

Addressing the context of e-learning: using transactional distance theory to inform design

Robyn Benson^{a*} and Gayani Samarawickrema^b

^a*Faculty of Medicine, Nursing and Health Sciences, Monash University, Australia;* ^b*Institute of Teaching and Learning, Deakin University, Australia*

(Received 3 September 2008; final version received 23 February 2009)

The rapidly expanding range of options available for innovative e-learning approaches based on emerging technologies has given renewed importance to teaching and learning issues that have long been familiar to distance educators. These issues arise from the separation between learners, and between teacher and learners, which occurs when learning is undertaken wholly or partly online. There may be important implications that emerge from aspects of separation, depending on whether students are studying primarily on-campus, off-campus, trans-nationally, or in specific contexts such as the home, the workplace, fieldwork locations, or other places made possible by mobile learning technologies. We suggest that the context of learning has significant implications for e-learning design, and that one way of analysing these implications is to draw on understandings from distance education, particularly the theory of transactional distance. We use cases from two Australian universities to illustrate the practical application of these implications to e-learning design, including designs that involve Web 2.0 technologies.

Keywords: e-learning design; context; transactional distance; Web 2.0 technologies

Introduction

The role of context is an important factor to consider in learning design if learning is seen as being grounded in the student's experience. In the design of e-learning, this suggests a need to consider the specific implications of the range of contexts in which learning might take place. For example, the design of an e-learning component for use in a lecture theatre or computer laboratory is likely to be quite different from a similar component designed for use at home by off-campus students, or for use in a classroom in another country.

In this article, we present a conceptual approach for including the context of learning and teaching as a specific aspect of e-learning design. This approach for analysing the learning context and accommodating it in e-learning design draws on characteristics of distance education that may be seen as having particular implications for e-learning. We illustrate the approach through selected examples from e-learning showcase websites at two Australian universities.

*Corresponding author. Email: Robyn.Benson@med.monash.edu.au

Theoretical background

Links between distance education and e-learning

According to the influential definition by Keegan (1996), characteristics of distance education include the quasi-permanent separation of teacher and learner; the influence of an educational organisation in planning and preparing learning materials and providing student support; the use of technical media; the provision of two-way communication; and the quasi-permanent absence of the learning group so that students are usually taught as individuals rather than in groups. The emergence of the third and subsequent generations of distance education (Bates, 1991; Nipper, 1989; Taylor, 1999) has had a major impact on the last of these characteristics. The use of computer-mediated communication, which began to accelerate during the 1980s (e.g., Mason & Kaye, 1989), has evolved to include a focus on online communities of practice (Wenger, McDermott, & Snyder, 2002), based on ideas from social constructivism (Vygotsky, 1978), which have been dominant in conceptualising social engagement online. The importance of the group is fundamental to recent advances in social software using Web 2.0 technologies (O'Reilly, 2005), including blogs, wikis, social bookmarking, social networking services (such as MySpace and Facebook), and virtual worlds, which are founded on group interaction as the central aspect of online engagement (Shirky, 2003).

Aside from these developments, the evolution of e-learning approaches in higher education has reflected the other characteristics of distance education to varying degrees. The quasi-permanent separation of teacher and learners, and between learners, which characterises both e-learning and distance education, raises considerations related to distance, although the specific learning and teaching context will determine the extent of the distance involved. In this article, we draw on the theory of transactional distance (Moore, 1980) to analyse some broad aspects of e-learning contexts in order to identify implications for learning design.

Learning, teaching, and context

The specific role of context in the experience of learning is influenced by the perspective from which it is viewed. From a phenomenographical perspective (Marton, 1981), students' reality is inextricably part of the context of their learning experience and requires the teacher to endeavour to see the world through the learner's eyes. The use of this perspective in accommodating the world of learners studying in non-traditional settings has highlighted the range of factors that affect their learning (Chambers, 2002; Morgan, 1993; Morgan & Beaty, 2005). This view also underpins Laurillard's conversational framework for technology-based learning (2002). Evans (1994) noted the impact on learning of the broader contexts of students' lives, including social and educational background, money, gender, power, work, play, time, and age. From a constructivist perspective, the world is seen as being separate from the student (Marton & Booth, 1997) but the individual or social construction of meaning that is involved in learning is conceptualised as occurring best through contextualised real-world tasks because 'knowledge is individually constructed and socially co-constructed by learners based on their interpretations of experiences in the world' (Jonassen, 1999, p. 217). Oliver (2000) drew on Grabinger (1996) to summarise old and new assumptions about learning from a constructivist perspective, demonstrating the importance of realistic contexts in the new assumptions, in contrast to the decontextualised nature of learning

associated with previous assumptions. From an experiential learning viewpoint, learning may be seen as a function of the relationship between learners and the learning milieu with the learner's personal foundation of experience, the learner's intent, and the learning milieu forming 'a network or nexus of cultural, social, institutional and psychological variables' (Boud & Walker, 1991, p. 17). Perspectives that emphasise the importance of the learner's experience and recognise the multiplicity of contextual factors which may affect learning are particularly relevant when the learners are adults who are taking advantage of the flexibility offered by e-learning.

Given the expanded opportunities that advances in e-learning technologies offer for when and where learning takes place, a key implication for learning design is to address students' needs in a huge variety of learning contexts. These extend from campus-based contexts to blended learning environments involving 'the thoughtful integration of classroom face-to-face learning experiences with online learning experiences' (Garrison & Kanuka, 2004, p. 96) to circumstances where learners have little or no common exposure to the campus context and all (or nearly all) learning takes place in the learner's own context. This freeing-up of the time and place of study means that, as well as the context of home, work, computer laboratories, libraries, community centres (or places in between), learning can occur in other states or countries, on ships, in hospitals or prisons, and so on. Kirkwood (1995, 2000) illustrated the importance of context in the experience of distance learning by focusing on the factors affecting home-based learning. There are implications for this kind of analysis in relation to online learning across many contexts (including work-based learning, fieldwork, and the multiplicity of contexts made possible by mobile learning) because the technology introduces an element of distance that is not present in face-to-face teaching.

The teaching institution also has a dominant contextual influence on learning, determining e-learning policies, infrastructure, systems, and procedures that impact directly on student support. Within this framework, teachers' contextual influences and conceptions of learning also affect the learning contexts that they design for their students. Further contextual variables include access issues, pedagogical support, and the skills and responses of staff and students to the use of various technologies, especially when students with a range of contexts and backgrounds may be in the same class.

It is beyond the control of the individual teacher to address many of the contextual issues present in online teaching. However, one way of analysing some broad aspects of the learning context so that they can be addressed in the learning design is to focus on the extent of the distance between teachers and learners, and between learners. Design decisions can then be based on the implications that emerge from this analysis. We outline an approach to this process later in this article, using six authentic cases drawn from two Australian universities to illustrate our argument.

Transactional distance theory and context

The theory of transactional distance (Moore, 1980) provides one way of analysing the learning and teaching context by considering it in terms of the separation between learners, and between teacher and learners. The idea that transactional distance involves the psychological (rather than geographical) distance between learners and the teacher which is bridged through the appropriate balance of dialogue, structure (course design), and learner autonomy (Moore & Kearsley, 2005) provides a means

of considering how these design elements can be addressed based on the teacher's knowledge of the learning and teaching context. Moore (1991) suggested that dialogue (D) and structure (S) are inversely related. High levels of structure (+S) combined with limited or low levels of dialogue (-D) contribute to high transactional distance. Increasing dialogue (D) then becomes a major implication for design, though this is influenced by the third variable, learner autonomy (A). Garrison (2000) noted that learner autonomy (A) is less easily explained as it may refer to personal autonomy or autonomy associated with the learning materials themselves. Both high and low transactional distance may be acceptable depending on the characteristics of the learners and their level of autonomy (Kanuka, Collett, & Caswell, 2002). Moore (1977) had previously acknowledged the possibility of both high dialogue and high structure (+D+S) (as in correspondence programs), and of low dialogue and low structure (-D-S) (as in self-directed independent study programs). He subsequently noted that high structure and high dialogue can reduce transactional distance (Moore, 1993) and suggested that instructors in doubt should err on the side of too much structure rather than too little, arguing that the right balance between structure and dialogue is dependent on the educational sophistication of the learner and the subject content (Moore, 2004).

Transactional distance theory, e-learning, and context

Developments in learning technologies have led to renewed interest in transactional distance theory. In the 1990s, studies of synchronous electronic interaction empirically confirmed concepts associated with transactional distance (e.g., Bischoff, Bisconer, Kooker, & Woods, 1996; Bunker, Gayol, Nti, & Reidell, 1996; Saba & Shearer, 1994). Despite some criticism of the concept for its inability to explain processes and predict events, and to correlate transactional distance with learning outcomes (Chen, 2001a, 2001b; Chen & Willits, 1998; Cookson & Chang, 1995; Gorsky & Caspi, 2005a), others have continued to see value in the idea of transactional distance and to explore its implications.

Several studies have focused on aspects of dialogue and structure. Murphy and Cifuentes (2001) noted that '[a] delicate balance between course structure and dialogue of the instructor and learners is critical for online learner success' (p. 298). Shea, Pickett, and Pelz (2003) and Stein, Wanstreet, Calvin, Overtoom, and Wheaton (2005) have supported the central role of structure in student satisfaction and perceived learning in online learning environments. The latter also supported the suggestion that high structure and high dialogue can reduce transactional distance. Wikeley and Muschamp (2004) noted the need for both high dialogue and high structure in e-learning environments involving doctoral students studying at a distance. They argued that 'whilst dialogue needs to be increased ... it is better achieved by tightening the structure to allow greater adaptability of content through careful moderation by tutors' (p. 125).

Other studies have explored the role of interaction in transactional distance. Moore (1989) identified three forms of transactional interaction (learner-instructor interaction, learner-content interaction, and learner-learner interaction) but his definition of dialogue as interaction between teacher and learner distinguishes it from the other forms (Moore, 1991, 1993). It is dialogue rather than interaction that he used to hypothesise the inverse relationship with structure in relation to transactional distance. However, Hillman, Willis, and Gunawardena (1994) added learner-interface interaction to the

other forms of interaction identified by Moore in order to accommodate the characteristics of electronic teaching. Subsequently, Chen (2001a, 2001b), Zhang (2003), and Lemone (2005) examined the effects of these four variables on Web-based learning. Zhang found that the strongest factor that affected students' transactional distance and engagement with learning was the transactional distance between student and students, followed by transactional distance between student and teacher. Lemone demonstrated how cultural influences affected transactional issues relating to these four variables in a study involving Nepali and Icelandic students. Dennen, Darabi, and Smith (2007) have identified some important aspects of instructor–learner interaction in online courses.

Dron, Seidel, and Litten (2004) illustrated the inverse relationship between dialogue and structure in a blended learning environment. Dron (2005, 2006, 2007a, 2007b) has also introduced other ideas relating to transactional distance and e-learning, in particular by analysing dialogue and structure in terms of transactional control. He noted that transactional control is concerned with choices, either by teacher or learners, and he examined the control issues that emerge in the use of social software, including the potential for structure to arise as a result of dialogue. Dron (2007b) explained that transactional control theory 'does not aim to replace transactional distance theory as it says nothing significant of the psychological gap between learner and teacher, but it helps to explain some of its dynamics.' He commented that '[s]tructure equates to teacher control, dialogue to negotiated control, and autonomy to learner control' (p. 60). On the basis that an inverse relationship between structure and dialogue was integral to transactional distance, he had previously noted a 'loophole' in the 'law' of transactional distance in virtual learning environments when structure is generated through dialogue to create an environment that has both high structure and high dialogue at the same time (Dron, 2004). Learners working collaboratively in wikis, for example, would be creating the structure of the environment by negotiating control through dialogue, while at the same time exercising their learner autonomy by controlling the creation of the wiki. The autonomy of learners appears to be particularly important to their ability to work in Web 2.0 environments where the opportunities for collaboration have 'changed the way learners can retrieve, share and evaluate information, and create knowledge' (Benson & Brack, 2009, p. 74). These Web 2.0 websites are markedly different from the static, non-interactive websites associated with Web 1.0 (O'Reilly, 2005). Web 2.0 functionalities respond to a need noted by Saba (2005) that 'educational systems of the future must respond to learner differences dynamically as the learning process evolves and not necessarily be based on pre-determined programs' (p. 264). However, students' readiness to use these technologies needs to be considered. Kennedy, Judd, Churchward, Gray, and Krause (2008) drew on empirical evidence to suggest that students who comfortably use them for social and entertainment purposes may not necessarily have the skills to use the same technologies for learning.

In e-learning contexts, the teacher's understanding of the learners is important to the way they are supported through structure and dialogue. E-learning design is dependent on this understanding. In an editorial about the importance and influence of context in e-learning, Searle (2008) commented that '[u]nderstanding the relationship between learning and technology is all about understanding context' (p. 2). A recent instructional systems design model (Morrison, Ross, & Kemp, 2004) included four key elements in instructional design (process, systems, outcomes, and delivery) with the focus of delivery on considerations about transactional distance. In the following

section, we propose another conceptual approach for addressing context as part of e-learning design that combines a constructivist framework with transactional distance theory.

A conceptual approach for addressing context as part of e-learning design

We draw on Oliver and Herrington's framework (2001) for describing critical elements of online learning settings to conceptualise the management of transactional distance in e-learning design. In this framework, based on a constructivist perspective, the design focus is on learning tasks which are aligned with the planned learning outcomes and assessment, with appropriate resources and learning supports provided to allow students to complete the tasks. Using this framework, we have previously suggested that management of transactional distance can be considered as primarily influencing the supports that need to be provided in specific contexts, which, in turn, may influence the design of learning tasks, learning resources, and assessments, as illustrated in Figure 1 (Benson & Samarawickrema, 2007). We regard provision for learner–content interaction and learner–interface interaction as elements of structure and consider dialogue as communication between learners or between teacher and learners. This view is supported by the idea of structure as including activities with automatic feedback programmed in advance, thereby contributing to intrapersonal dialogue, as opposed to interpersonal dialogue through open-ended social and emotional engagement with other people (Gorsky & Caspi, 2005b).

Our analysis of the design patterns that have emerged across a number of different units with a range of learning and teaching contexts suggests that a classroom can support low dialogue and low structure (–D–S) in the online components used because the face-to-face context provides for low transactional distance. However, in contexts characterised by medium transactional distance (such as blended

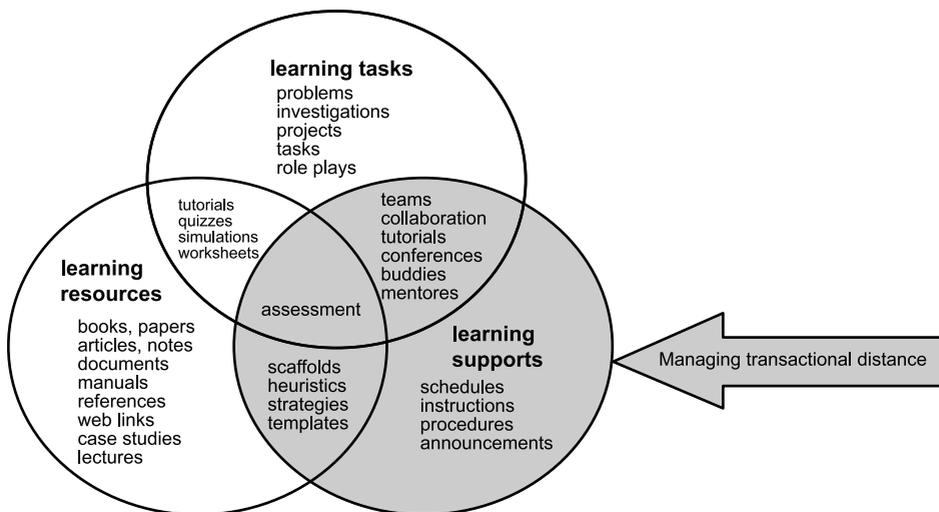


Figure 1. Including management of transactional distance as a factor in e-learning design (based on Oliver & Herrington, 2001, p. 20).

learning environments), an inverse relationship between structure and dialogue is evident, though the specific aspects of the relationship will depend on the context and on the autonomy of the learners. As transactional distance becomes potentially greater in off-campus and transnational units which are wholly or partly online, there appear to be benefits in both high dialogue and high structure (+D+S) to meet learners' needs. Thus, it seems that the degree of learner autonomy may be less important in contexts with low or high transactional distance, compared to contexts characterised by medium transactional distance. We illustrate this in the authentic cases presented in the following section. We consider that these design patterns are likely to be evident in any successful approach to e-learning which addresses the context of the learners, and that it would be valuable to explore this further through empirical research.

Examples of successful approaches to addressing context in e-learning design

The cases below demonstrate how basic knowledge about the learning context has been used to manage transactional distance by balancing dialogue, structure, and learner autonomy to reflect the design patterns outlined above. We have selected these cases as specific examples to illustrate a range of learning and teaching contexts from classrooms to partially and fully online environments that extend to transnational settings. The cases have been previously judged as successful examples of e-learning design and included in showcases of effective teaching. Therefore, implicitly, the designs could be expected to include appropriate characteristics for managing transactional distance. The showcases are Monash University's *Designing Electronic Learning and Teaching Approaches (DELTA) for the Health Professions* (a faculty-level password-protected site) and Deakin University's *Contemporary Online Teaching Cases* (available at <http://www.deakin.edu.au/itl/teach-learn/cases/index.htm>). The design patterns in the selected cases are representative of the other cases available on the sites in terms of the management of transactional distance.

Case 1: on-campus, classroom enhanced (-D-S+A)

In a postgraduate counselling unit, the lecturer draws on a series of video vignettes on DVD of clients (represented by actors) presenting challenging situations faced by counselling psychologists in order to help students to practise, reflect on, and evaluate their own counselling skills. When the lecturer uses these vignettes in class she selects them in any order from the linear structure of the DVD to meet the needs of the specific situation. She asks students to write immediate responses (as a counsellor would) and then discuss these in small groups. Because access to a face-to-face learning context tends to reduce transactional distance, and dialogue and structure are provided in the surrounding face-to-face context, the small, unstructured e-learning components (-S) can be used in a class in various ways and there is no requirement for online dialogue (-D). Although the autonomy of these postgraduate learners is high (+A), learner autonomy does not appear to be so important in this context because the teacher can accommodate high or low autonomy in the face-to-face setting. Consequently, the low transactional distance (-D-S) of the classroom-enhanced context can accommodate limited e-learning design, irrespective of learner autonomy (A).

Case 2: on-campus, blended (-D+S-A)

E-learning activities and resources have been designed to complement on-campus teaching in a large second-year undergraduate pharmaceuticals class of over 200 students. This blended learning approach was introduced to replace resource-intensive practical classes in tablet making, which could only accommodate eight students at a time. The teaching staff provide videotaped segments of the tablet production process along with online lecture material and revision quizzes on the unit website to offer a structured (+S) alternative to practical classes suitable for second-year undergraduate students, who might be expected to demonstrate low levels of autonomy (-A). There is no online dialogue (-D) as the opportunity for dialogue is available in the face-to-face setting. This e-learning design therefore illustrates an inverse relationship between structure and dialogue (-D+S) that is tailored to the characteristics of the learners and the learning context.

Case 3: workplace-based, blended (+D-S+A)

A blended learning environment has also been provided for a class of final-year public relations students undertaking a Bachelor of Arts degree, who are required to serve a mandatory work placement. The lecturer works with the Faculty Office to organise these semester-long work placements for his students, who may choose to serve their practicum in companies in Australia or overseas. As part of the unit assessment, he requires learners to submit two assessable items: a work report and an analysis of how theory is connected to their placement work. He asks learners to negotiate the scope and extent of these assessments individually, based on the work involved in their placement. This activity is in keeping with the learner autonomy (+A) that characterises the independence of final-year students about to join the workforce.

Negotiation is managed via the learning management system and the lecturer maintains a high level of online dialogue (+D) with his dispersed student group while also ensuring that the learners stay connected with each other. The site also connects students to their assessable e-journals. The unit is deliberately loosely structured (-S) to accommodate the different workplaces and roles in which students will be involved.

As in case 2, the medium transactional distance of the blended learning environment is characterised by an inverse relationship between dialogue and structure, and the specific characteristics of the context, along with the level of learner autonomy, determine whether the focus of the e-learning design needs to be on dialogue or structure. In case 2, transactional distance is managed through face-to-face dialogue and high levels of structure in the online materials to accommodate the low autonomy (-A) of learners, while case 3 illustrates management of transactional distance with high online dialogue (+D) to suit the limited online structure and the context of the workplace setting. This is possible because of the high autonomy (+A) of the learners. In these two cases, the nature of the blended learning environment determines whether the design focus needs to be on dialogue or structure.

Case 4: on-campus, multiple campuses, wholly online (+D-S+A)

A unit entitled 'The Strategic Academic' in the Graduate Certificate of Higher Education has been designed for wholly online study because the learners (new academic staff members) are located on multiple campuses. The course is mandatory for all new academics and must be completed during their probationary period. The

unit assessment is planned to ensure that learners understand their professional environment, reflect on how to manage it, and define strategies to move forward in their profession. Therefore, students define their individual career goals and related study plans as part of their assignment.

Towards this end, the lecturer has designed a unit site on the learning management system, providing a range of digital resources to support learning. The site offers a basic unit outline and the required deadlines in addition to the discussion space for the dialogue. The unit structure is deliberately low (–S) in order to allow learners to negotiate their assignment and unit outcomes individually. These highly autonomous learners (+A) identify their own learning needs and outcomes and work with the lecturer to develop their measures for success, using extensive online dialogue (+D) to negotiate learning outcomes with her and to engage with the other learners via threaded discussion forums.

In this case, the combination of wholly online teaching in an on-campus teaching context provides another example of medium transactional distance, with management features similar to those in case 3. In case 4, high dialogue and high learner autonomy have accommodated low structure (–S) enabling transactional distance to be bridged individually through learners negotiating structure and content. As a consequence of individually negotiating and making choices related to content and pace, learners demonstrate greater control, and levels of dialogue are higher than in case 3.

Case 5: off-campus + transnational, wholly online (+D+S–A)

A wholly online approach has also been used in a core computer ethics unit in the Bachelor of Technology degree. This is a large class of urban and rural Australian students and international students from several countries, including Australian students studying from overseas. The lecturer teaches this group of 500 final-year undergraduates with the help of three tutors. They use the learning management system to deliver all resources, including learner guides, schedules, announcements, and instructions. The only print resource the students receive is a letter in the mail giving their username and password to access the system.

The unit is highly structured (+S) to ensure that all learners in the large cohort move through the semester at the same pace. Accordingly, learners work through a series of assessable activities at specified times, leading on to a compulsory final examination. If assessable items are not submitted online on the specified dates, the system rejects them. The design also provides for a high level of dialogue (+D) via the online discussion space. Each assessable item has its own dedicated threaded discussion moderated by a designated tutor. Further opportunities for dialogue are provided by a general discussion space where announcements are made by the lecturer and general queries are raised by students. Wikis are used for the small-group project work. Although these are final-year students who might normally be regarded as autonomous learners, because of the size and dispersion of the group, transactional distance is managed by allowing for only low levels of autonomy (–A).

This case illustrates that when transactional distance is high, as in off-campus or transnational contexts where teaching occurs online, high dialogue and high structure (+D+S) appear to be important because the extent of the transactional distance suggests that high levels of support through both avenues need to be built into the e-learning design in order to bridge it.

Case 6: off-campus + transnational, partially online (+D+S+A)

A postgraduate unit on social work and aged care is offered to small classes of students enrolled in a Master of Social Work degree. Students consider current social policies in relation to ageing and examine whether or not these promote healthy ageing. The unit is designed to accommodate off-campus Australian students as well as others at locations around the world. All are practising social workers. The material is Australian-based but offers the opportunity of sharing the experiences of international students.

To teach the unit, the lecturer provides a set of distance education print materials which complement a unit website within the university’s learning management system, as well as a DVD of interviews with elderly people. These unit components are highly structured, with activities designated in the print materials to guide students’ use of the other components. This includes discussion activities which students undertake within specified timeframes on the unit website. Students’ participation in these activities forms 80% of the assessment in the unit. The website also contains other visual and aural resources, including audio clips from four social work practitioners in each topic containing their comments on the implications of that topic for their work. Students are encouraged to draw on these comments in their written assignment (worth 20%), which focuses on the implications of their learning for their own practice.

Although these learners have potentially high levels of autonomy (+A) as post-graduate students and practising social workers, the unit is characterised by both high levels of dialogue (+D) to facilitate their engagement and high levels of structure (+S)

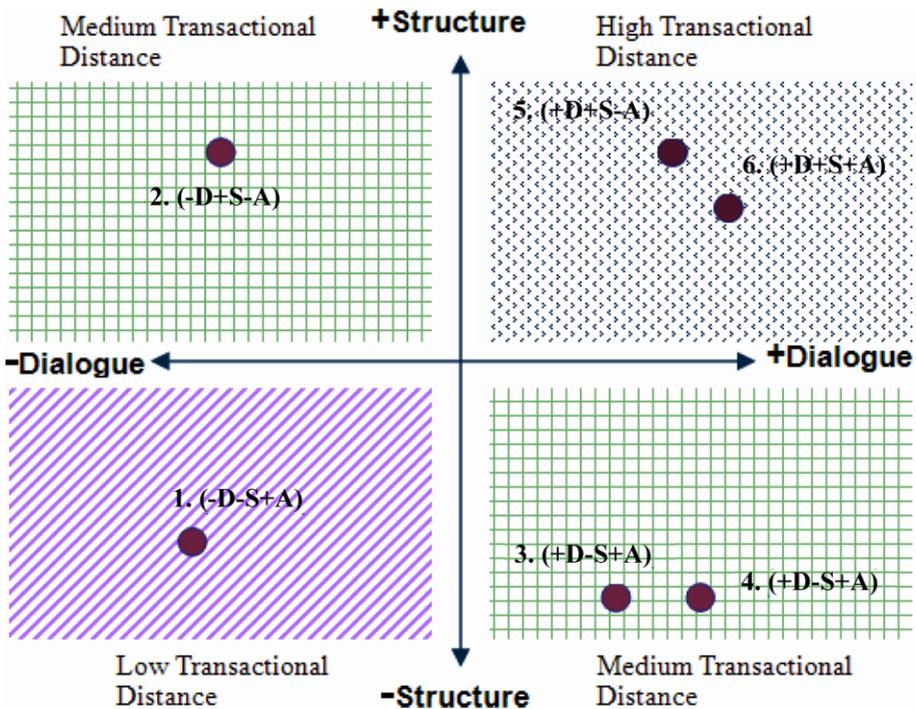


Figure 2. Relative levels of dialogue, structure, and autonomy in the selected learning contexts.

to maximise support across their diverse learning contexts. Considering cases 5 and 6 together, it seems that high levels of dialogue and structure are suggested by high transactional distance, even when learner autonomy is high.

Figure 2 illustrates the relative levels of dialogue (D), structure (S), and learner autonomy (A) of each of the above cases, demonstrating how low transactional distance is associated with low levels of online dialogue and structure ($-D-S$), and high transactional distance with high levels of dialogue and structure ($+D+S$), which appear to be likely irrespective of learner autonomy. In contrast, e-learning contexts involving medium transactional distance are characterised by the inverse relationship of dialogue and structure and seem to be most affected by the level of learner autonomy. Garrison (2000) has commented that '[u]nderstanding transactional distance very much depends upon whether we are discussing a two-by-two matrix, a single continuum, or distinct clusters' (p. 9). As indicated by Figure 2, the approach suggested here lends itself to the use of a two-by-two matrix.

In the next section, we consider some implications for e-learning design that emerge from this analysis.

Implications

Implications of using transactional distance theory to address context in e-learning design

The above analysis suggests some practical strategies that can be undertaken during the planning of an e-learning design to ensure that opportunities provided for dialogue and structure offer appropriate support in a given learning and teaching context. We consider that wholly online learners in the early years of a course might be expected to demonstrate low levels of autonomy and require high levels of structure in order to bridge the transactional distance. This might therefore involve structured online tasks (to facilitate intrapersonal dialogue) that are completed in specified timeframes, and plentiful guidance through scaffolding strategies. When learning activities require interpersonal dialogue, this may also need to be structured by the teacher, perhaps using Salmon's e-moderation model (2003), with substantial support provided early so that more complex discussion tasks are introduced when students are more able to interact comfortably in an online environment. In contrast, more mature learners with higher levels of autonomy studying in blended learning environments and supported by some face-to-face contact may be able to manage their own learning easily, and may readily form online communities of practice, where much of the dialogue involves social construction of knowledge through learner-learner interaction, and structure can be minimised.

A preliminary analysis of the teaching context to identify the expected transactional distance provides a means of determining the levels of dialogue and structure which may be indicated to support students appropriately in planning the learning design, bearing in mind the expected general level of learner autonomy. This then offers a basis for considering any further information that is available about the learners' contexts and characteristics. Analysis of this information will be influenced by the theoretical concepts that the designer adopts about the role of context in learning. This process helps to flesh out the specific nature of the dialogue and structural elements to be included to support students. Consideration of these elements may also influence the design of resources and the activities themselves, as suggested by

the interrelationship of support, resources, and activities in Oliver and Herrington's model (2001).

If a teacher was designing the online component of a research methods unit to be offered in a blended learning environment (face-to-face lectures and online tutorials) and planned an online activity to help students to write a research proposal, the nature of the context and the expected autonomy of the learners would help to refine the related decisions. If the task was designed from a constructivist perspective, students could be asked to critique a research article in a journal to construct knowledge about key components of a research project using an authentic resource. If the students were undergraduates who were unfamiliar with research processes, and whose autonomy in this area was low, one approach would be to break down the online task into small, structured components and provide well-chosen and easily accessible online resources to assist them. Given the availability of the face-to-face environment, requirements might be explained in the related lecture and opportunities offered for face-to-face clarification. The design of the online teaching component could then be represented as $-D+S-A$. However, if these were postgraduate students who were familiar with research methodology and whose level of autonomy was high, the main features of the activity might remain the same, but there would be less need for online structure. Online support might primarily take the form of dialogue for clarifying concerns as they arise ($+D-S+A$). If some of these students were studying off-campus, then the high level of online structure might be maintained, including opportunities for dialogue ($+D+S+A$), in order to maximise the online support available because these students have no access to face-to-face support.

The additional contextual information that is available about any of these groups of students would further inform the way the supports are designed. For example, most of the undergraduate students might be working about 25 hours a week, and could therefore study only in small blocks of time, or a number of the off-campus postgraduate students may have limited access to high-speed Internet connections. Although teachers might intuitively take some of this contextual information into consideration when designing learning activities, the value of the concept of transactional distance is that it provides another lens through which to consider e-learning design, which has very practical implications for informing the way the balance of dialogue and structure is managed in relation to the expected level of learner autonomy.

In general, practical implications to consider in designing for high transactional distance environments include the ongoing involvement of teachers and sensitivity to learner needs in order to ensure that levels of dialogue are appropriate to support learners. Where high structure is implicated, an upfront investment in planning and time is required as well. Even where considerable control of dialogue or structure is delegated to the learner, there are implications for careful planning, management, and evaluation by the teacher to establish requirements and monitor progress to ensure that learning outcomes are met.

Implications for e-learning designs that involve Web 2.0 technologies

The above implications remain largely applicable when the e-learning design includes the use of Web 2.0 technologies by students. However, in some circumstances the levels of support provided may need to be greater than those offered in online learning

environments with which students are more familiar. When Web 2.0 technologies are used, it is important to distinguish between the role of dialogue and structure in managing transactional distance (which is under the control of the teacher) and the role of dialogue and structure *within* the selected Web 2.0 environment, which allows learners control of that environment to facilitate emergent structure and collaborative learning negotiated through dialogue. Transactional distance is likely to be high for students who are less familiar with learning in Web 2.0 environments, which, as indicated earlier, may include net generation students with widely varying access to, and skills and preferences for using, emerging technology-based tools for learning. Teachers need to take account of this when planning the activities, resources, and supports that contribute to the design of such an environment.

In a blended learning context, when a teacher expects students who are unfamiliar with Web 2.0 technologies to use a wiki to undertake a student project, considerable support may be needed to compensate for their low autonomy in this area. Some support may be provided face-to-face but high levels of online dialogue may be needed as students clarify requirements, together with high levels of online support as the teacher increases the structure surrounding the wikis in order to provide more guidance to students. By increasing online dialogue and support to reduce the transactional distance for these learners, the design pattern (+D+S-A) resembles that described earlier for e-learning contexts involving high transactional distance. For off-campus or transnational learners who already require high levels of support, the learning design may need to provide for even higher levels of dialogue and structure.

With these higher levels of support, learners are likely to be in a better position to use social software such as blogs and wikis and experience the empowerment of learner control through learner-learner interaction. When learners use the shared online space to build their learning environment collaboratively in a wiki, the choice made by the teacher to delegate control to the students in turn increases the students' choices within that context and their ability to manage dialogue and structure. However, once students have developed the confidence to engage with their peers in the Web 2.0 context, then the high levels of dialogue and structure that may characterise their engagement relate to the nature of the medium, rather than to transactional distance, and consequently do not actually indicate a loophole in the law of transactional distance (Dron, 2004).

Conclusion

In this article, we have considered the importance of addressing the learning and teaching context in e-learning design and have suggested that one way of approaching this is to consider the separation between learners, and between teacher and learners, in terms of the transactional distance involved. Learner support can then be managed by designing levels of dialogue and structure that are appropriate for the learners and the learning context in order to reduce transactional distance. We have illustrated this idea with a series of case studies that indicate that low levels of dialogue and structure are sufficient for e-learning contexts involving low transactional distance, while contexts involving high transactional distance may be best supported by high levels of dialogue and structure (+D+S). In both these contexts, the expected level of learner autonomy appears to be less important than in contexts involving medium transactional distance. We suggest that it is in contexts of medium transactional distance that

the inverse relationship of dialogue and structure is most likely to be appropriate and most likely to be affected by the level of learner autonomy.

This approach offers a practical way of making initial design decisions by analysing a given e-learning context. These principles can be extended to e-learning contexts involving Web 2.0 technologies, despite the fact that dialogue and structure are under the learners' control when they work in these contexts. The principles continue to be applicable because it is important to distinguish between the role of dialogue and structure in managing transactional distance (which is under the control of the teacher) and the role of dialogue and structure *within* the Web 2.0 environment. We have proposed that for many students lack of familiarity with the use of Web 2.0 technologies for learning may mean that teachers need to design for high levels of dialogue and structure surrounding the Web 2.0 environment in order to support students.

Further analysis of the above ideas in a broader range of contexts, particularly drawing on empirical evidence, may provide useful insights for e-learning design. Although the concept of transactional distance is not measurable and from a scientific perspective the theory is open to critique (Gorsky & Caspi, 2005a), the variables on which it is based are intuitively relevant to teaching. It offers a clear reminder that the design of e-learning is not a one-size-fits-all enterprise and provides a strategy for an analytical approach that is responsive to the characteristics of learners and the context of their learning.

Acknowledgements

We acknowledge those responsible for the case studies considered in this article: Dr Janette Simmonds, Ian Larson, Suzanne Caliph, Keri Jones, and Lesley Hewitt of Monash University; and Ross Monaghan, Dr Julia Walsh, and Dr Jo Coldwell of Deakin University. This article extends the ideas presented in the conference paper by Benson and Samarawickrema (2007).

Notes on contributors

Robyn Benson is senior lecturer, educational design and e-learning, in the Faculty of Medicine, Nursing and Health Sciences, Monash University, Australia. She is particularly interested in exploring theoretical and practical approaches for helping teaching staff to develop effective e-learning strategies.

Gayani Samarawickrema is a lecturer in the Institute of Teaching and Learning, Deakin University, Australia. She is involved in professional development and research in teaching with technology in higher education.

References

- Bates, A.W. (1991). Third generation distance education: The challenge of new technology. *Research in Distance Education*, 3(2), 10–14.
- Benson, R., & Brack, C. (2009). Developing the scholarship of teaching: What is the role of e-teaching and learning? *Teaching in Higher Education*, 14(1), 71–80.
- Benson, R., & Samarawickrema, G. (2007). Teaching in context: Some implications for e-learning design. In R.J. Atkinson, C. McBeath, S.K.A. Soong, & C. Cheers (Eds.), *ICT: Providing choices for learners and learning. Proceedings of ascilite Singapore 2007* (pp. 61–70). Singapore: Centre for Educational Development, Nanyang Technological University. Retrieved February 2, 2009, from <http://www.ascilite.org.au/conferences/singapore07/procs/benson.pdf>

- Bischoff, W., Bisconer, S., Kooker, B., & Woods, L. (1996). Transactional distance and interactive television in the distance education of health professionals. *The American Journal of Distance Education, 10*(3), 4–19.
- Boud, D., & Walker, D. (1991). *Experience and learning: Reflection at work*. Geelong, Australia: Deakin University Press.
- Bunker, E., Gayol, Y., Nti, N., & Reidell, P. (1996). A study of transactional distance in an international audio-conferencing course. *Proceedings of the Seventh International Conference of the Society for Information Technology and Teacher Education* (pp. 40–44). Phoenix, AZ: The Society for Information Technology and Teacher Education.
- Chambers, E. (2002). Understanding students' learning 'from the inside': The early work of Alistair Morgan. In T. Evans (Ed.), *Research in distance education 5: Revised papers from the Fifth Research in Distance Education Conference Deakin University 2000* [e-book] (pp. 1–18). Geelong, Australia: Deakin University.
- Chen, Y.-J. (2001a). Dimensions of transactional distance in the World Wide Web learning environment: A factor analysis. *British Journal of Educational Technology, 32*(4), 459–470.
- Chen, Y.-J. (2001b). Transactional distance in World Wide Web learning environments. *Innovations in Education and Teaching International, 38*(4), 327–338.
- Chen, Y.-J., & Willits, F.K. (1998). A path analysis of the concepts in Moore's theory of transactional distance in a videoconferencing learning environment. *The American Journal of Distance Education, 13*(1), 45–59.
- Cookson, P., & Chang, Y. (1995). The multidimensional audio conferencing classification system (MACS). *The American Journal of Distance Education, 9*(3), 18–36.
- Dennen, V.P., Darabi, A.A., & Smith, L.J. (2007). Instructor–learner interaction in online courses: The relative perceived importance of particular instructor actions on performance and satisfaction. *Distance Education, 28*(1), 65–79.
- Dron, J. (2004). A loophole in Moore's law of transactional distance. *Proceedings of the Fourth IEEE International Conference on Advanced Learning Technologies (ICALT 2004)* (pp. 41–45). Joensuu, Finland: IEEE.
- Dron, J. (2005). E-learning and the building habits of termites. *Journal of Educational Multimedia and Hypermedia, 14*(4), 321–342.
- Dron, J. (2006). Social software and the emergence of control. *Proceedings of the Sixth IEEE International Conference on Advanced Learning Technologies (ICALT 2006)* (pp. 41–45). Kerkrade, the Netherlands: IEEE.
- Dron, J. (2007a). *Control and constraint in e-learning: Choosing when to choose*. Hershey, PA: Information Science Publishing.
- Dron, J. (2007b). Designing the undesignable: Social software and control. *Educational Technology & Society, 10*(3), 60–71. Retrieved February 2, 2009, from http://www.ifets.info/journals/10_3/5.pdf
- Dron, J., Seidel, C., & Litten, G. (2004). Transactional distance in a blended learning environment. *ALT-J, 12*(2), 163–174.
- Evans, T. (1994). *Understanding learners in open and distance education*. London: Kogan Page.
- Garrison, D.R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95–105.
- Garrison, R. (2000). Theoretical challenges for distance education in the 21st century: A shift from structural to transactional issues. *International Review of Research in Open and Distance Learning, 1*(1). Retrieved February 2, 2009, from <http://www.irrodl.org/index.php/irrodl/article/view/2/22>
- Gorsky, P., & Caspi, A. (2005a). A critical analysis of transactional distance theory. *The Quarterly Review of Distance Education, 6*(1), 1–11.
- Gorsky, P., & Caspi, A. (2005b). Dialogue: A theoretical framework for distance education instructional systems. *British Journal of Educational Technology, 36*(2), 137–144.
- Grabinger, R.S. (1996). Rich environments for active learning. In D.H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 665–692). New York: Macmillan.
- Hillman, D.C.A., Willis, D.J., & Gunawardena, C.N. (1994). Learner–interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *The American Journal of Distance Education, 8*(2), 30–42.

- Jonassen, D.H. (1999). Designing constructivist learning environments. In C.M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory (Vol. II)*, pp. 215–239. Mahwah, NJ: Lawrence Erlbaum.
- Kanuka, H., Collett, D., & Caswell, C. (2002). University instructor perceptions of the use of asynchronous text-based discussion in distance courses. *The American Journal of Distance Education*, 16(3), 151–167.
- Keegan, D. (1996). *Foundations of distance education* (3rd ed.). London: Routledge.
- Kennedy, G.E., Judd, T.S., Churchward, A., Gray, K., & Krause, K. (2008). First year students' experiences with technology: Are they really digital natives? *Australasian Journal of Educational Technology*, 24(1), 108–122. Retrieved February 2, 2009, from <http://www.ascilite.org.au/ajet/ajet24/kennedy.pdf>
- Kirkwood, A. (1995). Over the threshold: Media technologies for home learning. In F. Lockwood (Ed.), *Research and development in open and distance learning* (pp. 129–138). London: Routledge.
- Kirkwood, A. (2000). Learning at home with information and communication technologies. *Distance Education: An International Journal*, 21(2), 248–259.
- Laurillard, D. (2002). *Rethinking university teaching: A conversational framework for the effective use of learning technologies* (2nd ed.). London: Routledge.
- Lemone, K.A. (2005). Analyzing cultural influences on elearning transactional issues. In G. Richards (Ed.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2005* (pp. 2637–2644). Chesapeake, VA: AACE. Retrieved February 2, 2009, from <http://web.cs.wpi.edu/~kal/elearn/elearn05.pdf>
- Marton, F. (1981). Phenomenography – Describing conceptions of the world around us. *Instructional Science*, 10(2), 177–200.
- Marton, F., & Booth, S. (1997). *Learning and awareness*. Mahwah, NJ: Lawrence Erlbaum.
- Mason, R., & Kaye, A. (Eds.). (1989). *Mindweave: Communication, computers and distance education*. Oxford: Pergamon.
- Moore, M. (1977). A model of independent study. *Epistologidaktika*, 1, 6–40.
- Moore, M. (1980). Independent study. In R. Boyd & J.W. Apps (Eds.), *Redefining the discipline of adult education* (pp. 16–31). San Francisco: Jossey-Bass.
- Moore, M. (1989). Editorial: Three types of interaction. *The American Journal of Distance Education*, 3(2), 1–6.
- Moore, M. (1991). Editorial: Distance education theory. *The American Journal of Distance Education*, 5(3), 1–6.
- Moore, M. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). London: Routledge.
- Moore, M. (2004). Constructivists: Don't blame the tools! *The American Journal of Distance Education*, 18(2), 67–72.
- Moore, M., & Kearsley, G. (2005). *Distance education: A systems view* (2nd ed.). Belmont, CA: Wadsworth.
- Morgan, A. (1993). *Improving your students' learning: Reflections on the experience of study*. London: Kogan Page.
- Morgan, A., & Beaty, L. (2005). The world of the learner. In F. Marton, D. Hounsell, & N. Entwistle (Eds.), *The experience of learning: Implications for teaching and studying in higher education* (3rd (Internet) ed., pp. 217–237). Edinburgh: University of Edinburgh, Centre for Teaching, Learning and Assessment. Retrieved February 2, 2009, from <http://www.tla.ed.ac.uk/resources/EoL.html>
- Morrison, G., Ross, S., & Kemp, J. (2004). *Designing effective instruction* (4th ed.). Hoboken, NJ: John Wiley.
- Murphy, K.L., & Cifuentes, L. (2001). Using Web tools, collaborating, and learning online. *Distance Education: An International Journal*, 22(2), 285–305.
- Nipper, S. (1989). Third generation distance learning and computer conferencing. In R. Mason & A. Kaye (Eds.), *Mindweave: Communication, computers and distance education* (pp. 63–73). Oxford: Pergamon.
- Oliver, R. (2000). When teaching meets learning: Design principles and strategies for web-based learning environments that support knowledge construction. In R. Sims, M. O'Reilly, & S. Sawkins (Eds.), *Learning to choose: Choosing to learn. Proceedings of the 17th Annual Conference of the Australasian Society for Computers in Learning in*

- Tertiary Education* (pp. 17–28). Lismore, Australia: Southern Cross University Press. Retrieved February 2, 2009, from http://www.ascilite.org.au/conferences/coffs00/papers/ron_oliver_keynote.pdf
- Oliver, R., & Herrington, J. (2001). *Teaching and learning online: A beginner's guide to e-learning and e-teaching in higher education*. Mt Lawley, Western Australia: Edith Cowan University.
- O'Reilly, T. (2005). *What is Web 2.0: Design patterns and business models for the next generation of software*. Retrieved September 1, 2008, from <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>
- Saba, F. (2005). Critical issues in distance education: A report from the United States. *Distance Education*, 26(2), 255–272.
- Saba, F., & Shearer, R.L. (1994). Verifying key theoretical concepts in a dynamic model of distance education. *The American Journal of Distance Education*, 8(1), 36–59.
- Salmon, G. (2003). *E-moderation: The key to teaching and learning online* (2nd ed.). London: RoutledgeFalmer.
- Searle, J.K. (2008). Developing e-learning experiences and practices: The importance of context. *ALT-J*, 16(1), 1–3.
- Shea, P.J., Pickett, A.M., & Pelz, W.E. (2003). A follow-up investigation of 'teaching presence' in the SUNY Learning Network. *Journal of Asynchronous Learning Networks*, 7(2), 61–80.
- Shirky, C. (2003). *A group is its own worst enemy*. Retrieved September 1, 2008, from http://shirky.com/writings/group_enemy.html
- Stein, D.S., Wanstreet, C.E., Calvin, J., Overtoom, C., & Wheaton, J.E. (2005). Bridging the transactional distance gap in online learning environments. *The American Journal of Distance Education*, 19(2), 105–118.
- Taylor, J.C. (1999). Distance education: The fifth generation. In *The new educational frontier: Teaching and training in a networked world. Proceedings of the 19th ICDE World Conference on Open Learning and Distance Education* [CD-ROM]. Vienna, Austria: ICDE.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wenger, E., McDermott, R., & Snyder, W.M. (2002). *Cultivating communities of practice*. Boston: Harvard Business School Press.
- Wikeley, F., & Muschamp, Y. (2004). Pedagogical implications of working with doctoral students at a distance. *Distance Education*, 25(1), 125–142.
- Zhang, A. (2003). *Transactional distance in web-based college learning environments: Toward measurement and theory construction*. Unpublished doctoral dissertation, Virginia Commonwealth University, Richmond.

Copyright of Distance Education is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.