# **Student Services in a Networked World**

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# Abstract:

The development of a global digital network fundamentally changes the ways and means by which all aspects of education is provided – including that most personal component – the provision of student services. This chapter examines the ever increasing 'affordance' of the Web and then applies these capabilities to the cognitive, social, and systemic categories of learner support. It provocatively argues that increasingly students will look for and receive the services they need, not from tutors or dedicated university staff, but from machines.

## Student Services in a Networked World

Oracle Corporation's famous axiom that the "Net changes everything" is becoming ever more apparent in both formal and informal education provision. The Net's invasive impact is apparent even within those components of the distance education system associated most directly with the human interactions that currently constitute much of what is referred to as 'student services'. In this chapter, I discuss the affordances of a ubiquitous networked world and apply affordances to the creation of new and expanded student services, the end result of which is to create new types of services that rely more on learner-machine interactions to reduce cost and increase access and flexibility to students.

The most common means of reducing costs and increasing or maintaining access and service has, since the beginning of the industrial revolution, been to substitute the labour and services of machines for those formally supplied by human beings. This substitution process continues in the Information Age and is currently focused on efforts to decrease costs in the service sector, including those services associated with provision of education and training. Unlike critical authors who see such automation as "mindless deformation, degradation, and delimitation of institutions presumably dedicated to the life of the mind" (Noble, 2002), I see the application of these technologies as means to continue the evolution and democratization of education from an exclusive resource of the rich and privileged to one that is open to all.

It has often been noted that technology changes social conditions, often having negative as well as positive effects on the lives of its users (Franklin, 1990). Thus, there is danger in assuming that all human interactions can be substituted by interactions with machines. This is especially true in domains such as student support services that can have components that are based on high degrees of affective interaction between and among students, teachers and professional staff. However, there is an equal danger that public education systems will ignore potential ways and means to significantly improve quality, cost effectiveness and access to these critical services by assuming that direct human interaction is always both desired and required for effective student service provision. The chapter provides examples, based upon Tait's (2003) taxonomy of student services, that are fundamentally altered through extensive use of networked and

especially automated services. In some cases, these services augment or extend those provided by humans but in many others nonhuman support are serving instead of those that were previously provided by human support and professional staff. The chapter argues that through examination of existing practice and deployments of intervention designs that make ever increasing use of 'intelligence' and accessible networked services, distance education providers can and are enhancing their services to students.

# **Defining Learning Services**

While completing a review of a recent book by Tait and Mills (2003) that focuses on the rethinking learner services, I was struck by the inclusiveness of the types of functions defined as "learner support services" by the international practitioners who authored various chapters in the book. I was left wondering if there is any component of the distance education system that is NOT considered by at least one author to be a "learner support service". This diversity inspired a search for a clear definition of learner support with two very different results. A perhaps typical definition from a distance education perspective is provided by Thorpe (2001) who defines learner support services "as all those elements capable of responding to a known learner or group of learners, before, during and after the learning process" (p.4). By this very inclusive definition all assistive interactions, activities and resources, including those associated with formal teaching and learning within a course or program, are described as learner services. A more typically North American and campus-based definition such as that provided by Louisiana State University, restricts learner services to apply to resources that "contribute to the student's emotional and physical well-being and to his or her intellectual, cultural, and social development outside the context of the formal instruction program" (Louisiana State University, 2002). Thus, the provision of cognitive, academic support, usually by teachers or tutors, is often excluded from campus based discussions of student support. However, for the purposes of this chapter I expand the definition to include academic learning assistance provided by distance education tutors and teachers.

Before discussing the ways in which networked services are being used to supply student services, I first discuss the general objection that some have to the provision of unique student services by machines. Thorpe (2001) discounts the capacity of machines to provide student services and argues that since a machine cannot react uniquely to individual "known" learners, these services must be provided by humans. However, continuing work on learner models in education is aimed clearly at doing just this creating unique models of identifiable individuals and groups of students. In fact this type of work that allows for customization of response and presentation is a dominant research theme in research associated with artificial intelligence in education and a major subset of a research domain referred to as adaptive hypermedia (Brusilovsky, 1966). Not only are machines learning to adapt differently depending upon the individual known learner behaviour but researchers are also struggling with ways to make this representation of the learner model accessible and manageable by learner, teacher, support systems and content (Zapta-Rivera & Greer, 2001). Further, work on adaptive systems and specifications (cf. the IMS Learner Information Package IMS Global Learning Consortium, 2004) is designed to allow the web-based learning context to adapt to the unique display of cognitive needs of individual students. This adaptability is at the root of my contention that much of the interaction currently undertaken to support distance learners can be (and will increasingly be) provided by

machines. I have argued that interaction is a necessary component of formal education and informal learning, but that various forms of interaction (learner-learner; learner-teacher; learner-content) can be substituted for each other depending upon cost, time, amount of use, content and context of learning. Further, I contend that learners in the future will be more comfortable and have higher expectations for the immediacy of service available "anywhere/anytime" that realistically can only be provided cost effectively by machines. To expand the basis for these contentions I next look at the capacity or affordances of the global internet to provide these forms of student support.

# Affordances of the Net

Every new technology brings with it new capabilities that have been referred to as the affordances of that technology. Gibson (1977) first noted that these affordances are not solely a function of the technology but are also determined by the perceptions of and value of these functions in the minds of users and the competencies of these users to effectively use the capabilities of the technology (Norman, 1999). Thus, the affordances associated with the Net are not absolute in at least three senses. First, the affordances have consistently been changing as technical capacity and ingenuity of applications have increased since the Net's early beginnings about 20 years ago. Second, access to the Net is very unequally distributed across geographic and socio-economic boundaries – thus an affordance for some group may be completely unavailable, unknown or undesired for another. Third, these affordances are dependent upon a host of personal, educational, social and motivational factors producing considerable individual differences. Nonetheless, I discuss these affordances below because, in combination, they provide hitherto unavailable resources and capacity for the provision of student services in formats that are largely unaffected by geographic and temporal distances – the major constraints to which distance education provision has always been addressed.

Access to information: Perhaps the most obvious affordance of the Net is the exponential increase in both general and very specific information sources available to distance learners. These resources include access to books, research journals, preprints, corporate and government reports and other documents that were formally available only in printed format and often at much higher costs than current web costs. Thus, students access to resources is not limited to a preselected list of readings, but expands to a high percentage of materials produced in all disciplines. To these are added a host of real time information provided through access to databases storing such things as student records, school calendars and schedules; current readings from web cams and other web enabled senders such as weather, market, or biological data. This information is formatted as video, audio and graphic materials of all imagined (and some very hard to imagine) types and content.

This information is available in such quantity so as to overwhelm many consumers and to give rise to descriptions of the Net as being like the world's largest library – with all the books scattered on the floor. However, there is tremendous effort being expended on sorting, cataloguing and tagging these information resources not just so they can take a single correct place on a virtual bookshelf, but so that they can be connected in a host of ontological linkages to other information resources (Aldea, A., Banares-Alcantara, R., Bocio, J., Gramajo, J., Isern, D., Kokossis, A., Jiménez, L., Moreno, A., & Riano, D., 2003). These linkages will be made not only upon the large granulations of meaning associated with library shelving conventions such as the Library of Congress or the

Dewey Decimal system, but rather linkages will be created based upon both personal and professional semantic categories that link diverse information resources and communities of learners.

Support for multiple modes of human interaction: The second major affordance of the net is the capacity to enhance provision for human communications. Human interaction has always been a critical component of education – both that which is delivered on campus and at a distance (Anderson, 2003b). The affordance of asynchronous text-based communications has been exploited by distance educators such that email and computer conferencing are now the dominant modes of student-teacher interaction in many distance education systems. Studies of these interactions have shown capability to support the critical components of social, cognitive and teaching presence necessary to create a distributed community of inquiry (Garrison & Anderson, 2003). The current deployment of high-speed networks creates opportunities for synchronous educational interaction using voice, video and application sharing systems that have been exploited by educational systems in many areas of the world (King & Montgomerie, 2003). Recent work that automatically captures and disseminates educational interactions (Abowd, 1999) provides capability to selectively shift human interaction between real and stored time modes allowing for flexibility, time shifting and archiving of educational interaction at very low cost. Other developments in mobile learning or m-learning are illustrating capacity to communicate and access information in the context of use rather than only in a virtual or campus-based educational context (Savill-Smith & Kent, 2003; Keegan, 2002). Finally, developments of wearable computers and cyborg type computer implants will facilitate even more ubiquitous communications in multiple modes amongst humans (Mann & Niedzviecki, 2001).

**Computational Affordance:** The final major type of affordance of the Net is its capacity to add computational and inferential capacity to both human and non-human interaction. This is illustrated by the type of networked mindtools that provide intelligent searching, simulations and information processing applied to a variety of educational uses (Jonassen, 2000). But perhaps more exciting is the capacity of the net to support interaction, transaction, inferential decision-making and search and retrieval not only by humans but by autonomous agents. An agent is a computer code that acts with relative autonomy, over a distributed network in order to perform "information gathering, information filtering, and/or mediation on behalf of a person or entity" (Thaiupathump, Bourne, & Campbell, 1999). Although primarily used for search engines, e-business and other commercial applications there is a growing list of applications in which agents are used to assist either students, teachers or both (Thomas & Watt, 2002; Beer & Whately, 2002; Dowling, 2002; Johnson, Rickel, & Lester, 2000; Shaw, Johnson, & Ganeshan, 1999). The capacity of agents to act upon, navigate and make inferences and decisions based upon network resources is limited by a variety of technical and social constraints beginning with the current presentation based design of the original WWW (Bosak & Bray, 1999). The ambitious goal of the new generation, Semantic Web is to create a globally linked set of resources that can be is directly useable by both humans and machines (Vila, 2002; Berners-Lee, Hendler, & Lassila, 2001).

Of course, each affordance or new capability of a technology also comes with associated negative repercussions (Roszak, 1986; Franklin, 1990). The challenge for educators and providers of educational services is to discern and then implement those services which

provide compelling pedagogical or economic advantages while minimizing potential negative effects. Unfortunately, such decision making is too often done from the perspective of administrative, faculty or tutor interest, rather than balancing these interests of the academy with the important interest and desires of not only current, but future learners who will access these educational services. I next overview these major student services and concentrate on the ways in which positive affordances of the network can be applied to enhance these services while minimizing negative consequences.

# Functions of Student Support Transformed in a Networked World

Tait (2000) has provided a taxonomy of student services in distance education that differentiates three basic types of services – these being cognitive, affective and systemic services .

#### **Cognitive Services**

Cognitive services are those that are provided by the institution to assist the student in mastering the formal educational objectives associated with the program of study. In a traditional, independent study distance education context a course consists of a number of educational resources (often textbooks, that may be augmented with various autographic materials). Usually a study guide is included that is written in a personal style to support what Holmberg (1989) referred to as "guided didactic interaction", a form of vicarious interaction through which the course author guides the student through a series of activities, readings and assessments. Obviously, this same form of course design can be distributed on the net with student printing or reading online and email and IP telephony replacing mail, telephone or face-to-face tutorials. But such a "horseless carriage" migration of print-based independent study to the Net fails to apply the affordance of this technology with much originality or pedagogical effect.

A more powerful vision of the independent study course is to view the course as a portal providing supported access into a domain of knowledge. The portal will, in the first instance, be created by the same academic expert(s) and development team, but unlike its print predecessor, it will never be finished as it undergoes constant revision, update and augmentation by all members of the learning community who engage with it. The portal will of course contain information resources. These may include digital textbooks, articles, case studies and other familiar learning resources. These print resources are augmented by a host of multimedia presentations, simulations designed for active exploration, evergreen content enriched by current events and real time data collection, collaborative and independent study activities, games designed to engage learners in extended exploration, presentations and products of current and past students and visiting experts. Each of these resources will be tagged as learning objects for re-use and adaptation (Wiley, 2001).

Teachers and tutors will design pathways through the portal that are designed to maximize student learning while providing opportunities for multiple forms of assessment and feedback provided automatically by agents and more personally by tutors. Advanced forms of tracking will be used not only to follow and assess learning activity in the portals but will also be used by learning objects to document their own use and revision. Pathways that result in high levels of learning outcome will be noted and subsequent users follow those same successful pathways, while allowing unproductive paths to grow over.

Student experiences and contextualization of the learning will be actively gathered, filtered and sequenced so that common problems, opportunities and demonstrations of learning are captured and re-used.

New information resources will constantly be added to the portal not only by the original course creator but by students, tutors and autonomous agents programmed to be constantly monitoring the web for useful resources. Activities supported in the portal will be available for both individuals and for groups learning in synchronous and paced asynchronous collaboration. A variety of learning activities will include access to simulations and virtual laboratories as well to remote laboratories in which students engage with "real lab" facilities from a distance (Cooper, Donnelly, & Ferriera, 2002). Assessment activities likewise will be multifaceted and realized in multimedia formats. These will include self, tutor and machine marked reports, quizzes observations and a greater emphasis on portfolios that documents a students achievement of learning outcomes (Barrett, 2000).

# **Affective Services**

Although notoriously difficult to define and consistently measure, it has been argued that emotion has an important role in learning, and that this is especially apparent when studying online (Thissen, 2000). In a small study, O'Regan (2003) identified emotions of frustration, fear, shame, enthusiasm and pride as having been experienced by online learners. Identifying and working effectively to reduce the magnitude of negative learner emotions, and developing of systems to support positive ones is the role of learner support services. But can these type of emotionally laden learning experiences only be successful if undertaken between learners and professional staff or among learners?

Perhaps the most common form of affective support provided to the online learner is that available in an online community and especially one specifically designed to support learning within the context of a class or program. Thorpe (2001) provides a model for this 'third generation' distance learning which adds the online learning group as a fourth component of the model of learner services augmenting the tutor, student and content interaction of the second generation. Most practitioners seem convinced that creation of affective support and communication is critical in reducing drop out rates and "social integration" is one of the major components of Tinto's (1975) much cited model of student retention. Tait (2003) has argued that "... 'conversation and community' seem to be important in most educational contexts and there is therefore no reason to assume that for most learners they will not be important in ODL, even though delivering them is more difficult". There is considerable evidence to suggest that online collaboration and creation of online learning communities is both possible and practical, and that it enhances participation, learning and completion (Tu & Corry, 2002; Conrad, 2002; Brown, 2001; Wilson, 2001) (Cf. also Blackmun & Pouyat-Thibodeau in this volume.)

However, the creation and sustenance of online communities is not without its cost. First and most critically, formal education courses are most often created by designers in a linear fashion such that learners proceed through the materials in roughly the same learning sequence. In cohort based systems or independent systems in which start and completion dates are not flexible, such linear progression is enhanced with time-based constraints that allow or require students to work at a common pace. The cohort provides opportunity for students to work collaboratively but at the same time, it constraints

learners to progress at the same rate as other members of their cohort. The creation of an online learning community is certainly possible, and can be used to meet many of the affective and identification needs of students. However, it cannot be assumed that creation of such a cohort group is either necessary or desirable for all distance learners working in all domains. Models that allow for social support in unpaced, independent study models of online learning are needed in addition to those based on paced learning cohorts. Finally, we need to differentiate the type of human communication that is necessary for effective learning. The net allows for conversation to be digitized, stored and replayed as needed. This type of persistence can be used to create interactions amongst students that not only span geographic but temporal space as well. Thus, it may be possible for students to learn from, rekindle and contribute to conversations that are spread across many months or even years of time.

Distance educators are beginning to understand the time and social commitments required when building learning activities or designs based upon the communication affordance of the Net. Our own work in analysis of text-based course transcripts reveals the need for development and sustenance of three necessary presences – social, cognitive and teaching, for higher level learning to emerge (Garrison & Anderson, 2003). But does social presence imply active moderation by the teacher? A 2003 case study (Postle, Sturman, Mangubhai, Cronk, Carmichael, McDonald, Reushle, Richardson & Vickery, 2003) from an Australian Faculty of Education moving to an online delivery reported major problems with the highly communicative course design that is a major feature of many models of higher education delivery using online learning techniques (Harasim, 2002). Postle et. al. (2003) report that "students have questioned whether their flexibility is being violated by 'forced' communications and a predominance of text and staff were unsure if the quantity of interaction was sustainable"(xiv).

Communication is clearly a vital and necessary part of the formal educational experience. What is unclear is if heavy communications is always required for online learning and if there are some types of combination of student-student; student-content and student-teacher interaction that is best for the particular content and quantity of learning aspired to in the courses learning objectives. In short, we must "get the mix right" (Daniel & Marquis, 1979; Anderson, 2003a). Answers to this question are emerging. Postle et. al. (2003) suggest that "content heavy courses are more suited to independent earners" (p. 61). They also noted that "there were the beginnings of informal protocols emerging that controlled the extent of interaction that a lecturer was prepared to manage"(p. 80). Teachers will learn to use this affordance effectively and efficiently, but this learning itself requires the active participation in research and knowledge building that is discussed briefly at the end of this chapter.

Besides course-based communities, a number of distance education organizations have attempted to develop net-based social environments in which institutional affiliation is used to create affective bonds among students. In its guide to developing online student support services, the Western Cooperative for Educational Telecommunications (1999) provides links to four such projects – a site to support a distance education student government, a chat site, a student newspaper and a text based virtual community. Since that time, graphical virtual environments, virtual conferences aimed at students, a variety of online communities and other student portals have been developed both as

commercial interests and as services provided by online deliverers, though there is little research documenting their impact on student learning, satisfaction or completion.

A type of network application loosely referred to as 'social computing' has recently merged that aspires to allow users to create and maintain social networks with friends, colleagues and co-workers regardless of their physical location (Musser, Wedman, & Laffey, 2003). For example, some tools allow users to meet others with similar interests, to share workspaces, display cases or entertainment venues where digitized objects can be displayed and conversation engaged around these objects. Others allow users to annotate physical or digital objects as information sharing and conversation starting tools. Certainly many of these developments will fail as they leave fundamental human needs unfulfilled. However, at the same time, it is likely that social education applications will be developed that allow learners to create satisfying social interactions with other students, staff and autonomous agents associated with the study of formal courses. Ironically many of the safeguards designed to protect privacy and security among participants in online learning can impair the capacity for students to provide social support for themselves. It is likely that whole new systems of trust and recommendation will be needed that allow students to casually introduce themselves, and find associates for collaborative learning activity with the same relative sense of security and opportunity (or not) that such an introduction might cause in a campus environment. For example, the Students Union at Athabasca University (2004) supports this type of qualified introduction by facilitating contact between students and student mentors. They also sponsor a group-based referral virtual club for students who are also mothers.

# **Systemic Learner Services**

The final of Tait's (2000) classification of learner services refers to those of a systemic or administrative nature. Much work has been done in this area over the past few years by most distance and campus-based organizations. The benefits in terms of anywhere /anytime access and the potential cost savings provided by automation of these systemic services provide both a consumer push and an administrative pull for increasing the scope of these services.

Examples from two dedicated distance learning institutions illustrate the variety of services available and the public nature of these services, invite readers to go to the web sites listed for additional detail. The Open University of the United Kingdom offers a host of tutorials, online resources, frequently asked questions (Phillips & Hawkins, 2003) including:

- A general first steps orientation to the OU at http://www3.open.ac.uk/firststep
- A guide to course selection at http://www3.open.ac.uk/courses
- A guide to credit transfer http://www3.open.ac.uk/credit-transfer
- And of course the ubiquitous linkages to a variety of administrative, counselling, library and registration services.

A similar set of services are provided at Athabasca University as well as a series of online surveys that allow a student to assess their own readiness to engage in university level distance education programming and their particular skill in English, mathematics and computer science (cf. Athabasca University, 2003). In addition the business school

has developed a sophisticated information portal, call centre and customer relationship management (CRM) system whereby human staff with very sophisticated network tools can provide both accurate and timely services to individual students. This service has reduced the calls to skilled academics by 80% and reduced the cost to the school of business by approx. \$100,000 annually with no significant difference in student satisfaction rates (Woudstra, Huber & Michalczuk, 2004). Questions, responses, service time and referral arrangements are tracked by the system, thereby allowing for the best person to address a student concern in the most timely fashion possible. The CRM system tracks and stores interactions between students and support staff providing qualitative statistics on frequently asked questions, the amount of systemic service requested and provided by human service providers.

As students become more accustomed to and more skilled at accessing automated information services, there expectations for these services will also increase. One can easily imagine the same preference for automated service in the education service sector as is provided by automatic teller machines (ATMs) in banks. Sophisticated web tracking and data mining tools will also be used to track and analyze the type and amount of automated services used by current and perspective students. Finally, one can easily imagine these services provided through a human interface such as a 'chat bot' that provides a text or voice input caricature that uses artificial intelligence techniques to 'converse' with human beings (Alice Artificial Intelligence Foundation, 2004). An example of legal services provided by the talking chat bot Alex, is provided by the Jurist information portal of University of Pittsburgh Law School (2004).

## **Research Opportunities and Challenges**

In an era of increased measurement, accountability and fiscal restraint there is increasing call for effective means to assess the efficacy of all forms of learner support services. A recent resurgence of the "paradigm wars" as relates to appropriate research methodology has produced both articles (Slavin, 2002) and government funding programs that very stridently call for the type of randomly assigned comparison group studies that have defined much science and health research. These calls have been hotly debated and from this debate emerges a particular hybrid of qualitative, quantitative and action research most recently referred to as design-based research (The Design-Based Research Collective, 2003). Design-based research has much in common with developmental research espoused by van den Akker (1999) in which the research extends from the design, literature review and theoretical development of a project, through design and construction of an intervention, through multiple iterations of the design in practice, to formative and summative evaluation and ending with studies of implementation (Bannan-Ritland, 2003). Throughout this process, a team of developers, evaluators, implementers, students and learners work together to develop and assess interventions that offer the greatest chance of improving practice within the fiscal, social and culture constraints of actual practice. Design-based research utilizes both qualitative and quantitative research tools, as applicable. It seeks to insure that interventions are owned not only by the researchers, the developers or the implementers, but that each share in development and the research. These new types of research models seem to offer the most likely model for transferring results of research and innovation into the working lives of professionals and active distance students and thus are a much better model for research than either the neobehaviourist controlled studies or the interpretative narratives of external researchers.

# Conclusion

It is obvious that student services will continue to play a vital role in the provision of formal education service in a networked era. However, the mix of human supplied and machine automated services will likely continue to merge in favour of more provision of support provided anytime anywhere by machines. The expanding affordances of the Net coupled with reduced costs make such a trend both inevitable and desirable for those whose goals are to provide quality educational opportunity to all Earth's citizens. It is as challenging for distance educators today to accept that most student support provision will take place without human intervention as it was for traditional teachers to imagine learning taking place outside of the teacher moderated classroom in years past. Classroom education has not gone away and neither will personal interaction in distance education. However, there will be many instances where cognitive, affective and systemic learning services will be provided more effectively and more cost efficiently without human intervention of professional staff. We ought not to fear this future.

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