Discussion paper

Development and successful implementation of a new Work Integrated Learning course in Food Technology with strong industry involvement

Bee K. May and Darryl M. Small

Abstract

Quality Assurance for Industry (ONPS2054) is an undergraduate course which incorporates RMIT University’s recommended approach to Work Integrated Learning, defined broadly as learning by doing in a realistic work situation, in conjunction with work relevant interactions and industry feedback. The course provides a carefully structured practical experience for Food Technology students in the final semester of their degree program. The objective is to draw together the knowledge and skills acquired during the previous five semesters so that students develop and implement a quality assurance manual for a specific food product by working closely with industry representatives in a practical food processing environment. For students, the course requires planning, careful documentation of procedures, as well as teamwork and leadership skills with a strong emphasis on food safety. This authentic work integrated learning experience is now being run for the sixth time and has very strong involvement of leading industry representatives and has consistently received excellent feedback from both students and employers. It is equipping students with the skills required in the workplace and RMIT is increasingly seen as the leading provider of “work-ready” graduates in Food Technology.
Introduction

A number of studies have highlighted the benefits, desirability and future directions of Work Integrated Learning (WIL) as a way to significantly influence the student learning experience. For example, Murphy and Calway (2006) explored WIL as an appropriate educational philosophy to enhance the careers of professionals by recombining learning that incorporates hands-on work experience with the real world in a single educational paradigm. Another term that has been used in this context is authentic learning (Radinsky et al., 1998). The Australian higher education sector has been under increasing pressure to demonstrate that their degrees generate work-ready graduates who have a combination of content knowledge and employability skills particularly communication, team work and solving problem thereby enabling effective professional practice (Patrick et al., 2008).

The term WIL may be used to describe a very wide range of activities, ranging from those that involve only work placement, to any learning activity in a local context that is linked to work or a particular workplace. At RMIT University, the distinctive feature of WIL is described broadly as ‘learning by doing’ – directly involving a realistic work situation along with work relevant interactions and industry feedback (RMIT, 2008). Quality Assurance for Industry (ONPS2054) which is offered by the School of Applied Sciences in the Food Science Discipline (Food Technology and Nutrition program) is a final year component of the Bachelor degree that incorporates this approach to WIL. Students participate in the actual work of a professional community and engage directly in the target community. This is authentic learning and the approach we have developed and implemented is summarized in Figure 1. The three horizontal “swim lanes” represent each of the groups (students, facilitator and industry) that participate in the process, while the four vertical boxes crossing the lanes represent the stages of the process. The small rectangles represent the process steps and the connecting arrows indicate the direction of process flow.

Approaches to the WIL model

In this course, we are particularly committed to designing a learning environment for students that enables them to experience the real world of work. This is done by integrating a series of structured activities into the
**Curriculum.** The components are lectures, workshops, fine-tuning practical sessions followed by a practice scale-up session before the production run and final assessment which is carried out in direct partnership with industry. We achieved this by using the pilot plant at RMIT as a “factory” where students become engaged as employees in the mass production of a high quality, safe food product and where assessments are carried out in partnership with experienced industry personnel.

Our model of WIL, used for ONPS2054, is aimed at integrating Contextual Learning which contributes to student learning (McLennan, 2008) with Supervised Experience and to draw on these work experiences when back in the classroom as outlined in Figure 1. The “context” is provided by the pilot plant, which is set up as closely as possible to a real-life production environment. Students, working in teams, participate in “contextual learning” in the pilot plant during both the development and production stages. Each team brings their “real life experience” into the classroom by Supervised Experience, which occurs in the development and production stages (Figure 1). Professional practice is an integral aspect of the course as is assessment by industry and facilitator.

This unique model produces students who are proactive in their learning, especially as they can see where to apply this learning in their career. The approach motivates and inspires the students to learn as demonstrated by 83% of the students who agreed or strongly agreed that “I can see how I’ll be able to use what I am learning in this course in my career”. In addition, the strong industry presence in their learning and exposure to current industry practices enhances employability, providing marketable job skills as well as clarification of career goals. Many students have given very positive feedback on this course particularly after they have commenced work in the industry. One example is that provided by an international student:

“...The work integrated learning (WIL) component of this subject is an excellent way to expose students to the system frequently used by the food industry to manufacture food products to the highest safety and quality standards. In a world where practical experience is much more important than theory, this subject provides a great practical experience for students whom mostly have very limited contact with the food
industry. In fact, many students who graduated in 2010 have gone to work in quality assurance ....” (Graduate, 2010)

Development of the curriculum

A career in food technology requires a thorough understanding of both the underlying principles (scientific and technical aspects) and practical experience of the profession. The technical aspects are usually complex and are taught by introducing different parts separately, in a series of courses, at different year levels and by different educators. In this undergraduate degree (BP199) ONPS2054 is designed as a capstone course with the opportunity for the students to see how the different courses “come together”. For example, students are expected to draw technical knowledge learnt from other courses especially Carbohydrates, Proteins and Lipids in Food Science courses, Food Chemistry and Food Microbiology to solve problems encountered during the production of the food product.

The emphasis of ONPS2054 is on learning how to be job-ready as a Food Technologist with the role of Quality Assurance Officer in the food industry. The curriculum is designed to meet Food Safety Standards using Hazard Analysis Critical Control Point (HACCP) principles that are internationally recognised and widely used to meet industry needs. Our model of WIL specifically makes use of relevant resources; in particular the pilot plant and high-calibre industry leaders. The pilot plant as described in the previous section is to provide a “real world” flavour. Specialised lectures are delivered by industry leaders who are identified through the Program Advisory Committee as well as the University’s networks with industry and ongoing contact with former graduates.

In addition, generic skills including teamwork; time management, analytical skills and both written and oral communication are incorporated into the curriculum and are widely applicable. For example, as the workload for the development of the manual and mass production of the specific food product are high, students have to learn to work in groups, typically of four, to accomplish the tasks. Working in teams usually results in situations where students encounter the joy of collegial support, the difficulty of conflicts, and in particular, experience the challenges of handling different situations to achieve the best possible outcomes in the required time frame. Support for team-work is discussed further in a later Section.
Our command of the field, as reflected by the curriculum development and resources is evidenced by the high number of graduates who are highly sought after and offered jobs as Quality Assurance Officers within a few months of graduation and, in some cases, as a Quality Assurance Manager in the food industry. As one recent graduate wrote:

“...Thank you very much. I have learned a lot from the course. The QA course successfully helped me in setting up quality plans and achieving HACCP certification for the business… has prepared me well for this job…the details required from developing the manual was exactly what the industry expected …great practice and preparation for the industry…”

In terms of benefits to the food industry, we are training future employees with a high level of competence as demonstrated by the excerpt below of feedback from an industry consultant:

“…RMIT food technology graduates are invariably ‘first’ choice; even final year students are constantly being sought initially for part-time positions. In contrast, current food science graduates from other Victorian universities working in the QA departments of food companies fail to demonstrate similar competence in QA as they have had no practical training in this discipline included in their degrees…”

**Development of students as individuals**

When the staff of the Food Science discipline were first given the responsibility, in 2006, of designing and developing ONPS2054 as a new course for a new degree program in Food Technology (involving a reduction from a 4- to a 3-year degree), we realised the task would be very challenging and this was confirmed by the relatively low Good Teaching Score of only 45.7% for our first attempt! We knew we had to listen and learn from the students. In listening, especially through the many interactions we had with students in class, during practical sessions, workshop discussions, the formal Student Staff Consultative Committee and incidental conversations, we learnt that one key missing ingredient with our approach in designing this course was to provide support for the development of students as individuals. The needs of each type of learner needed to be accommodated. A particular issue was that the class included a high proportion of international students (approximately 50%), from many and varied backgrounds, having specific needs and requiring appropriate
respect and support. We have also found that the key factor in determining the satisfaction levels of students in this course is their experience of teamwork. For example, a group of 3-4 individuals trying to work together for 13 weeks, where a high degree of interactions and tight time-lines are expected, can readily cause unpleasant conflict. We actively encourage and support the contribution of each student to the resolution of such difficulties as would be done by teams and good managers in industry situations.

Mastering people skills and learning to work as a team is a life-long experience and this course provides only a taste of what these students will encounter when they enter the work force. From the outset, we have endeavoured to address team issues by providing documented examples of those experienced by teams in previous years and providing strategies of how to address these issues during a workshop session. In particular, we emphasise the importance of mutual respect by formulating a “Team Learning-in-Action Contract” in which each individual states their expectations, agrees on a set of team values and keeps a weekly reflective journal on how they have handled people-skills issues. Students are encouraged to review this Team Learning-in-Action Contract on a regular basis. In the operation of this course, it is made clear that “free-rider” behaviour is not accepted by staff and most students actively support this. In order to provide strong reinforcement, and with strong student support, each individual is required to submit a confidential peer evaluation form at the end of the semester. This allows confidential identification of other team members who have not contributed fully to the achievements of the group. This provides further incentive to contribute and assessors have a means to deduct marks from students who attempted to minimise their input, thereby effectively overcoming one of the common problems encountered in group work.

In the evaluation surveys completed each year by the students, the Good Teaching Score improved significantly from 2006 and over the previous three years (2008, 2009 and 2010) to an average of around 76% (Table 1). However, it is important to bear in mind that these surveys were taken around week 10 of the semester when the students had not experienced the highly empowering feeling of successfully producing a safe product based on the QA manual they have developed. In addition, the final part of the performance was to face the industry panel with their finished product and QA manual in the final assessment in week 13. We were confident that the Good Teaching Score and Overall Satisfaction Index would increase further if the students were to evaluate the
course after they had completed all aspects of the course. This occurred in 2011 and both the Good Teaching Score and the Overall Satisfaction Index increased substantially (to 84.1 and 93.5% respectively).

**Assessment and feedback**

During week 1 of the semester each student is provided with a ten-page document which clearly defines intended learning outcomes, including the generic capabilities. Assessment is also fully described and is closely aligned with both the intended outcomes and the practical experiences that the students carry out. However, there is also flexibility for recognition to be given for additional innovative efforts by the students, so that although they are provided with a formulation for the product they are to produce, if they refine or enhance this during their practical sessions then the marking can take account of the initiative shown.

As an example of the approach to assessment, one of the aims of the course is to evaluate the ability of each team to identify problems during fine-tuning sessions (carried out in the pilot plant) and to propose short or long term solutions as appropriate to demonstrate their understanding of the processes involved. Each team is assessed on key aspects of the HACCP principles for making a safe and consistent product, and is also encouraged and required to identify limitations of the facilities available within the pilot plant and propose potential solutions. In particular they have to pay attention to compliance with food safety and hygiene principles, as well as with OH&S practices, and show a command and good comprehension of food science principles.

We encourage students to be proactive and show initiative and interest in both their own and team learning. For example, in Week 8 where the instructors have the first interview with each group, we provide feedback on the status of their manual and also whether they are on track to progress to the next stage where their allocated product is to be mass produced. The impact of the feedback on student learning was that those who were doing well were encouraged to do even better while those who needed to “get their act together” were motivated to put more effort into improving their manual. In our experience, no group wants to miss out on the mass production of their product. The positive impact of the feedback is clearly demonstrated in the responses of students to the formal Course Evaluation Surveys (Table 1). These surveys are carried out independently of
teaching staff each year and the trends reflect the efforts made to refine the course since it was first presented in 2006. The positive responses of students regarding feedback (question 5 on the surveys) improved from 39 to 75%. This is particularly significant as it occurred when the numbers of students in the class rose from 39 to 63; and we had to provide effective feedback within an ever decreasing staff time. In addition to the feedback in week 8, we provided feedback for the class as “common mistakes observed”, after each fine-tuning session. These were posted on the website for this course and students found the feedback particularly helpful as it increased awareness by highlighting areas for improvement before the mass production run and the associated assessment.

The teaching staff are facilitators who provide students with knowledge during the lectures and assist them in drawing their own links and arriving at their own understanding especially during the workshop sessions. Often we act as enablers where we provide contextual examples of application of principles in an industry environment. A key feature of Quality Assurance for Industry (ONPS2054) is that students undertake and are assessed on a structured activity, which is based on the development of a procedures manual for a specific food product in workshop sessions followed by implementation of a scaled-up production to evaluate the clarity and transparency of the documentation and finally the very proud moment for the students when the group finally produces their finished food product. One of the most exciting experiences for the students is having a face-to-face interview with the industry panel; feedback from industry is integral to each student’s learning experience.

**Conclusion**

We have described how our undergraduate offering Quality Assurance for Industry has been designed as a WIL course, based on the model of integrating Contextual Learning with Supervised Experience and to draw on these work experiences when students subsequently returned to the classroom. Our model of WIL has consistently achieved excellent student learning outcomes with highly positive industry feedback.
Acknowledgements  Many people have provided support and contributed to the development and implementation of the WIL course. We are particularly grateful to the Program Advisory Committee (representing various parts of the food industry), for their encouragement and participation, to Soonlee Eu who has provided industry involvement over the last three years of this course, to Prue Bramwell who presents lectures in some aspects of the course (RMIT) and to Lillian Chung (RMIT) for her role in facilitating the practical sessions of the course.

References


Figure 1: A schematic representation of the operation of the RMIT Work-Integrated Learning course for Food Technology
Table 1: A summary of key responses of students in the Course Evaluation Surveys since the commencement of the WIL course at RMIT

<table>
<thead>
<tr>
<th></th>
<th>Surveys conducted in class by an admin staff in week 10</th>
<th>Surveys conducted online at the end of the semester</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2006</td>
<td>2010</td>
</tr>
<tr>
<td>Number of surveys completed</td>
<td>39</td>
<td>63</td>
</tr>
<tr>
<td>Student enrolment</td>
<td>42</td>
<td>66</td>
</tr>
<tr>
<td>Good Teaching Score (%)</td>
<td>45.7</td>
<td>76.4</td>
</tr>
<tr>
<td>Overall Satisfaction Index (%)</td>
<td>-</td>
<td>80.3</td>
</tr>
<tr>
<td>Q5 (The teaching staff normally give me helpful feedback on how I am going in this course) (%)</td>
<td>39</td>
<td>75</td>
</tr>
<tr>
<td>Q18 (I can see how I'll be able to use what I am learning in this course in my career) (%)</td>
<td>74</td>
<td>83</td>
</tr>
</tbody>
</table>

Note: Responses represent the proportion of students providing positive answers. The Good Teaching Score is composited from responses to a series of questions regarding teaching.