Personalised Approach to Learner Autonomy

Chandra Vemury
Newcastle University, Newcastle, UK
chandra.vemury@newcastle.ac.uk

Marie Devlin
Newcastle University, Newcastle, UK
marie.devlin@newcastle.ac.uk

Abstract: *This paper attempts to address some of the issues that exist in achieving learner autonomy in large learner group settings. As suggested by Grow (1991,1996), the ability to self-direct one's own learning is a function of number of factors such as familial and genetic conditions and individual personality traits such as persistence. An institution has to have an understanding of the factors affecting each learner in order to generate resources to help the learner become self-directed. The problem becomes more difficult when an institution intends to create an environment of self-directed learning among a large group of learners. Raya and Fernandez (2002) suggested that in order to become autonomous each learner needs guidance in that goal. This can only be achieved if there is greater understanding of the learner's personal circumstances and context (Bishop, 2006). The personalised bond with the learner may then be extended by inviting them to participate in structuring the layout of their course as discussed by Devlin et al (2008).*

Introduction

This paper is aimed at addressing 'learner autonomy' within the context of undergraduate courses in civil engineering and computing science. The authors find a majority of the published material and research on 'learner autonomy' and 'independent learning' being based around the university courses from humanities and social sciences. This paper presents two unique contexts, one of large group learning in computing science and the other from civil engineering and highlights the Issues faced by lecturers and students when trying to foster learner autonomy within these settings. We make some recommendations for institutional strategy to support lecturers and students towards a more personalised learner autonomy.

Learner Autonomy

There is much debate about what learner autonomy actually is. For some it is simply the ability to take charge of one's own learning (Holec, 1981), whereas for others the definition is wider in the sense that it depends on factors such as willingness and motivation to assume responsibility for the choices required (Littlewood, 1996). For Blondy, a self-directed {online} learning environment requires learners to establish their own learning goals and activities but also requires a curriculum that is focused on process versus content (Blondy, 2007). This means that tutors may need to give up their control of the course and allow learners to be empowered. In this respect, traditional forms of higher education remain valid because students in these environments are used to expressing thoughts, ideas, opinions and solutions in written form and reflection on the learning process is often as important as content (Denicolo et al, 1992). However, there has to be a balance between what students do and what we tutors do to enable the growth of autonomy during a learning project's lifetime or a student's learning programme. Spratt et al suggest, like Littlewood, that motivation is a key factor that influences the extent to which learners are *ready* to learn autonomously and that teachers therefore might try to ensure motivation before they 'train' students to become autonomous (Spratt, 2002).

Currently Higher Education, (in the UK, at least), produces "a curriculum driven student, often used to solving problems in a theoretically coherent framework, who is used to a classroom in which instructors instruct and learners learn. They normally work towards pre-set educational objectives and are used to being assessed, rewarded or penalised by external evaluation" (Denicolo et al, 1992).

According to Grow , (Grow 1991), in this form of teaching "learners adapt to the set course framework and have little or no input to the mode of delivery and assessment of course material" This is in direct contradiction to the learners that we all say we want to develop at the end of their program. Ideally, we would like our graduates to leave being able to communicate well and work in teams, take direction yet be self motivated, problem solve and find things out, make intelligent judgements, test ideas and turn them into plans, meet deadlines i.e. to be autonomous and learn whilst working. But what do we mean by autonomy and how does our interpretation of the word translate into our teaching and learning strategies? Eneau (2008) discussed the ambiguity in the definition and use of the phrase 'learner autonomy'. A lecturer/facilitator should attempt to define the phrase in a sense that is specific to his/her learner groups. A lecturer/facilitator, being the representative of an institution should be conscious of his/her own freedom in devising the scope, nature and the outcomes of the delivery and assessment of a course/module. There must also be a genuine appreciation on the part of the lecturer/facilitator of the fact that the learner is vulnerable and is less able to influence the dynamics of the delivery and assessment of a course/module.

As pointed out by Confessore (2002), a great deal of current and past research has ignored the autonomy of the individual in a larger sense. In defining the 'learner autonomy', the lecturer/facilitator and the institution must consider all of the psychological, methodological and the sociological aspects that affect an individual's ability to learn and perform during examinations and other set tasks. Eneau (2008) mentioned that in France, researchers studying 'self-directed learning' have considered the important role of interpersonal relationships in the construction of learner autonomy. The authors believe that it is therefore essential that an institution has mechanisms in place to allow the development of sustainable interpersonal relationships between representatives of the institutions (either lecturers/facilitators or other staff) and individual learners. The introduction of personal tutors and stage tutors has significantly improved the confidence and the performance of students at Newcastle University (NSS, 2008). An institution and the lecturer/facilitator must appreciate that 'learner autonomy' is multi-faceted and some elements of which are biological and pre-existent (Varela, 1979/1989) and the rest to be nurtured and preserved (Eneau, 2008). In creating a framework that fosters 'learner autonomy', the institution and the learner/facilitator must allow adequate flexibility to account for the differences among various learner groups and those among various learners within a leaner group. The intention to create an environment of 'learner autonomy' must be a holistic one and yet, one that is personalised towards an individual learner.

Case Study in Civil Engineering

Since the academic year 2006-07, we at the School of Civil Engineering and Geosciences, Newcastle University, have been offering a compulsory 30 credit module called 'Multidisciplinary Design Project' to the third year undergraduate students on civil and civil/structural engineering courses. This module constitutes 25% of the overall amount of credits in the third year of the course and integrates the skills developed in areas such as Structural and Geotechnical design, Transportation Engineering, Environmental engineering and Sustainability and Construction Project Management. Traditionally, the skills from these specialist areas were imparted to the students through a series of discrete modules over the four year duration of the undergraduate course. In the traditional approach, the students had no real opportunity to integrate and apply the knowledge and understanding of various branches within civil engineering to a real/commercial project or a fictitious project that contains all constraints of a real construction project. By working to the set curriculum, the students were constricted in terms of the extent and nature of the learning they carried out. Modules such as Multidisciplinary Design Project are hence very useful for the students in developing a range of skills that were not possible through traditional teaching methods and course structure.

The objective of this module is to help students develop the technical and interpersonal skills that are essential for working in a large-scale construction project. It is worthwhile mentioning that during the inspection in the year 2007, the Joint Board of Moderators, UK, have highly commended the good work done through this module. In the words of Mr.Alex Colman, a graduate of Newcastle University, "The nature of the module provided the opportunity for everyone to share professional experiences. Many of us had by third year spent time in industry and we were able to learn a variety technical material, methods of managing work and how to present information from one another".

Case study: academic year 2008-09

This year, the class group was given the task of developing a detailed design with a cost appraisal for reinvigorating the existing 'Metro Rail' transportation system of the North-East of England. The overall project includes the extension of Metro Rail network, Improvement of Stations and Customer Interface, Rolling Stock renewal and Maintenance works. The design and recommendations proposed by the student group had to adhere to a budget capping of £600 millions.

The mode of delivery of the learning material and assessment styles used for this module encouraged students to work in teams, support their peers' learning and help each other towards completing various tasks within the project. During the first phase of the project, students worked in groups of five or six and developed conceptual design for the project. In the second phase, they worked in large teams of seventeen members to compile a detailed design.

As a deliberate attempt to help students develop the necessary complex communication skills, the total number of classroom based lectures given for this module was limited to eight. This, in many ways gave reasons for the students to work in teams and help each other in understanding the nature of the given project/problem and then working together to articulate a design proposal that would meet the clients' requirements. The assessment methods used for this module included group presentations, team-poster presentations, individual interviews and submission of portfolios. Practicing engineers from various sectors within the construction industry have contributed to the assessment of this module and are highly appreciative of the quality of the work produced by our students. This module has certainly worked well in giving students the context for their learning and also the freedom to configure their own learning. Given the nature of the tasks set to the students enrolled on this module, there is likelihood that the learner group concentrates a significant amount of their time on developing skills relevant to people and project management and presentation skills. In the authors' opinion, these soft skills are essential but only complementary to the core design skills of an engineer. Over-emphasis in the curriculum on these soft skills might limit the technical development of learners.

Case Study in Computing Science

Active Learning in Computing (ALiC) is a Centre for Excellence in Teaching and Learning, (CETL), project funded by the Higher Education Funding Council for England, (CETL ALIC, 2005). It is a collaborative effort between four partner institutions: Newcastle University, Durham University as CETL lead, Leeds Metropolitan University and The University of Leeds. One of ALiC's aims is to engage students more with the computing curriculum especially in relation to group work and to make their group working experiences more realistic and relevant to industry. We do this via our Software Engineering Team Project module where students are placed in small teams of 6-7 students.

We place a strong emphasis on students managing their own teams, communicating with their colleagues at the other site, allocating roles, distributing tasks and responsibilities and planning the project together –students must rely on their collective computing knowledge but also direct their own learning to gain new knowledge to solve the problem they have been given.

We 'front-load' the lecture component of the module and give 10 one hour introductory lectures on the basics of Software Engineering i.e. project management techniques, software life-cycle models and each of the standard SE phases – Requirements, Design, Implementation, Testing, Maintenance, as well as lectures on team working, communication, negotiation, conflict resolution and time

management. After the lectures no formal teaching takes place for the rest of the academic year. We determine how and when students will be assessed and what they have to deliver. We also stipulate the technologies they must use based on the learning they have experienced in their programme and the technical infrastructure available.

Students determine when to hold meetings, the structure of their team, their communication strategy for cross-site collaboration, the milestones, interim deadlines during the project, the roles and responsibilities of each group member and task allocation. Most importantly, they determine how they will solve the problem and have total control over the creative process for the product (we outline a minimum set of criteria they must meet in the project brief). Initially students need direction until they have learned enough to be self-motivated so the instructor concentrates on facilitation and communication and supports the students in using the skills they have as in Grow stage 1 and 2, see Figure 1 (Grow, 1991). Students take on an increasingly greater responsibility as the project progresses. Over time, most of our students learn to set their own goals, exercise skills in time management and learn the art of self-evaluation and peer critique (Grow's stage 4).

	Student	Teacher	Examples
Stage 1	Dependent	Authority, Coach	Coaching with immediate feedback. Drill. Informational lecture. Overcoming deficiencies and resistance.
Stage 2	Interested	Motivator, Guide	Inspiring lecture plus guided discussion. Goal-setting and learning strategies.
Stage 3	Involved	Facilitator	Discussion facilitated by teacher who participates as equal. Seminar. Group projects.
Stage 4	Self-Directed	Consultant, Delegator	Internship, dissertation, individual work or self-directed study-group.

Figure 1: Grow's Self-Directed Learning Model

Since 2005, we have varied our team-selection methods, the amount of staff input and guidance we have given, the format of assignments and peer marking schemes etc. in order to assertain what balance of teacher-led and student-led learning works best (see Devlin, Drummond et al, 2008) So far the learning outcomes and feedback from employers and students has been very good e.g. as can be seen in Figure 2, when students were asked to reflect on skills they had gained during the project, an increasing number of students reported an improvement in their teamworking skills from 2005 onwards, after the curriculum changes were put in place. The data were elicited via content analysis of a standard student report, used every year. For example one student wrote: "In section two I listed five aims which I set myself at the start of the project. I wished to guide the team were possible, learn from the project, be 100% committed, meet deadlines and most of all enjoy myself. I can say without question I have met all of these. I took a leadership role in meetings and delegating tasks were required hopefully without alienating team members or becoming a dictator within the team. I have not only learnt programming and technical skills but have gained life experiences in team working and project management which I will carry with me into any future work " However, the increase in the number of students taking the course in recent years has added another level of difficulty for course designers.. Large group teaching can make monitoring individual student progress more difficult in these situations and supporting all the students in a group learning process can be an onerous task for the tutor. In Computing Science, we try to maintain observation of group behaviour and progress by providing a monitor for each team. Monitors, (staff members) help the module leader to ensure that all students are observed and listened to during the project and that each student is encouraged to contribute and learn from the experience. However, the monitoring process is time and resource intensive and often monitors are not given any training in working with student groups or on ways to assist them in becoming autonomous over the course of the project¹s lifetime.

Year		Improved Teamwork Skills		Total
		No	Yes	
	2003-04	52	46	98
	2004-05	41	39	80
	2005-06	20	60	80
	2006-07	17	49	66
Total		130	194	324

Figure 2: Student skill improvement

Developing a Personalised Approach

As stated earlier, a lot of research on curriculum design for learner autonomy has taken place in the Humanities especially in the area of foreign language learning (e.g. Holec, 1991, Littlewood, 1996). If we are to adapt these methods and recommendations to the scientific disciplines we need to define what constitutes autonomy more clearly within the context of our disciplines' learning designs and constraints i.e. within group work situations and large classes and with a focus on the skills required by the sciences as learning outcomes. We also need to focus on students' autonomy as Computer Scientists or Civil Engineers as well as their autonomy as learners and strike a realistic balance about what skill levels can be achieved within one module or project and/or a whole learning programme. Our experiences with team work and problem-based learning in both the case-studies presented here have shown us that our project work designs have the benefit of allowing students to test all of their 'soft' and technical skills in one place and to put their prior learning into practice. We have learned, that giving students some control over the some of the structure of their course e.g. allowing them to assign roles and tasks to team members and make creative and practical decisions during the project, enhances the students' learning experiences and promotes the development of their autonomy. The challenge remains however to continue to design tasks suitable for the students to explore their own individual learning goals but general enough so that a wide range of abilities and skills are taken into consideration. We also need to get the balance right between the level of support we give the whole cohort and letting them explore and learn on their own. Most students gain a valuable insight into their skill strengths and weaknesses and the professional requirements of their discipline during the projects but for some these tasks and the necessity of collaboration to complete the work, present enormous difficulties of a personal and intellectual nature, (see Devlin, Marshall & Phillips, 2006 for an overview of skills assessment during the project).

Designing mechanisms to support and develop learner autonomy in a project or single module is not easy, especially when one needs to consider the range of professional skills that have to be taught and the specific curriculum often required for accreditation purposes from professional bodies outside of an institution. Lecturers are given minimal training on assisting students with non-academic problems such as relating to other students within a group or on how to motivate and mentor students towards a new level of autonomy. For staff, the experiences and student feedback in the case studies described here have been a learning process and have shown that there are still a number of issues that need to be resolved if these projects are to continue to be effective in terms of helping students gain their learning autonomy. One of the evidences for the unresolved issues is the results from the survey carried out with a group of students. Towards the end of the academic year 2008-09, twenty one students who worked on the Multidisciplinary Project responded to a questionnaire that addressed various aspects associated with independent learning. The results suggest that a significant proportion (approximately 40%) of these students is still not fully confident of their study skills and progression onto a professional life. The following are some of the issues raised by students and staff from both the case studies during formal feedback and informal discussions:

- Management of these projects require a lot of effort and staff time and often training on problem-based learning and creating learner autonomy is non-existent within an institution.
- Colleagues often have not got time to contribute to the day to day running of such large group projects to help ease the management burden. The projects are often the responsibility of one or two lecturers, no matter what the cohort size.
- Levels of technical and administrative support for innovative projects that involve student groups and team working depend largely on the institutional framework in which the learning program resides and tutors may have to resolve many problems or issues themselves if they use new methods of delivery.
- It is difficult to cater for diverse learning styles and previous experience in the design of these projects and in the assessment methods used. If we are to create assessment methods that help students recognise their own learning development we need more training on course design for group projects.
- Many issues that occur are outside of the practical and often fall into the category of emotional support and mentoring of individual students and lecturers, (especially, new lecturers), are often not sure how to respond when these occur.

Resources that foster Personalised Learner Autonomy

Based on our reviewing and evaluation methods e.g. National Student Survey results (Higher Education Academy, 2009), our annual module evaluation questionnaires, student focus groups and internal subject-review panels, we believe that the following are some of the essential resources that a university/institution must put in place to create an environment of autonomous learning and thereby learner autonomy|:

- Creation of an institution wide culture that is geared towards sympathetic interpersonal
- relations.
- Support for students to develop study skills and in some cases essential life skills
- Support for students with special needs.
- Student forums that engage in discourses and activities aimed at all round self-development.
- Student led organised systems of peer mentoring and peer tutoring.
- Opportunities for students to develop skills enabling them to participate in the delivery and assessment of the subject matter.
- An institution level professional development programme for lecturers/facilitators that explores their attitude and ethos towards student learning and needs.
- Training facilities for lectures to help them develop better understanding of the changing cultural, socio-economic and self-identity trends.
- A self-reflective training programme that helps lecturers/facilitators contemplate their own personal and professional choices and their own efforts towards becoming autonomous professionals.
- As suggested by Clark et. al, (Clark et al, 2002), a discipline-based element in the teaching and learning training offered to early career lecturers.

Conclusion

In this paper, we have outlined two cases where problem-based learning and team working are used to help foster learner autonomy for undergraduates in Computing Science and Civil Engineering. We have highlighted some of the issues faced by staff in their implementation and by students during their learning experiences and suggest some ways in which these projects can be further supported at an institutional level. We have highlighted our successes in helping students toward greater learning autonomy and how this has been recognised by students, colleagues and industrial contacts who have become involved in our work. However, our work has also shown us that, given increasing numbers of students and the event of more pressure on learning resources, institutions need to adopt strategies to

ensure that all students are able to participate in their own learning and are helped to increase their autonomy. Large group teaching is often a matter of efficiency versus effectiveness and if we are to continue to develop innovative projects that support students as learners, as practitioners within their discipline and ultimately as individual members of society, the drive towards a more personalised approach to student development requires structured institutional support to tackle the issues we have outlined here.

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