

MULTIPLE PERSPECTIVE AND THEORETICAL DIALOGUE IN LEARNING TECHNOLOGY

Martin Oliver

Higher Education Research and Development Unit
University College London, UNITED KINGDOM
martin.oliver@ucl.ac.uk

Grainne Conole

Research and Graduate School of Education
University of Southampton, UNITED KINGDOM
g.c.conole@soton.ac.uk

John Cook and Andrew Ravenscroft

Learning Technology Research Institute
London Metropolitan University, UNITED KINGDOM
j.cook@unl.ac.uk; a.ravenscroft@unl.ac.uk

Sarah Currier

Department of Computer and Information Science
University of Strathclyde, SCOTLAND
sarah.currier@strath.ac.uk

Abstract

This panel will attempt to define the current status of 'learning technology' as a new and emergent area of research. This will include mapping learning technology research to its feeder cognate disciplines as well as distilling out some of the multiple perspectives and theoretical dialogues that help classify the area. The outcome will be a better understanding of the field and the richness of the various 'schools of thought' and the tensions and strengths that each bring to the area. The paper presents a series of short positional papers to reflect the different perspectives. The conference presentation will include overviews from each of the different positions, followed by a plenary to discuss these multiple voices and their role within the area.

Keywords

Learning technology research, theoretical perspectives

Introduction

Learning technology is a relatively young area of study, which is beginning to emergent as a separate research area. It is by its nature multidisciplinary and stakeholders include a range of researchers from different fields (educational research, literary criticism, semantic and ontological research areas, cognitive psychology, instructional design, computer science, etc) as well as subject-experts. This is a common feature of new emergent research areas and, in one sense, is strength. However, if we are to capitalise on this richness of expertise, it will be necessary to work towards a clearer understanding of the nature of the area, along with a mapping of the feedback cognate disciplines. This in turn should lead to a better theoretical underpinning that will allow these diverse cultures to engage with and develop the use of learning technology. In a previous paper on aspects of this issue we argued the following:

An important starting point for any discussion of this type is the realisation that learning technology use is shaped by contextual factors. Beetham argues, for example, that "Learning technologists have always started from the 'practical concerns of the classroom' and we tend to

claim validity for our activities according to their impact in the classroom,” and goes on to contend that within this area, ‘the majority of researchers are concerned to find relationships among the inputs to and outcomes of a learning process which is very poorly theorised, and that this has serious consequences for the future of learning technology research and practice’ (Helen Beetham, 2000). Similarly, Oliver concludes that ‘an appropriation model of theory use implies that purpose will be determined (at least in part) by situationally specific issues such as the personal background and current needs of its user’ (Martin Oliver, 2000), (Conole & Oliver, 2002)

This raises a number of key questions:

- If the use of theory in learning technology is strongly shaped by the context of its use, however, how can academics that are new to this area be supported as they begin to engage with the topic?
- What are the key feeder cognate disciplines and how do they contribute to the field of learning technology research?
- Different disciplines use different ontologies and epistemologies, is it possible to develop a shared meta-language to enable understanding across the different schools of thought?
- Is it possible to develop a clearer definition of the field and hence provide support and guidance for researchers and practitioners in the field?

The panel will explore these issues by inviting researchers in the field to submit positional papers laying claim to the following:

- their area of expertise,
- their understanding of the area,
- an explicit acknowledgement of which cognate disciplines, key texts, influences and important theoretical stances are important for them as researchers in this area.

This will help to clarify the different influences and perspectives on the area. The panel will use these positional papers to attempt to map the domain to the feeder cognate disciplines and will begin to articulate out key strengths and weaknesses and inter-relationships between the different schools of thought.

Background

This panel builds on a number of research discussions and interest groups, which have emerged in the UK in the past 18 months. The first is the Association of Learning Technologies Sig. Group on Learning Technology Theory, which meets face-to-face three times a year and is supplemented by an online mailing list. The group has been trying to articulate the theoretical underpinnings of learning technology as a research area. The second is a special issue of the Journal of Interactive Media in Education (www.jime.ac.uk) which includes positional papers and different perspectives on learning technology. The third was a Blue Skies Research Colloquium held at Sudeley Castle in the Cotswolds in April 2002, which considered the pluralistic nature of this new area of research and began to map out some of the different voices and perspectives. The group plan to build on this colloquium by articulating out the relationship between these voices through a process of dialogic interaction to highlight the multiple perspectives. The panel will provide an opportunity to build on these previous discussions and initiate an international debate on this area.

Positional paper 1: The role of dialogue in computer-based learning: A position paper on approaches to theory

John Cook and Andrew Ravenscroft

In two recent papers (Cook, 2002; Ravenscroft, 2001) the authors have examined the role of dialogue in computer-based learning. The interdisciplinary consensus that seems to be emerging is that in order to improve our understanding of learning in the context of the use of new media in education, we need to link theory and models to the analysis of teaching and learning. Furthermore, it appears that certain types of learning may not occur unless dialogue takes place between a tutor and learner(s) (Pilkington &

Parker-Jones, 1996). Interaction has an adaptive mediating role, helping students to recognise and resolve inconsistency. Explaining one's problem-solving strategy or overhearing the dialogues of others may have a positive impact on learning (Chi, Bassok, Lewis, Reimann, & Glaser, 1989). Furthermore, dialogue may take various forms: disputational, cumulative, and exploratory; however, exploratory dialogue may be more likely to lead to in-depth learning (Mercer, 2000). Indeed, Cook (Cook, 2002) has made the tentative claim that the reason 'why' some exploratory dialogues may promote cooperative learning is because one of the participants has been prepared to take on the role of a tutor who asks open questions; i.e. the type of questions that are asked is important.

In his paper Cook presents an evolutionary approach to analysing the role of theory/models, empirical work and technology in learning. Specifically, the purpose of this evolutionary approach is the mapping out of not a specific theory, but a mapping out of how different researchers are working towards the creation of theories. The point being that in the evolutionary approach there is a requirement to be transparent about the theory and models in use. This requirement, in itself, may not communicate well from one discipline to another, as words have different meanings in different disciplines; indeed, words have different meanings within a discipline. The only solution to this problem is, in our view, careful and continuing dialogue between all stakeholders. The evolutionary approach contains the following three components:

1. **Theories/models of learning, teaching and interaction.** A theory or model can be used as a means for understanding and predicting some aspect of an educational situation. Theories are not the same as models. A theory can possess an explanatory power and can consist of a set of general assumptions and laws ... that are not themselves intended to be directly (in)validated (for that, the theory must engender a model). Theories are foundational elements of paradigms, along with shared problems and methods (Kuhn, 1962) (Baker, 2000).

Thus, a theory of cooperative problem-solving should predict what forms of cooperation should exist, and ideally what interactive learning processes they trigger. A model of an educational process, with its attendant theory, can be used to form the basis for the design of a computer tool for education (Baker, 2000). What is meant by a 'theory' or 'model' can vary across the different disciplines. For example, they may manifest themselves as descriptive, explanatory, analytical, quantitative, symbolic, analogue, or other approaches.

2. **Empirical observations of learning.** This may involve a variety of research methods used to observe human-human interactions or human-computer-based learning environment interactions (some researchers may observe computer-computer dialogues). For example, the phenomenon predicted by a model of cooperative problem-solving may be tested by quasi-experimental method. On the other hand, other research approaches, e.g. grounded theory, may come in at this point from the perspective of immersion and experience of the educational interactions, deferring theorising until data is analysed (theorising may be deferred indefinitely in some cases).
3. **Interactive learning environment design and implementations.** This is the building of a computer-based educational artefact. An example of a model-based approach being linked to the artefact is provided by (Baker & Lund, 1997), who describe a model of task-oriented dialogue that forms the basis of design and implementation of tools for computer-mediated communication between learners and teachers in a computer-supported collaborative learning environment.

What is required of such an endeavour is that the specific nature of the relations between theory, model, corpus (i.e. transcriptions of interaction data), and design of learning environments be made as explicit as possible as legitimate objects of scientific discussion and as means of generalising findings towards re-design. In the panel presentation the first author will examine the utility of the above evolutionary approach by illustrating it with examples from both of the authors' research.

Positional Paper 2: Embedding theory into learning technology practice with toolkits

Grainne Conole and Martin Oliver

Learning technology is inherently multidisciplinary and stakeholders include a range of researchers from different fields (educational research, cognitive psychology, instructional design, computer science, etc), as well as teaching subject-experts who engage with it as 'end users' or 'consumers'. This multidisciplinary nature is a common feature of new emergent research areas and, in one sense, is a strength. However, if we are to capitalise on this richness of expertise, it will be necessary to work towards a clear theoretical underpinning that will allow these diverse cultures to engage with and develop the use of learning technology.

An important starting point for any discussion of this type is the realisation that learning technology use is shaped by contextual factors. Beetham argues, for example, that "Learning technologists have always started from the 'practical concerns of the classroom' and we tend to claim validity for our activities according to their impact in the classroom," and goes on to contend that within this area, 'the majority of researchers are concerned to find relationships among the inputs to and outcomes of a learning process which is very poorly theorised, and that this has serious consequences for the future of learning technology research and practice' (H. Beetham, Conole, Oliver, Ingraham, & Boyle, 2001). Similarly, Oliver concludes that 'an appropriation model of theory use implies that purpose will be determined (at least in part) by situationally specific issues such as the personal background and current needs of its user' (Martin Oliver, 2000).

However, if the use of theory in learning technology is strongly shaped by context how can academics that are new to this area be supported as they begin to engage with the topic? Is it possible to provide general support and guidance whilst remaining sensitive to the situational influences described above? This paper will explore these issues through one pragmatic approach to applying theory to practice: the development of 'toolkits' to support decision making that are derived from a specific theoretical perspective. The paper will begin with a definition of the term toolkit, along with related concepts (frameworks, wizards and models). Three toolkits will then be described, specifying the theoretical perspective that they draw upon, the methodology behind their development and use, and extracts from evaluation studies of their use with practitioners.

Resources for supporting decision-making

A range of aids and resources to facilitate decision-making processes has developed to support the use and integration of learning technologies. As a consequence, the terms 'tools', 'toolkits', 'frameworks', 'good practice' and 'model' abound, but are very rarely used with any consistency. Indeed, there is considerable confusion and overlap within the literature on the precise nature of these types of resources. Therefore, this section attempts to provide some definitions for these terms, along with illustrative examples of the different types of decision-making resource.

Aids to decision-making range from highly restrictive 'templates' or 'wizards', which provide high levels of support and step-by-step guidance but little possibility of user-adaptation, through to 'theoretical frameworks', which provide a context and scope for the work but leave the user to devise their own strategy for implementation.

A number of pedagogical frameworks have been developed to support learning technology. All develop from a particular theoretical viewpoint (whether explicitly or implicitly), aiming to encourage the application of good practice according to a specific pedagogical approach. In this context, 'good practice' is taken to mean practice that is informed by and which exemplifies (or contributes to) theory. For example, Conole and Oliver have developed a framework for integrating learning technologies that builds on Laurillard's conversational framework (Conole & Oliver, 1998). This provides a structured approach to integrating learning materials into courses. The framework is designed to support the process of 're-engineering' a course (Nikolova & Collis, 1998). It provides a framework in which various features of an existing course can be described and evaluated, allowing an analysis of strengths and weaknesses, the suitability of different media types (in particular the different educational interactions they support) and limiting factors, including resource issues and local constraints. The framework can be applied as a series of stages, starting with the review of existing provision, working through a process of shortlisting and selection of alternative teaching techniques, and concluding with a mapping of the new course.

By way of a contrast to theoretical frameworks, another approach to supporting the use of learning technology involves the use of highly structured decision-making systems: templates and wizards.

Generic templates are found in most software packages. They can provide structured, pre-defined layouts or structures for the user to base their document or presentation on. A wizard is a software tool that makes decisions on behalf of the user, based on solicited information and drawing on pre-defined templates. In most cases, the way in which these outputs are generated is hidden from the user. As a result, wizards and templates are relatively easy to use, but are restrictive in the range of outputs that can be achieved, and allow very little engagement with issues or response to the values and assumptions built into the system. There are many examples of templates and wizards that provide a generic structure that guides users through a set of options. Online shopping sites, book stores and travel centres often have 'wizards' which guide the user through a series of options or interests, helping them to focus in on topics of particular interest. It is evident that these types of semi-structured forms of support and guidance are becoming increasingly important as a way of guiding users through the plethora of information available online.

These two types of resource both share a common aim of supporting a users' engagement with an area. Clearly, however, they are working at very different levels and making different assumptions about the type of support that the user might need. Theoretical frameworks provide a structure and vocabulary that support the exploration of concepts and issues. Wizards provide automated processes that support the production or selection of resources, and are predicated on the assumption that the user is primarily concerned with efficiency rather than critical engagement. Fundamental concerns (for example, about the suitability of using a particular type of resource) are either ignored or assumed by the wizards.

These two positions can be characterised as extremes of one continuum. At one extreme there are frameworks, which are flexible and versatile, but which offer relatively little support for practitioners attempting to engage with them. At the other there are wizards and templates, which are highly restrictive, but (by virtue of the constraints that they impose) are able to offer much closer support and guidance to users.

Between these extremes lie a range of resources, including checklists, guidelines and step-by-step tutorials. Toolkits can be viewed as a mid-point on this continuum: they are decision-making systems based on expert models (Conole & Oliver, 2002). (In this context, a model is taken to be a simplified account of reality that can be used to explain or predict certain features. In toolkits, models tend to be of design processes.) Toolkits are more structured than frameworks; they use a model of a design or decision-making process, together with tools provided at key decision-making points, to help the user engage with a theoretical framework and apply it in the context of their own practice. Each of the tools that is drawn upon as the user works through the process model is designed to help the user to access a knowledge base in order to make informed decisions. The format of toolkits means that they can be used in a standard, linear fashion, or can be "dipped into" by users whose level of expertise is stronger in some areas of the design process than others.

In summary, toolkits represent a mid-point between facilitated, uncritical development of resources and a deep engagement with fundamental issues and theories. They are not intended to replace expertise, although they are intended to reduce the *need* for prior expertise before practitioners are able to engage with fundamental issues in a meaningful way. As such, they can be viewed as a stepping-stone between uncritical and autonomously critical engagement with an area. In the panel presentation the first author will discuss the role of toolkits and how they can be used to articulate underpinning theory and translate it into practice.

Position Paper 3: Coming Out of the Library Closet: Information Science and Learning Technology

Sarah Currier

The contribution of library & information science (LIS) to education has long been taken for granted within academia, largely because we've been doing our job right. We have developed our theories and methodologies away from the end users' eyes, and have produced, for them, the well-organised catalogue, the index to periodicals, the system for efficient interlibrary loan. As with other contributors to the ALT-C 2000 panel 'Is There a Theoretical Basis for Learning Technology?', we have an emphasis on practice:

“Learning technologists have always started from the ‘practical concerns of the classroom’ and we tend to claim validity for our activities according to their impact in the classroom.” (H. Beetham et al., 2001)

Similarly, as practitioners, we claim validity for our activities according to their usefulness to the library user (student or staff), whether the library is physical, digital or hybrid. Theories related to teaching and learning do not play a large role in LIS. We have assumed that learners need access to information resources, and that it is the job of teachers to decide how best to arrange the resources for the actual teaching and learning. The term “resource-based learning” is the one most often heard in LIS, where teaching and learning is being considered. We have set about making sure that the appropriate resources are as easy as possible to access. We have also tried to educate our users to find and evaluate information using the tools we provide; what is now called information literacy.

LIS Research

“An essential type of library science research is applied research, in which the library is the laboratory.” Library Philosophy & Practice e-journal website. <http://www.uidaho.edu/~mbolin/lp&p.htm>

This applied research is increasingly taking place in the digital library, where the boundaries of that laboratory no longer mark it off clearly from the classroom.

LIS research per se tends to be about information seeking behaviour, and how information may best be evaluated, selected, organised and presented for resource discovery, by humans or machines. Human-computer interaction and cognitive styles in information seeking are of great interest. Information literacy, as opposed to IT literacy, is another area of recent interest, where there is also a large crossover with the teaching and learning world. And, as a constant undercurrent, the LIS profession, particularly in public and academic libraries, has always been about cooperation, and sharing of resources. As such, we have developed whole bodies of professional literature and practice around facilitating these.

LIS has become one of the key professions in the learning technology research field. Close collaboration with teachers, educational developers and IT specialists has become increasingly prevalent in the development of online learning resources. However, our voice is rarely heard in such learning technology fora as ALT and ASCILITE. As a service-based profession, we try to listen to our users, but sometimes have difficulty making ourselves heard outside of our own discipline. While we are beginning to learn the language of pedagogy, we sometimes see the usefulness of potentially wonderful developments being compromised by issues around organisation of information, where practices that we find second nature would have helped enormously. We also see commercial products developed without our resources and services in mind, as referred to by MacColl (MacColl, 1999):

“In general, the systems currently supplied by third party vendors do not seem to us to be sufficiently aware of the resource dimension to learning. Functionally, many are strong in the areas of communication, between lecturers and individual students, between lecturers and entire classes, or between students themselves. Course management is well-handled in respect of provision for pages of content, test creation and automatic assessment. But any link to the library system seems to be missing.”

With the advent of LIS/elearning collaborative developments such as the JISC Teaching & Learning Programme, the INSPIRAL study which produced 4 case studies of good practice involving library / VLE integration, the SHEFC funded SeSDL (Scottish electronic Staff Development Library) Project which brought in an LIS consultant, and indeed, this Workshop, it is clear that things are changing.

LIS Theory

Theory within LIS is an emerging area of importance. Historically there has been little formal theory to agree or disagree on (McGrath, 2002). The peer-reviewed journal “Library Philosophy and Practice”, which explores the connection between library practice and the philosophy and theory behind it, has been in existence only since 1998. Researchers do, however, make extensive reference to theory. Others found that, in 1,160 articles, in six LIS journals, 396 “incorporated theory in either the title, abstract or text” (McKechnie & Pettigrew, 2002) (p. 66). This reference itself comes from an issue of “Library Trends” devoted to theory in LIS research, which was published Winter 2002. It would be interesting to explore

the extent to which this recent interest arises from above-noted increasing integration with disciplines where theory is of greater importance.

LIS and elearning developments: Why are we needed?

When LIS professionals do get involved in elearning developments, our contribution is often valued by teachers and others. However, from an LIS point of view, there are some disturbing developments afoot in the elearning field. A good illustration of this may be found in the area of metadata research. LIS professionals understand just how complex the whole business of adding metadata to resources is, based on many years of experience in developing the principles and practice of cataloguing and classification. There is a growing trend for developers producing digital repositories for sharing elearning materials expecting the depositor, regardless of training or background, to add the metadata. In one such instance, an academic who was required to do this task as part of an evaluation commented: "The whole exercise has given me more admiration and respect for librarians." (Currier, 2001). This somewhat back-handed compliment notwithstanding, the effect on the searchability of digital repositories organised by metadata applied by "amateurs" is an area which I believe needs some research!

Just as librarians have not traditionally had to think in depth about pedagogy, teachers have never had to think about LIS elements of delivering education before. In the past, this would look something like this: Give a student a resource list. Send them to the library. The resources just happen to be listed in the catalogue, and found on the shelf, in the right place. They may have got there because the teacher requested the subject librarian to purchase them. But the long line of activities, and the theory supporting them, between the purchase request and the student taking the book out the door, are not within the teacher's mindset.

A more common scenario now: A teacher develops an online course. He puts an HTML page of the course resource list into the VLE. It's in author order. It includes hyperlinks to about 90% of the resources. By the second term three of these are broken, but one is one of the most important texts, so learners are getting frustrated already. The other 10%, the student has to find for themselves in the library. One of them is available, but through a subscription online periodical that requires a separate password, if the student can find the right place in the library website, after coming out of the VLE. The rest are only available in hard copy, some are reference only, and searching the library OPAC online requires another sign-on procedure. Finally, there are some reading materials delivered as content within the VLE. However, one of these was simply scanned and uploaded as a PDF file, without copyright clearance or an acknowledgement of the source publication, opening the university to a lovely lawsuit (an actual example of this may be found as a case study in: (MacColl, 2001). Alternatively, the teacher uses a resource list of only web-based materials, to circumvent most of these problems, but in doing so, several potentially useful texts are omitted.

Another teacher, slightly more experienced with developing online courses, has collected a list of links to web-based resources of direct relevance and interest to his students. He is unaware of (a) his institutional library's subject tree in his field, and (b) the nationally funded internet subject gateway in his field, both of which do a similar job, or could at least have assisted him. Or his students could've been introduced to them as part of teaching them information literacy in their discipline. Anyway, students are able to add links themselves and annotate them, which is cool. The problem is, eventually the list of links gets really long, and is three screen pages long, requiring a lot of scrolling. He added his initial list in order of importance as he saw it, and subsequent additions get added chronologically. Soon it is hard to find a link you know is there, because they are not organised in a meaningful way.

It is early days for learning technologies and their application to the real world of teaching and learning. The professional roles of those involved in delivering elearning are evolving rapidly. This can mean considerable frustration and anxiety for those of us interacting more closely across the old barriers between disciplines. Beginning to develop a common language and a common theoretical framework (or at least, a mapping of languages and theories!) is perhaps one way to ensure that valuable knowledge and experience is not lost. Including LIS in this work is vital, in order to ensure that this important area is not reinvented, badly, for the digital generation. It is also incumbent on the LIS profession to continue developing our own theories so that we may contribute meaningfully to this process.

Conclusion - Why theory?

The three positional papers give very different perspectives on the area of learning technology research and it is evident that they are based on very different underpinning theories and are targeted at different aims and objectives. The panel will attempt to uncover the various theories which underlie the area of learning technology research and will attempt to develop the analysis using a reflexive critique. The purpose of this is to identify observations that may provide an insight into the ways in which theory is, or can be, used by members of the learning technology community. The intention of this is to develop a fuller appreciation of the impact of theory use, in practice and in terms of its possible social impact.

What is it that motivates the use of theory in research of this type? One reason is that it is claimed that theories provide a way of endowing an otherwise descriptive account of phenomena with meaning (M. Oliver & Aczel, 2002). They are a means of sense-making, a way of interpreting. Whilst this may be true, however, it is not a particularly full account of the motives or methods for using theory in this context. The remainder of this commentary will attempt to unpick these issues in greater detail. In the following sections, specific aspects of theory use will be considered, covering the way in which the choice of theories was made, how they are used and how they are judged. This commentary will conclude by attempting to re-visit this initial question "why theory?" in greater detail, and by using this to consider ways in which work in learning technology might develop in the future.

One notable feature in learning technology research is that use of theory is relatively eclectic, drawing from psychology, computer science and cognitive science. It might be assumed that this is because these disciplines are closely related to learning technology. Indeed, they are but so are disciplines such as sociology, business and education, to name but a few. It behoves us, then, to ask why these particular fields are represented whilst others are not. To some extent, the choices reflect different authors' bias. Another influence is the fact that much of the research come out of funded initiatives from national and international funding bodies and inevitably this will influence and direct the research towards the particular funding whims and agendas. This alone provides a fairly convincing rationale for the inclusion of certain theories and the exclusion of others within the paper. Importantly, these reflections have implications for the use of theory in learning technology research.

Inevitably, the theories that researchers feel comfortable using will reflect their career paths. The obvious implication of this is that only those theories with which researchers are familiar will be adopted. Thus the choice of theories (and also of research cited) in papers such as this may provide an insight into the habitus of the researchers, thus giving an insight into their context and beliefs. A corollary to this point about personal histories is that, if a good characterisation of the backgrounds of learning technology researchers could be drawn up, it may prove possible to map the range of theories likely to contribute to research in the area. Perhaps more importantly, it would also be possible to identify related disciplines that were not adequately represented; this would provide an opportunity for overlooked theories to be drawn upon, and for new forms of critical discussion to be engaged with.

Although the notion of habitus may provide insights, these must be constructed with caution, since the main paper clearly does not provide a complete and comprehensive story; theories outside of the fields of psychology (etc.) were clearly available as resources to authors (M. Oliver & Aczel, 2002). In an academic context, not all fields are equally privileged; Becher's categorisation of disciplines (1989) into hard or soft, pure or applied, includes the observation that 'hard, pure' fields of study tend to be privileged, whereas 'soft, applied' fields are sometimes criticised for being un-academic. Becher notes that such fields sometimes show a tendency for 'academic drift', which involves practitioners seeking to legitimise their work by changing its character to resemble a hard, pure discipline. To some extent, the choice of theories used within the paper, and more fundamentally, the very desire for theorising that this special issue represents, could be interpreted as an attempt to develop 'pure' aspects of learning technology. Certainly, the use of theories from the hard, pure quadrant of Becher's disciplinary map could be interpreted as being a way of trying to make the field seem more credible.

All these observations are symptomatic of the relative youth of learning technology as a field of study. That the theories used represent the varied career paths of the participants in this discourse, rather than a single dominant ideology, highlights the openness of the field (which could equally be interpreted as a

lack of coherence). Similarly, the perceived need for legitimisation, greater respect, or credibility could be read as a signal of its relative insecurity alongside other better established disciplines.

References

- Baker, M. J. (2000). The Roles of Models in Artificial Intelligence and Education Research: A Prospective View. *International Journal of Artificial Intelligence in Education*, 11, 122-143.
- Baker, M. J., & Lund, K., 175-193. (1997). Promoting Reflective Interactions in a CSCL Environment. *Journal of Computer Assisted Learning*, 13, 175-193.
- Beetham, H. (2000). On the significance of 'theory' in learning technology research and practice. *Positional Paper at the Learning Technology Theory Workshop, ALT-C 2000, Manchester.*
- Beetham, H., Conole, G., Oliver, M., Ingraham, B., & Boyle, T. (2001). *Learning theory panel*. Paper presented at the ALT-C, Edinburgh.
- Chi, M. T. H., Bassok, M., Lewis, M., Reimann, P., & Glaser, R., 145-182. (1989). Self-Explanation: How Students Study and Use Examples in Learning to Solve Problems. *Cognitive Science*, 13, 145-182.
- Conole, G., & Oliver, M. (1998). A pedagogical framework for embedding C and IT into the curriculum. *ALT-J*, 6(2), 4-16.
- Conole, G., & Oliver, M. (2002). Embedding theory in learning technology practice. *Journal of Interactive Media in Education* (Special issue on learning technology research).
- Cook, J. (2002). The Role of Dialogue in Computer-Based Learning and Observing Learning: An Evolutionary Approach to Theory. *Journal of Interactive Media in Education (e-journal)*.
- Currier, S. (2001). *SeSDL Taxonomy Evaluation Report*. Glasgow: University of Strathclyde.
- Kuhn, T. S. (1962). *The Structure of Scientific Revolutions* (Vol. 2). London: University of Chicago Press.
- MacColl, J. (1999). SELLIC: Learning Management and the Library. *Ariadne*, 19(March 1999).
- MacColl, J. (2001). *Virtuous Learning Environments: How to Make Library Systems and VLEs Interoperate*. PowerPoint Presentatio, from <http://www.sellic.ed.ac.uk/publicat/staffpub/inspiral.ppt>
- McGrath, W. (2002). Current Theory in Library and Information Science: Introduction. *Library Trends*, 50(3).
- McKechnie, L., & Pettigrew, K. (2002). Surveying the Use of Theory in Library and Information Science Research: A Disciplinary Perspective. *Library Trends*, 50(3).
- Mercer. (2000). *Words and minds how we use language to think together*. London: Routledge.
- Oliver, M. (2000). *What's the Purpose of Theory in Learning Technology?* Paper presented at the Positional Paper at the Learning Technology Theory Workshop, ALT-C 2000, Manchester.
- Oliver, M., & Aczel, J. (2002). Theoretical Models of the Role of Visualisation in Learning Formal Reasoning. *Journal of Interactive Media in Education*, 3.
- Pilkington, R., & Parker-Jones, C. (1996). Interacting with Computer-Based Simulation: The Role of Dialogue. *Computers and Education*, 27(1), 1-14.
- Ravenscroft, A. (2001). Designing e-learning interactions in 21C: Revisiting and re-thinking the role of theory. *European Journal of Education: Special edition on On-line Learning*, 36(2), 133-156.

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