Evaluating Online Asynchronous Support In The Institutes Of Technology Ireland*

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Abstract

As the uptake of e-learning continues to increase, it has come to light that engaging students in e-learning requires a large time commitment on the part of the lecturer. The burden may be eased by the expedient use of online asynchronous support tools. This research evaluates the use of asynchronous support tools in the Irish Institutes of Technology (IoTs) and their application to the provision of online support to IoT students. It provides an evaluation of the perception of IoT students as to the adequacy of asynchronous support offered to them and prescribes for improvement of that support. The research suggests that asynchronous support tools are substantially underutilised within the IoTs and consequently that student engagement via asynchronous support is insufficient in meeting their learning needs. While email is identified as the preferred and dominant means of communications, discussion boards and weblogs are not employed to anywhere near potential. The findings suggest that improved use of asynchronous support tools would help redistribute scarce lecturer's time and address the important issue of providing online support to students in a 'just-in-time' learning manner, rather than a 'just-in-case' data repository. In addition it recommends the integration of e-learning platforms and their constituent tools with a knowledge base. This would facilitate the lecturer in providing 'reusable' and 'in context' online support to be used by students if and when required. The findings therefore present two major challenges to IoTs: to enhance student support by substantially improving the current use of online asynchronous support tools and to employ the expedient use of semantic technologies. Facing and surmounting these challenges are a vital step in creating and sustaining a quality online supportive environment for both lecturer and student.

Keywords: asynchronous support, e-learning, third level education, email, discussion board, weblogs, semantic technologies

* Research Article. URL: http://ojs.aishe.org/index.php/aishe-j/article/view/50

1. Research Background

Over the last thirty years, more flexible learning methods have been slowly introduced in place of some traditional educational methods (Jarvis et al. 2003). These methods propose to enhance learning in many forms (Garrison & Anderson 2003). As a result, there is increasing investment, research, and development in new learning methods within Higher Education (HE) throughout Ireland (Kelly et al. 2004). These new learning methods include the introduction of relatively new concepts into HE such as e-learning. The phenomenal uptake of e-learning is escalating (Kahiigi et al. 2008). HE is now exploiting this substantially to port learning content to the Internet. As a result, e-learning is attracting increasing student numbers within Institutes of Technologies (IoTs). However, Alonso et al., (2005) suggest that HE is facing many uncertainties with the implementation of e-learning. One example where uncertainty lies is in their ability to provide sufficient online support. As the student population through e-learning media continues to increase, it is inevitable that the demand for online support will also increase. Asynchronous support is the predominant method of delivering support to students within e-learning environments (Milliron & Prentice 2004). However, there has been little research effort within an Irish context to evaluate students' learning experience with regard to online asynchronous support.

2. Context and Justification of Research

The starting point and to some degree the overall purpose and scope of this research originates with an interest in exploring student learning experiences as they engage in e-learning. For e-learning to succeed, the IoTs must understand the advantages, disadvantages, and limitations of various tools, and their effects on the student's learning experience. This research evaluates whether lecturers and students are exploiting asynchronous tools within an e-learning environment. Thus, the focus of this research is on the perceived effectiveness and efficiency of asynchronous support tools as students engage in e-learning activities. An evaluation explores whether online asynchronous support enhances student learning experiences within an e-learning environment. It also explores whether there is a need for IoTs to take more responsibility in providing structure and guidance in e-learning environments. This is critical as students within e-learning environments are now reported to assume increased control of their learning (Scheuermann 2003). From a learning support perspective, as student numbers are expected to grow it is inevitable that demand for support will put a continuous strain on supply of support from lecturers. As e-learning continues to grow within the Irish third level education sector, there has been insufficient reporting on whether or how students' learning experiences vary according to the level of online support. Thus, evaluating the current state of e-learning, as experienced by students, and reporting on the availability of asynchronous tools to them while seeking online support, offers an excellent platform for educators, researchers, and e-learning developers to gain a true snapshot of e-learning experiences within the IoTs.

3. The Literature

This section provides an overview of some prominent learning theories, and discusses approaches to teaching and learning that are applicable to particular practices in e-learning. Learning theory can be defined as an interpretative account for change in our behaviour, including cognitive, emotional, and environmental factors and experiences, to make sense of the world around us. Bernard (1956, p.118) defines learning as:

> … change in performance through conditions of activity, practice, and experience.

McCormick and Paechter (1998) provide a definition of learning as:

> … a persisting change in performance or performance potential that results from experience and interaction with the world. Learning is also a knowledge construction process .

These definitions provide us with a base for discussion to develop an understanding of what learning is. Learning can largely be acknowledged through the change in one's performance (e.g., Maeroff 2003). As students undergo change in their performance, this allows the researcher to investigate their perception of their learning experience within an educational environment. Williams (2002) explains that, over the last three decades, several new approaches to the theory and practice of educational evaluation have emerged to address concerns within the learning process. Kolodner et al. (2005) explore the question of what learning is and how it takes place. According to Bernard (1956), learning includes not only the acquisition of subject matter but also of habits, attitudes, perceptions, preferences, interest, social adjustments, skills of many types, and of ideals. Behaviourism, cognitivism, and constructivism, as three fundamental learning theories, are often utilised in the creation of learning environments (Siemens 2004).

3.1 Classifications of Learning Tools

E-learning tools are electronic tools used to support the function of learning. E-learning tools are used to encourage student collaboration, higher-order thinking, and develop social learning communities. Rogerson-Revell (2007) discusses how the current phase of the e-learning evolution is witnessing the emergence of various Web tools and technologies that are relevant to e-learning material development. There are many classifications of tools available to facilitate learning activities. These can be divided into four main categories:

1. information creation
2. information seeking
3. information exchange
4. information maintenance

Kellar et al. (2006) provide a description and categorisation of the four classifications. These are summarised in Table 1 below, which outlines the main classifications of tools used within an e-learning environment to support information seeking, exchange and maintenance tasks. These tools can be further categorised as *synchronous* or *asynchronous,* discussed in the following sections.

Information Goal	Information Task	Example of Method to Achieve Goal
Information Creation	Publishing	Creating, publishing, editing, adding, or deleting information on public forums, e.g. weblogs, discussion boards and social networks.
Information Seeking	Fact Finding	Looking, searching or checking information through the use of a Web browser; (e-library resources, online research papers).
	Information Gathering	Looking and researching information, for example, seeking support of a lecturer through e-mail, search engines, online resources.
	Browsing	Reading weblogs, news articles, movies, audio, email, browsing websites.
Information Exchange	Transactions	Validating information, document delivery request, online assessment, email, online surveys
	Communications	Email, Discussion boards, Weblogs, Mobile phone text messaging.
Information Maintenance	Maintenance	Ensure links work properly, ensure content is correct, unsure content is updated

Table 1: Web Tool Classification (Kellar et al. 2006)

3.2 Asynchronous Communication

There are two basic forms of e-learning tools: synchronous and asynchronous. Through synchronous tools, the two communicative tools primarily synchronise themselves to each other, and then continually send data in 'real time', for example, a one-to-one or group chat using Skype[1]. Synchronous communication allows for faster data transfer rates than asynchronous methods i.e., lecturer and student are present in the same time in a virtual space (Mabrito 2006).

Asynchronous communication implies 'no synchronisation', and does not require sending and receiving data in real time. Asynchronous communication is slower than synchronous, for example, e-mail. Therefore, timekeeping through an asynchronous medium requires the coordination of events to operate a system in harmony. Asynchronous learning occurs when a student, or lecturer is not present (physically or virtually) for instruction at the same place and time but communication is successfully achieved. The use of asynchronous tools in structured courses breaks the traditional paradigm of time and physical space. This creates new educational possibilities and opportunities (DeSouza & Gomes 2005). Asynchronous instructional materials are accessible from any place at any time. These materials offer students the opportunity to learn at their own convenience (Deal 2002; Cannings 2003). A key component of asynchronous learning is interactivity. Students respond to some component of instruction, such as a reading assignment, or a request to respond to a discussion question or complete a tutorial assignment. Students may also communicate with lecturers and peers through tools such as email or discussion boards (Laabs 1997). Another form of asynchronous instruction requires students to participate in some form of online tutorial. Students log into a VLE and participate in a tutorial. Unlike the synchronous classroom environment, students may not have to complete assignments within a specified short timeframe. Students can repeat lessons as many times as necessary. They may also have the choice to complete as much or as little of the assignment depending on the time available to them. Thus, supporting students within specific timeframes is an important activity within e-learning.

According to Garrison and Anderson (2003), e-learning presents unique capabilities and promise to support asynchronous, collaborative communication in a dynamic and adaptable learning environment. In the HE sector, asynchronous learning is a very powerful method of learning (Milliron 2004). He adds that the associated techniques for using asynchronous learning to support in-class and online instruction attempt to bring learning to life in more innovative ways. According to Clarke (2003), asynchronous learning can promote student exploration and problem solving through:

- collaborative involvement in authentic methods
- challenging multidisciplinary tasks by providing realistic complex environments for student inquiry

1 http://www.skype.com/

- furnishing information and tools to support investigation
- presenting data to support problem solving learning activities

Sims et al. (2002) and Garrison (2003) suggest that asynchronous e-learning methods can create a rich cognitive presence, capable of supporting effective, higher-order thinking. Critical thinking and self-directed learning align with the defining properties of asynchronous online learning. Attention must be given to the opportunity to reflect upon and monitor knowledge (re-)construction as well as the ability to collaborate and manage the learning process (Israel & Aiken 2007). The properties of asynchronous online learning share similar characteristics of higher-order learning constructs such as reflective inquiry, self-direction and meta-cognition (Sloffer et al. 1999). The close mapping of online learning properties and higher-order learning dimensions suggest considerable potential and promise in informing and guiding effectiveness and efficiency through online asynchronous technologies. Students can communicate and collaborate asynchronously without needing to have a set time available in their daily schedules. Strollberg et al. (2005) describe collaboration as the *'cooperative interactions of individuals to achieving complex objectives'*. Student activities are often actively mediated by peer groups as strong interactions transcend from the traditional classroom (Kear 2004). Students in such groups sometimes cooperate to deal with the formal curriculum through collective studying and problem solving techniques within group activities.

According to Pelz (2004) the student is, for most part, in charge of what gets learned. Therefore evaluating the student's learning experience and the availability of support to students within an e-learning environment is a critical matter. Asynchronous tools possess the advantage of facilitating methods to involve people from multiple time zones. Ashley (2003), documents that the uses of asynchronous tools are also helpful in capturing the history of the interactions of a group, thus allowing the collective knowledge to be more easily shared and distributed in a supportive manner. Other benefits of asynchronous tools are discussed in the following section.

3.3 Benefits of Asynchronous Tools

There are numerous benefits to using asynchronous tools. Asynchronous tools can be used to enhance the learning environment. Students can participate in groups. Students find it difficult in the traditional classroom environment to get together in groups to work on activities that promote learning communities. Asynchronous online tools allow students to collaborate at any time, in traditional or online classes, at times suited to their own schedules. Asynchronous tools also provide flexible methods of learning which allows students to learn at their own pace (Deal 2002). In addition it does not present any opportunities for preconceived notions of race, color, or sex (Maeroff 2003). Asynchronous tools, as a method of learning, are considered to be time and cost efficient, especially when compared to a classroom setting. It also affords students the opportunity to repeat concepts as often as necessary for learning to occur (Deal 2002). It is also suggested that students are more comfortable writing than talking in a class and therefore may become more involved in online groups. This allows students to publish comments online having time to reflect and articulate. Through the use of asynchronous tools,

online resources can be shared quickly and accurately, for example file transfer protocol (FTP). This offers flexibility on the process of learning through the use of Web technologies. Lecturers and students may feel less anxious about time being wasted, for example, in the event of a class being cancelled if they can report such incidence via asynchronous tools. Communications can go beyond the 'bricks and mortar' of the classroom. Students from all over the world can discuss topics of common interest without regard to differences in time zones. This has the advantage from the college's perspective in offering an online course to a vast number of students situated around the world (for example, eLearning EVENE — Erasmus Virtual Economics & Management Studies Exchange[2]). In addition, students in need of support can be identified by their participation (or lack of participation) within VLEs and personalised attention can be given to them, to enhance a student's learning potential. This may be facilitated through the use of online discussions which can be organised by topic which can make the filtration of information easier and allowing more time for the student to digest and contribute to the information (Kay 2006). Asynchronous tools, for example email, also afford the use of attachments which allows for increased transmission of data. The advantages of asynchronous tools have paved the way for some developments towards the evolution of e-learning. However there are a number of drawbacks to asynchronous tools.

3.4 Drawback of Asynchronous Tools

The primary drawback of asynchronous tools is that they require some regulation when used within online communities (for example, people must login to participate). This act may feel impersonal to those who favour more interactive synchronous technologies. Other drawbacks include the lack of impulsiveness and the lack of a personal touch in communication methods. Email extends the concept of the traditional college time by allowing students to submit questions anytime-anywhere and receive the answers without waiting to meet with the lecturer.

2 http://virtuni.eas.sk/rocnik/2006/data/pdf/fid001382.pdf

4. Summary of Research

The primary objective of this research was to explore students' perception of their learning experience while utilising online asynchronous support throughout an e-learning course. The research achieves this objective by

- developing a profile (average age, discipline of study, etc.) of students undertaking e-learning in the IoTs
- exploring the range and usage of asynchronous tools to gain online support and
- reporting the perceived effectiveness of online asynchronous support tools and levels of satisfaction of students when using each asynchronous tool.

As with all research, the philosophical assumptions that underpin the validity of research must be appropriate to the nature and complexity of the research questions. The philosophical viewpoint must reflect the objectives of the research which are to determine students' perception on the quality of online asynchronous support within the Irish IoTs, i.e., to interpret and provide descriptions (qualitatively) of the learning experiences and to generate understanding from quantitative measures of students' experience regarding the usage of asynchronous support tools.

According to Lincoln and Guba (1985), prior to carrying out qualitative research, a research strategy must adopt the characteristics of the naturalist paradigm, and prepare a research design to meet naturalistic inquiry strategies. Therefore, as this research collects meanings constructed by students as they engage with the world (i.e., e-learning) they are interpreting to allow the research make sense of their perceptions. The researcher attempts to understand the phenomena, through assessing these meanings provided by students and report on typical interaction amongst students and lecturers; this suggests the appropriateness of a *naturalistic* and *interpretive* view of ontology and epistemology.

Data collection using the interpretive and naturalistic view of ontology and epistemology seek to obtain people's perception of the world in which they live in to develop subjective meanings of their experience. According to Creswell (2003), the goal of this research method is to rely on the participants views of the situation being studied. The process is largely inductive, as the researcher generates meaning from the data collected. The research method adopted in this research is both largely qualitative, with quantitative elements, for example, to determine student profiles and tool usage patterns. According to Hoepfl (1997), quantitative researchers draw "causal determination, prediction, and generalisation of findings", whereas qualitative researchers seek "illumination, understanding, and extrapolation to similar situations". Qualitative research studies (exploratory or interpretive) require *naturalistic* environments in order to make sense of a specific situation. Denzin and Lincoln (2000, p.3) define qualitative research as:

> … multi-methods in focus, involving an interpretative, naturalistic approach to its subject matter …

This research sets out to study students' learning experience in their natural learning environment, to make sense of, or interpret e-learning phenomena in terms of the meanings which student bring to them (Denzin & Lincoln 2000). Therefore a survey is deemed the most suitable research method to capture students' experiences. This method provides a numeric description of student's attitudes, description of trends, use of learning tools and opinions of the research population. It allows the researcher to identify the essence of student learning experience. Lincoln and Guba (1985, p.120) explain that:

> … if you want people to understand better than they otherwise might, provide them information in the form in which they usually experience it.

Understanding students' learning experiences and tool usage allows the researcher to report the students' views while undertaking e-learning courses.

4.1 Selection of Research Tool

The method adopted by the researcher is field research through the use of an online questionnaire. According to Bryman (2004), the main advantages of an online questionnaire include, low cost, faster response, attractive formats, unrestricted distribution, fewer unanswered questions, and a better response to open questions. This study requires the collection of data through the use of an online questionnaire, implemented with *Survey Monkey*[3]. This is used to determine the perception of students' learning experiences and the range of online asynchronous support tools used by students while engaging in learning tasks. It also allows students to provide additional comments on any issues, factors, or considerations they deem to be important to the successful completion of the students' learning objectives. Quantitative surveys aim to uncover data on respondents' perceptions, attitudes, opinions, and experience using structured questionnaire items (Sue & Ritter 2007). Information is collected from a population sample which is a fraction of the predefined population. This approach facilitates replication of the study and generalisation of the answers from the sample to the overall student population in the IoTs. The online survey was used to gain a wider understanding of learners' experiences in seeking online support. The questionnaire was pretested on six third level students participating within an e-learning course.

According to Kumar (2005), bias is a deliberate attempt either to hide what a researcher has found in their study, or to highlight something disproportionately to its true existence. Mertens and McLaughlin (2003) report that assumptions are made that the best way for the researcher to obtain this knowledge is to remain objective, which is achieved by *'maintaining a distance from the people under evaluation'*. Within this research, bias and non-response bias was overcome by following a strict deployment of population sampling. The non-response occurs whenever some members of the sample refuse to cooperate, cannot be contacted, or for some reason cannot supply the required data (Bryman 2004). Email and online survey tools allows the researcher to monitor the rate of responses received from the student population.

3 http://www.surveymonkey.com/

This enabled the researcher to directly contact 30 non-respondents from across all the IoTs who originally refused to participate within the survey. These results were accounted for within the data analysis. The researcher applied several strategies to eliminate non-response bias. These include:

1. **Called back 30 non-respondents:** Finding out why students did not respond helped determine the extent of response bias.
2. **Compared data in hand on respondents and the 30 non-respondents:** Data from the researcher instrument allowed the researcher to compare data from non-respondents to determine whether there are any significant differences.
3. **Assured there was no response bias and generalised to the student population:** The data from both the respondents and non-respondents allowed the researcher to profile the student population and on examination of the data, it revealed no obvious abnormalities.
4. **Result:** There were no variances within the data received from the respondents and non-respondents, therefore a generalisation to the student population can be justified while eliminating any form of bias.

This sample was obtained by carrying out a population sample of the student population within the IoTs, which adheres to the ethical code of research that this methodology achieves.

4.2 Summary of Main Findings

This research received valid responses from 448 students across the Irish IoTs. The student profile was based on six criteria: age, gender, nature of application (i.e., standard applicants or mature applicants), computer proficiency level (very inefficient, average proficiency, or very proficient), NQAI level (level 6-10) at which they are studying, and their average time online per day (hours). These results are summarised Table 2 .

The respondents were asked to specify which academic department they study within. Figure 1 depicts the percentage of surveyed respondents studying in various departments. This illustrates that the level of response varied across the departments. Respondents were asked to specify their usage of asynchronous support tools while undertaking learning tasks. There were 351 valid responses to this question. Figure 2 illustrates these results. This shows that 77% (270) of respondents make moderate to extensive use of asynchronous support tools. Of the asynchronous tools students use, the respondents were asked to specify the level of importance (out of 100%) they place on each of the following tools to successfully complete their module. These findings are summarised in Table 3 .

Student Demographics	Valid Responses	Findings
Average Student Age	471	23.7 years
Gender	471	49% Male; 51% Female
Perceived Computing Proficiency	358	92% of students average or above
Perceived Internet browsing Proficiency	358	91% of students average or above
Average time consumed online per day	362	2.6 hours
Student's Application Status	467	80% Standard; 20% Mature
NQAI Level	455	• 5% Higher Cert • 46% Ordinary Degree • 41% Honours Degree • 3% Higher Diploma • 4% Masters Degree • 1% Other

Table 2: Summary of Students' Demographics within the IoTs

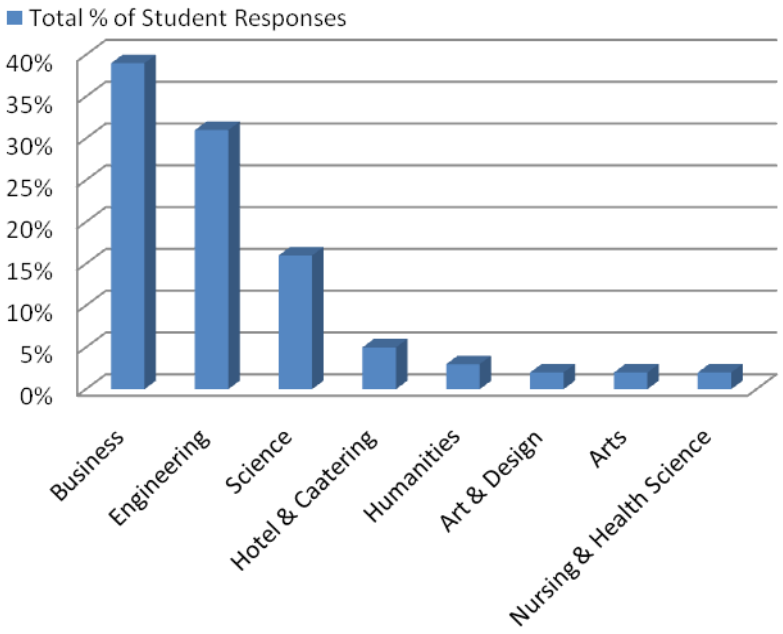

Figure 1: Student Responses within each Department

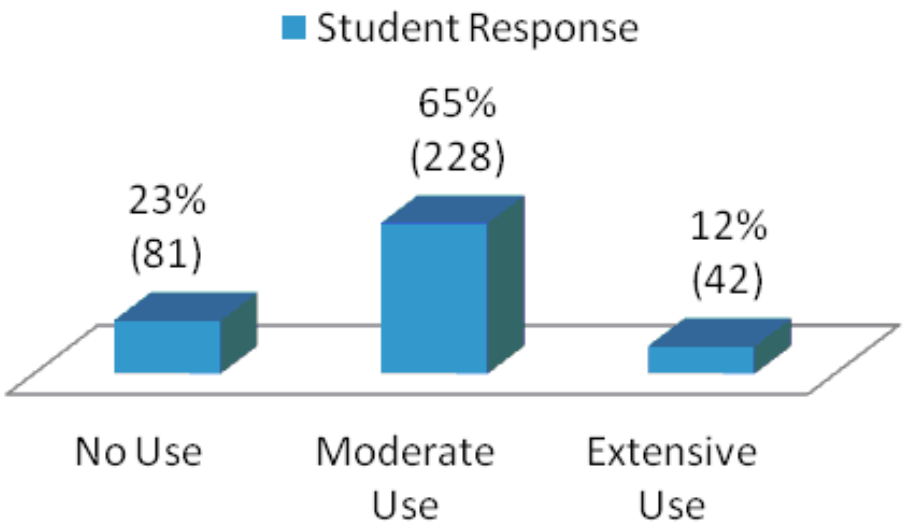

Figure 2: Use of Asynchronous Tools

Asynchronous Tools	% of Importance
Email	97%
Mobile Phones	62%
Discussion Boards	54%
Wikis	49%

Table 3: Students' Perceived Use of Asynchronous Tools

The students report that e-mail is the most important tool, followed by mobile phones, and discussion boards to successfully complete their module. The respondents were requested to specify the level of importance they place on the more prominent asynchronous tools to successfully complete an e-learning module. There were 352 valid responses to this question. The results are illustrated in Figure 3.

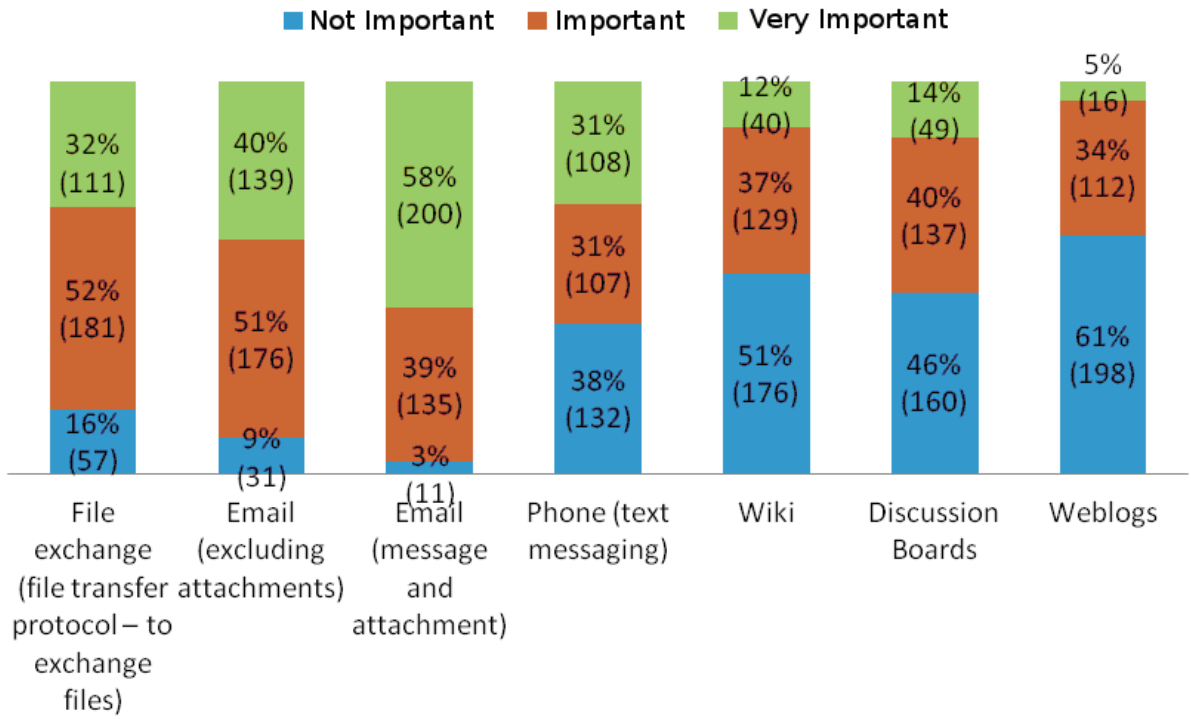

Figure 3: Importance of Asynchronous Tools

Over 90% of students feel that the use of email is important to successfully complete their e-learning module. Ninety seven percent of students feel that the use of email attachments to send files is also important to complete the module. Sixty two percent of students indicated that mobile phones are an important tool to assist in completing course work (for example, planning and working on collaborative learning tasks). The respondents were asked to indicate their level of use (%) of email, discussion boards, and weblogs to receive support from their lecturer and peers. Table 4 summarises the students' responses.

	High Use of Online Support		Moderate Use of Online Support		No use of Online Support	
Asynchronous Tool	**Peer**	**Lecturer**	**Peer**	**Lecturer**	**Peer**	**Lecturer**
Email	17%	23%	48%	60%	35%	17%
Discussion Board	6%	7%	22%	26%	72%	67%
Weblog	3%	5%	24%	27%	72%	70%

Table 4: Student's % use of Tool to Avail of Online Support

It is evident from Table 4 that the majority of students make moderate to extensive use of email to avail of online support. Students make less use of discussion boards and weblogs to avail of online support. The respondents report that they make relatively similar use of discussion boards and weblogs to seek support form lecturers and peers. The respondents were asked to specify their perceived intensity (%) of use of email, discussion boards, and weblogs for specific learning activities. The major findings, based on 280 valid responses, are presented in Table 5.

Learning Activities	Email Usage	Discussion Board Usage	Weblogs Usage
Communicating with other students	75% (102)	29% (42)	22% (29)
Communicating with your lecturer	80% (113)	36% (49)	26% (33)
Carrying out a group learning task	61% (77)	22% (28)	16% (20)
Carrying out a learning task individually	54% (64)	32% (39)	26% (31)
Gathering information	67% (76)	44% (53)	43% (52)
Listening to course material	24% (28)	22% (26)	20% (24)
Managing course material	46% (52)	30% (34)	27% (31)
Planning a group learning task	54% (59)	24% (27)	17% (19)
Planning an individual learning task	41% (41)	26% (29)	27% (30)
Reading course material	44% (44)	32% (36)	40% (45)
Revising course material	34% (34)	34% (37)	36% (40)
Self assessment exercises	30% (29)	25% (27)	25% (27)
Receiving Student Support	61% (68)	37% (41)	30% (32)
Providing Student Support	54% (62)	34% (37)	27% (29)
Viewing course material	53% (55)	37% (40)	36% (39)

Table 5: Usages of Asynchronous Tools for Learning Activities

Students were asked to specify whether or not they agree with the statement:

> I feel that face-to-face contact with my lecturer is necessary to learn within this module.

Respondents could also indicate whether or not they had an opinion to offer. There were 281 valid responses to this question. These are summarised in Table 6. The majority of students (68%) feel that face-to-face contact is necessary with their lecturer. Only 16% of these respondents who feel that face-to-face contact is necessary have reported that communication with their lecturer is not easily achieved through the use of asynchronous tools. This is a significant finding as it suggests that online learning needs to be augmented by face-to-face communication.

Statement	True	False	No Opinion	Response Count
I feel that face-to-face contact with my lecturer is necessary to learn within this module.	68% (192)	22% (61)	10% (28)	281

Table 6: Necessity of face-to-face contact with lecturers

Students were asked to specify whether or not they agree with the statement:

> Group activities are a critical part to successfully completing this module.

Respondents could also indicate whether or not they had an opinion to offer. There were 281 valid responses to this question. These are summarised in Table 7. Less than half of the respondents (46%) state that group activities are a critical part to their module. Thirty two percent of students do not consider group activities as a critical success factor.

Statement	True	False	No Opinion	Response Count
Group activities are critical to successfully completing this module	46% (130)	32% (91)	22% (60)	281

Table 7: Group learning activities

In addition, students were asked to specify whether or not they agree with the statement:

> I work productively on my own in achieving module objectives.

Respondents could also indicate whether or not they had an opinion to offer. There were 281 valid responses to this question. These are summarised in Table 8. The findings suggest that 82% of students' work more productively on their own and as one student puts it, *"avoids the hassle"* of arranging group activities, with the exception of seeking online (peer) support and arranging group activities or meetings.

Statement	True	False	No Opinion	Response Count
I work productively on my own in achieving module objectives	82% (230)	8% (22)	10% (29)	281

Table 8: Working Productively on own

The respondents were asked to:

Estimate the percentage of core course content you are expected to access in each of the formats, to successfully complete an online course.

The questionnaire listed four media (based on literature) of accessing course content. There were 199 valid responses to this question. These are summarised in Table 9.

Accessing Course Content	Averages % of Course Content
Text Books and hard copy articles (hard copy, offline materials)	53%
Online textual core course content – Web Pages containing text	41%
Online core course content in the form of Video/Animation	2%
Online core course content in the form of audio	2%
Other	2%

Table 9: Accessing Online Course Content

Interestingly, a survey carried out by Zao and Yang (2004) concludes that over half of all online students prefer the Internet as their primary source for information, because of its ease of information retrieval, convenience, and the quality of information. However, it is interesting to find within this research that the primary source for over half (53%) of the course content is accessed through text books and hard copy articles. Students access 41% of course material through web course content. The technology within a VLE affords lecturers the possibility to exploit web technologies and deliver course material and web resources. However it is evident that students are very dependent upon traditional learning approaches, i.e., through text books. The findings also suggest that there is a lack of innovative multimedia practices (animation, video, or audio) within e-learning environments.

5. Conclusion and Discussion

This research suggests that asynchronous support tools are substantially underutilised within the IoTs and consequently student engagement via asynchronous support is insufficient in meeting students' learning needs. While email is identified as the preferred and dominant means of communications, discussion boards and weblogs are not employed to anywhere near potential. The findings suggest that improved use of asynchronous support tools would help redistribute scarce lecturer's time and address the important issue of providing online support to students in a 'just-in-time' rather than a 'just-in-case' learning manner. In addition it recommends for the integration of e-learning platforms and their constituent tools with a knowledge base. This would facilitate the lecturer in providing 'reusable' and 'in context' online support to be availed of by students if and when required. The findings therefore present two major challenges to IoTs; to enhance student support by substantially improving the current use of online asynchronous support tools and to employ the expedient use of semantic technologies. Facing and surmounting these challenges are a vital step in creating and sustaining a quality online supportive environment for both lecturer and student. This findings offer a discussion on students' learning experiences with online asynchronous support tools. The themes emerging from the findings of this research may be summarised as follows:

1. The rising expectations of students and lecturers
2. The need to introduce increased social support factors for student engagement
3. Lack of encouragement for students to publish learner content
4. Variance in students IT skills
5. 24/7 demand of online support
6. Mobility of online support
7. Accessibility of online content

The use of VLEs facilitates students to achieve their learning objectives reasonably well by accessing learning content. However, there is little evidence in this study to suggest that e-learning provide similar learning experiences although IoTs use similar learning methods if compared to the traditional classroom environment. The majority of students (68%) feel that face-to-face contact is necessary with their lecturer. Only 16% of these respondents who feel that face-to-face contact is necessary have reported that communication with their lecturer is not easily achieved through the use of asynchronous tools. This is a significant finding as it suggests that online learning needs to be augmented by face-to-face communication. This research indicates that e-learning systems require academic staff, students and instructional designers to be increasingly more involved in the development life cycle of the e-learning platform. This will improve lecturers' ability to understand and meet students' supportive requirements. The results also suggest that developers and lecturers must explore the design of pedagogically sound instruction and preparing course resources to meet students' learning needs. Students tend to be more independent, prefer working individually, and are reasonably motivated to succeed in their module. Lecturers must become more innovative with the

methods to deliver online asynchronous support. A preference for specific e-learning asynchronous support tools does not appear to be a determinant for success. It is evident from the findings that there is a requirement for increased social interaction (i.e., social constructivism) within students' learning experience.

This research is considered valuable as students have indicated through their responses that there is a sense of inadequate online support within the IoTs. The IoTs are not fully exploiting e-learning technology to enhance students' learning experiences. Instead, the e-learning platform appears to act as a data repository allowing students to access content or instructions on textbook content. In this regard the developers (programmers, academics, graphic designers, and multimedia experts), should embrace a multidisciplinary and collaborative model of development to create a knowledge-base that is appropriate for the evolving e-learning and social networking environment. It appears that e-learning is a great educational marketing tool, which attracts a wide student audience, opting for a more flexible learning mechanism tailored around their lifestyles. Support is an integral part to the learning life cycle. The IoTs do not provide sufficient online support to meet students' diverse needs. In some cases, lecturers fail to acknowledge students seeking support. If the IoTs are to increase student numbers, an increase for student support and the development of social media is inevitable. IoTs and e-learning developers must be proactive and invest in advanced IT to explore methods to automate or enhance learning support.

The research findings highlight the need to implement a knowledge-base and the introduction of a semantically enhanced VLE and social constructivism learning tools and technologies. E-learning's success relies on the student's successful experience within the platform. The IoTs need to be equipped with the skill to ensure that each student has a successful and positive learning outcome within each module, thus promoting a positive learning experience for the students. The results of this research indicate that the availability of online asynchronous support to students is insufficient within the IoTs. Mature student are more critical of the effectiveness of use of asynchronous support tools. One of the main reasons which explain the variance in student perceptions is the level of IT proficiency skills between both groups (standard applicant and mature applicant). The findings suggest that asynchronous support tools are substantially underutilised within the IoTs and consequently student engagement via asynchronous support is insufficient in meeting students' learning needs. There is a significant lack of social engagement within the e-learning environments. The findings imply that email, discussion boards and weblogs are the predominantly used tools in an e-learning environment within the IoTs. Email is reported as the preferred means of communicating, and receiving support within an e-learning environment. The findings indicate that discussion boards provide little to moderate support to students while engaging in learning activities. It is also apparent that weblogs are under-utilised to support students' e-learning activities. It is evident that students enjoy communicating through social networks, although there was no report of a college-wide social network community. The findings suggest that social aspects of learning are not encouraged within the e-learning environment.

The findings also suggest that it would be hugely beneficial to implement a knowledge-base within e-learning platforms, and to move away from the content repository standpoint. This would permit online support to be powered by learner and lecturer generated content. Students across IoTs participate in similar e-learning courses (for example, business studies), across Ireland. One of the key recommendations which have emerged from the research is to suggest that the IoTs cooperate across a learning network and allow students to participate in a wider national learning community. It is anticipated that as the demand for e-learning courses continue to grow, the availability of online support will continue to weaken if action is not taken now to improve learner support. It is suggested that this will help reduce the dependency on lecturers to provide timely online support, allow and encourage students to collaborate through wider social learning networks. The research findings prescribe the need for new learning developments possibly through the exploitation of Semantic Web developments. For example, the Semantically-Interlinked Online Communities (SIOC)[4] model would be a good platform to semantically enhance the availability of online support within an e-learning environment. The IoTs must improve the level of support and increase the probability that students have a more successful with positive learning outcome, thus promoting a constructive, creative, and social learning experience for students within e-learning environments.

The findings of this research indicate that asynchronous support tools are under-exploited in fulfilling students' supportive needs within the IoTs. The findings do not suggest that innovative uses or best practices of asynchronous technologies are in place within the IoTs. The findings do indicate that although e-learning is considered the most prominent method to extend the reach of education, it under-exploits the opportunities afforded by the asynchronous technologies. At present, the IoTs appear to be 'experimenting' with asynchronous tools' possibilities. The findings report that communication and interactivity are minimal, with little effort from students to participate in group learning tasks. E-learning platforms within the IoTs appear to act as data repositories which allow students to log-on and view course content. This is supported by the significant finding which suggests that online learning needs to be augmented by face-to-face communication. This has a major impact on students' learning experiences, giving them a feeling of isolation, or 'online silence' if they cannot meet the lecturer face-to-face. The students' responses indicate that many of the promised learning functionalities and features documented throughout the literature are not as sophisticated as one would anticipate within the IoTs.

Technically, email could replace the VLE, considering it is used for the majority of students' learning activities and to distribute material. Lecturers appear to make very little use of discussion boards and weblogs. Email could replace VLEs to deliver learning content and to facilitate communication activities through attachments and group email lists. E-learning content may be delivered to students on a pre-scheduled basis, which could allow students to focus on one asynchronous tool and thoroughly exploit its functionalities. The marketing campaigns within the IoTs to attract e-learning students, incorporates terms such as good accessibility of the course content, innovative usage of multimedia, and its capability of

4 http://sioc-project.org/

meeting the increasing demands for education in a more flexible manner, were initially very much rehashed across all IoTs. This made e-learning appear to be very attractive as a method of learning, thus explaining its explosive growth and interest in recent years and in a state of constant change. Lecturers need to gain experience in exploiting VLEs, i.e., course content management, multimedia, interaction online, and project a stronger sense of leadership to enhance student motivation and student engagement. Mature students appear to be the most vulnerable group as they feel that their additional needs are neglected in relation to additional technical support. One of the problems recurring throughout the findings is possibly the emphasis on the technologies themselves, and not on learning styles. As identified earlier in this paper, students are adopting a more supportive role within an e-learning environment and the use of mobile phones emerged as an effective tool to provide students with support. This suggests that students are seeking alternative tools to communicate with peers and possibly lecturers. The IoTs must begin to incorporate students into the VLE development life cycle, determine what their needs are, and attempt to exploit asynchronous support tools to enhance their learning experience. The IoTs should temporarily divert some of their attention from discovering what technologies exist, and towards evaluating methods to meet students' needs. Lecturers need to determine students' learning needs and discover what technologies exist to meet those needs more effectively and efficiently.

6. Further Research

The findings from this study conclusively indicate that the current state of online asynchronous support within the IoTs is unsatisfactory, and in need of significant attention, redevelopment, or reinvention. It has also identified the need to introduce methods to enhance the availability of innovative and mobile online support. One of the most significant findings which warrant further research is on social interaction in e-learning environments. In addition, further research needs to be undertaken on the IoTs community of shared practices and learning policies, to determine whether there is a need to reshape the current IoT strategies to cater for e-learning methods of teaching. This research provides an excellent stepping stone for determining these approaches to enhancing the students' learning experiences within e-learning environments. Research should be carried out on whether students' e-learning lifestyles and selection of learning courses may have been misguided by their perception, expectations and college marketing. Additional research should be focused on student mobility, and mobile technologies.

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