The Application of Learning Skills in an Engineering Programme

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In the Dublin Institute of Technology, an engineering programme in the School of Control Systems and Electrical Engineering has successfully incorporated a study skills module into the core curriculum. The purpose of having this module, *Academic Development and Key Skills*, in the first year of the programme is two fold. It is meant to assist the students with the transition from second level education to third level by aiding the students in becoming more competent with his/her learning style. This is turn has helped to create a positive impact with the retention of this student group within the programme. The second year of this module develops the study skills further. It has been recognised by Industry that study skills in fact mirror many of the skills students require for their future careers such as time management, presentation skills, communication skills and task management. These skills are otherwise known as soft, core, key or transferable skills. This paper discusses how the implementation of study skills into the core curriculum of a third level engineering programme can be of benefit to the current and future needs of the students – both academic and personal development as well as with their future professional requirements. By providing the environment to develop and learn these skills within an engineering programme it is taking a step towards addressing the holistic needs of its student population.

Keywords: Study Skills, Student Retention, Transferable Skills, Key Skills

I INTRODUCTION

The value of study skills has long been a source of discussion amongst teachers and lecturers at all levels of educational development [1]. Even though there is a growing body of research to support the inclusion of study skills, such as time management, problem solving, and note taking, into third level curricula it appears that the approach to the application of this knowledge is ad hoc. It seems that many lecturers assume their students have already acquired these skills at some point during their second level education. In addition, there are others who believe that third level students should have the initiative and motivation to independently learn and/or improve these skills during their time in college.

In regards to the transition from second level education, students entering third level are arriving from a sheltered academic environment. In their previous school setting, students were restricted in their choices and learning styles and the responsibility for their education seemed to rely more on an extrinsic model, through the teachers and parents, rather than an intrinsic one. Third level education encourages and facilitates students' independent learning and communication skills (both written and verbal) as well as their ability to critically evaluate their work. It is through this that the students' motivation is encouraged to gradually move from an extrinsic model to an intrinsic one. Regardless this is a major academic and personal transition within the life of a student [2]. It has been noted that for many third level students,

they will encounter other demands of living such as rent, course fees, living and social expenses, as well as academic costs for the first time [3]. This further step into independent living can be frightening and overwhelming for the inexperienced young adult.

In the Faculty of Engineering, a degree programme in the Department of Electrical Services Engineering, which is part of the School of Control Systems and Electrical Engineering, has been successfully incorporating a study skills module, *Academic Development and Key Skills*, into the curriculum. This module aims to assist students who may not have sufficient skills to cope with the many personal and academic transitions they encounter during their third level education. Therefore, the backbone of this module is to facilitate the students with learning how to *learn* the necessary skills, both personal and academic ones, that are required for a successful academic career and smooth transition to future professional employment. This module also aims to encourage positive self-esteem because it assists in increasing a sense of achievement as well as with the acquisition of new life skills for the students. Also, by supporting students with the transition from second level education and by helping them to develop their study skills, this has been shown to have a positive impact with the retention of the students within the Department of Electrical Services degree programme [4].

During the second year of the *Academic Development and Key Skills* module, students apply the concepts and skills they attained during the first year of the programme. It has been recognised that study skills in fact mirror many of the skills students require for their future careers such as time management, presentation skills, communication skills (verbal and written) and task management [5] [6]. Although these employment related skills are commonly referred to as 'key skills', 'generic skills' 'core skills', 'transferable skills' or 'soft skills' because of how they are applied in the *Academic Development and Key Skills* module in the degree programme it would be more appropriate to refer to them as 'learning skills'.

As has been observed by Oxford Brookes University, "it is clear that graduates value transferable skills and rate them as more useful than course content while they are in their first jobs" [1]. In addition, Oxford Brookes University has noted that their own institution has benefited from these key skills being imbedded into their programmes. Their research has shown that over the last twenty years, since the implementation of these key skills modules, the graduates from Oxford Brookes University have earned the respect of the professional community and this has resulted in a good reputation with both prospective employers as well as with potential students [1].

II MODULE STRUCTURE

The structure of this module is based on the recognition that students require their social, personal and psychological needs to be addressed in addition to their academic needs. It is the overlooking or lack of recognition of these 'non-academic' needs that can have a significant impact on the third level students' ability to complete a programme of study as well as to make a successful transition to the workforce [1]. Also, the structure of this module is based on recommendations from employers as well as on research completed during 2001-2 by Frank Costello, the Dublin Institute of Technology's Retention Officer [6] [11]. Mr. Costello's study focused on the experiences of first year students at DIT. This survey evaluated the responses of 1,356 students. These students were derived from 43 programmes in DIT. There was a representative sample from each of the six faculties. In his research Mr. Costello identifies four types of students in first year: the 'at risk student', the 'struggler', the 'average student' and the 'confident student'. The needs identified for the first two types of students relate to many personal identity issues such as confidence, career choice, and course choice. Academic issues pertaining to study skills relate to the first three categories of DIT students [11].

In light of the results of this survey, psychological research from Erikson, Maslow, Skinner and Rutter was incorporated into the formation of the *Academic Development and Key Skills* module. The intention was to utilise this information to further address the variety of issues, both academic and non-academic, that are presented by a typical third level student population.

The *Academic Development and Key Skills* module is delivered by the following: one-hour lectures, supplemental laboratory classes, research projects and workshops/seminars. The students are actively involved in class discussions, peer learning, presentations, group work and individual assignments as well as problem-based learning. Therefore the module facilitates the students' development of how to learn in an academic setting with the objective of transferring these skills to the world of employment.

The concept of peer learning has been integrated into the assignment work based on its successful integration into programmes in Ireland and abroad [8] [9]. It is based on the psychological concept of modelling which is otherwise known as observational/social learning

theory. The basis of this theory is that learning can occur through the process of observing the activities of others. Therefore the academic environment, behaviour of the learners and the students' cognitions/beliefs are also important aspects of the learning process [7]. As part of the *Academic and Key Skills* module, efforts have been made to create a supportive and positive learning environment that fosters students' academic and personal development. This in turn assists in creating an atmosphere that promotes deep learning. It is important to recognise that is also reflective of the ethos of the degree programme [10].

A typical example of an assignment for the first year group requires the students, in small groups, to participate in a college based scavenger hunt. This activity requires them to locate specific items and areas that are relevant to their college experience such as finding the location of the mathematical learning centre, the medical centre, the library and of course the departmental secretary. Next, the students are required to write a group essay on teams and their development. As part of the exercise, the students must incorporate their personal reflections of their team experiences during the scavenger hunt into this essay. Both aspects of this task are meant to assist the students with skills such as problem solving, goal setting, conflict management, group work, self-reflection, research skills, computer skills and written communication.

In the second year of the *Academic and Key Skills* module, the students teach workshops on specific skills such as presentation skills, memory techniques, and examination revision to first year students. The workshops include active learning exercises that require self-assessment as well as a practical application of the specific skill set being taught. What emerges is a mentoring relationship between the first year and the second year students. This relationship is enriched by the insights that the second year students have gained from their experiences during their first year of the programme.

Each year of the module is examined by means of continuous assessment and progression from one year to the next requires a pass mark The benefit of this method of assessment is that the students further develop their independent learning skills thus preparing them for lifelong learning [10]. In addition, students are encouraged to reflect on their own personal developmental and academic progress. Formative feedback regarding their academic performance helps to encourage self-reflection.

III DEVELOPMENTAL PSYCHOLOGY

The general age of full-time students at DIT is between 18-22 years of age. This age group corresponds with Erikson's *adolescent* and *young adult* stage in his theory of psychological development. From this theory two distinct target areas, personal and social needs, are highlighted. These areas focus on the development of individual identity and relationships with others [12].

From Erikson's theory, which is supported by the results of the survey conducted by Mr Costello during 2001-2002, a clearer picture of the needs of DIT students emerges. Students entering third level education are in the midst of the *adolescent* stage, which is characterised by identity versus role confusion conflict [12]. At this stage in any individual's development, the person is searching and struggling for his/her identity in regards to self, occupation, politics as well as religion. This can be a very challenging experience for the third level student. During this time, students are faced with the prospect of forging new relationships, negotiating a new academic setting and possible living in a new environment. In reality, a conflict regarding identity may manifest itself as an internal confusion where the student is attempting to make sense of *who* they are, *what* they believe, *what* they think, *what* they want/need while at the same time presenting this independent, all-knowing self to others. This experience can feel very confusing, isolating and threatening to the student. This can lead to an undermining of self-esteem and possibly behavioural problems or a lack of engagement with the programme. Interestingly these issues were identified by Mr. Costello's study as being most prominent with the 'struggler' and 'at-risk' student category [11]. From observation of students on the programme, there have been individuals who have been identified as 'struggling' academically or personally or in both areas. When these students have declined assistance from the Department of Electrical Services degree programme they often withdraw during their first year in DIT.

The *Academic Development and Key Skills* module is aimed at supporting the students through the many academic and non-academic transitions that they are currently facing thus assisting the 'at risk' and 'struggling' student into becoming the 'average' or 'confident' students. The successful completion of this developmental stage will affect programme satisfaction, healthy relationships, psychological well-being and social involvement which is linked to a positive outcome of the student in terms of commitment and endurance.

In the latter age group of the full-time student population, another phase of development that is

encountered is *young adulthood*. This is characterised by the conflict of intimacy versus isolation in which the young adult must develop intimate relationships with others in order to proceed successfully in the next life stage which is *middle adulthood* [12]. Once again, stepping out as an independent adult is the challenge of this particular age group. The individual on his/her own may not have the skills to make this transitional step. This may be observed in incidences of bullying, scapegoating, social isolation, difficulty in performing any activities albeit social or academic ones in which the spotlight is on them, and this is further illustrated by the findings of Mr. Costello's 2001-2002 research [11].

The successful completion of this stage will affect psychological well-being, relationships within the college, communication of needs, responsibility for self and social activity. All of this will prepare the individual for entering the workplace because this module equips the individual student with learning skills which enables them to adapt to the work environment [13].

In light of this information, the second year of the Academic Development and Key Skills module has a strong focus on group work. Students are provided information about groups, how they form, the roles that are found within groups, communication and conflict management. The assignment work requires the students to apply this information to their own experiences within the module and to reflect about their own personal development in this area. One of the main aims of the second year module is to assist the students with developing, understanding and fostering relationships with in the class group thus preparing the students for the challenges that await them in their future professional and personal roles.

IV OBSERVATIONS TO DATE

It has been the feedback of both the current and former students as well as the Department Head that the module has been successful. One observable trend that has emerged is how the retention for the first year students has been steadily improving. In the 2001-2002 academic year, 58% of the first year students were eligible to progress into the second year. This increased to 61% during the 2003-2004 academic year [14]. At this time the statistics for the 2004-2005 academic year have not yet been published.

Still, as has been pointed out not all retention issues can be eliminated nor should they be. Instead there should be a monitoring system in place to understand the reason(s) for the withdrawal [15]. This type of monitoring began in the Department of Electrical Services degree programme three years ago. The one main trend that has emerged is that the majority of first year students have left this programme to make a lateral move into an Electrical Apprenticeship [16].

Another positive development that has been observed is how at least 80% of the graduates have been successful in locating employment in the area of Electrical Services Engineering. This has been a constant since the first set of students completed the programme in 2001. In addition, many of the students who do not enter the job market immediately choose to continue their studies within other DIT engineering programmes or other institutions in Ireland and in the UK [17].

Finally, this module received special recognition and praise from the Validation Committee during the most recent validation process in March 2004.

V CONCLUSIONS

The implementation of learning skills to the core curriculum of a third level engineering programme can be of benefit to the current and future needs of the students – both academic and personal ones. By providing the environment to develop and learn these skills, the educational programme is taking a step towards addressing the holistic needs of its student population.

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