

فائدة دمج التعليم الخدمي في برنامج الدراسات العليا لتخصصات تكنولوجيا المعلومات

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من الضروري أن لا يقتصر اهتمام طلبة تكنولوجيا المعلومات بالجانب التقني فقط؛ بل يجب تمكين الطلبة من صقل المهارات اللازمة للعمل في البيئة الحقيقية للتخصص. مع العلم بأن الطالب يقوم بعمل مشاريع صغيرة ودراسات تساعد في هذا الجانب، وجميعها أعمال ورقية ووظائف لاستكمال متطلبات المادة، لكن العمل في بيئة حقيقية ومشاريع واقعية تخدم المجتمع سيكون لها تأثير حقيقي على مهارات الخريجين بلا أدنى شك. إن ربط الخريج مع المنظمات المجتمعية غير الربحية يعد واحداً من أهم الطرائق التي يجب على المؤسسات الأكاديمية أن تتبناها؛ للمساعدة في تنمية مهارات الخريجين في مجال تكنولوجيا المعلومات بشكل خاص. وتسمى هذه الطريقة بالتعليم الخدمي والتواصل المجتمعي. وسنستعرض في هذا البحث استخدام التعليم الخدمي في برنامج الدراسات العليا لتخصصات تكنولوجيا المعلومات بشكل عام. وهذه الطريقة في التعليم لا تهدف إلى فائدة الطالب وتطوير مهاراته فحسب؛ إنما تساعد منظمات المجتمع المحلي غير الربحية كذلك في تأدية واجباتها تجاه المجتمع.

finding to installation with the short period allocated. Finding such organisations requires the university department to have good personal links within the community.

Support of all academic staff, for technical assistance during the semester and help in assessing the module at the end of term ensures a supportive environment to encourage learning. It is also helpful to have the support of college authorities in using service learning as part of an academic programme. This can mean that not only is any module incorporating it recognised and applauded, but support is also available in establishing links, encouraging staff and advising when problems arise. In MIT, engaging with the local community is recognised as an integral part of a staff member's career path and is required for promotion.

The academic supervisor needs to balance a number of factors to ensure students are given freedom to learn on their own terms. The module brief given initially should be loose enough to allow them to apply the appropriate range of skills, and yet structured enough to form a formal academic syllabus. Supervision must be minimal, with responsibility for all interpersonal communications lying with students and marks allocated for this being done successfully.

Conclusion

Using Service Learning to provide clients to student groups enables academics to combine the taught subject matter on a computer science degree in a novel and practical manner. It also allows the students to put into practice their professional skills in dealing with uncertain situations.

Service Learning has the added benefits of giving not-for profit groups resources to which they might not otherwise have access, while raising awareness in the student of the benefits of civic involvement.

References

1. ACM SIGITE Curriculum Committee report, 2005.
2. Adams, J. B. and Runkles, E.R. "May we have class outside?" Implementing Service Learning in a CS1 Curriculum, *Journal of Computer Science in Colleges*, 19, 5 (May 2004), 25 – 36.
3. Chaytor, L. Urban Empowerment: A Successful Example of Service Learning. In Proceedings of the CITC conference (CHI '00) (Lafayette, Indiana, USA, April 1–6, 2003). ACM Press, New York, NY, 2000, 226– 230.
4. Dark, M. Civic Responsibility and Information Security: An Information Security Management, Service Learning Course, InfoSecCD Conference, October 2004
5. Jamieson, L.H. Service Learning in Computer Science and Engineering Workshop, SIGCSE 2002
6. National University of Ireland, Galway, Academic Plan 2003 – 2006.
7. Sanderson, P. & Volmmar, K. A Primer for Applying Service Learning to Computer Science SIGCSE 2000
8. Traynor, C. and McKenna, M. Service Learning Models Connecting Computer Science to the Community, *Inroads – The SIGCSE Bulletin*, 35,4 (December 2003), 43 – 46.
9. Francisco Amat, and Moliner Miravet "Service-Learning in the university: building citizenship" University Jaume (SPAIN), ICERI2013 Proceedings 2013, Pages: 5653–5661.
10. Roshanak Roshandel, Jeff Gilles, and Richard LeBlanc" Using community-based projects in software engineering education", IEEE, Conference on Software Engineering Education and Training, 2011
11. Jill E. Stefaniak, "The implementation of service-learning in graduate instructional design coursework" *Journal of Computing in Higher Education* , January 2015.

through from initial idea to concrete product, integrating the topics of their coursework. They have also exercised their professional skills in managing meetings, presenting outcomes, producing reports and adhering to a project plan of their own devising. In doing so, they have learnt to work as team and negotiate the allocation of work. It is difficult to consider how all of these outcomes could be achieved through a contrived paper exercise.

In the industrial internship during the second year of their programme, MIT students are often placed in the IT department of a leading public or private organisation. They work among people with very often similar backgrounds to themselves, graduates who are comfortable with technology. Their task there is often to implement leading edge technical solutions to business problems, partaking in the creation systems which have a large budget invested in their success. Their service learning experience has exposed them to a very different world. They become aware of the digital divide, and that not everyone wants or needs leading edge technologies, nor do they always have the money to spend on sophisticated technology. They engage with people who may be from different social and educational backgrounds and seen how they might contribute to other's lives using their IT skills. When developing a system, they have seen the need to make systems robust and easy to use, as this is essential for a host client which may have a large turnover of voluntary workers. As stated by Traynor and McKenna "Student's sensitivity to the needs of many different user populations, experiences working with users who have different needs and perceptions than themselves...[are] ...critical issues for computer science" [8].

Most of all, the students gain a sense of satisfaction and have a lot of fun when carrying out their IT Project work. It is in its nature very different

from their other modules, and this novelty motivates a fresh view on their subject. Having a real-life client can drive students to succeed as there is more than themselves who will benefit from a well-executed project. This is a common finding on Service Learning modules: "... the learning experience and student learning outcomes are usually richer when there is a distinct and known need for the service" [4]. The project work also requires creativity and the exercise of independent thought, something not often asked for in computer science education, but a valuable skill nevertheless. Some students have continued to work with their client groups, showing a commitment to civic engagement which might not have otherwise occurred.

However, it is not only the student who gains from the service learning experience. The community groups involved inevitably benefit by the improvements implemented. This may not just be by having more streamlined computer systems. The ideas generated by the students may create a new focus on how they can exploit IT in the future, and provide a documented basis for seeking new funding. These are organisations that would never be able to justify the outlay for IT consultants to review their operations, and yet in effect that is what they gain through participation in the IT Project module.

Factors for Success in Service Learning

Ideally for this programme, the not-for-profit client groups involved should be small and autonomous, rather than part of a national organisation. If the latter, they will usually have clear direction as to how IT can serve them; in a smaller local organisation it can be the students who devise this plan. A smaller group also enables the students to see the overall picture of how they operate, and it allows them to apply the full cycle of skills from fact-

The Mit Project Module

The academic supervisor of the MIT Project module is the coordinator of the MIT programme, who prior to the course beginning, establishes links with a local not-for-profit organisation that might have a need for such services. S/he talks to the group leaders and explains the nature of the MIT programme, while the local leader describes their current use of computers and their aspirations as to how they might use them in the future. Through this, an understanding is gained as to how the students might help the organisation.

The IT project is presented to students during the first week of their second semester of study. They are given a wide brief, being asked to engage with a client (the community group) in order to determine their needs and implement a number of solutions. The course outline they receive does not set out solutions in specific terms, as finding these things out for themselves is considered a valuable part of what they learn. In this way they are also able to be creative in how they apply their resources.

Typically, students may be asked to:

- Assess the client ICT needs.
- Define an IT strategy based on those needs and assist them in selecting a future direction.
- Develop any selected technologies using sound software engineering principles. All developed solutions should be easy to learn, use and maintain, be fully documented, and require minimal future support.
- Carry out all interactions in a professional manner.
- Complete the work within time and budget.
- Work as a cohesive team, sharing work between clients and within the group.

From this broad specification, the students interview the host organisation to gather information,

and then spend time brainstorming ways in which they might use their skills to help. They draw up a document outlining what they might achieve within the semester, and this must be negotiated with and approved by their academic supervisor. The document is then brought to the client, who may make choices as to what is to be developed or may change the specification to reflect their own priorities. When agreement is reached, the students set about implementing the plans made. This may include tasks such as constructing a piece of software, conducting training, configuring machines, or installing new hardware.

The role of the academic supervisor in the process is to act as a manager to whom the student team report – s/he is kept informed of progress, and asked for advice when problems arise or students are unsure of their next step. He will also ensure that students keep to their project plan. All of the student's IT lecturers are also available to provide expert advice and support during the semester.

At the end of the semester, students hand over their completed work to lecturers and clients in a formal presentation, and are individually questioned on the decisions they have made and the extent of their contribution. This acts as a type of viva in order to assess the marks assigned for the module. They also produce a two-page assessment of what they have learnt from the exercise, producing a reflective document which can trigger thoughts on the civic engagement nature of the work they have done.

It Project Outcomes

To date, the module has been very successful in achieving benefits for both students and the not-for-profit groups with whom they have engaged.

From an academic perspective, students have learnt how to take an unknown domain and assess how the IT theory they have learnt may be applied to it. They have seen the development of a system

the formal teaching process is put into practice through service to the community. This is of benefit to both the student as provider of the service and the community as recipient. Adams and Runkles [2] have expressed this concept neatly in the diagram shown in figure 1, which shows a “service learning pyramid” reflecting various ways in which students can engage with the working world outside college. As one moves up the pyramid, they move closer to the concept of service learning. In an idealised service learning environment, there is an equal balance between the service provided by the student and what they gain from it (deliverable and learning), and both student and community group benefit equally.

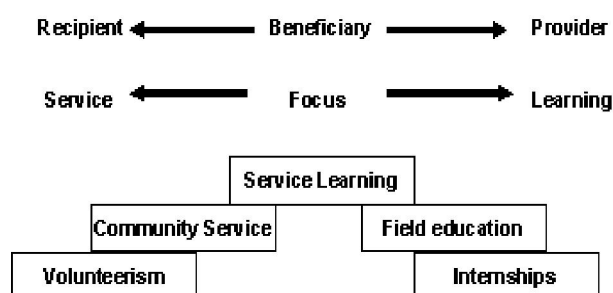


Fig 1. Service Learning Pyramid (Adams and Runkles, 2004)

Applying service learning to computer science courses is not new, [2, 3, 4, 5, 7, 8, 9] although it has not yet found its way into mainstream practice. It provides new challenges for programme administrators, and is most successful when encouraged and supported by the academic institute. This is an approach which has been adopted for the past three years on the master's degree programme in NUI, Galway.

The Masters in Information Technology (MIT)

The Masters in Information Technology (MIT) is a two year postgraduate course. Incoming students must have an upper-class undergraduate degree in any discipline, and are selected through interview. The curriculum comprises one year of taught courses, followed by six months industrial placement

during which the students draw material for a written thesis submitted at the end of the second year as shown in table 1.

Table 1: The Master's curriculum requires 33 semester hours, including four required core courses.

Course Title	Units
CORE COURSES	
Assessing Information Needs	3
Usability Analysis	3
Management of Information Organization	3
Information Systems Management	3
ELECTIVES (9 semester hours)	
SERVICE LEARNING PROJECT	
Service Learning Project (start on second semester)	12

Taught subjects on the MIT programme cover three strands: technical, business and behavioural sciences. In order to link these often diverse elements, and to give the students an opportunity to put theory into practice, a bridging module, “IT Project” was introduced during the first year, second semester of the programme. This was initially seen as an opportunity to combine the various taught subjects through asking students to create a small hypothetical computer system. However, in this form it did not give any opportunity for the students to engage with users or to practise the professional skills expected from MIT graduates. The finished system was ultimately shelved, as it was only a paper exercise, and this reduced student interest and motivation, as the product of their work was never put into action.

Opening the IT Project will provide the students with a real-life “client” in the form of a not-for-profit community group who needed support in exploiting IT resources to further their work. This is a very successful, and will establish a format for the new module. It also has the support of college authorities in furthering their aspiration to providing service learning for students [6].

Integrating Service Learning in a Postgraduate IT Programme

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Abstract

It is necessary for IT students not only to be technically competent, but also to be able to put their skills into practice in a real-world environment. While case studies and projects go some way to providing this need, working for a “live user” can supply valuable interactions which can not be given in a paper exercise. One approach in which academics can provide such users is to link with not-for profit groups who do not always have themselves the expertise or resources to exploit IT to their advantage. This approach is a form of Service Learning which for many institutions provides a valuable link with the local community. This paper describes the use of Service Learning on a Masters in Information Technology course which not only enables the students to gain valuable experience in the practice of their subject, but also benefits local charities and community groups.

Introduction

The range of subjects on most computer science degrees is wide [1] and while individual courses may have assignments which enable students to put their learning material into practice, it can be difficult to find a coherent practical exercise which straddles individual courses and which exhibits the complexity of real-life systems. The opportunity to combine, say software engineering, programming and knowledge of hardware, while putting into practice what might be taught in professional skills and ethics courses, is something which many students never get the opportunity to do until they reach the workplace.

Industrial placement programmes go some way to enabling students to apply a number of their skills in a professional working environment, often in a large organisation. However, a student on placement may find their placement to be isolating, and they may only be exposed to a limited set of the full

gamut of what IT practice is today. Giving students the opportunity to link subjects and skills within an academic programme can provide a supportive environment which enhances learning and increases confidence.

Service learning is one approach which can complement computer science courses in providing students with opportunities to combine theory and practice. It can also contribute in a worthwhile way to community groups and raise awareness in students as to how they might, as IT professionals, contribute to the world around them.

Service Learning

Service learning is a growing trend in many degree programmes as colleges recognise ways in which they may contribute to society around them and encourage civic engagement in their students. The general principle is that material learnt during