INTRODUCTION

It is well recognised that students in higher education need to acquire and develop effective study and interpersonal skills in order to be successful in their study courses and after graduation (Tinto, 1993; Upcraft et al, 1989). The greater need is when students first arrive at university. At this stage, the majority are adjusting to their new lifestyle as university students and to the freedom which is afforded by it. They are suddenly faced with a radically different educational environment in terms of the way in which the knowledge is delivered and the amount of independent learning which is required. They often have little awareness of the way in which they learn and tackle problems. To be successful in higher education, students must develop the ability to examine their behaviour and become more independent self-learners (Ritzen, 1996). On the other hand, it has been observed that many of the skills needed by new students are the same as the transferable skills often missing in graduates, such as communication skills (Blair and Robinson, 1995; Connolly and Middleton, 1995). In fact, employers often prefer graduates who show abilities to communicate with other people and to manage time and work (Blair and Robinson, 1995). Therefore, the solution is to provide students with an appropriately delivered training in these skills at the very beginning of their university education.

Various higher education institutions worldwide employ different methods for the provision of study and other transferable skills training. Generally, there are three common approaches for the provision of study skills training: (a) the incorporation of special modules into the course curriculum, (b) the availability of additional classes/workshops, often voluntary, that are offered to various disciplines by central university departments, and (c) the provision of written and other multimedia materials that are usually made available by university information centres. However, the success of the above approaches has been limited due to three factors. First, the training modules are viewed by some students as remedial and hence, if voluntary, not attended by those who may benefit from them (Blair and Robinson, 1995). Secondly, as these courses/material are seen as being unrelated to the student's main discipline of study, it may have the effect of reducing the student motivation. Thirdly, the lack of flexibility and the poor timing of these additional courses often contribute to poor attendance. In addition, research has revealed that effective skills training is difficult to achieve since each
student must adopt and personalise their own study skills and methods (Blair and Robinson, 1995). Study skills cannot be taught to students by conventional teaching by using a set of established procedures, which can be reproduced for examination purposes.

To overcome the above issues the approach is to provide a flexible study skills training system which is facilitated by a technology-based learning environment (Hartley, 1999). The system described in this paper, called 'Skills SuperStore', has been designed and developed to be used as an on-line interactive self-learning tool to aid students in acquiring and developing study and other transferable skills in conjunction with existing skills learning resources. Decisions on the choice of delivery means, functionality, architecture and contents of the system were mainly based on the findings of a viability study conducted at the University of Limerick (UL), as will be discussed in the following section.

**SYSTEM'S SPECIFICATIONS**

In order to define the specifications of the target system, a viability study was conducted at UL. The aim of the study was to gather as much information as possible to assist in determining the appropriate features of the system, such as the required architecture, functionality, services and means of delivery. The study was effected by two means: (a) investigating and evaluating various methods used by various higher education institutions to facilitate study skills training as described in the previous section, and (b) conducting a voluntary survey of students from various departments, courses and disciplines. One hundred and fifty students, 86 males and 64 females, were surveyed. The majority of these students were in first year of their studies; however numerous second, third- and fourth-year students were also included. They were asked to complete a questionnaire that was designed to identify problems, needs and potential solutions regarding their personal study habits and requirements. The questionnaire consisted of 30 multiple-choice questions divided into three categories:

i. Problems faced during studying/revising and/or in learning new material;

ii. Personal study habits;

iii. Possible solutions and preferred training means.

The questions in the first category were formulated to assess which aspect of study skills the students find difficult to acquire and develop. Using the format of 'Do you have problems with ...', the questions highlighted nine different aspects of study skills ranging from note taking to planning and time management. Based on analysis of the collected data, the findings regarding this category are summarised in Table 1, where the percentages of students that indicated facing problems with the various areas are given. The table shows that a significant percentage (48%) of the surveyed students indicated that they face problems with effective planning and time management. On the other hand, relatively few (14%) think they have problems with note taking in the lectures.
### TABLE 1: STUDY REQUIREMENTS SURVEY - AREAS OF DIFFICULTY

<table>
<thead>
<tr>
<th>AREA OF DIFFICULTY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Planning &amp; Time Management</td>
<td>48</td>
</tr>
<tr>
<td>Reading Effectively</td>
<td>18</td>
</tr>
<tr>
<td>Learning Blockages</td>
<td>12</td>
</tr>
<tr>
<td>Notes Taking</td>
<td>14</td>
</tr>
<tr>
<td>Writing Reports &amp; Essays</td>
<td>18</td>
</tr>
<tr>
<td>Researching &amp; Conducting a Project</td>
<td>26</td>
</tr>
<tr>
<td>Understanding Course Material</td>
<td>24</td>
</tr>
<tr>
<td>Revising</td>
<td>32</td>
</tr>
<tr>
<td>Preparing for Exams</td>
<td>24</td>
</tr>
</tbody>
</table>

Analysis of the answers to the second category of questions, which are associated with the study habits, provided clues to what might be the causes behind the problems faced by the students with various study skills. For example, it was found that 50% of the surveyed students usually study in environments that lack adequate resources and are prone to distractions. Another question, concerning time spent studying, showed that the majority of the students (64%) think that five or fewer hours per week on average is sufficient. Also, when students were asked whether they prefer to study individually or in groups, the majority preferred individual study.

The questions in the third category were designed to collect as much data as possible regarding what they believe would be the most effective way of helping them in developing their study skills. More specifically, one question asked about preferred methods to receive adequate training in study skills with choices such as conventional workshops, modules integrated within the curriculum, on-line system and audio/video material, 60% of the students preferred the on-line system. The audio/video option was the least popular. Based on the findings of the investigation and the overall analysis of the survey data, it was decided that a web-based study-skills training system would best serve the collective students' needs and preferences.

**THE SKILLS SUPERSTORE SYSTEM**

**System Requirement**

As a first step in designing the Skills SuperStore system, it was necessary to identify potential users of the system. Three different user categories were identified, as student user, academic user and administrative user as indicated in Figure 1:
Services to each category of users were also identified. For example, a student user needs to be able to register and log onto the system, view selected modules and use the various facilities offered by the system to interact with any of the available skills modules. On the other hand, an academic user requires services that would enable him or her to log onto the system, view student information and student feedback and maintain the skills modules. Finally, administrator users were given the privileges of being able to log onto the system and have access to the maintenance features in order to maintain both the user information and study skills modules.

**System Design and Architecture**

To facilitate future expansion and developments of the system, a design-for-scalability approach has been adopted in the design and development of the Skills SuperStore system. Based on this approach, the system has been divided into two layers: a front-end layer consisting of a number of static and dynamic pages and a system back-end.

**Front-End Layer**

The front-end layer consists of a number of static and dynamic pages to provide the following:

i. A registration and log-on page that facilitates a customised and authorised access to the system based on the category of a user as identified by her/his Identification Number (ID);

ii. The Skills SuperStore user-customised main page, which contains links to the main sections of the system and provides links to:
(a) An Introduction to Learning Skills tutorial: a short introductory tutorial, which explains the importance and benefits of acquiring various study and other transferable skills. It also indicates how the Skills SuperStore system can aid the user in achieving this;

(b) A guidance tutorial How to Use the System: a short tutorial, which goes through the structure of the Skills SuperStore system and shows the user how to use the system effectively;

(c) A module index page, which provides links to all the skills modules offered by the system as shown in Figure 2;

(d) Resource page that contains links to other related websites and resources.

**FIGURE 2: SKILLS SUPERSTORE SYSTEM ARCHITECTURE AS SEEN BY A STUDENT USER**

![System Architecture Diagram]

The front-end layer of the system also provides links to the various services offered by the system to different users, as defined in Figure 1. It also provides access to other complementary services and features, such as an electronic chat feature, a search feature, and a feedback feature for student users. To the academic and administrator users, access to authoring tools is also available via this layer.

**System Back-End**

The system back-end consists of a number of arrays holding the contents of various skills training modules. It enables easy maintenance, retrieval and updating of material associated with current and future study skills modules. In line with the scalability approach of the system's configuration, the system back-end provides a set of templates for creating and adding new modules. Currently, the system offers the following interactive study skills modules:
i. Studying More Effectively: This study skills module helps the user evaluate what is required in order to study more effectively. It examines such things as the best place to study, what students need to do to study effectively and methods of studying. It provides the user with the opportunity to evaluate their own study habits and gives some useful guidance on effective study methods;

ii. Learning From Lectures and Effective Note Taking: This tutorial helps the student find ways of getting the most out of lectures. It indicates what should be done before and after lectures in order to be prepared and up to date with lecture content. It will also supply tips on how to take notes and make them useful;

iii. Reading More Effectively: This section looks at the different methods of reading which people use in order to be more efficient and effective. It indicates strategies that would be useful when reading to gather information and/or for reading to remember;

iv. Preparing for Assessment: This part gives a brief description of each of the different types of assessments and how they differ between stages, each other and various disciplines. It also provides a number of case studies in which the student user can get an example of how to successfully complete an assessment and from these examples draw up an action plan to help them prepare for their own assessments;

v. Managing Your Time Effectively: This study skills module helps the user examine how to manage their time and helps them consider how to use all study time productively. It also provides tips on how to organise coursework and the time required to complete the coursework;

vi. Researching an Assignment: This section examines the process of researching material for an assignment. It provides tips and guidelines on how to research effectively and efficiently;

vii. Planning Projects and Writing Essays: This module provides tips on how to plan a project and how to break it down into smaller, more manageable tasks. It also examines the process of writing essays and what the assessor is looking for from an essay. It also provides advice on how to structure, plan and write essays.

The modules' material has been adapted from a number of specialised references (Hartley, 1999) and web-sites. Each module in the system provides the student user with an opportunity to evaluate his/her study habits and develop a particular study skill in a way that would improve his/her learning, retaining and application of knowledge. The systems' arrays also hold and facilitate the user-controlled access mechanism and all the administrative resources. The purpose of the administrative resources is to enable the maintenance, updating and creation of modules.
The Skills SuperStore system was designed and developed with reference to the five pillars of quality online education. These are as follows:

i. Learning Effectiveness;
ii. Student Satisfaction;
iii. Faculty Satisfaction;
iv. Cost Effectiveness;
v. Access.

System Functionality and Use

System Operation for the Student User

The principal purpose of the Skills SuperStore system is to provide student users with an easily-accessed study skills training environment that assists them in acquiring and developing various study and other transferable skills required to have a successful third-level education. Since it is the student user who is identified as the main system user it would be beneficial to give an overview of the system operation from the perspective of the student user.

On commencing a session of the Skills SuperStore system the student user is firstly asked whether they are a new or returning user of the system. If they are new to the system, students are firstly required to register their details by selecting the register option. The register option requires new users to submit various required information such as name, ID, password and other details to be stored in a system array. This facilitates the user personalisation of the system. The system will know what users, along with their details and their progress, are using the system at any given time. If it is a returning user who is commencing a session with the system they will be requested to log onto the system. This facilitates a customised and authorised access to the system based on the category of a user as identified by their ID.

Once the student user has successfully registered or logged onto the system they will be directed to the student menu page. This page provides the student user with four different options which they can select from:

i. The Introduction to Learning Skills Tutorial;
ii. The How to Use Tutorial;
iii. The Module Index;
iv. The Resource Centre.

On the first use of the system the student user is recommended to firstly complete the Introduction to Learning Skills tutorial and the How to Use tutorial so that they may obtain the optimum use of the system.
The Introduction to Learning Skills tutorial is a short introductory tutorial which provides a brief overview of the importance and benefits of acquiring various study and other transferable skills. It achieves this by firstly discussing the current situation and how students are completing college but not achieving the degree at the end of their four years, that reflects both their ability and effort. It describes how students in their first year adopt various methods of study such as cramming for example, which are not very productive but still enable them to pass their assessments, and continue to use these methods throughout their higher education experience. Following this discussion, the various study and other transferable skills are presented briefly and how beneficial it would be to acquire and develop these skills to assist them to succeed, with a little effort, in their third-level education. Finally, the tutorial will conclude with a brief overview of how the Skills SuperStore system aims to assist the student users acquire and develop these various study and other transferable skills so that they may receive degrees that not only reflect their ability but also the effort they put in.

The second of the two tutorials which the first time student users are recommended to complete before choosing a module to study is the How to Use tutorial. The purpose of this tutorial is to go through the structure of the system, all the features and facilities that the system offers to the student user to ensure that they are able to use the system to its optimum potential. In particular, it discusses in detail the study skills modules offered by the system and how the user becomes actively involved in each lesson in order to entice them to think about their own personal learning styles, problems and needs. It explains each of the interactive pages included to facilitated this purpose and how each of them operates so that when encountered the student user can apply the tutorial content to their own personal situations.

Once the student user has completed both of these tutorials they then select the module index option. By selecting this option, a page which lists all the modules offered to the user by the system is displayed. The student user can then select the module they wish to complete.

The purpose of these modules is to encourage the student users to examine their own approaches to study and apply the methods suggested by the modules to build on and develop the students existing skills. Each of the modules offered by the Skills SuperStore system to the student user will assist the student to acquire and develop one particular skill. As each student's study approach is different, in that no two students have the same style of learning, a module which simply provides general information about the study skill is not sufficient. For this reason, the modules were required to engage the student to be become actively involved when completing the modules so as to apply the material delivered to their own learning problems and situations. This is achieved via the interactivity pages incorporated into the module. The interactivity, module delivery and content will be discussed in more detail in the following sub-section.
Also, when the student user successfully commences a session of the Skills SuperStore system via registration or log on they will have access to other complementary services and features, such as an electronic chat feature, a search feature, a notepad feature and a feedback feature from anywhere in the system as they desire. Each of these complementary services is discussed in detail now.

The electronic chat feature enables users who are simultaneously engaged in using the system to communicate in real time. It enables them to discuss any problems they may be experiencing or alternatively any methods or techniques they are employing which work for them and enable them to study effectively.

The next complementary service is the search feature. This feature enables the student user to find the specified information. The search is achieved by comparing the search word against the text stored in the database module tables. If any match is found, it is then displayed on screen for the user. The user can then select the page corresponding to the search word they wish to view.

The third of the complementary services is the notepad service. This service enables students to access Notepad or some other editor available on the computer.

The fourth and final of the complementary services is the feedback service. This service enables students to submit their views, experiences, problems and solutions about both the modules offered and the system in general. This feedback enables the academics and administrators to continually improve the study skill modules and the system itself.

**Overview of Module Delivery and Content**

To gain an understanding of how the skills modules assist third-level students in acquiring and developing various study and transferable skills, an overview of the delivery mechanism and content of the skills' module would be of great benefit.

It is important to note firstly that the purpose of the study skills modules is to assist third-level education students in acquiring and developing various study and transferable skills in such a way that the modules engage the student user and entice them to actively think about their own current study approaches and problems. The most effective way to explain is to go through a specific module from when it is first selected by a student to when it is completed.

Each skills module begins with one or more general overview pages. These pages give an introduction to the skill being studied. However, as already mentioned, delivery of the module is designed such that it enables the student user to become actively involved with the module. At some stage, therefore, the module must challenge the user to reflect on their current approaches and problems and how they may apply the methods discussed in the module to
improve their situation. This is achieved through interactive pages, which engage the student through answering questions and performing activities. There are four types of interactive activities used in the Skills SuperStore system modules:

i. Matching;

ii. Picture Selection;

iii. Multiple Choice;

iv. True or False.

A good way to demonstrate how the above actually works is to provide an example by going through the prototype module, Effective Study. When the student user first commences the module, as already mentioned, they first encounter a number of general overview pages providing an introduction to Effective Study, the importance and need for it and the current situation in terms of how students study. Following this, an overview of motivation is provided, explaining what intrinsic and extrinsic motivation is. Subsequently, the student user will encounter the first of the interactivity pages. They are asked whether they have difficulty with clarifying motivation. This question will persuade the student user to contemplate their current motivation and how they motivate themselves to study. By thinking about this they may see that they could incorporate some of the methods suggested in the module to improve their level of motivation for example. This continues as the student user progresses through the module. Each time they encounter an interactivity page they reflect on the topic and decide whether there is something they could do in order to improve the situation.

SYSTEM'S EVALUATION

As mentioned earlier, the main objectives of the Skills SuperStore system is to provide a flexible learning environment for higher education students - University of Limerick students in particular - to help them evaluate and develop their study, learning and other interpersonal skills. It is envisaged that by providing a system such as the Skills SuperStore both the students and staff of higher-level institutions will benefit from the following outcomes:

i. Students' academic performance will be improved via developing their study and learning skills;

ii. Improving students' transferable/professional skills will enhance graduates' employability;

iii. Students will be motivated to become more responsible, independent and life-long learners;

iv. Raising students' awareness of the importance and benefits of information resources within their institution and beyond, and how to search for them;
v. Promoting appropriate use of technology in teaching and learning approaches in the University of Limerick and other higher education institutions in Ireland.

In order to assess the achievement of the above objectives and monitor the performance of the system, an on-going evaluation process is currently being implemented. As part of this process, a comparison with currently available e-learning platforms that facilitate on-line training and course delivery has been initiated in terms of functionality and ease of use. First, a number of e-learning platforms were identified and a collective list of the most commonly available functions in these systems was compiled. The comparison was then effected by looking at each platform, including the Skills SuperStore, and marking whether each of the listed functions is available and the degree of user-friendliness associated with its use. Table 2 gives a summary of the functions provided by the Skills SuperStore. The comparison showed that the Skills SuperStore provides about 80% of the most common functions usually available in e-learning platforms.

TABLE 2: FUNCTIONS PROVIDED BY THE SKILLS SUPERSTORE

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>SKILLSUPERSTORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>Yes</td>
</tr>
<tr>
<td>Course Material Development</td>
<td>Yes</td>
</tr>
<tr>
<td>Behaviour</td>
<td>No</td>
</tr>
<tr>
<td>Assessment</td>
<td>Yes</td>
</tr>
<tr>
<td>Learner Information</td>
<td>Yes</td>
</tr>
<tr>
<td>Learning Preferences</td>
<td>No</td>
</tr>
<tr>
<td>Interaction</td>
<td>Yes</td>
</tr>
<tr>
<td>Learning Content</td>
<td>Yes</td>
</tr>
<tr>
<td>Multimedia</td>
<td>Yes</td>
</tr>
<tr>
<td>Course Configuration</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Regarding the degree of user-friendliness, feedback data is being continuously collected from users, particularly students, through both the on-line feedback facility of the system and the written and oral surveys conducted by lecturers, tutors and support staff from the Centre for Teaching and Learning in the University. In addition, an access counter has recently been added to the system to monitor the frequency of its use. To date, the feedback has been very positive, indicating a good level of satisfaction with the system, its contents and user-friendliness. Also, a number of lecturers, tutors and other associated academics are currently being surveyed. The survey involves completing a questionnaire based on the current status of the Skills SuperStore system and ways/suggestions for improvements.
CONCLUSIONS

The facilitation of a new on-line interactive study-skills training environment using a web-based system has been presented in this paper. The system has been designed to be used in conjunction with existing study-skills learning material and resources in third-level institutions. The functionality and contents of the Skills SuperStore system were designed and developed such that they enable students to formulate their own learning strategies and provide positive guidance and direction on how to develop study skills. An on-going evaluation process is currently being implemented and feedback data is being continuously collected and analysed. Initial feedback has been very positive.

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REFERENCES


