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## Exploring the Nardoo: Designing problem-based learning experiences for secondary school students

Susan J. Bennett

*University of Wollongong*, [sbennett@uow.edu.au](mailto:sbennett@uow.edu.au)

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# **Instructional Design: Case Studies in Communities of Practice**

Michael J. Keppell  
Hong Kong Institute of Education, Hong Kong



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## Chapter XV

# Exploring the Nardoo: Designing Problem-Based Learning Experiences for Secondary School Students

Sue Bennett, University of Wollongong, Australia

### Abstract

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*This chapter examines how instructional designers work together in teams to solve problems. It examines the advantages and disadvantages of a team approach to instructional design. This case will explore how a team of instructional designers worked together to create Exploring the Nardoo, a multi-award winning CD-ROM developed by the University of Wollongong's Educational Media Laboratory (emLab). The case describes key issues related to the design and development of the package from the perspective of a faculty-based multimedia unit, which was established with a strong emphasis on advancing research through innovations in design.*

## Introduction

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Instructional design is often a process by which an individual designer works closely with a subject matter expert to collect and adapt content for the development of instructional materials. Examples of the types of problems solo designers might face are included in cases (Ertmer & Quinn, 2003), descriptions of design paradigms (Visscher-Voerman, Gustafson, & Plomp, 1999), and instructional design books (Reigeluth, 1999). Research into the instructional design process is also available in works such as the early research by Perez and colleagues (Perez & Emery, 1995; Perez, Johnson, & Emery, 1995) and, more recently, Keppell (2000). Comparatively, little attention has been paid to questions about how teams of instructional designers work together. For example, what happens when instructional designers work in teams to solve problems, and what are the advantages and disadvantages of a team approach to instructional design?

This case will explore how a team of instructional designers worked together to create *Exploring the Nardoo*, a multi-award winning CD-ROM developed by the University of Wollongong's Educational Media Laboratory (emLab). The case describes key issues related to the design and development of the package from the perspective of a faculty-based multimedia unit, which was established with a strong emphasis on advancing research through innovations in design. The case is based on extensive primary research by the author, which was originally carried out to develop an online case for students in a postgraduate course at the University of Wollongong. The data collected and analysed to develop the case included interviews with four of the instructional designers on the team, archival documents and research papers.

This case offers a unique perspective of this well-known project by revealing the experiences of the designers, which provides a behind-the-scenes view of the negotiations and decisions made during the development of the project. The case sets these experiences within the real-life situation of the project, and describes the strategies the designers used to address the problems and how these led to the solutions chosen. The case also draws out principles that can be derived from these experiences and the "lessons learned" by these instructional designers. These will provide insights for other instructional designers grappling with similar issues or situations. The case also explores the "communities of practice" concept from a different perspective by considering the community of practice created by the project team and the influences of external communities of practice with which team members identify.

## Background

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The notion of "communities of practice" was first introduced by the work of Lave and Wenger on situated learning (Lave & Wenger, 1991). In their conceptualisation, a person builds expertise by gradually becoming a part of a community of practice. This process moves the person from legitimate peripheral participation to full participation. These ideas have sparked interest in how learning environments can be designed to provide "contexts in which learners ... can practice the kinds of activities that they will encounter outside of

schools” by situating “authentic activities within the environmental circumstances and surroundings that are present” in the real world (Barab & Duffy, 2000, p. 30). Understanding the nature of these communities and how they are established and maintained is of particular interest in the areas of professional preparation and professional development, for which the notions of enculturation and knowledge sharing seem particularly relevant. This is evidenced by the recent interest in *online* communities of practice (cf., Barab, MaKinster, Moore, Cunningham, & the ILF Design Team, 2001; Conceição, Sherry, & Gibson, 2004; Cox & Osguthorpe, 2003; Herrington, Herrington, & Kervin, 2005). Communities of practice are also being suggested as a strategy to foster the exchange of ideas and the formulation of new thinking in business and government (Snyder, Wenger, & de Sousa Briggs, 2004; Wenger, 2004).

In essence, the “community of practice” concept invites alternative ways to think about how knowledge is shared and created by groups of people. Communities of practice exist in a myriad of forms, and may be formal or informal in their membership and means of interaction. A key characteristic is that “people in communities of practice share their experience and knowledge in free-flowing, creative ways that foster new approaches to problems” (Wenger & Snyder, 2000, p. 140). Some communities exist for a limited time, for example to solve a particular problem. Other communities are more persistent, perhaps formed because of the mutual interests or concerns of their members. All communities of practice are underpinned by common beliefs, practices and assumptions, many of which are implicit (Barab & Duffy, 2000).

Communities of practice are also relevant to understanding how instructional designers work. Instructional design often occurs within a team context; this is particularly so for large projects and those that require specialist technical and production input. The collective effort required involves instructional designers working with subject matter experts, graphic designers, programmers and audio-visual specialists. This usually requires collaboration between team members from different organisations, or from different groups within an organisation. While such teams may be created formally by management, they often have a more informal beginning as members are gathered because of their expertise and availability. Wenger and Snyder (2000) suggest that such groupings are more likely to become a community of practice. These project teams become communities of practice.

In addition, the members of the project team will also identify with other communities of practice that align with their professional expertise. Working on design projects enables members to apply their professional knowledge and skills, but also to develop new knowledge and then disseminate this back to their community of practice. In this way the professional community is sustained and transformed, a further characteristic identified by Barab and Duffy (2000). These notions of communities of practice are considered in this case from the perspectives of four instructional designers who worked as part of a larger team on a major educational multimedia project.

## Case Description

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### Context

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In the early 1990s there was a great deal of interest and activity in designing interactive multimedia for education, and an emerging awareness of the potential of Internet-based learning. Teachers and designers had begun to discuss how constructivist approaches to learning might be realised using the new technologies that were becoming available. There had, however, been little implementation of these ideas. Most multimedia applications of the time still reflected the instructional tutorial model associated with earlier modes of computer-assisted learning. It was into this environment that *Investigating Lake Iluka* was released in 1994. This CD-ROM based resource presented learners with a simulated lake environment. It allowed students to explore various ecosystems, and make physical, chemical and biological measurements while investigating ecological issues. Following *Investigating Lake Iluka's* release, its designers from the University of Wollongong's Faculty of Education were approached by the New South Wales Department of Land and Water Resources to create a similar package. This initiated the development of *Exploring the Nardoo*.

*Exploring the Nardoo* brought together a government department and a faculty-based design and development unit to create a learning resource aimed at secondary school students. The work was carried out by a multi-disciplinary team, which included instructional designers, subject matter experts, graphic designers, programmers and audio-visual consultants. The project drew together a range of expertise, with team members bringing their own values and assumptions to the project. Furthermore, the design team included instructional designers who were also research and teaching academics within the Faculty, and instructional designers who were secondary school teachers. While a community of practice formed within the context of this project team, the participants also identified with other communities of practice, such as communities focusing on instructional design, educational research, school education, scientific research, public dissemination of science, graphic design, and technical development. This created a complex dynamic that fostered innovation and, on occasion, produced conflict.

### *Initiation of Project*

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The project began in early 1994 with discussions about the nature of the proposed project and the budget. The Department of Land and Water Conservation (DLWC) wanted to develop a CD-ROM package to complement a wider campaign to improve awareness of water conservation issues. The target audience would be secondary school students, who would then hopefully take the message home to their families. Having been impressed with *Investigating Lake Iluka*, the DLWC envisaged a similar resource. The university-based designers, however, saw the project as an opportunity to improve on their previous work and to implement some new ideas. The initial discussions took place between two key personnel from the university and several representatives from DLWC. After extensive consultation over a period of three months, a project proposal was produced that formalised the basis for contractual arrangements between the parties. This document established the timeline, stages

and milestones; provided a detailed costing; identified technical issues; and described the expertise of the proposed design team (which drew on the team that created *Investigating Lake Iluka*). In essence, this proposal represented the shared understanding developed in the initial stages of the project, and once it was accepted the project could begin.

### *Design of the Product*

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The basis for the design of *Exploring the Nardoo* is underpinned by two key principles: (1) that the package would support learning through setting the information and activities within a relevant context; and (2) that learning would be driven by exploration and problem-solving.

The first of these principles was applied through the way information was structured and presented in the package. Drawing on the concept of an “information landscape” (Florin, 1990), the package is centred around an inland water catchment. The catchment is presented through four time periods, ranging from a pristine environment through to the present day, and in four regions along the river’s length. The river is presented graphically, and learners can investigate various locations by clicking on objects embedded in the landscape, such as a town or a factory, to access related information. This information may take the form of radio, newspaper or television stories, the results of measurements within the river, or descriptions about plants and animals found in the area. By navigating from the source to the mouth, learners can explore the way different activities impact on the river environment. By moving through the time periods, learners can see how those activities have changed with habitation and development of the valley. Learners can also visit the Water Research Centre, which is represented using an illustrated office interior. By clicking on objects in the office, learners can access further information. In implementing the information landscape approach, the designers hoped to create an intuitive interface encouraging learners to explore a source of rich information presented in a variety of realistic formats.

The second key design principle—that learning should be driven by exploration and problem solving—is integrated through a range of water management investigations, related to both natural events and human impact. These investigations are supported not only by the information made available through the landscape, but also through a number of support tools and strategies. Guides in the form of three staff members in the Water Research Centre introduce the scenario and invite learners to choose from the investigations. They also offer guidance and suggestions based on the investigation selected. Simulations allow learners to explore issues related to blue-green algae, dam management and household water use by entering and manipulating variables. As learners move through the river environment they can gather information and personalise their notes using a personal digital assistant (PDA)—an innovative tool originating from the program. The PDA allows students to copy, paste and type in text, and to link to other types of media. An integrated presentation tool allows learners to develop a comprehensive response to an investigation that can incorporate the textual, graphic, audio and video resources they have collected. In addition, genre templates are provided to scaffold learners’ argumentation.

## *Design and Development Process*

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After the acceptance of the proposal, the team spent four months on an initial period of design work. They first developed a design brief. The main purpose of this document was to identify links to the curriculum and to map these, in general terms, to the problems and the accompanying support tools and strategies. These ideas were developed further and incorporated into a design statement, which described the overall scope and nature of the package and its features. As the first project milestone, the design statement was an agreed sign-off point and, like the project proposal, it represented the shared understanding at that stage of the project. This document was the result of much consultation with the DLWC and a great deal of discussion amongst the members of the design team.

Prior experience both as educators and as designers of educational software had taught the team that learning resources are only used when there are clear links to the curriculum, enabling teachers to more easily see the applicability of the resource to their teaching. Furthermore, research and evaluations conducted on the use of *Investigating Lake Iluka* in the classroom had helped the design team to identify some deficiencies in the package that they could address in the design of *Exploring the Nardoo*. Feedback from both teachers and students indicated that the problems needed to be introduced at the beginning of the package and be easily accessible to encourage the learners to get involved with the tasks. Students also wanted to be able to edit their notes directly in the package and to incorporate the media resources. The copy-and-paste notes feature from the earlier package was transformed into a sophisticated multimedia notebook and presentation tool that allowed learners to edit their text and link to portions of resources as quotes. Another issue was that students needed more support in solving the problems, and so the guides and genre templates were introduced.

The designers also drew inspiration from the emerging literature associated with constructivism, situated learning, interactivity and the role of computers as cognitive tools. They began to put some of the ideas from this body of conceptual literature into practice. Technology was also changing rapidly and this allowed new technical options to be considered. As the literature and technology were developing, so were the ideas of the team and these impacted on the design of *Exploring the Nardoo*. For example, one designer indicated that the team had lengthy discussions about the best way to convey the context and that they talked about the nature of the river landscape at nearly every meeting in the early stages of the design. The underpinning concept and usability issues were hotly debated. This process enabled the team to consider a broad range of alternative options as a means of encouraging innovative thinking. In the words of one designer, *if you don't start broad and then narrow it in and don't pay attention to ideas as they come along, you can miss some good ideas, and you need to have a store of ideas that you can tap into in case something doesn't work.*

The PDA also became a significant focus for design discussions. Initially, the designers saw the PDA as an extension of the note collection feature in *Investigating Lake Iluka*, which was based on a book metaphor. It soon became apparent, however, that with the text editing and presentation functionality needed in the PDA, it would be more like a hand-held electronic device. At the time, the Apple Newton had recently become available, along with a range of other hand-held electronic organisers, games and devices. Team members brought in pictures from catalogues to generate ideas for the appearance and functionality of the PDA. As it took shape the PDA also became the solution to two other problems the

team was having with the design. It became a means to play audio-visual resources, and so eliminated the need for the Water Research Centre to contain an extra room intended for this purpose. This move simplified the structure of the package and reduced the amount of graphic design work needed. The PDA was also adopted as a means of navigating through time periods in the river environment, replacing an earlier design idea which would have seen learners navigating through vertical layers and digging further down to go back in time. Opinions had been divided on the usefulness of this metaphor, despite considerable discussion about it and testing of the concept on paper. Both of these PDA functions represented a significant departure from the realism of the information landscape, a dilemma that, as one of the designers suggested, demonstrates the tension between being true to a metaphor and “stretching it to take advantage of what a computer can do.” This stretching of the metaphor is also apparent in the hot links and scrollable windows used in an on-screen representation of a book in this package.

In describing the process by which *Exploring the Nardoo* was created, the designers repeatedly recalled the need to be flexible and adaptable during the process. It is apparent that the designers were driven by the desire to introduce further innovations beyond what they had achieved in their earlier work, but also beyond what had been developed by others. They convey a sense of this project as breaking new ground in terms of design, and because there were few precedents, there was often no obvious design solution. One of the designers reflected that there were many possible ways in which some design problems could have been solved, and he found this both exciting and scary.

It is also clear from the way this project is described that the development work occurred concurrently with the design. During the early stages of the project the focus had been on the design work that would be formalised in the design statement, however the team needed to take care that it could deliver the design ideas proposed. The designers realised early in the project that the commercial multimedia authoring software they had used to create *Investigating Lake Iluka* was too limited to support many of the new features they envisaged for *Exploring the Nardoo*. At the time, the only solution was to develop their own software tools, which would allow much greater design freedom. And so, even in the early stages of the design, the programmer was testing the viability of some of the functionality proposed. After the design statement had been submitted and signed off by the DWLC, the challenge of implementing the design really began. At this stage there was simultaneous design and development as new ideas were tried and compromises were negotiated.

Nine months of work was required to develop the first prototype, which was the second project milestone and sign-off point. After a further four months, formative evaluation with school students was conducted. It was during these stages in particular that some of the constraints became apparent and impacted on the design of the product. All of the designers interviewed spoke of both the wealth of design ideas developed and the enormous content resources provided by the client. It was a challenge to the whole team to determine what would and what would not be included in the package. The budget was the most obvious limitation and this in turn limited the amount of time that could be devoted to the project. This meant that some content was not included; for example, only three of the six planned simulations were included in the final version. Some features were also modified, for example the simulations that are included contain fewer hints than the team had planned.

Team members also had to develop some new skills to achieve the project goals. For example, the main graphic designer had only just begun to use some of the software tools required

and was having difficulty keeping pace with the project requirements. A decision was made to bring in another graphic designer on contract to assist. Advances in the technology also meant that the programmer had new challenges as well as new opportunities. At the time, drag-and-drop functionality was just beginning to be widely used, but there was a significant problem in implementing across platforms. A delay of around five months ensued while this was being resolved. Changes in the nature of the project also meant that some priorities changed. The most obvious example of this was the influence of the publisher—who the team had started negotiations with while developing the prototype. This added pressure on the team to ensure that the product was commercially viable. As a result, the project team was required to develop an increased level of teacher documentation to accompany the CD-ROM.

Almost two years after the proposal had been accepted, the package was launched. The end result was a package that was published commercially in Australia and the United States, but which also had significant research and development outcomes. The design ideas have been the subject of academic publications, and the product has received awards and accolades internationally.

### *Roles and Teamwork*

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A major project of this size requires a range of design, production and technical experts. This case, however, focuses on the experiences of the instructional designers. There were four key members of the instructional design team. Three were staff members of the university (two of whom were former teachers), and one was a secondary school teacher on secondment. Two of the designers were continuously involved throughout the project and they took responsibility for the project management and coordination. Two other designers were heavily involved at specific stages and focused on particular aspects of the project. One, for example, led the development of the simulations, and the other worked closely with the subject matter experts on the content. Two other academics had input into the design and were more peripherally involved, rejoining the team at various times to provide feedback on design ideas, often providing a “reality check” for those more closely involved in the project.

Each designer had their own perspective on the project, depending on the nature and level of their involvement, but also on their backgrounds. Three of the designers had significant experience in secondary science teaching, although two had since moved to university positions. This gave these members a good understanding of a teacher’s perspective of the characteristics of an effective learning resource, and of what teachers would need from a package like *Exploring the Nardoo*. The academic members of the team were also committed to furthering the research agenda in the design of interactive multimedia for education. This was the main driver of innovation, which ensured that *Exploring the Nardoo* was not simply a copy of *Investigating Lake Iluka* with different content. Furthermore, while there was an underlying commitment to the key design principles, the academic designers had different expertise and views. For example, one designer had particular expertise in interface design that was called upon at various times during the project. This mix of perspectives ensured that there was constant questioning of ideas throughout the project, and that design decisions were well justified.

As well as working with each other, the instructional designers were part of the wider project team that included subject matter experts, graphics designers, programmers and audio-visual experts. All of the designers were multi-skilled in that their expertise extended beyond instructional design. For example, all were experienced users of educational technology in their own teaching, and most also brought highly developed technical skills and production knowledge to the project. Some team members also had background knowledge in science that was also relevant to the nature of this project. These factors were highly beneficial to the functioning of the team because the designers were better able to communicate to the scientists who acted as the subject matter experts and with the multimedia and computing specialists.

Despite this, however, there were times when the priorities of the team members and their views of what was most important to the project differed from one another. This was perhaps most obvious in the relationship between the designers and the two subject matter experts. The scientists from the DLWC were heavily involved in identifying, selecting and creating content. The instructional designer carried out significant re-writing of existing information to make it suitable for secondary school students, and reworked a significant amount of material into alternative formats such as newspaper stories or TV news items. This was an involved process, requiring that the subject matter experts checked the revised content to ensure that it was accurate. Comments from the designers indicate that although these subject matter experts gradually came to understand a lot about the overall process and the complexities involved, they were still very much focussed on maximising the amount of content in the product. The design team, on the other hand, were more concerned with “getting the interactivity and navigation in place.”

## **Challenges, Strategies, and Solutions**

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*Exploring the Nardoo* posed two main challenges for the design team. The first was in fostering innovation within the constraints of money, time, skills and technical limitations. While these constraints need to be managed and addressed in any project, they pose particular challenges when innovation is a key goal. As noted by the designers on this project, innovation requires open-mindedness, adaptability and compromise. Open-mindedness ensures that there is a culture in which ideas can be shared and debated in a constructive way. A range of perspectives on any problem is valuable, as is a degree of risk-taking. Adaptability and compromise are essential features when either the ideas or their implementation do not work or cannot be achieved within the constraints. All of these are characteristics of the process by which *Exploring the Nardoo* was designed and developed, and contrast markedly to the simplified versions of instructional design that regularly appear in text books. While these models may alert readers to the types of activities that occur during the process, they do little to convey the messiness and uncertainty that are features of innovations such as the one discussed here. Most notably such models often separate design and development, whereas in the case of *Exploring the Nardoo* these activities were inextricably entwined.

The other significant challenge for the designers was working with a diverse team. Just like other educational multimedia products, be they CD or Web-based, *Exploring the Nardoo* required the input of a wide variety of experts. The initial task for the project leaders was to assemble the right project team. In this case many of the key players had been involved in the

previous project, but this new project also introduced new members with different knowledge and skills. It was a distinct advantage that the instructional designers were multi-skilled, and it is likely that the enhanced communication that resulted enabled the project participants to build a shared understanding more easily. The project documents, such as the brief and design statement, became expressions of that shared understanding. These were not detailed design specifications, but they were sufficient to articulate the agreed scope and nature of the project. As one designer noted, however, even when ideas were committed to paper, there were still times when the client (DLWC) would have a very different interpretation. The team addressed this by mocking up screen representations of the package in the early stages to make those ideas more concrete. The lead designers also worked hard to manage expectations through continuous consultation with DLWC, formal and informal face-to-face meetings, and e-mail messages. These provided important forums for addressing the multiple perspectives and the sometimes competing priorities of the team members.

## Principles

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There are five principles that emerge from this case that may be relevant to other designers. These are offered below as the “lessons learned” from this project.

### **Assess and Address Constraints**

Every instructional design project must be completed within particular constraints. Some of these, such as the budget and timeframe, are inherent in the project and easy to identify from the outset. Others become important because of changes or events that occur during the project, such as the introduction of a new software standard that requires a different approach or new skill to be learned. All constraints impact on a design in some way, and instructional designers need to continually assess constraints throughout a project and work with other team members to address them.

### **Identify Underlying Instructional Design Principles and Goals**

The underlying instructional design principles and goals should be identified in the early stages of a project. Significant deliberation and discussion is needed to ensure that all team members develop a sound understanding of these principles and goals. The agreed principles and goals can then guide specific design decisions, and help the team to maintain consistency across the project. This is particularly effective when projects are large, and when individuals or sub-teams take responsibility for parts of the project.

### **Be Open to Adaptation of the Design**

Instructional designers need to be receptive to adaptations in the design. This is important at the beginning of a project when the scope and nature of the design is being negotiated. At this stage adaptations come from the multiple perspectives of the team members and from mock-ups to test new ideas. Trying to restrict the design at this stage may mean that innova-

tive ideas are discarded. Adaptations are often necessary partway through a project—perhaps as a constraint becomes apparent, or when a particular design idea cannot be achieved or is rejected during formative evaluation.

### **Establish and Manage Open Communication**

Open communication among team members that is respectful of others' perspectives is essential to projects that are developed by diverse teams. This can be achieved when the contribution of ideas is valued and when all members feel able to provide input. This may be established by bringing all members of the team together at various times, and using strategies to maintain communication between meetings when sub-teams may be working on a particular aspect of the project. Continuous communication with the client, who may not have prior experience in working on a similar project, can help to manage their expectations and inform them about the process.

### **Use Documentation as a Communication Strategy**

Various types of documentation can be part of an effective communication strategy for design teams. The most obvious form of documentation is the formal project document that is submitted for review and becomes a milestone for sign-off. These documents represent agreements about the project and usually detail the scope of the project and its key features. They can become reference points during discussions and debates about the design. Other forms of documentation that might be shared include mock-ups of graphic design options, key points from meetings, and e-mail communications. Documents can be easily shared between team members and provide a means to record decision-making amongst the group.

## **Conclusion**

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The case has described some of the experiences of four members of the instructional design team on the *Exploring the Nardoo* project. This project is of interest because it involved a number of designers working together within a larger team that included subject matter experts and production specialists. Further, the project was a vehicle for innovation in the design of interactive multimedia for science education. Innovation on the project was supported by the nature of the team, in particular the multi-skilled instructional designers, and by the flexible and iterative process that combined design and development throughout. This case highlights the role of effective communication strategies and reference to underlying design principles as part of that process.

When viewed in terms of the communities of practice concept, it is possible to see that this project, and others like it, create a community of practice and also interact with other communities of practice. In terms of the project itself, the participants were engaged in a joint enterprise that over time developed particular ways of communicating and collaborating, shared understandings of the problem, and common resources and practices. Participants were also members of other communities and these influenced their goals and perspectives. Participants brought with them some of the culture of the communities they identified with,

such as being a member of an educational technology research community, or as a classroom teacher. It is also evident that the design practices developed as part of this project were fed back into the communities through presentations and publications.

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## References

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- Barab, S., & Duffy, T. (2000). From practice fields to communities of practice. In D.H. Jonassen & S.M. Land (Eds.), *Theoretical foundations of learning environments* (pp. 25-55). Mahwah, NJ: Lawrence Erlbaum Associates.
- Barab, S., MaKinster, J.G., Moore, J.A., Cunningham, D.J., & the ILF Design Team. (2001). Designing and building an on-line community: The struggle to support sociability in the inquiry learning forum. *Educational Technology Research and Development*, 49(4), 71-96.
- Conceição, S., Sherry, L., & Gibson, D. (2004). Using developmental research to design, develop and evaluate an urban education portal. *Journal of Interactive Learning Research*, 15(3), 271-286.
- Cox, S., & Osguthorpe, R. (2003). Building an online instructional design community: Origin, development and the future. *Educational Technology*, 18(5), 44-48.
- Ertmer, P., & Quinn, J. (Eds.). (2003). *The ID casebook: Case studies in instructional design*. Englewood Cliffs, NJ: Merrill/Prentice-Hall.
- Herrington, A., Herrington, J., & Kervin, L. (2005). The BEST site on the Internet: An on-line resource of beginning and establishing successful teachers. In P. Kommers & G. Richards (Eds.), *Proceedings of EDMEDIA 2005 World Conference on Educational Multimedia, Hypermedia and Telecommunications* (pp. 2646-2651). Norfolk, VA: Association for the Advancement of Computing in Education.
- Keppell, M. (2000). Principles at the heart of an instructional designer-subject matter expert interaction. In R. Sims, M. O'Reilly, & S. Sawkins (Eds.), *Proceedings of the 17<sup>th</sup> ASCI-LITE Conference* (pp. 317-326). Lismore, NSW: Southern Cross University Press.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Perez, R., & Emery, C. (1995). Designer thinking: How novices and experts think about instructional design. *Performance Improvement Quarterly*, 8(3), 80-95.

- Perez, R., Johnson, J., & Emery, C. (1995). Instructional design expertise: A cognitive model of design. *Instructional Science*, 23, 321-349.
- Reigeluth, C. (Ed.). (1999). *Instructional theories and models*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Snyder, W., Wenger, E., & de Sousa Briggs, X. (2004). Communities of practice in government: Leveraging knowledge for performance. *The Public Manager*, 32(4), 17-21.
- Visscher-Voerman, I., Gustafson, K., & Plomp, T. (1999). Educational design and development: An overview of paradigms. In J. van den Akker, R. Branch, K. Gustafson, N. Nieveen, & T. Plomp (Eds.), *Design approaches and tools in education and training* (pp. 15-28). Dordrecht, Netherlands: Kluwer Academic Publishers.
- Wenger, E. (2004, January). Knowledge management is a donut: Shaping your knowledge strategy with communities of practice. *Ivey Business Journal*, pp. 1-8.
- Wenger, E., & Snyder, W. (2000, January/February). Communities of practice: The organizational frontier. *Harvard Business Review*, 139-145.