Grounded Design for a Learning Environment for Graduate Student Researchers

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Abstract: Using grounded design this paper describes an online learning environment for graduate students in education called GRAIL (Graduate Researchers Academic Identity onLine). The overall goal of this project is to develop a set of social and technical tools that support the formation of an online community to engage students throughout their program in activities related to educational research across course boundaries. Grounded design is used to explore the psychological, pedagogical, technological, cultural, and pragmatic implications on a learning environment within the theoretical framework proposed by Communities of Practice (Lave & Wenger, 1991; Wenger, 1998). The design elements of the GRAIL learning environment currently under investigation are described. The presentation will detail key issues relating to design and learning that emerged during this first year of the project.

Introduction

In this paper we describe the design of an online environment called GRAIL (Graduate Researchers Academic Identity onLine) that supports research apprenticeship for graduate students in education. Graduate students in education are a diverse group with unequal access to full-time campus-based study. In this respect they can be considered to face constraints on engagement similar to those of students studying at a distance. They face challenges in establishing and maintaining engagement in the ongoing academic activities that provide them with the opportunity to gain the explicit and tacit knowledge that supports participation in the scholarly practices of their field of study. The overall goal of this project is to develop a set of social and technical tools to support the formation of an online community that is sustained across the duration of a student’s program of study. Using this model we are developing a technology-based research environment that implements these principles and captures research data to inform an iterative design process (Bereiter, 2002; Collins, 1992, in press).

Land and Hannafin (2000) propose grounded design as a framework within which to develop learning environments by bringing to the fore the theoretical, psychological, pedagogical, technological, cultural, and pragmatic assumptions under which the environment will be implemented and used. Grounding the designed aspects of a learning environment within a consistent theoretical approach supports further research and evaluation of the environment, with the possibility of creating generalized designs that can be used for other purposes. Land and Hannafin describe grounded design as the “deliberate alignment of core foundations and assumptions, and the linking of methods and approaches in ways that are consistent with their corresponding epistemological perspectives” (p. 3). They elaborate five foundations (psychological, pedagogical, technological, cultural, and pragmatic) upon which to base the design of learning environments. These five core foundations are aligned within theoretical and epistemological assumptions. Using grounded design we explore the implications on the design of the GRAIL environment when graduate study is considered to be an apprenticeship within a community of research practice (Lave & Wenger, 1991, Wenger, 1998).

Background and Theoretical Assumptions

The everyday practice of educational researchers is primarily situated in an academic setting. However, there is not necessarily either a direct or singular path from graduate school to academe for many graduate students. They frequently have long histories of work experience outside the academy and many either remain in or will be returning to those work settings upon graduation (Neumann, Pallas & Peterson, 1999). Further, graduate students have a range of goals for pursuing advanced degrees including professional advancement, personal growth and interest or a desire to enter academia as a teacher and researcher (McCormack, 2004; Pearson, 1999). These
differing goals and experiences affect motivation and interest in research leading to contrasting viewpoints about the values associated with research practice (Lee, Green & Brennan, 2000; Pallas, 2001).

Educational research is a complex intellectual pursuit. Donald (2002) suggests that where a discipline is characterized by discrete lines of research with accepted methods of inquiry, education can be considered to be a field that is informed by many, often contrasting disciplines. Learning the practice of educational research is therefore challenging as it is a diffuse and contested terrain (Scott, 1992; Shulman, 1999).

Graduate education, particularly at the doctoral level, is traditionally characterized as an apprenticeship in which students are learning the practice of research by working for and with faculty supervisors and other students. Lave and Wenger (1991) provide an analysis of learning in the context of apprenticeship that suggests that progressive learning occurs through various apprenticeship arrangements as a result of legitimate peripheral participation, and not simply through observation and reproduction. Legitimate peripheral participation, they assert, describes socially constructed learning in which newcomers participate in increasingly meaningful ways in the work of a community of practice along with more experienced and knowledgeable members. Learning occurs over time, through participation and contribution to the real tasks of a practice. The community, they assert, does not “imply necessarily co-presence, a well-defined, identifiable group, or socially visible boundaries. It does imply participation in an activity system about which participants share understandings concerning what they are doing and what that means in their lives and for their communities” (Lave & Wenger, 1991, p. 98). Lave and Wenger’s Communities of Practice model provides a theoretical starting point for conceptualizing a sustainable learning environment for graduate students because it provides a way to consider learning research as participation through the notion of legitimate peripheral participation.

Foundations

With these assumptions in mind we can now consider the supports necessary for graduate students learning to be researchers from psychological, pedagogical, technological, cultural and pragmatic perspectives. These foundations provide a coherent link between the theoretical assumptions described above and the design decisions that ultimately guide the implementation and evaluation of the learning environment (Hannafin & Land, 1997; Land & Hannafin, 2000).

Psychological Foundations

The psychological foundations of a learning environment specify the underlying beliefs about how learning occurs in individuals. In an online environment built upon the theoretical foundations of Communities of Practice, learning is not considered to be separate from doing. Learning occurs through participation in the practice of the community. An important aspect of practice is its inherently social nature. Knowledge results from the meaningful use of and creation of the artefacts and language of the practice (Lave & Wenger, 1991). Research practice involves both technical skill and disciplinary understanding. The meanings of the tasks associated with research are derived through participation in the design, implementation and interpretation of research projects. The skills involved in data collection and analysis are learned through a combination of coursework and application. Academic forms of communication, writing for publication and conference presentations are the public form of disciplinary participation (Florence & Yore, 2004; Shulman, 1999).

Access to research practice for graduate students necessarily requires being able to participate in real research projects along with others at various levels of expertise. This requirement puts part-time and distance students at a disadvantage when research activities are centred on campus. The implications of these psychological foundations on the design of the learning environment include: (1) ensuring that there are ongoing opportunities to become involved in research even for newcomers throughout their program, (2) providing opportunities to engage with the artefacts of research, including conference and publication efforts, data analysis and collection activities, and (3) an environment that supports discourse to bridge these activities.

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We are using this term following Hannafin and Land, 1997.
Pedagogical Foundations

Land and Hannafin (2000) describe pedagogical foundations as the “affordances and activities of the environment [which] should be inextricably linked to corresponding psychological foundations” (p. 3). Turning to the theory of learning within the traditional relations of master and apprentice, Lave and Wenger (1991) suggest that the curriculum arises out of practice and that “mastery resides not in the master but in the organization of the community of practice of which the master is a part” (p. 94). Faculty members therefore have a necessarily central role in making the practice of research transparent and accessible to graduate students.

Research regarding graduate student success supports both the central and active role of the faculty member and the direct contact for students within ongoing research projects (Anderson, 1996; de Valero, 2001; Florence & Yore, 2004). However, there is also evidence to suggest that participation with more experienced peers or other researchers is important as well (Lovitts, 2001). Therefore a key element of the learning environment is the support of meaningful participation in ongoing activities related to an active research agenda with others at different skill levels including faculty. This can be done by linking research projects with research courses to make coursework authentic and part of practice, involving students in data collection and analysis activities, creating opportunities for students to present, critique and receive feedback on their work, and supporting experiences in academic writing (such co-writing reviews for conference and journal articles with faculty members).

Learning through practice requires ongoing engagement in the meaningful activities of a community and, therefore, participation beyond the life of a particular course is seen as an essential component of the pedagogical foundation of the learning environment. Motivation comes from a sense of belonging and a belief on the part of the students that their contributions are valuable to the community (Lave & Wenger, 1991). The learning environment therefore must be designed to foster ongoing and authentic collaboration among its members with support to participate in various roles across tasks.

Cultural Foundations

Hannafin and Land (1997) suggest that “[c]ultural foundations reflect prevailing beliefs about education, the values of a culture, and the roles of individuals in society” (p. 176). For graduate students, the values associated with research play an important role in the various communities within which they participate. Practicing educators engaged in graduate studies may have less experience with the nuances of academic culture and research than full time, on-campus graduate students. This experience differential continues as part-time or distance students are less able to participate legitimately in actual research activities. Also, research culture varies depending upon the setting, whether it is academic, school-based, or takes place in a business context. Research knowledge and skills may be similar, but practice will have subtle differences (Conrad, Duren & Howarth, 1998; Lee, Green & Brennan, 2000). Thus students may arrive with different cultural experiences of academia and technology; they may experience their program with different, perhaps local, supports from available communities; and they may have different values associated with the research they will practice upon graduation.

In considering the design of an online learning environment, these differences will be reflected in the individual and community meanings associated with research. There must therefore be mechanisms by which students and faculty can negotiate shared meanings and values while being accepting of difference (Hodgson & Reynolds, 2005). This is achieved in part by ensuring that the community has a way of involving newcomers, of recognizing the value that they bring to practice, and incorporating these experiences into the history of the group (Barab & Duffy, 2000). Creating an environment that reflects the diversity of research experiences, context, and student goals can be achieved by providing a flexible structure, a persistent database of past projects and discussions and a social system that integrates newcomers with old timers.

Technological Foundations

The technological foundations “influence how media can support, constrain, or enhance the learning environment” (Land & Hannafin, 2000, p. 4). Technology plays an important role in this learning environment. Because the students are not all on campus full-time, they rely heavily on access to web-based technologies, primarily for communication during and outside of classes. A learning environment for graduate student researchers requires readily available access to tools that support timely communication, information sharing, and access to the ongoing practice of the community.
A mechanism for group discussion is required since information sharing and critical dialogue around the
design and implementation of research are key elements of functioning research groups (Caffarella & Barnett, 2000;
Florence & Yore, 2004). Professional discourse is a primary method by which scholarly knowledge is advanced
(Pallas, 2001; Shulman, 1999). Recent innovations in streaming audio and video are coming close to making this
possible. Such technologies also support a sense of social presence (Rourke, Garrison, Anderson & Archer, 1999),
important to students’ developing an identity within the research environment.
Web-based technologies can also serve to make the artefacts of research equally available regardless of
place. Sharing of key documents, transfer of audio files, and collaborative writing environments all serve to support
a transparent environment in which a virtual community of research practice can develop.
Finally, technologies that support new forms of public reflection and connection such as weblogs, social
networking software and wikis hold promise in providing students with access to the wider community of research
practice that lies beyond the students or faculty within an academic department (Downes, 2004). Because education
is a diverse field, this potential to develop distributed networks researchers can create communities of practice that
bring together people with similar interests that work and study in institutions around the world.

Pragmatic Foundations

Pragmatic foundations reflect the situational constraints faced by participants within a learning
environment. As much as possible, these foundations should be taken into consideration in the design of learning
environments so as not to limit access or effectiveness. Hannafin and Land (1997) suggest that pragmatic
foundations “emphasize the practical reasons a particular approach can or cannot be used in a given learning
environment” (p. 177).
There are several pragmatic considerations the design of an online learning environment for graduate
research students. The most pronounced difference among the students is that of place. Full-time students who are
not working off campus are engaged in research practice, face-to-face on a regular basis. Also of importance are the
diverse expectations and goals students have for their graduate studies. This diversity affects the amount of time
they have to spend on their studies, their interests in research, and the meanings they associate with scholarly and
professional practice. These differences are apparent within degree programs (i.e., masters and doctoral students are
not cohesive groups) and can also be exaggerated when masters and doctoral students attempt to form one
community.
Internet connectivity must be considered as a pragmatic concern. While this is becoming less of an issue
with time access to broadband Internet cannot yet be assumed. The challenge is to create an environment that does
not disadvantage those students that cannot participate fully, and also creates a rich, authentic and engaging
community for everyone.

Implications for the GRAIL Learning Environment

The psychological, pedagogical, cultural, technological and pragmatic foundations suggest that the design
elements of the GRAIL environment described in Table 1 be selected and implemented based on the coherent
assumptions and foundations derived from the theoretical foundations of Communities of Practice (Lave & Wenger,
1991; Wenger, 1998). The environment should support meaningful participation with others at various levels of
experience with educational research. Engaging in authentic research projects is important for all participants and
should be flexibly based on their experiences and interests. The social and technical tools should support the
negotiation of diverse values and beliefs with respect to the practice of educational research.
The GRAIL environment itself is being built within an open source content management system called
PLONE (http://plone.org/). As much as possible all elements used for the GRAIL environment will be integrated
into a single, cohesive web-based location. Design elements are being selected to maximize flexible student
engagement in authentic research practice. Social and technical tools being actively researched and integrated are
described in Table 1.
<table>
<thead>
<tr>
<th>Design Element</th>
<th>Description</th>
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<tbody>
<tr>
<td>Weblogs &amp; Wikis</td>
<td>Weblogs provide a writing environment that is both personal and public. The software is designed to facilitate diary keeping. Others can read and comment on the reflections. RSS (Rich Site Syndication) provides an automated method for tracking summaries of the blog entries so that users can make connections based on interests, insights and experiences without going to many websites each day to find out if there are changes. Wikis provide a simple collaborative writing environment that can be modified to suit a variety of writing activities such as journal and conference paper development and reviews. As well, a shared web-based reference manager called RefWorks is being integrated so that bibliographies can be collaboratively built and maintained.</td>
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<tr>
<td>Audio/Video Streaming</td>
<td>As web-based audio and video streaming becomes more affordable and available, this environment can be integrated into the regular practices of all students, whether on or off campus. Macromedia Breeze is currently being used to host and archive bi-weekly research group meetings with the full group as well as ad hoc, as required meetings among smaller working groups. These meetings are available in an archive for those who miss the meetings.</td>
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<tr>
<td>Web Knowledge Forum</td>
<td>An asynchronous conferencing environment with a variety of cognitive and social supports is available to all students in the research group.</td>
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<td>Research Tools</td>
<td>A fundamental project research goal is to better understand the trajectories over time of relationships between the individual and institutional /academic community as well as the local communities of which the individuals are a part. Such monitoring requires ubiquitous tracking of use and the development of multiple feedback mechanisms</td>
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Table 1: Design Elements of the GRAIL Learning Environment

The GRAIL project is now completing its first year, with ongoing research projects investigating the implications of these design elements on graduate student research practice. The presentation will detail key issues relating to technology and design and effects upon learning and participation that have emerged during this time.

Acknowledgements

This research is supported by a grant from the Social Sciences and Humanities Research Council of Canada and by a Canadian Foundation for Innovation New Opportunities Fund Award.

References