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Personal Development Planning for Student Retention and Progression in Engineering

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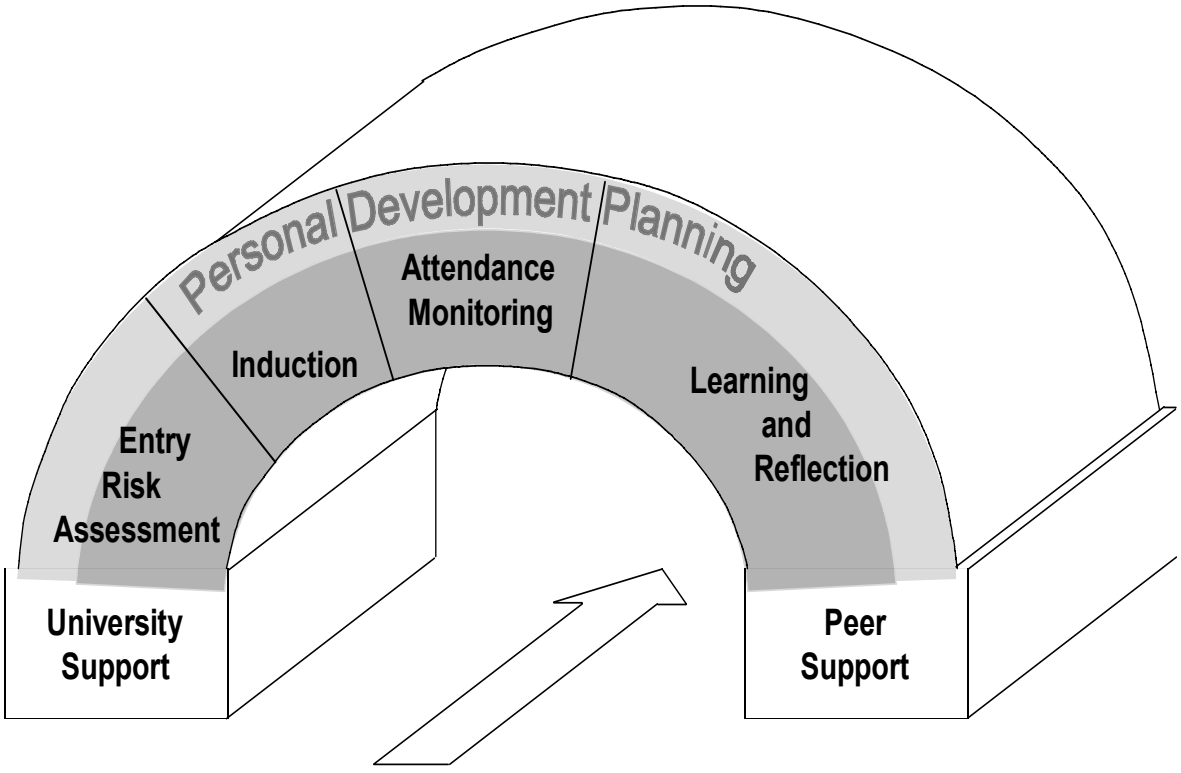

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Chapter 1
Introduction to Student PDP

Few engineering academics working in the HE sector over the last two years can have avoided at least a brief encounter with the phrase student Personal Development Planning (PDP). Explaining at length the what, where and why of PDP, a policy that needs to be operational by 2005/2006, is not the objective of this guide. Those who seek more details are directed to the publications identified in the references.

What is PDP? The definition is given in a number of papers including one of the LTSN Generic Centre's Guides for Busy Academics [1]. "PDP is a structured and supported process undertaken by an individual to reflect on their own learning, performance and achievement and to plan for their personal, educational and career development".

Where has PDP come from? This question is straightforward. PDP came from the National Committee of Inquiry in Higher Education in 1997 [2] (Dearing and Garrick reports). "We recommend that Institutions of Higher Education develop a Progress File that should consist of two elements a transcript recording student achievement and a means by which students can monitor, build and reflect on their personal development".

Why should we implement PDP? This question is not so straight forward and is key to the credibility and to how enthusiastically engineering academics will embrace the policy. We look to reviews of existing research for evidence that the process of PDP, which connects reflection, recording, planning and action in a similar way to Kolb's model Figure 1, can have a positive effect on students in terms of attainment and their approaches to learning [3].

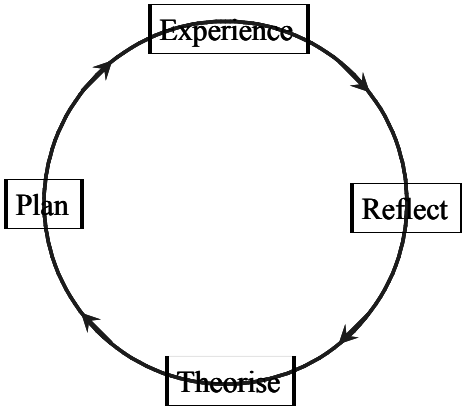


Figure 1 Kolb's Learning Cycle

Although research into the definition, implementation and effectiveness of PDP in HE is at an embryonic stage, facilitation of a process which involves reflection, recording, planning and action is not alien to engineers. Engineers have always needed to develop both specific technical skills and the life enriching general transferable skills identified in their QAA [4]. Such skills, which include many aspects of PDP, are needed to enable engineers to liaise with other disciplines and to rise, as they frequently do, to management positions.

The benchmark statements define the essence of engineering. "It is understood that undergraduate degrees in engineering are a sound educational experience but also lead to practice in the profession. An engineer must be able to exercise original thought have good professional judgement and be able to take responsibility for the direction of impor-

tant tasks". The truth is that engineering academics have always personally developed their undergraduates and much of the process of PDP is about identifying and improving on what is already embedded in our undergraduate programmes.

So we are presented with a problem. The problem is not to develop PDP from scratch but rather to nurture the content of engineering programmes, tease out and share the examples of good practice which facilitate the development of our undergraduates' skills.

Since engineering is not so much about the theory of solving problems but more about the practice of building solutions, as engineering academics we need to demystify the process of PDP, reclaim it from the educational theorists and administrators and make it fit for purpose.

It is with this in mind that this guide book was co-authored by a group of academics who have identified synergies in their approach to PDP. For many of us the development of progression strategies in relation to first year undergraduate support activities, models and methods was the primary driving force.

In this guide book, common themes, along with interesting and novel variations are highlighted by case studies in the three HEIs involved.

The authors believe that the first year undergraduate experience consists of many elements and the way in which these elements are integrated determines how positive that experience will be for the individual student. PDP is seen as an essential and over arching contributor to the journey from first to second year, Figure 2.

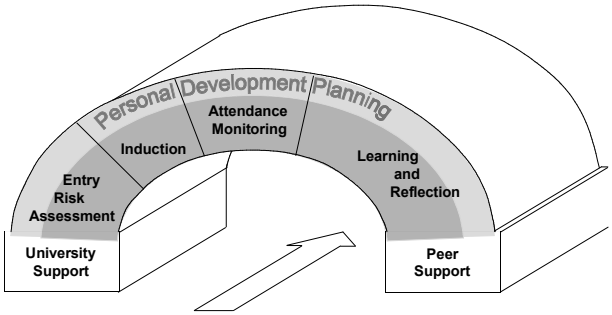


Figure 2 The First Year Experience

This guide takes us through the early stages of this journey. It is recognised that undergraduates will enter HE with some existing strengths and weaknesses and identifying entry point development issues is addressed in Chapter 2. The guide book moves on to see how induction can be used to start the process of PDP and how ongoing PDP can be addressed as part of student support in Chapters 4 and 5.

Finally, we cannot leave this introduction to PDP without quoting the words of Warren Houghton [5]. "PDP is not a bolt on extra, it is the logical development of and integral to good teaching". It can only happen if supported by teachers who are reflective practitioners themselves.

We sincerely hope that this guide, with its emphasis on working and evaluated case studies, will encourage you to reflect and provide you with ideas and tools that can be adapted for immediate use in your own institutions.

Elaine M Smith

Chapter 2
Identifying Students at Risk and Doing Something About It

2.1 Introduction

It is interesting to explore methods which may assist us to identify individual and group profiles of students at the point of entry since we may then be able to better respond to the needs of students and thus enhance the chances of first year survival. A number of approaches to this issue have been reported in the literature [6, 7, 8]. This chapter discusses results recently obtained in a research study involving 163 incoming first year undergraduates studying in academic year 2001/2.

2.2 Details of the Implementation

Three programme groups were considered across a range of engineering disciplines. These programme groups were BEng(Hons), BSc(Hons) and University Diploma (UD). Entrance requirements are highest for the BEng and lowest for the UD.

Risk Factor Identification

Based on the literature, and the experience of the authors in supporting first year undergraduates in engineering programmes, a number of possible 'risk factors' were selected for investigation. These factors were (not in any order of significance):

previous unsuccessful attendance at university;
living away from the family home;
low priority of course choice;
late application through the UCAS Clearing System;
no previous immediate family attendance at university;
work commitments;
having no friends in the class at the start of studies;
age;
entrance qualifications;
absence from classes.

The age and entrance qualifications of the students were available from centrally held admissions data. Attendance information was collated during the academic year. The remaining factors were determined from a point of entry questionnaire. The questionnaire was issued at enrolment sessions during Freshers' Week in September 2001, Appendix A. 163 students enrolled and 94 completed questionnaires were returned by the end of Freshers' Week.

2.3 Effectiveness of the Strategy

Table 1 shows the breakdown of the number of students from each programme group who were involved in the study. Completion of the questionnaire was voluntary.

TABLE 1 - Student and questionnaire numbers in the study

	UD	BSc	BEng	Total
Enrolled	62	74	27	163
Questionnaires returned	36	39	19	94

Table 2 shows the result obtained from the questionnaire for each of the programme groups.

TABLE 2 - Questions and percentage YES responses

	UD	BSc	BEng
Have you attended university before?	19%	39%	5%
Are you living away from your family home?	19%	33%	21%
Was this course your 4th or later choice?	19%	3%	0%
Did you apply in clearing?	56%	31%	37%
Are you the first person in your family to go to university?	47%	69%	63%
Do you work 1 to 4 hours per week?	3%	3%	0%
Do you work 5 to 8 hours per week?	3%	10%	26%
Do you work more than 8 hours per week?	42%	39%	53%
Do you know nobody else in your class at the moment?	42%	46%	53%
Do you know 1 or 2 people in your class at the moment?	39%	44%	37%
Do you know 3 or more people in your class at the moment?	19%	10%	10%

Table 3 shows the relationship between the number of modules failed in the academic year (including all re-sits) and the risk factors which produced the 3 most significant correlation coefficients. As can be clearly seen, absence from classes is the most strongly related risk factor. Entry qualifications also have a slight relationship. The most surprising relationship, however, is between modules failed and having no friends in the class at the start of the academic year. Other parameters had correlation coefficients lower than 0.1.

TABLE 3 - Most significant correlation coefficients comparing the number of module fails with relevant risk factors (all programmes)

	Correlation coefficient	Number of samples
Absence	0.54	163
No friends at start	0.27	94
Entry qualifications	0.15	163

2.4 Discussion

It is obvious that the pattern of responses to a questionnaire of the type described may vary considerably according to the discipline and institution involved. There are a number of interesting and important outcomes from this study.

For the group of students studied there are large numbers who fall into the following possible risk factor categories:

- studied at university or college before
- applied in clearing
- are first members of the family to go to university
- work relatively high hours

When the end of year results are taken into account, the clearest indicator of potential failure is class attendance. The next most significant factor related to failure, rather surprisingly, is the lack of friends at the start of the academic year. This outcome is the subject of current on-going research by the authors. None of the remaining factors exhibit strong or significant relationships to eventual first year academic failure.

2.5 Conclusions

These results suggest that there are two areas of the first year undergraduate student experience which require very careful attention. First of all, a rigorous and accurate absence monitoring system is essential. From experience this monitoring system needs to be backed up by strong intervention and support activities when individual students in danger have been identified. Secondly, methods to facilitate the establishment of student to student contacts and relationships during induction and Freshers' Week activities are worthy of consideration.

A number of suitable activities can be incorporated into Freshers' Week such as icebreakers and group project work.

Chapter 3
Using Induction to Start the Process of PDP

3.1 Introduction

One recommendation from the Dearing Report was that all students should be able to "monitor, build and reflect upon their personal development" [2]. The Spiral Induction Programme (SIP) is designed to be an integral element in implementing that recommendation at Southampton Institute. This induction programme introduces students to the Kolb Learning Cycle [9] establishing via suitable student centred, individual and group learning activities, notions of self-assessment, action planning and reflection. The aim being to give students the skills necessary for them to begin to take responsibility for their own learning (to become independent learners), and to enable both staff and students to proactively identify if and what additional support is required. This support is provided via an integrated team based Student Support Network (SSN) [10].

3.2 Details of the Implementation

An important aim of the SIP is to provide an opportunity for students to work in an informal manner with as many of their fellow students as possible, thereby establishing social and support groups. An internal Learner Experience & Achievement Project (LEAP) study [11] undertaken, prior to the introduction of the SIP and SSN, at Southampton Institute concluded that:

- approximately half (52%) of students would approach other students for non-academic advice, and that
- only 6% of students would approach their personal tutor for non-academic advice. (The sample size of the LEAP study was 955 undergraduate students).

It is therefore of the utmost importance that effective social and support groups are developed at the earliest opportunity.

SIP starts for new students with a course based induction week before normal teaching begins. This is then followed for the next five weeks by a one-hour per week timetabled session for each course group (approximately 20 students per group). These sessions can be additional to, or integrated within the normal subject teaching timetable. Spiral Induction then continues throughout the whole of the year and course with learning activities and events at key times to ensure all students at all levels receive timely induction and continued support.

3.3 Learning Activities

The learning activities are designed to provide students with an appropriate challenge from the start of the course on a basis that it is 'what the student does' [12] (or doesn't do) and 'how they perceive' [13] what they are doing that is most important. Once the learning cycle is established students and staff should be able to identify, through the monitoring of unit specific learning activities, if and how, the cycle is breaking down. The cycle may be breaking down for a number of academic and/or non-academic reasons. However, by monitoring closely, students and staff are able to initiate appropriate support

in an effort to re-establish the learning cycle. It is to be hoped that the student would be proactive in seeking the necessary non-academic and academic support from the SSN. Unfortunately, this cannot be relied upon, therefore the close monitoring of the learning activities [14] enables staff to gauge the student's level of participation and engagement, and to then proactively target necessary support. An example of 'Workshop Activity 2: What are my skills?' is given at Appendix B.

3.4 Effectiveness of the Strategy

The SIP and SSN have been evaluated [15] during 2002/3 by the Institutional Research Unit at Southampton Institute. The research design aimed to gain a representative sample of students across the Institute and used a mixed methodology of surveys and interviews.

Main findings arising from Survey point 1 (end of the induction week)

- There was a significant increase from 2001/2 and 2002/3 in students reporting that induction week was helpful for meeting other students, a good introduction to Southampton Institute, opportunities for meeting lecturers and orientation and learning about information resources.

- Most (96%) of students attended Induction Week and were generally positive about it. The most popular of these was: the Sports Fayre; IT induction and the introduction to student services. The least popular were video sessions such as health and safety.

- Students mainly wanted to get a degree, make friends, have a social life during their time here and get on with a career after that.

- By the end of their first week, most reported that they had made friends and generally enjoyed being students here.

- More vulnerable groups were those who didn't attend Induction Week or EU/International students.

- There were no significant differences in terms of expectations, aspirations and experiences by age or gender.

Main findings arising from Survey point 2 (week 6):

- Most students were positive about support systems. Students who had not attended the initial 5 week spiral induction were more worried about financial issues and were less integrated.

- Most students had attended spiral induction sessions. The activities they found useful included learning techniques, learning styles, team building, information literacy skills, essay writing skills, and assignment information. Students requested more support with essay and assignment preparation and writing, and budget management.
- Students who attended were more confident socially and felt a stronger sense of belonging to their peers, their courses and the Institute. In fact making friends and the social aspects of HE was identified as being

one of the best experiences so far.

- Students who had not attended spiral induction were less likely to feel integrated with their course group or that they have made friends with students on their courses.
- Students reported being most worried about doing their assignments at this stage and the standards expected of them.
- Students who had not attended spiral induction were most worried about money.
- Students who reported considering deferral or withdrawal were also more likely to report financial worries and travel problems.
- Females were more likely to report missing home.

Main findings arising from Survey point 3 (week 12):

- Throughout the 3 surveys students consistently reported issues in relation to: money; confidence and control. There was a general upward trajectory of confidence and sense of belonging. Students who had not attended spiral induction had a similar profile but reported less friends and not feeling a part of their course and a decrease in rapport with staff.

- Of the students who responded, most (93%) felt they were on the right course and were good attenders at most of their classes. The majority of students were enjoying their courses and stated that they would come to the Institute if they could start over again.

- There was a correlation between attendance and satisfaction.

- Main reasons for deferral/withdrawal were wanting to change the course, finance and HE life not being what they expected.

- Students were generally socially and academically integrated by this stage.

- Practically all of them had made friends, something which they felt was an important part of student life. Students who did not attend spiral induction earlier in the term remained less integrated and less confident academically.

- Money was the biggest worry students had. This was followed by keeping up with their course workloads and getting assignments done.

- There was a correlation between attendance and students who felt they were not on the right course. These students reported higher levels of non-attendance. They were also more likely to miss classes because they did not like their lecturer or because they did not find classes stimulating or interesting.

3.5 Conclusions

In conclusion, the overall implementation of the Spiral Induction Programme and Student Support Network was viewed very positively by the students. Most students appreciated the subjects covered in the spiral induction sessions. There is evidence that, compared to previous years, there has been a significant increase in students knowing where to go for the support and information they require.

Chapter 4
Ongoing PDP as part of Student Support

4.1 Introduction

The need to continue the personal development of engineering undergraduates can be considered to be an issue of student support. This chapter describes the development of an integrated first year experience during academic year 2001/02. The study was carried out with a first year class of 163 students studying a range of engineering programmes.

These students were supported by a radically different paradigm of first year academic and administrative management based on a new model of care, control and consistency - the 'Triple C Model'. The paradigm uses centralised absence management and assertive outreach techniques as core elements [16].

4.2 Time and Management Issues

In the 'Triple C Model' of care, control and consistency, Figure 4.1, the idea of control in relation to a group of adult learners may seem controversial. It is defended on the basis that the type of control involved is seen as almost parental and therefore benevolent.

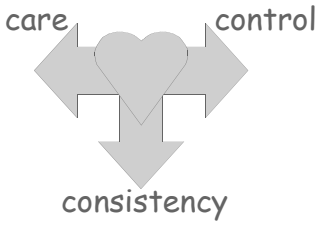


Figure 4.1 - The 'Triple C Model'

The largely administrative traditional role of the first year tutor was developed into that of a First Year Czar. The First Year Czar had a remit to champion the needs and aspirations of first year students within the school. The quality and relevance of each element involved in the student support initiatives were extremely important. Some elements already existed, such as the personal tutor system. It was felt that the way in which the existing and new elements were integrated resulted in the sophistication and success of the completed and fully evolved initiative. The personal development of the student was particularly addressed in the semester goals sheet and the meetings with Personal Tutors, Appendix C and Appendix D.
The important elements are listed below:

- Preparation and Induction
- Personal Tutor
- Centralised Absence Monitoring
- Student Goal Setting
- Absence Management
- Assertive Outreach

The centralised attendance monitoring was a great time saver for academic staff. They were given sign in sheets and asked to return raw data. This moved the burden of record keeping onto administrative staff.

4.3 Details of the Implementation

Long before the first year students appeared in the University considerable effort was put into preparing the environment into which they would be received. This involved ratio-

nalising and rigorously checking the accuracy of timetables. Mindful of the work commitments of many students, timetables were modified to allow each student to have one full day without classes. Other changes were also made to minimise gaps of more than one hour and to equally distribute between groups the need for early start or late finish classes. This attention to housekeeping details is an illustration of the care element in the 'Triple C Model'.

As soon as a prospective student firmly accepted an unconditional offer of a place, they were sent information about the freshers' activities that were being planned. A second letter with their own group timetable for their induction was then sent to them along with a personal invitation from the Dean of the School. Students were also sent the URL of the freshers' week support website. The emphasis was on friendship and familiarisation trying to overcome the joint enemies of anonymity and lack of belonging.

Where possible, the staff working with the groups would later become the personal tutor supporting the element of consistency in the 'Triple C model'.

The detailed monitoring of absence was achieved by centralising the function of collating absence data. This was done by supplying sign in sheets for all lectures, laboratories and tutorials for every module studied. These sheets were returned to the first year tutor and collated on a three weekly basis. A pastel traffic light system was evolved as detailed in Figure 4.2. Students were categorised into those whose attendance was excellent, good or poor. Every student was then sent an attendance letter printed onto the appropriate colour of paper.

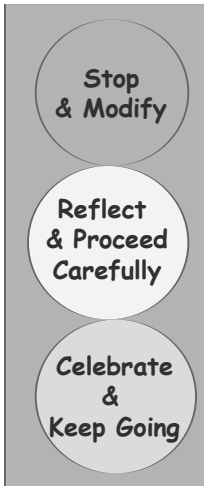


Figure 4.2 - Coloured Letters

Green letters were sent to those achieving more than 85% attendance, yellow to those whose attendance was between 75 and 85%. Pink letters to those whose attendance had dropped below 75% to an unacceptable level. All pink letters also had an appointment to attend a meeting with the first year tutor. Absence interviews were conducted on the basis of trying to identify and resolve issues contributing to the lack of attendance. These activities are indicative of the control aspects of the 'Triple C Model' implemented under the principle of assertive outreach.

Where appropriate other support systems of the university such as student counselors were also involved. It is noted that although absence itself is a problem it is frequently also

the manifestation of greater problems. For this reason individual recovery plans were made with students. This sometimes involved alerting the teaching staff to the imminent return of a student and seeking their tolerance and support in making this process easier.

4.4 Staff and Student Response

The introduction of the concept of a First Year Czar and the success of such a modified role was entirely dependent on the support, involvement and tolerance of other academic staff. The need for an improvement in the student experience was widely acknowledged and by keeping colleagues informed and seeking their comments, ownership of the first year experience was collectively held and nurtured by all staff throughout the school [17].

Personal Tutors appreciated the fact that meetings with their students were each identified on the goals sheet as having a purpose. This gave staff a clear agenda for the meeting and helped to ensure that a consistent approach was applied.

Students responded well to having the identity of a problem solver clearly labeled. This removed the confusion which can sometimes arise from many people having different remits in relation to student management. Having met their personal tutors during induction, they were more likely to seek their guidance later in the year or when they got into difficulty.

Students enjoyed the coloured letters and were often seen showing them to other students and staff. The pink letter was rarely viewed as an admonishment, and was interpreted sometimes as an extra much needed push and sometimes as a manifestation of care. The arrival of such a letter meant someone had noticed they were not attending.

4.5 Effectiveness of the Strategy

To verify the success of the initiatives developed and implemented to achieve optimally maximised student retention in this group of students, data was gathered for the year of the study and the two preceding years. The 163 students in this study were divided into programme groups - University Diploma (UD), BSc and BEng. These programmes have increasing entry requirements, Figure 4.3. Any student who enrolled to study is included in these statistics regardless of when they may have withdrawn. It is normal practice in statistical studies of first year withdrawal to discount students who withdraw early in the academic year. By including all enrolled students a more honest assessment of the impact of the initiative on early drop out is achieved. A student is defined as 'retained' if she/he is a fee-paying student at the same HEI in the following academic year. This may mean that they have progressed, repeated or transferred internally.

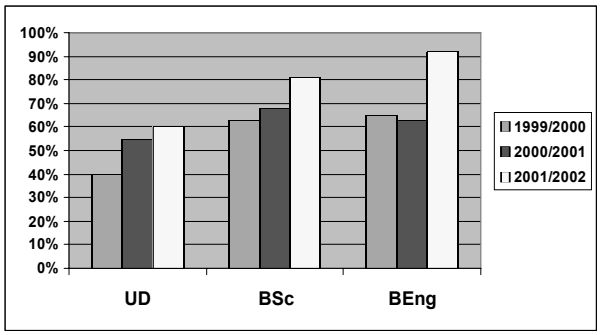


Figure 4.3 Retention Results

Chapter 5
Responding to Entry Point Issues

5.1 Introduction

While there are a myriad of issues that one could reasonably describe as "entry point issues" for students entering Higher Education, one issue appears to stand out for students entering engineering programme of study. It appears indisputable that the general area of the mathematical sciences does provide hurdles for students that many find difficult to jump. Certainly the mathematical sciences provide an essential and non-disposable set of tools for the engineer which many find it increasing difficult to come to terms with. The thoroughly documented decline over the years in the level of mathematical skills of new entrants [18] will not be repeated here, but the fact that in a recent survey [19] 46 out of 95 institutions indicated that they had found it necessary to set up mathematics support centres of some description attests to the magnitude of the problem faced by many would-be engineers and those who teach them. It is perhaps worth noting that the survey [19] noted that the aspect of support most valued by students was the provision of face-to-face tutoring rather than online resources.

Assuming that staff responsible for the teaching of the mathematical sciences to engineers find it advisable to provide extra help to students, three obvious questions arise:

- how does one decide where help is most needed?
- what sort of help should be provided?
- who should provide it?

A partial answer to the first question may be provided by the use of diagnostic testing.

5.2 Diagnostic Testing

There is an argument that students entering Higher Education should not have to face diagnostic testing of any sort during the first few weeks of their fledgling careers at university. Set against this is the fact that the sooner problems are recognized, the sooner help can be offered. Given that the mathematical problems of students left to their own devices tend to multiply rather than diminish, it is suggested that 'the sooner the better' philosophy should be adopted. It is worth noting that in June 2000, the Engineering Council recommended that [18] 'all students embarking on mathematics-based degree course should have a diagnostic test on entry.' Given that some form of testing is deemed to be advisable, it is necessary to adopt a testing procedure of some description and, on the assumption that a very considerable amount of effort is not going to be put into the development of a 'new' test, one needs to know what is available off-the-shelf. There are a variety of tests available, both computer-based and paper-based, for example:

- DIAGNOSYS - John Appleby, School of Mechanical and Systems Engineering at Newcastle University;
- Mathletics - Martin Greenhow, Department of Mathematical Sciences, Brunel University;

are popular computer-based tests and may be

obtained for little or no cost. Among the better known systems offering tutoring as well as testing is

- CALMAT - Jean Cooke, Department of Computing and Mathematical Sciences, Glasgow Caledonian University;

which must be purchased but does offer a very comprehensive set of on-line tutorial material and the ability to author, within the package a bespoke testing system. While obtaining the systems might be easy, there can be problems mitigating against their easy implementation. For example, the availability of computer rooms and/or the rapid setting up of student computer accounts have been known to provide problems to staff wishing to provide early computer-based diagnostic testing. In a recent survey [20], it was established that roughly twice as many universities offer paper-based testing as computer based testing. Among these universities are:

- UMIST - Colin Steele, Department of Mathematics
- Coventry University - Duncan Lawson, School of Mathematical and Information Sciences.

Details may be obtained by contacting the above named staff.

The use of a diagnostic test should provide the users (staff and students) with valuable information on where, from a subject perspective, help is most needed.

5.3 What Help is Most Needed?

While the author would argue that there will always be students who need extra help coming to grips with aspects of (for example) the calculus and numerical methods, Sutherland [21] argues powerfully that the teaching of school algebra has been very strongly influenced by the 'celebration of understanding' which has implied that the techniques of traditional algebra which became associated with rote learning and therefore opposed 'understanding' have not been seen within the educational experience of the majority of pre-16 students. The net result is that many students who enter engineering programme of study simply do not have the algebraic skills, confidence or experience to cope with the mathematical generalizations necessary to cope adequately with an engineering degree. If the extra help given to students could remove the barrier that algebraic symbolism, concepts and manipulation appear to present to many would-be engineers a great service would have been performed.

Having argued that 'algebra' should be seen as a basic tool to be mastered rather than as a barrier to be surmounted, the question arises as to who should provide the help needed by many students.

5.4 Who Should Provide the Help?

From a student perspective, one of the most effective ways of addressing their needs is face-to-face teaching [22]. One might be tempted to immediately conclude that extra

classes should be offered for students who are struggling with mathematics. This is not always the best use of the students time, one has to remember that it is often the strugglers who, for whatever reason, find it most difficult to cope with extra classes mounted on a regular basis. Experience at the University of Sunderland indicates that it might be better to provide the extra help needed via the use of a specialist centre. Among the advantages quoted by Sunderland students are:

- the inherent flexibility of appointment time;
- the ono-to-one tuition provided;
- the tuition is tailored to cope with the needs of the individual;
- less embarrassment when taught by someone other than the regular tutor;
- the Maths Scheme reach-out.

The last point needs comment. At Sunderland, staff who run the University-Wide Mathematics Help Scheme 'reach-out' to Schools within the University. Essentially this means that staff who are willing to negotiate with the Scheme can organize School-based appointments for their students, i.e. personal or small group sessions take place within the School at a time guaranteed not to interfere with other timetabled sessions. This has been found to be a very successful way of encouraging students to engage with the scheme.

Of course, in this day and age one cannot ignore the wealth of teaching experience contained in on-line teaching materials, for example:

- Internet Mathematician, http://www.eevl.ac.uk/maths/index.htm
- LTSN Maths, Stats and OR Network, http://mathstore.ac.uk/index.shtml
- An excellent compendium may be obtained via the EEVL website which has links to many good and interesting sites relevant to anyone teaching and learning the mathematical sciences. Go to http://www.eevl.ac.uk

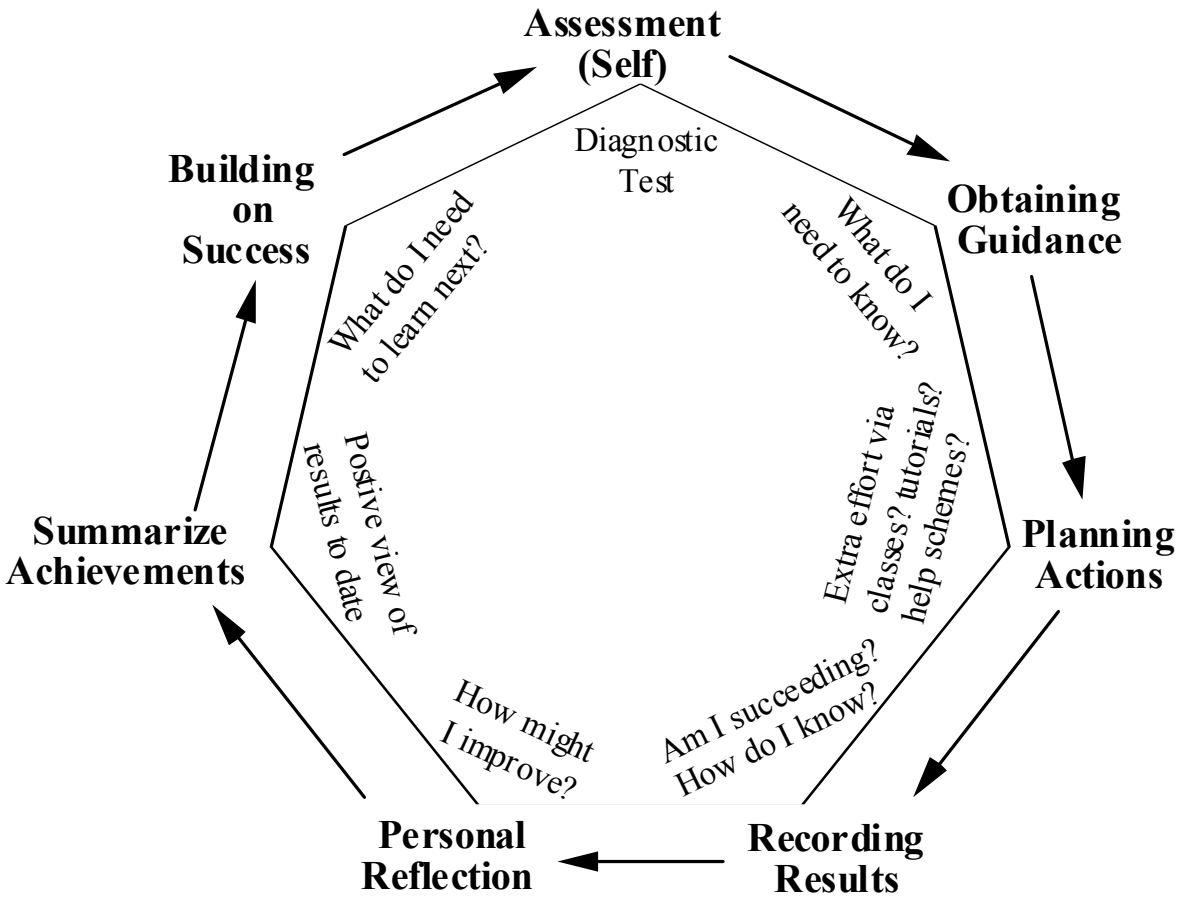
Neither can one afford to ignore the collections of flexible paper-based materials being developed in many universities. Perhaps the foremost example of this genre is the FDTL4 HELM (Helping Engineers Learn Mathematics) Project led by the University of Loughborough. The project, which started in 2002, aims to produce some 40 open learning booklets on aspects of engineering mathematics ranging from simple algebraic manipulation to complex analysis, through aspect of numerical analysis and from data presentation to the use of aspects of statistics such as hypothesis testing, regression analysis and the analysis of variance all with engineering applications. To complete the materials available on statistics, often curiously neglected by those responsible for service teaching in universities, it is hoped that an introduction to Bayesian methods will be included. All of the materials will be thoroughly trialled and will be made available throughout UK Higher Education in due course. There is much more to the HELM project than space allows for here, for details of the project see the project website at http://helm.lboro.ac.uk.

5.5 Conclusions

This booklet is about planning for personal development and Kolb's learning cycle has been mentioned earlier in the booklet. In the context of this chapter, unashamedly mathematically biased because the subject is so important to engineers and yet represents a real barrier to so many students, the an adaptation of the learning cycle might appear as follows.

Students who use the cycle as a guide to Personal Development Planning generally find that as an aid to successful study it becomes a natural part of their study planning.

Finally, the experience of the author suggests that if the cycle is used in conjunction with effective time management skills, then Personal Development Planning becomes a core skill of the student and is a significant aid to long term success.



Supplementary References for this chapter:

1 LTSN Maths TEAM Project Maths 'Support for Students,' http://www.ltsn.ac.uk/mathsteam

2 LTSN Maths TEAM Project Maths 'Maths for Engineering and Science,' http://www.ltsn.ac.uk/mathsteam

3 MSOR Connections Newsletter, relevant articles concerned with teaching and learning maths, stats and OR appear regularly written by experienced practitioners sharing their experiences

4 Teaching Mathematics and its Applications. An IMA publication which can provide a useful resource for those teaching scientists and engineers.

5 Undergraduate Mathematics Teaching Conference. An annual conference (usually early September) at which teams of interested and experienced practitioners address issues of interest to the mathematics teaching community. The results are published annually in the form of papers written by working groups attending the conference.

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Appendices

Appendix A - Induction Questionnaire

Questionnaire

The information we gather will be used to help us make your learning experience as enjoyable and successful as possible.

Q1 Name

_____

Q2 Date of birth

_____

Q3 Have you started, but not completed, a University or College course before?

- *Yes* ❑
- *No* ❑

Q4 Have you left your parents' home for the first time to start University?

- *Yes* ❑
- *No* ❑

Q5 Was the course you are going to study:

- *your first or second choice* ❑
- *third or later choice* ❑

Q6 Did you apply for the course through the UCAS Clearing System?

- *Yes* ❑
- *No* ❑

Q7 Are you the first person in your immediate family (including parents, brothers and sisters) to begin a University course?

- *Yes* ❑
- *No* ❑

Q8 Do you have a part-time job which you will keep while you are at University?

- *Yes* ❑
- *No* ❑

Q9 If you do have a part-time job which you will keep while you are at University, how many hours a week on average do you expect to work?

- *1 to 4* ❑
- *5 to 8* ❑
- *More than 8* ❑

Q10 How many other students do you already know who will start the course at the same time as you?

_____

Appendix B - Spiral Induction Learning Activities

As an example consider the 'Workshop Activity 2: What are my skills?'

In this activity there are three outcomes:

(i) being able to discuss with members of a group and come to some form of agreement,

(ii) deciding on what skills are the weakest,

(iii) developing some form of strategy to improve those skills.

Prior to beginning the activity, students learn what are key skills and why they are important, they then complete an individual skills audit. After completion, the students, in groups of four, discuss the outcomes from each audit and identify which skill is the strongest and which is the weakest in the group as a whole. They then discuss why particular skills are well developed and whether the reasons for this could be applied to the less well developed skills (the beginnings of a skills development plan).

Note, the building of a development plan and the use of such a plan to improve their skills is an excellent indication of a student's level of participation and engagement.

Each group then reports back to the rest of the class and with the Support Tutor try to identify a skills profile of strongest and weakest skills for the whole tutorial group. This skills profile forms the focus of activities over the coming weeks of the spiral induction and aid students to form 'Self-Help Peer Support Groups'.

Appendix C - Semester A Goals Sheet

Week Numbers	Goal	Date
Week 2	Complete Section A on Personal Tutor Complete My Timetable	
Week 3	Complete Study Timetable Get signature of Personal Tutor	
Week 4	Receive first attendance letter	
Week 5	Mid semester evaluation meeting with Personal Tutor	
Week 7	Receive second attendance letter	
Week 10	Receive third attendance letter. Progress meeting with Personal Tutor	
Week 12	Compete Section B and submit this Goals Sheet to Year One Tutor	

Section A **Personal Tutor Details** **Name** **Room number**

I have seen my student's timetable and study timetable and checked Section A

First Signature of Personal Tutor Date

The student has attended the mid semester meeting and I have seen their first attendance letter

Second Signature of Personal Tutor Date

The student has attended the progress meeting and I have seen their second attendance letter

Third Signature of Personal Tutor Date

Section B **Date and Time of My Semester A Examinations**

Appendix D - Semester A Reflection

At the end of Semester A you are half way through the first year of your programme of study. This is a good time to reflect on what has happened to you over the past three months. It may feel like a long time since you first walked through the gates of the University and you may have had a mixture of positive and negative experiences since that first day. When you review the first semester, you should be very pleased and proud of your achievements so far, but still be willing to make changes and improvements where they are necessary. This questionnaire has been designed to encourage you to think about the way in which you have approached your studies in Semester A. There may be some areas where you think your approach could be improved. If there is room for improvement, you should take some time to think about what you could do differently. After you have completed this sheet, you can discuss your plans with your Personal Tutor during your first meeting of Semester B.

1. Are you enjoying being at University
2. Are you satisfied with your attendance in Semester A
If your answer to any of the previous two questions is No, can you indicate how this might improve
3. Have you submitted all the coursework for Semester A
4. Have you sat all the class tests and exams for Semester A
If your answer to any of the previous two questions is No, do you know when you can re submit or re sit Consider how can you avoid these problems in the future.
5. Write down your two favourite modules from Semester A
Briefly give your reasons
6. Having come through Semester A, is there any advice you would give to anyone about to begin first year
What have you learnt from Semester A that you feel will help you in Semester B