to appropriate skills in a planned and organised way, and these are reinforced throughout the four subjects in first year biology. The effect of the new scientific writing program on student performance and perception of the curriculum is documented elsewhere (Blanksby et al., 2009). The new program achieved a substantial improvement in the student perception of the curriculum, and by the end, a large proportion of students (73%) believed that they had learned to write scientifically (Blanksby et al., 2009).

Key features of the new writing program which resulted from the collaboration of the Librarian, ALL and discipline lecturers were a Scientific Writing Workshop and the *First Year Biology Communication Skills Manual*. The workshop taught students paraphrasing, report writing and referencing and was run early in semester one, prior to the first written assessment tasks. An online version of the workshop was also created so that the material would be available for review throughout the year. The *First Year Biology Communication Skills Manual* clearly stated expectations, formatting and referencing requirements for reports as well as detailing a consistent style for all first year biology reports. A 25% improvement in the proportion of students who thought that they got a lot of help and advice on learning how to write scientifically and were confident of the standard of work expected of them was found in response to the new curriculum, compared to previous years (Blanksby et al., 2009). Individual responses to open-ended questions about the new Writing Skills Workshop confirmed this: “*It gave me an insight as to how to write scientifically. What to do as well as what not to do*” (Blanksby et al., 2009). A high proportion of students (86%) found the *First Year Biology Communication Skills Manual* helpful, and individual comments included: “*It’s awesome ... Wouldn’t have made it through without it*” and “*... I find it to be a bible of sorts*” (Blanksby et al., 2009). In 2009, the *First Year Biology Communication Skills Manual* was revised with the addition of new sections focusing on independent learning skills and statistical hypothesis testing. Because of the widened focus of the content, the 2009 manual was rebadged as the *First Year Biology Survival Guide*.

3.3. Benefits of working collaboratively in a community of practice

Seven of the eight members of the FYBLTG completed a questionnaire asking them to reflect on the experience of working in a CoP. The questionnaire comprised six questions:

1. How has the FYBLTG contributed to curriculum reform in first year biology?
2. What are the benefits of this reform for students?
3. Describe any changes you have made to the way you teach or what you teach as a result of being a member of the FYBLTG.
4. Describe how being a member of the FYBLTG has impacted your working life.

5. How has collaborating in a diverse “community of practice”, (i.e. discipline lecturers, faculty librarian and Academic Language & Learning lecturer) developed your knowledge and understanding of teaching and learning?
6. Can you see any wider benefits for the Faculty of Science, Technology and Engineering arising from the work of the FYBLTG?

The following extracts from questionnaires focus on the reflection of group members on their experience of working in a community practice.

3.3.1. Learning from each other

Group members valued the opportunity to learn from other members of the group and particularly valued the different insights brought to the group by the diversity of its members.

“Having others who have diverse skills and approaches has been extremely useful in finding solutions to perceived first year learning difficulties. Finding ways of achieving these solutions, applying for grants, sharing information and resources, motivating others and being motivated to push for first year resources by gaining acknowledgement of these issues from management has been effective.” [R5]

“I learned new ways to do things by listening to other staff talk about what has worked or hasn’t worked for them.” [R1]

“The nice thing about this group is we seem to be able to play different roles depending on what we are working on. I love the collaborative nature of the group.” [R6]

3.3.2. Achieving curriculum reform:

It was clear that members valued being part of a group as a means to motivate them to achieve change.

“Being part of an enthusiastic group has maintained the motivation to really tackle some important curriculum issues.” [R6]

“FYBLTG has motivated me to look at other units [subjects] and to try alternative methods for approaching assessment and delivery of the unit content.” [R5]

“I feel like we can actually achieve big changes by working together. Being part of the group has changed my perception on what is achievable in curriculum reform. I feel much more positive about it being able to make change happen than I did before joining the group.” [R1]

3.3.3. Deeper understanding of student learning issues

The diverse backgrounds of the group members substantially contributed to a much deeper understanding of the first year student perspective. Chanock (2007) argues that individual consultations with students are a valuable way to gain insights into students’ problems and misconceptions and that these insights can have broader applications to inform other modes of teaching. Through listening to students in one-to-one consultations, the Academic Language and Learning lecturer in the group had gained valuable insights into the difficulties faced by first year students in coming to terms with tertiary academic expectations. Passing on this information to the group enriched the members’ understanding of the academic challenges students face and informed decisions about the necessary level of scaffolding students require to develop their skills. This knowledge was particularly useful when designing the content of the *First Year Biology Survival Guide*. For some members, the increased understanding of the student perspective resulted in a transformation of their approaches to learning and teaching.

“The FYBLTG group has made me aware of the shortcomings in our expectations for first year biology students. We expected a certain level of

understanding and experience regarding report writing, paraphrasing etc., but first year students appear to require more information and direction in these areas to complete them competently.” [R7]

“It has been very valuable to hear about the student (and their trials and tribulations) from a different perspective. I think about the student more holistically now – before it was all about what I wanted them to learn (content!). Now I’m more aware of the whole package: their preconceptions of University life coming into first year, study skills they need to learn, different approaches that work for different students, getting students to be active in their learning. Now when I make decisions about what I’m going to teach and with what method – there is a lot to consider.” [R1]

“Has made me realise the importance of embedding generic skills in content – not just presenting it as an add on with no context for how this applies to the course content and assessment.” [R4]

3.3.4. Improved workplace satisfaction / collegiality

Wenger, McDermott, and Snyder (2002) highlight the value of learning together in a CoP, resulting in group members’ “personal satisfaction of knowing colleagues who understand each other’s perspectives and of belonging to an interesting group of people”. We feel the personal value of working together in a team to achieve common goals can not be understated. Several of the group members commented on an improved sense of their role and purpose in the workplace.

“I really like the collegiality of the group. I feel like I belong and I contribute to something significant that has a big impact on lots of students. This positive feeling makes for a happier workplace.” [R1]

“I don’t feel so isolated anymore. Not being part of a lab, tends to isolate you in a university where research is the key thing. It is great to meet with colleagues who appreciate the importance of teaching.” [R6]

“Being part of the FYBLTG has made me feel more a part of the faculty, and the collegiality of the group has a lot to do with this.” [R3]

The regular interactions and collaborations between members of the group improved communication between all staff involved with the four biology subjects and created a collegial working environment. The collegiality was recognised as important for creating a more rewarding workplace.

“It has been great to get to know other academics working with similar teaching and admin challenges and simply getting on with finding solutions to the communal difficulties has been very rewarding. I now know several other people on campus that are not within my department and not in my discipline that otherwise I would not have met. In particular the interaction with Albury/Wodonga [campus] would likely never have happened but for the motivation and energy of the FYBLTG.” [R5]

3.3.5. Professional development

One unexpected benefit of working within this CoP was the professional development of some members working within the group. A better understanding of the current issues in teaching and learning in higher education and a recognition of leadership in teaching and learning were two features of professional development which were highlighted.

“I have become more familiar with the Learning and Teaching literature through my involvement in writing papers about the groups’ activities.” [R3]

“It has been a stepping stone for a career shift towards a bigger focus on teaching and learning. Through my involvement in the group I have been invited to join other teaching & learning committees (such as Faculty Academic Board) and have the opportunity to make a difference by being involved with decisions on how money is spent on teaching & learning projects.” [R1]

“I am sure the work we have done in the group has helped me become the Faculty Scholar for this year.” [R6]

3.3.6. Benefits beyond first year biology

The La Trobe University community were made aware of the achievements of the group through dissemination of the minutes of the meetings and presentations made to Faculty Teaching and Learning Colloquia and the annual La Trobe University Teaching and Learning Colloquium. The work of the group is highly regarded by the wider university community in two ways. Firstly, some of the resources developed specifically for biology students have been recognised as valuable and effective and are being explored as models for use elsewhere in the Faculty.

“Promotes FSTE [Faculty of Science, Technology and Engineering] as proactive and committed to improving the first year student experience.” [R4]

“Already you can see the ripple effect of our group ... we are starting to share our experiences within the Faculty and there has been quite a bit of interest in the FYB Survival Guide and its possible application to the wider group.” [R6]

Secondly, La Trobe University is currently undergoing a period of significant curriculum review and renewal and the FYBLTG has been identified as “a model for organisation of effective teams of staff” working towards curriculum renewal in higher education.

“Our group has been referred to as an exemplar for working groups.” [R6]

The following statement was written by the Associate Dean (Academic) of the faculty (extracted from the Firm Foundations curriculum review project proposal).

“Over the last two years unit co-ordinators in first year biology at La Trobe have formed a working group to address issues across the first year biology suite of subjects. This has proved to be a powerful staff grouping particularly since it was created by its members who are all passionate about this area of teaching. This group provides a model for organization of effective teams of staff.”

4. FYBLTG – a model for achieving curriculum reform?

In the light of the 2008 Bradley Review of Australian Higher Education, it is likely that universities will come under increasing pressure to compete for students under a “demand-driven entitlement system” (p. 158). As Australian universities become more competitive, the need for an attractive, flexible and dynamic curriculum will become paramount. Higher education institutions will need to equip academic staff with the necessary skills and knowledge in order to reform their curricula as quickly and effectively as possible. Existing top-down initiatives such as centrally managed, generic professional development courses and workshops have had limited success (Viskovic, 2006), particularly those that adopt a “deficit model of staff development” (Trowler & Cooper, 2002, p. 235). Green and Ruutz (2008) argue that “formulaic, top-down approaches” are not appropriate because they fail to take into account “the complexities of the organisational environment and the inextricable link between disciplinary knowledge and identity” (p. 1).

CoPs in higher education have been suggested as a potentially more effective way to improve teaching and learning and achieve appropriate curriculum reform, particularly because they are able to adapt to rapid changes (Cox, 2006). However, taking a more systematic approach to establishing CoPs presents a difficult dilemma. When a CoP forms voluntarily, the resulting collegiality and common sense of purpose can be an important part of the group's motivation to achieve change. Any efforts by "outsiders" to systematically foster the formation of CoPs could destroy the benefits of voluntary participation in the group. However, Wenger, McDermott, and Snyder (2002) suggest that organisations *can* effectively cultivate CoPs in a systematic way and still preserve a group's autonomy. They use the analogy of cultivating a garden where healthy growth can be encouraged by creating the right environment to nurture growth and provide protection from harmful external factors. They argue that organisations must provide the necessary time and resources to encourage staff to form and participate in CoPs and then nurture them by giving them a voice and valuing their achievements without destroying their autonomy.

The experiences and insights of the FYBLTG could help to inform decisions about promoting the establishment of further CoPs at La Trobe University or at other higher education institutions. While top-down staff development tends to focus mainly on developing the skills of the teacher, the FYBLTG targeted its interventions based on the needs of a common student cohort – first year students studying one or more first year biology subjects. This approach is in line with Biggs (2003), who suggests that there is a hierarchy of pedagogical attitudes ranging from a focus on "what the student is" to "what the teacher does", and finally "what the student does". Biggs argues that good teaching needs to focus mostly on the last of these and that a "blame the student" or "blame the teacher" attitude is unlikely to produce the best outcomes for students. The FYBLTG's focus on students' learning needs as the primary driver for change has allowed us to build an integrated curriculum which systematically develops the required enabling skills needed in first year biology. The student-centred approach to curriculum reform has been enhanced by the FYBLTG members' diverse perspectives on the first year experience. The difficulties facing students in first year are complex and have various sources. The inclusion of a faculty ALL advisor and a faculty librarian who work with students one to one has given the group a deeper understanding of the multitude of factors affecting individual student performance.

5. Conclusion

CoPs show great promise as a way of improving teaching and learning in higher education. The experiences of the FYBLTG demonstrate the many benefits of working in a diverse CoP for staff, students, and the university, and as such the group can be seen as a model for the establishment of CoPs working on curriculum reform. While we believe that promoting further CoPs in the university is advisable, care must be taken to ensure that such groups are cultivated and nurtured in a manner which allows for flexibility, a sense of autonomy, and ownership of aims and outcomes.

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