

July 2006

Authentic tasks online: A synergy among learner, task and technology

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Recommended Citation

Herrington, J.; Oliver, R.; and Reeves, T. C.: Authentic tasks online: A synergy among learner, task and technology 2006.

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Authentic Tasks Online: A Synergy among Learner, Task and Technology

Submitted to a special issue of *Distance Education*

Edited by Rod Sims

Herrington, J., Oliver, R. & Reeves, T.C. (2006). Authentic tasks online: A synergy among learner, task and technology. *Distance Education*, 27(2), 233-248

Abstract

Fostering the synergy among *learner, task* and *technology* to create innovative and immersive distance learning environments runs counter to the widespread practice of incorporating traditional classroom pedagogical strategies into web-based delivery of courses. The most widely accepted model of online higher education appears to be one of reductionism, whereby learning management systems facilitate the design of easily digested packets of information, usually assessed by discrete stand-alone tests and academic assignments. This paper describes a model of authentic tasks that can assist in designing environments of increased rather than reduced complexity. It provides a robust framework for the design of online courses, based on the work of theorists and researchers in situated learning and authentic learning. It describes the characteristics of a task's design that facilitates the requirements of an entire course of study being readily satisfied by its completion, where the students make the important decisions about why, how, and in what order they investigate a problem. The paper describes several learning environments that were investigated in depth in the study and explores the synergies that exist between the learners, tasks and technology engaged in authentic learning settings. The paper leads readers to a conceptual understanding of the role of authentic tasks in supporting knowledge construction and meaningful learning, and illustrates the principles of authentic task design for online learning environments.

A synergistic view of teaching and learning

synergy: the working together of two or more things, people, or organizations, especially when the result is greater than the sum of their individual effects or capabilities.

F. Buckminster Fuller, an early advocate of a systems view of the earth and designer of geodesic domes, defined *synergy* as the behavior of whole systems unpredicted by the behavior of their parts taken separately (Buckminster Fuller Institute, nd.). Educational researchers and practitioners in distance education have long lacked a sufficiently synergistic view of teaching and learning. This paucity of holistic perspectives in the distance education literature and practice is derived partially from impoverished theoretical foundations (Gibson, 2003; Saba, 2003). The lack of seeing the forest for the trees, if you will, also stems from an enduring legacy of poor research in distance education. For many years, the distance education literature was dominated by predictive research studies that employed quasi-experimental methods in repetitive attempts to tease out the effects of individual variables (e.g., feedback, delivery mode, media, etc.) on outcome measures of dubious reliability and validity (Bernard, Abrami, Lou, & Borokhovski, 2004; Reeves, 2005). More recently, distance education research has been enriched by numerous interpretivist studies involving qualitative designs, but for the most part these studies have focused on a single tree, and the forest remains unexplored.

In this paper, we propose that synergistic perspectives on distance education could be advanced by adoption of a model that can be used to guide the design of online learning environments focused on authentic tasks. This model is described below in terms of ten integrated design elements. In addition to presenting the authentic tasks model and its theoretical foundations, we also present examples of Web-based courses that exemplify our model.

Characteristics of authentic activities

Research in distance education has for many years, and continues today, to investigate the use of online technologies to enhance and support learner activity and engagement (e.g., Spector, 2005). One key to success appears to lie in the design of learning environments that make effective use of the communications capabilities of technologies that can connect learners in meaningful ways (e.g., Goodyear, 2005; Laurillard, 2002). There are a number of models of learning that have been proposed as providing ways to attract and engage learners. In particular, the preferred approaches are seen to be those that encourage and support deep rather than surface approaches to learning (Ramsden, 1992). The majority of these approaches are based on learning strategies that promote knowledge construction and include such forms as problem-based learning, computer-supported collaboration and student-centred learning.

The precise instructional forms used to deliver learning programs that employ such student-centred approaches to learning are usually easy to describe in terms of learner actions and activities, but more difficult to prescribe in terms of teacher actions and activities. In recent years there have been a number of attempts to formalise particular

designs for learning, learning designs that can guide and inform teachers as they seek to create effective learning environments for their students. In particular there have been concerted and well-coordinated attempts to identify and describe learning designs for technology-based learning settings and those that use information and communication technologies (ICTs) to deliver education at a distance (e.g., Agostinho, Oliver, Harper, Hedberg & Wills, 2002; Oliver, Harper, Hedberg, Wills & Agostinho, 2002).

A second key to successful distance education stems from the design of learning environments that encourage learning activities that are relevant and/or authentic to the participants. Authentic learning as a learning design takes many forms and has been shown to have many benefits for learners, especially for those students in online units and courses (Lebow & Wager, 1994). In authentic learning settings, real-life authentic tasks are used to create the core of the learning environment, and the completion of the tasks effectively occupies the entire student commitment for the course. Many courses have been based on complex and sustained scenarios and cases, where students become immersed in problem solving within realistic situations resembling the contexts where the knowledge they are learning will eventually be applied.

The authentic task project

The research project described in this paper has engaged us for over a decade in exploring the use of authentic tasks. The timeline of our collaborative research coincides with a period of rapid growth of online learning courses in higher education. However, during this period, under the pressure of reduced funding to the university sector, larger classes and higher workloads (e.g., Sharda, 2005), it has become apparent that authentic and complex tasks have largely been sacrificed to more manageable and expedient activities that can readily be incorporated into the weekly schedules of a course. Assessment requirements and administrative constraints also tend to militate against the use of sustained tasks that might take a whole semester, or a large part of it, to complete. In spite of the massive swing among educational theorists and those who prepare teachers towards a more constructivist philosophy of learning that has occurred over the past 2-3 decades, 'instructivist' models of online teaching abound on the Web as they do in most classrooms. Our research was designed to investigate this phenomenon by examining in depth successful cases of online authentic tasks that were complex and sustained, and facilitated learning of both content and processes through their completion. As this type of complex task is uncommon, we were interested to find working examples of the approach, and to explore those factors that led to successful experiences for both students and teachers.

The stated aims of the research were:

1. To investigate the effectiveness of authentic activity as an alternative model for online delivery of university courses.
2. To investigate and determine the characteristics of authentic activity that facilitate a whole course unit of study being encapsulated within a single complex task.

3. To determine the factors which contribute to the successful adoption and implementation of activity-based online courses and units.

In choosing the cases for in-depth investigation, we drew upon the findings of an extensive literature search and our own earlier work. In particular, theoretical and applied work done in the USA informed our thinking. For example, Jonassen (1991) defined authentic activities as tasks: that have real-world relevance and utility, that integrate those tasks across the curriculum, that provide appropriate levels of complexity and that allow students to select appropriate levels of difficulty or involvement. Similarly, Bransford, Vye, Kinzer and Risko (1990), Young (1993), Lebow and Wager (1994) and Savery and Duffy (1996) among others have nominated criteria of authentic activities.

Our own previous research has also focused on aspects of authentic and situated learning (e.g., Herrington & Oliver, 2000; Oliver & Herrington, 2000; Oliver & Herrington, 2001), authentic activity (Herrington & Knibb, 1999; Herrington, Sparrow & Herrington, 2000), problem-based learning (Oliver & Omari, 1999; Reeves & Laffey, 1999) and authentic assessment (Reeves & Okey, 1996; Herrington & Herrington, 1998). For this study, we focussed more precisely on the design of tasks themselves, rather than more general designs of authentic learning environments.

From the findings of this research, and an in-depth literature review, characteristic elements of authentic activities or tasks were defined for selection of cases (reported in more depth in Herrington, Reeves, Oliver & Woo, 2004). According to our own experiences in teaching in authentic learning environments and the aforementioned review of the literature, the following characteristics define authentic activities or tasks:

1. Authentic tasks have real-world relevance: Activities match as nearly as possible the real-world tasks of professionals in practice rather than decontextualized or classroom-based tasks (e.g., Brown, Collins & Duguid, 1989; Cognition and Technology Group at Vanderbilt, 1990a; Jonassen, 1991; Lebow & Wager, 1994; Oliver & Omari, 1999; Resnick, 1987; Winn, 1993).
2. Authentic tasks are ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity: Problems inherent in the activities are ill-defined and open to multiple interpretations rather than easily solved by the application of existing algorithms. Learners must identify their own unique tasks and sub-tasks in order to complete the major task (e.g., Bransford, Vye et al., 1990; Brown et al., 1989; Cognition and Technology Group at Vanderbilt, 1990a; Lebow & Wager, 1994).
3. Authentic tasks comprise complex activities to be investigated by students over a sustained period of time: Tasks are completed in days, weeks and months rather than minutes or hours, requiring significant investment of time and intellectual resources (e.g., Bransford, Vye et al., 1990; Cognition and Technology Group at Vanderbilt, 1990b; Jonassen, 1991; Lebow & Wager, 1994).
4. Authentic tasks provide the opportunity for students to examine the task from different perspectives, using a variety of resources: The task affords learners the opportunity to examine the problem from a variety of theoretical and

practical perspectives, rather than a single perspective that learners must imitate to be successful. The use of a variety of resources rather than a limited number of preselected references requires students to detect relevant from irrelevant information (e.g., Bransford, Vye et al., 1990; Cognition and Technology Group at Vanderbilt, 1990b).

5. Authentic tasks provide the opportunity to collaborate: Collaboration is integral to the task, both within the course and the real world, rather than achievable by an individual learner (e.g., Gordon, 1998; Lebow & Wager, 1994; Young, 1993).
6. Authentic tasks provide the opportunity to reflect: Activities need to enable learners to make choices and reflect on their learning both individually and socially (e.g., Gordon, 1998; Myers, 1993; Young, 1993).
7. Authentic tasks can be integrated and applied across different subject areas and lead beyond domain-specific outcomes: Activities encourage interdisciplinary perspectives and enable diverse roles and expertise rather than a single well-defined field or domain (e.g., Bransford, Sherwood et al., 1990; Bransford, Vye et al., 1990b; Jonassen, 1991).
8. Authentic tasks are seamlessly integrated with assessment: Assessment of tasks is seamlessly integrated with the major task in a manner that reflects real world assessment, rather than separate artificial assessment removed from the nature of the task (e.g., Herrington & Herrington, 1998; Reeves & Okey, 1996; Young, 1995).
9. Authentic tasks create polished products valuable in their own right: Tasks culminate in the creation of a whole product rather than an exercise or sub-step in preparation for something else (e.g., Barab, Squire & Dueber, 2000; Duchastel, 1997; Gordon, 1998).
10. Authentic tasks allow competing solutions and diversity of outcome: Tasks allow a range and diversity of outcomes open to multiple solutions of an original nature, rather than a single correct response obtained by the application of rules and procedures (e.g., Bottge & Hasselbring, 1993; Bransford, Sherwood et al., 1990; Bransford, Vye et al., 1990; Duchastel, 1997).

These characteristics were used to define suitable cases for investigation, that is, to identify and locate courses that met the following conditions:

- Authentic complex activities form the core of the entire course (i.e., a semester unit or subject)
- The tasks meet at least six of the authentic task criteria listed above,
- The course must be a higher education course (not K-12 schooling or training),
- The course must be totally online and delivered at a distance (not a web-based supplement to an on-campus unit), and
- The course must have run successfully for at least two semesters.

A search for suitable courses was conducted, firstly, through examination of published refereed literature. It was thought that if a paper had been published describing a course, it would be more likely to be innovative and well established, rather than an unrealised idea or plan. Journals such as the *Australasian Journal of Educational Technology*, *Distance Education*, *British Journal of Educational Technology*, *Journal of Interactive Learning Research*, and *Journal of Educational Multimedia and Hypermedia*, and refereed proceedings for conferences such as *Ed-*

Media, Australasian Society for Computers in Learning in Tertiary Education (ASCILITE), E-Learn and others were searched for potential cases. An extensive web search was also conducted, and email messages were sent to many established leaders in the field of educational technology throughout the world to ask their assistance in locating eligible cases. After locating only a few excellent cases using this method, we realised the difficulty stemmed from our requirement that a whole semester course be devoted to a single complex task, and so reduced this requirement to a major task comprising more than a third of a course. We also allowed courses that had an on-campus component into our analysis, but only if that component was incidental, rather than critical to the completion of the task. In all cases, the courses selected used tasks that could have been completed completely at a distance (i.e., the on-campus element was not critical for completion or assessment of the task, but in most cases simply reflected the nature of the course cohort). With these changes in selection criteria, many more potentially eligible examples of authentic tasks in higher education contexts were found.

When a case was selected for investigation, a contact teacher or designer was located and permission was sought to conduct interviews and examine the course website. Interviews were generally conducted with at least two teachers, instructional designers or staff development personnel associated with a course. A range of exciting and innovative courses were investigated, revealing talented and imaginative teachers and designers who clearly looked beyond the delivery of information to explore the synergies among task, learner and technology. Cases were represented across disciplines at both under-graduate and post-graduate levels. Some of the cases had been developed with external funding, and used extensive graphics, audio, and interactive web features to enhance the presentation of the authentic context. Others were accessible to students through course management systems (such as *Blackboard* or *WebCT*, or some university departments' own systems), and some were very low cost, simple representations that relied more on a very good idea and well described task than on sophisticated technology per se.

Three sample cases

Three case descriptions are given below to give a snapshot of the types of courses that were researched, including a short description of the task, the learner, and the technology used within each learning environment. None of the course instances at the time of the research were large undergraduate classes; all were comparatively small specialised cohorts with 1-3 teachers involved in their delivery. All three examples came from universities in Australia:

Research Preparation: Research Methods

Research Preparation: Research methods is an introductory research methodology course studied within a Master of Education degree (see Angus & Grey, 2002, for more detail on the course).

Task: In order to learn about appropriate use of qualitative and quantitative research methods, students are given the task of investigating the closure of a fictitious rural Australian school. They use data collected by two fictitious graduate students, Peggy and Brian, including

interviews with parents and teachers, researcher notes, school records, surveys and demographic data. They also have access to newspapers and other types of information from the town. Their task is to prepare an analysis and report (using qualitative and quantitative methods) on the likely impact the closure of the school will have on the rural community. The task is comprised of a number of large assessable sub-tasks which contribute to the development of one report which is the focus of the entire semester course.

Learner: The learners taking the course are usually in the first year of a Master of Education degree. Some are returning to study after a substantial gap, and many require a great deal of support in the first few weeks of the course in particular before they feel confident in the approach. In completing the task, they work vicariously using the data that has already been collected, and in small collaborative groups with other students. However, their final report is an individual one.

Technology: Students access the task, resources and supports available to them through the course website. A graduate research centre is presented as a metaphor (Figure 1), and a range of resources become available by clicking on the different items in the interface. For example, the two filing cabinet drawers reveal qualitative data in the form of interview transcripts, researcher notes, and documents, and quantitative data in the form of survey data, and other statistical records. Video interviews are accessible under the television, and town demographics and newspaper reports are available on the coffee table. A range of other resources on research methods are available through the Help Desk (door). Students are able to freely navigate the space to access data and resources as needed.



Figure 1: The graduate research center

North American Fiction and Film

North American Fiction and Film is an advanced undergraduate course in North American Literature in a Bachelor of Arts degree. The design framework of the course is described in Fitzsimmons (2001), and further discussion on the theoretical foundation of the approach can be found in Fitzsimmons (2006).

Task: In a semester course on *North American Fiction and Film* (Figure 2), students studying novels written by North American writers such as Melville, Hemingway, DeLillo, Vonnegut, Atwood, and Esquivel, are given the role of Editorial Board Members of an online scholarly journal. They are invited to submit book reviews and articles based on

their study of the literature, and as editors, they collaboratively design a guide for novice reviewers on how to write a book review. The teacher of the course is the journal editor, and an edition of the journal is published online at the end of each semester featuring the best articles chosen by the board.

Learner: The learners are in their second or third year of a Bachelor of Arts degree, or they are pre-service education teachers (English teachers) from the Faculty of Education. They complete the task by acting as members of the editorial board for the journal, and preparing papers on their chosen works. At the end of the course, and a one day mini-conference is held where students can present their papers.

Technology: The course task and resources are fully available on the website. The major task is presented to students in the form of a memo welcoming them to their new position on the editorial board of the NAFF (*North American Fiction and Film*) journal. A range of literary papers, articles and reviews and other support services and resources are also accessible from the site.

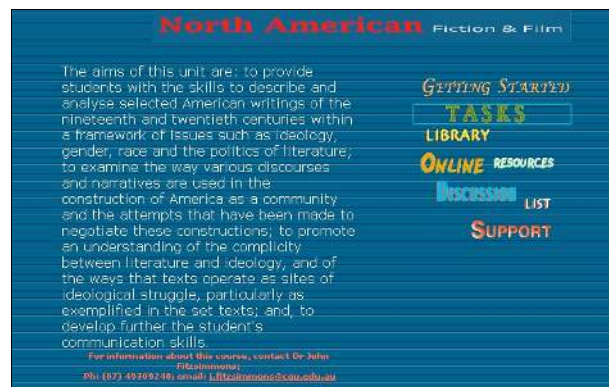


Figure 2: North American Fiction and Film

Writing in organizations

Writing in organizations is part of the third-year curriculum for the degree of Bachelor of Arts (Communication Studies) where students learn business communication skills by accepting temporary employment in a virtual recording company (described in detail in Pennell, Durham, Orzog & Spark, 1997).

Task: Learners accept a temporary position at a recording company (Figure 3), and are given the task of preparing a report on whether the company would benefit from the introduction of an internal newsletter to improve communication between employees and management. In order to complete this activity, student make appointments, keep a diary, 'interview' the director and other employees, and write letters, and memos as required.

Learner: The students are third year on-campus undergraduates studying an elective in the communication degree. By the time they take this course, they would have already undertaken one or two courses in the professional writing strand. Students complete the task by attending work 'virtually' each day for two weeks. During this time, they keep a

real physical diary for their appointments, as a further authentic element to the learning environment.

Technology: The learning environment is presented entirely online even though it is part of an on-campus course. The task is extremely well resourced with audio-interviews (including full text on screen) with a number of employees, cartoon-style graphics, and a range of resources on business writing and communication. Characters have been extremely well conceptualised to present alternative and competing perspectives, and students have a rich source of ideas on the interaction between employers and employees and how they communicate in organizations.



Figure 3: Writing in organizations: Virtual Records

Exploring synergies in authentic learning settings

A large part of the learning advantage that can be derived from the use of authentic learning settings appears to draw from the synergies that result from the interactions of these three elements, learner, task and technology. Our research has revealed the need for more authentic *tasks* as described above. Likewise, the use of *technology* in authentic distance learning environments draws on particular attributes of technology-use that relate to the real-life nature of the activity, and the seamless and integrated applications for communication and knowledge construction that the technology must provide. And finally, *learners* in authentic settings are typically freed from the constraints of weekly lectures, readings and other linear constraints usually associated with courses presented in course management programs. They are able to pursue more self-paced independent learning using technology, and associated interactions with peers and other supports. Table 1 summarises and distinguishes between the attributes of the elements that form the basis of authentic distance learning settings.

Table 1: Attributes of authentic learning elements

| Element | Attributes |
|---------------------|--|
| Tasks | <ul style="list-style-type: none"> • Complex activities • Ill-structured • Based on real-life scenarios and instances • Resulting in a polished product |
| Learners | <ul style="list-style-type: none"> • ICT literate • Problem-solvers • Reflective learners • Collaborative learners • Self-sufficient learners |
| Technologies | <ul style="list-style-type: none"> • Providing access to rich media • Providing learner and resource connectivity (ideally 24/7) • Providing access to rich resource collections • Supporting extensive functionality (including cognitive tools for construction of knowledge representations that can be shared, critiqued, and refined over time) • Ubiquitous access and availability |

It is apparent from our analysis of the three case studies described above and other examples that the use of authentic tasks provides important synergies between the three elements: learner, task and technology. The tasks were seen to be positive supports for the learner, in the form of meaningful contexts, motivations and skills development. In a similar fashion, the learners who were familiar and comfortable in authentic learning settings were able to extend the ways in which various technologies were used. Often the students produced products others could use, and in all cases, their learning activities produced the product that subsequently formed the basis of their assessment. This complementarity was seen frequently to provide synergies which could expand how tasks could be structured as a consequence of students' capabilities and technology use (Figure 4).

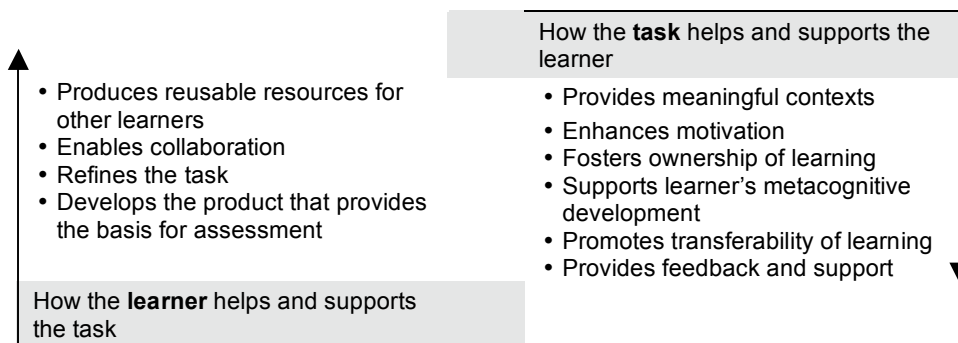


Figure 4: Synergies between task and learner in authentic learning settings

In a similar fashion, the forms of tasks that were selected influenced in many ways the technology that was planned as an element in the solution process. Figure 5 indicates some of the ways in which the task can be seen to support the use of the technology by providing meaningful contexts for inquiry and collaboration, and a seamless and natural place for technology use. When the teachers formulated their tasks, the fact that technology was to be a tool for the students provided many opportunities for the design and specification of the task in terms of resource access, enriched communications concerning research and inquiry, and cognitive tools for building the solution products.

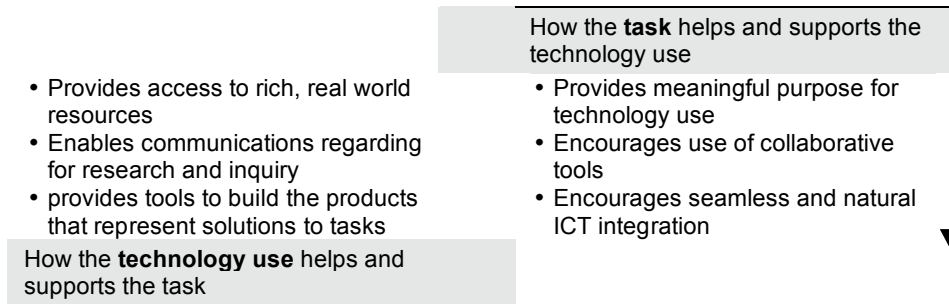


Figure 5: Synergies between task and technology use in authentic learning settings

Finally, there were synergies identified that occurred as a consequence of the role of the learners and the way in which they used the technology in the learning process (Figure 6). The fact that the learners across all cases were able to use the technology in a self-sufficient way to solve problems, stemmed from the design of a learning environment that relies heavily on technology for support. And what the technology appeared to offer this kind of learner, tended to be far more than what a student in a conventional environment might expect or need to use. The communication capabilities, the cognitive tools for knowledge construction, the resource opportunities and the support facilities all served to assist the learner in ways that more typical uses of technology might not normally have achieved.

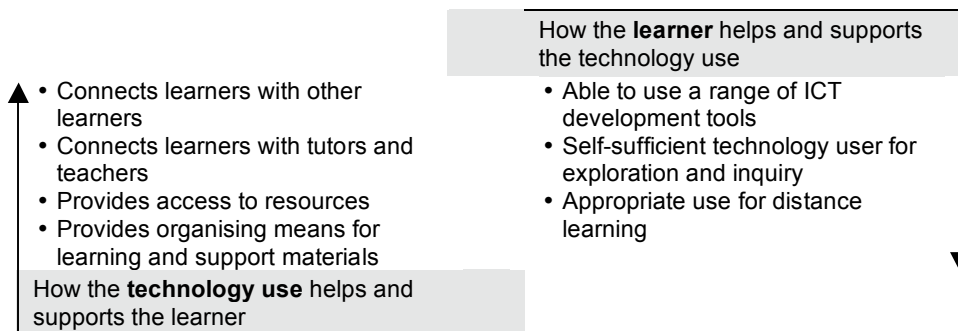


Figure 6: Synergies between technology and learner in authentic learning settings

The synergies illustrated in Figures 4-6 are useful in illuminating the complementarities that exist among learner, task, and technology. Together with the examples of actual courses grounded in authentic tasks described above and in more detail in other reports of our research (Reeves, Herrington & Oliver, 2002; Herrington 2002; Herrington, Oliver & Reeves, 2003a, 2003b; Herrington, Reeves, Oliver & Woo, 2004), these synergies will hopefully encourage course designers and instructors to design, implement, and evaluate authentic task-based courses.

Summary and Conclusions

Authentic tasks describe a learning design that appears to hold considerable promise for the delivery of units and courses through distance education modes. In this paper, we have discussed and described a framework for designing authentic learning based on the prescription of an authentic task that is holistic and complex. The framework for the design of online courses based around complex tasks, draws from the work of

theorists and researchers in situated learning and authentic learning and seeks to formalise a number of the design and implementation elements.

The paper has identified and described three cases of actual learning settings based on the use of such forms of authentic task. In each of the cases, the respective roles of learner, task and technology have been identified and synergies between these elements have been explored. The inquiry has demonstrated that synergy among the various roles and elements is a strong contributor to the success of such learning settings. Each element was seen to provide affordances and supports for the other elements and at the same time to draw on the relative contributions of each to strengthen its own capability to support the learning setting. The task should be authentic, learners should be engaged, and technology should provide powerful communications capabilities and cognitive tools for information seeking and knowledge construction.

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Acknowledgements

This research was supported in part by grants from the Australian Research Council (ARC-Discovery) and the Australian-American Fulbright Commission as well as by the authors' universities. More information about the authentic tasks model used in our research can be found at: <http://www.authentictasks.uow.edu.au/>.

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