



COVER SHEET

Hughes, Hilary and Bruce, Christine and Edwards, Sylvia (2006) Fostering a reflective approach to online information use for learning. In Orr, Debbie and Nouwens, Fons and Macpherson, Colin and Harreveld, R.E. (Bobby) and Danaher, Patrick Alan, Eds. *Proceedings 4th International Lifelong Learning Conference. Lifelong learning: Partners, pathways, and pedagogies*, pages pp. 143-150, Yeppoon, Central Queensland, Australia.

Copyright 2006 (please consult author)

Accessed from: <http://eprints.qut.edu.au/archive/00004556>

FOSTERING A REFLECTIVE APPROACH TO ONLINE INFORMATION USE FOR LEARNING

Hilary Hughes
Christine Bruce
Sylvia L. Edwards

March 2006

ABSTRACT

In response to evident limitations in university students' use of online information for learning this paper proposes a reflective, holistic approach - with potential for higher education and wider lifelong learning contexts - based on a model that combines principles of reflective practice, action research and Bruce's *Seven faces of information literacy*.

INTRODUCTION

Information literacy has become a common feature of the higher education curriculum yet there is evidence of limitations in students' use of online information for learning, which corresponds with an apparent imbalance between students' general IT competence and a less developed critical awareness in their information use (Armstrong et al. 2001; Brown et al. 2003; Hughes 2005; Jones 2002; Logan 2004). In response to this anomaly our paper highlights the synergy between reflection and information literacy and presents a model that fosters a reflective approach to information use for learning.

The *Reflective online information use model* (introduced in Figure 2) represents online information use as a holistic experience that incorporates information seeking, knowledge construction and creative applications. It views information use as a continuous dynamic that resembles the action research cycle. Reflection is shown as the essential unifying thread that runs through the information cycle. The model, which integrates principles of reflective practice and action research with Bruce's *Seven faces of information literacy* (1997), is intended as a theoretical and practical framework for developing a reflective approach to information literacy. Although this paper focuses on higher education, we suggest that this reflective approach to information literacy also has potential for wider lifelong learning contexts.

BACKGROUND

Lifelong learning and information literacy

The fundamental role of information literacy in lifelong learning is widely recognised and promoted by national and international organisations. While there are varying conceptions and definitions of information literacy, the authors of this paper understand it to be a multifaceted phenomenon that fosters learning and social empowerment (Bruce 2002; Bruce 1997; Bundy 2004). This paper focuses on the information-rich higher education environment which according to Martin (2003, p. 21) is influenced by a number of converging trends:

'The rapid development of information technology, changes in the theory and practice of learning, the evolution of conceptions of computer and later IT literacy, the rise of information literacy as an

imperative, the emergence of electronic learning environments, and the increasing importance given to the acquisition of transferable skills which will be relevant to lifelong learning’.

While the literature documents extensive development and implementation of information literacy programs in higher education, it also continues to indicate significant limitations in many learners’ critical use of online information. This is associated with a variety of tendencies including: an over-dependence on the World Wide Web and popular search engines like Google and Yahoo; unrealistic confidence in their ‘computer savvy’ proficiencies, countered by limited critical awareness; unfamiliarity with alternative sources and searching techniques; ineffective or ‘chaotic’ search strategies; unquestioning satisfaction with previous results gained from the Web (Armstrong et al. 2001; Brown et al. 2003; Jones 2002; Logan 2004). These findings are supported by our recent studies, which are described briefly below.

Hughes’s ongoing study into international students’ engagement with online information resources (Hughes 2005; Hughes & Bruce in press) also detects a marked imbalance between students’ well-developed IT skills and under-developed information literacy. Generally skilful use of standard computer hardware and software and confident interaction with the Internet for personal interests and communication, often contrasts with evidence of less effective applications that include: use of the Internet as first (often only) resort for study; unfamiliarity with and/or difficulty in using other online tools such as catalogues, journal and specialist databases, online help guides and tutorials; a generally non-critical approach to all aspects of the search process; little planning/revision of search strategies; frequently unsatisfactory/indiscriminate search terms; tendency to select resources with little evaluation on a random or ‘top of the results list’ basis.

Edwards used a phenomenographic research approach (Marton 1986, 1994; Marton, Dall’Alba, & Beatty 1993) to reveal the varying ways university students experience internet based information searching and to inform ongoing curriculum design in a unit of study devoted to information resources and information literacy (Edwards 2004, 2006). This study identified a relational model of internet information searching - that is how four varying ways of experiencing information searching related to each other. The four ways of experiencing information searching include seeing information searching as finding a needle in a haystack; or finding your way through a maze; or using the tools as a filter; or at the highest level, panning for gold (Edwards 2004). The study identified how these four ways of experiencing information searching are related to each other; that is, what aspects or elements are similar in each experience, and what aspects or elements are not common through the four identified category experiences. In addition to these four categories, Edwards’s study also identified the importance of reflection in the information searching experience (Edwards 2004, 2006). Essentially these research findings show two key aspects of the searching experience: the reflection about the search process and the planning of the search process, or in fact, the lack of these two aspects. These two aspects are both critical dimensions of the identified four variations in the searching experience. The four category experiences clearly show that the more advanced levels of information searching are related to how a student may plan and reflect, and in the more advanced experience levels it is a combination of how they cognitively plan and how they act or perform the search in practice.

A reflective approach to information literacy

These research findings suggest the need for information literacy responses that engender a more expansive and critical use of information for learning in the challenging, rapidly changing higher education environment described above by Martin (2003, p.21). This need is addressed by the models described below that foster a reflective and holistic approach to information use based on a deep understanding of the information use experience. The efficacy of these models derives from their simple yet dynamic structure that combines key elements of reflective practice and action research (Edwards & Bruce 2002) with Bruce’s (1997) conceptions of information literacy.

Reflective practice, as envisaged by Donald Schön (1987), promotes continuous, contextualised learning by encouraging participants to reflect both ‘on-action’ (after completing an activity) and ‘in-action’ (whilst engaged in the activity). Reflection is also integral to the action research cycle which seeks understanding, tangible outcomes and positive change (transformation) in authentic contexts (Kemmis & McTaggart 1988; Zuber-Skerritt 1992). The *Seven faces of information literacy* (Bruce 1997), derived from an exploration of people’s experiences of information use, represents information literacy as a multifaceted phenomenon, characterised by the seven inter-related conceptions of:

Information technology; Information sources; Information process;

Information control; Knowledge construction; Knowledge extension; Wisdom.

Importantly this holistic representation of information literacy focuses on the learner rather than the technology in promoting a critical and creative approach to information use for learning. It also focuses on the broad experience of information use, rather than a narrower orientation towards information behaviour.

EVOLUTION OF REFLECTIVE MODELS FOR INFORMATION LITERACY

In this section we describe three models that promote a reflective and holistic approach to information use that incorporates both technical skills and critical thinking. While each model has a different emphasis, they all draw on the principles of reflective practice and action research. The first two, which have been published previously, focus respectively on reviewing research literature and learning about internet searching. The third recently developed model applies across a broad online information spectrum for formal and informal learning.

The *Reflective model for reviewing the literature* (Bruce 1996), which builds on an earlier representation of reflective information searching (Bruce 1992) has at its heart ‘information style’ and ‘different conceptions of the literature review’. It portrays the processes of planning, acting, recording and reflecting as integral to the entire experience of information use when engaged in the processes of reviewing the literature. The role of that model is to help neophyte researchers ‘... expand their repertoire of conceptions [of the literature review], and encourage them to think about their literature review as something other than an exercise in literature searching’ (Bruce 1996, p. 246).

The *Action research model for reflective Internet searching* (Edwards & Bruce 2002; Edwards 2006) shown in Figure 1 focuses attention on thinking and learning about the Internet and promotes a reflective approach to the searching process. Like its predecessor, this model portrays the processes of planning, acting, recording and reflecting as integral to the whole information experience. This model illustrates the dynamic nature of Internet searching – both in terms of the searcher’s active engagement and the changing online environment in which the engagement takes place. The model represents Internet searching as continuous and relational rather than linear. The four inter-connected phases of the model - PLAN, ACT, RECORD, REFLECT – correspond with the structure and terminology of action research. In common with action research it allows for cycles within cycles. So for example the PLAN phase might be broken into six interconnected mini-cycles: analyse the problem; identify concepts; create a search strategy; identify Net search tools; translate strategy to fit tool; retrieve information. Internet searchers may enter the cycle at any point, or may position themselves at different points depending upon their own style of Internet engagement. In order to gain the benefits of a reflective approach, ideally searchers would find their way eventually through the whole cycle according to their own heuristics. This would encourage a flexible approach to information use and accommodate individual differences in learners’ experience and needs.

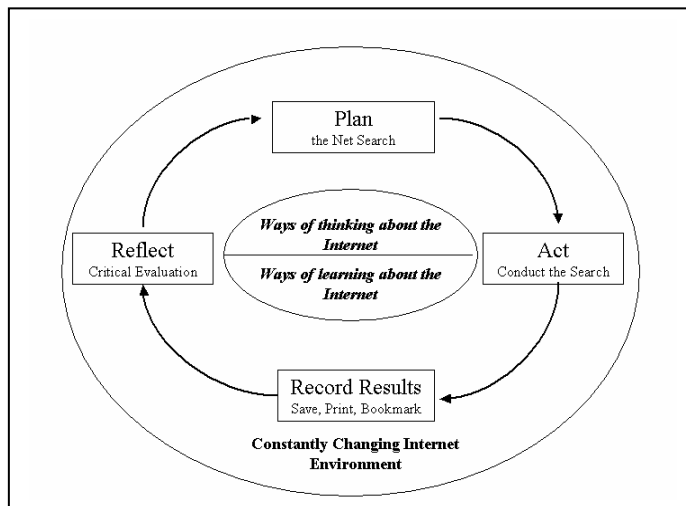


Figure 1: Action research model for reflective Internet searching

The latest *Reflective online information use model* – shown below in Figure 2 - extends the previous model by incorporating elements of the *Seven faces of information literacy* (Bruce 1997) into the PLAN-ACT-RECORD-REFLECT cycle. It continues to represent information use as dynamic and cyclical, but the influence of the *Seven faces* (as defined previously and applied in the next section) is evident in the widening perspective from the search process to a holistic engagement with online information. The model shifts attention from the Internet itself to the whole range of information available to learners via online sources such as journal databases and library catalogues. We contend that the flexibility of the model's structure allows its application to a wide array of search purposes and degrees of complexity. The expanded context – designated in the model as the 'Constantly changing **information universe**' – acknowledges the realities of the rapidly evolving global online environment and ever-increasing information bases that learners encounter.

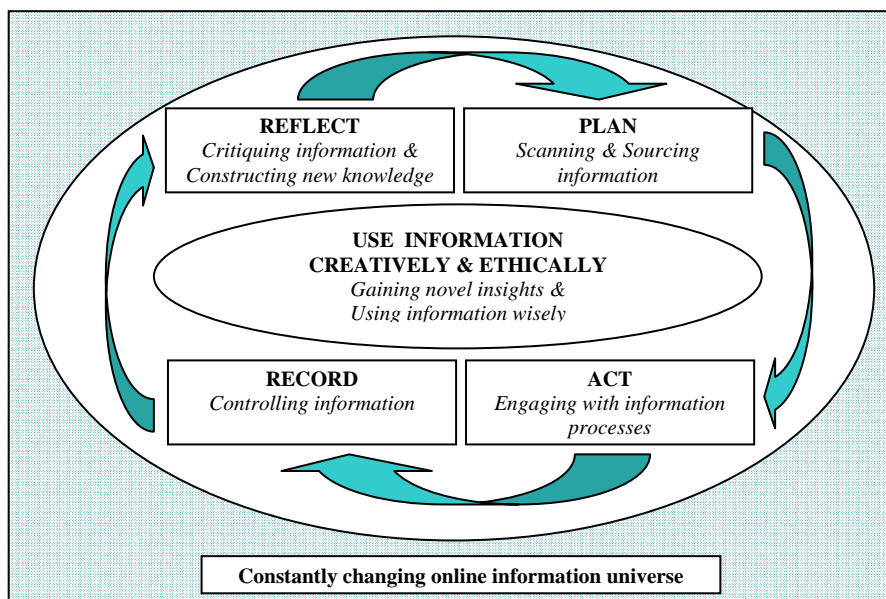


Figure 2 – Reflective online information use model

OVERVIEW OF THE REFLECTIVE ONLINE INFORMATION USE MODEL

The *Reflective online information use model* shown above in Figure 2 retains the cyclical structure of the *Action research model for reflective Internet searching* (Figure 1). The key elements or 'phases' – PLAN-ACT-RECORD-REFLECT – align with the first five of Bruce's *seven faces* or conceptions of information literacy, as follows:

PLAN relates to the first two conceptions of information literacy:

- ◆ *Information technology – developing awareness of information technology and its use through scanning the information environment*
- ◆ *Information sources – finding information in information sources, successful information retrieval*

In this initial phase the user is concerned with investigating what online tools and resources are available and planning strategies for using them effectively to find information.

ACT relates to the third conception:

- ◆ *Information process – implementing information processes for problem solving*

This phase involves applying the previously determined strategies in using the online tools and resources to satisfy an identified information need.

RECORD relates to the fourth conception:

- ◆ *Knowledge control – storing and organising information*

This phase involves activities such as saving, bookmarking, emailing and printing information found during the ACT phase to ensure its effective retrieval.

REFLECT relates to the fifth conception:

- ◆ *Knowledge construction – building up a personal knowledge base through critical analysis of information*

The sixth and seventh conceptions of information literacy appear at the centre of the cycle since they relate to both the purpose and outcomes of reflective online information use:

- ◆ *The knowledge extension conception – gaining novel insights through working with knowledge and personal perspectives*
- ◆ *The wisdom conception – using information wisely for the benefit of others*

In common with the *Action research model for reflective Internet searching* (Figure 1) this model consists of a 'meta-cycle' of four phases - PLAN, ACT, RECORD, REFLECT - which can support any number of inter-related 'mini-cycles' within each phase. Importantly REFLECT occurs continuously 'in-action' within each mini-cycle, as well as 'on-action' at completion of the meta-cycle. Learners are able to engage flexibly with information and they may pass through part or all of the meta-cycle once, several or many times depending on their information need(s) as the examples shown Tables 1 and 2 demonstrate. Although sequential progression through each phase is presented as the 'ideal' approach, they may jump phases, backtrack or exit mid-way. Also they may complete one or several mini-cycles within a particular phase.

Engaging with the information use cycle

The following example reconceptualises the model in a hypothetical practical context:

Lets' imagine a student who is tackling an assignment on the 'Republican debate' that occurred in Australia surrounding the 1999 referendum. Table 1 (below) envisages one possible way in which this student may initially progress through the information use meta-cycle. It intentionally depicts a rather uncritical approach to information use that corresponds with the research findings discussed earlier in this paper. So this example reflects limitations in the hypothetical student's approach with regard to: selection of insufficient search terms; searching only Google; evaluation criteria (only considers currency); simply 'noting' rather than assessing the implications of political bias in particular websites.

Information use phases	Options include	Student's responses
PLAN Scanning and sourcing information	Developing a search strategy, determining search terms and identifying information sources	<ul style="list-style-type: none"> - Considers assignment information needs - Identifies search terms: <i>Republic, Australia</i> - Determines strategy: Search Google with these terms, select relevant articles, print them and write up assignment
ACT Engaging with information processes	Applying the search strategy and search terms to identified information sources	<ul style="list-style-type: none"> - Conducts a basic Google search - Gains approx 136 million hits - Scans through first 3-4 results pages
RECORD Controlling information	Saving and organising the information found	<ul style="list-style-type: none"> - Bookmarks several sites - Selects/prints 5 or 6 web documents
REFLECT Critiquing information and constructing new knowledge	Critically assessing the quality and relevance of the information found and the information sources	<ul style="list-style-type: none"> - Checks for currency - Notes that some sites have a political bias - Realises this is mostly general information about republics, rather than specific to 'the Republican debate'

Table 1: Example of an information use meta-cycle

However, as stated previously information use does not always involve a straightforward progression from one phase to another. On completing the ACT phase of the meta-cycle the student in this example is unclear about what constitutes a 'republic' and therefore decides to delay moving on to the RECORD phase until a better understanding of the concept is gained. To achieve this - as outlined in Table 2 - the student works through a mini-cycle within the ACT phase seeking a meaningful definition. Table 2 also highlights the relationship between active and reflective elements in information searching.

Mini-cycle phases	Student's active responses	Student's reflective responses
PLAN Scanning and sourcing information	Locates a source of information that provides a definition of 'republic'	<ul style="list-style-type: none"> - What sources do I know? <i>Macquarie dictionary, Wikipedia.</i> - Do I need to seek out other sources? - How can I identify sources I don't know? - Let's start with the ones I'm familiar with and see what I find there. Then maybe check out other possibilities.
ACT Engaging with information processes	Consults <i>Wikipedia</i>	<ul style="list-style-type: none"> - Well this gives me a useful working definition of 'republic'
RECORD Controlling information	Copy/pastes the definition of 'republic' & bookmarks the relevant <i>Wikipedia</i> page	<ul style="list-style-type: none"> - This will be useful to refer to - The quote will support my argument
REFLECT Critiquing information and constructing new knowledge	Checks for citation details and evaluation by other <i>Wikipedia</i> users	<ul style="list-style-type: none"> - Everyone uses <i>Wikipedia</i>, so the definition must be OK - I now know that republic is but I'm still not sure what's meant by 'republican debate' - Do I need to search further? Where, how?

Table 2: Example of an information use mini-cycle (within the ACT phase)

The example shown above in Table 2 demonstrates some developing critical awareness. The hypothetical student assesses the suitability (and limitations) of the definition found previously in light of its intended application and considers alternative sources of information. As a result s/he revises the original search strategy. However, some limitations in the student's approach are still evident, for example: in accepting the *Wikipedia* definition on the basis that "everyone uses it"; and continuing to focus on seeking a definition, rather than understanding of the context and outcomes of the republican debate.

In accordance with our view of the dynamic nature of information use, on completion of this mini-cycle the student would have a variety of options that include:

(a) continuing through the ACT stage of the meta-cycle using the term(s) identified; (b) reverting to PLAN to refine the search more specifically on the 1999 referendum and/or investigate alternative information sources; (c) Moving on to RECORD; (d) abandoning the search and exiting the meta-cycle.

The decision regarding which option(s) to follow may be influenced by a range of factors including the student's individual situation and motivations.

THE REFLECTIVE APPROACH IN PRACTICE

The *Reflective online information use model* aims to enhance the understanding and practice of information use for learning. Although this paper focuses on the information needs of university students the model offers potential for widely varying information literacy learning contexts - formal and informal - and may be of value to neophyte and more experienced information users. It offers the advantage of being generic, transferable and yet adaptable to specific disciplines and levels of experience, as outlined below. Once learners are familiar with it, the model offers a straight forward, consistent tool or plan of attack for addressing information needs. Importantly it encourages individuals to develop a holistic approach to information use, by fusing technical skills and critical thinking.

The model can support active learning for both introductory Internet use and advanced literature reviews, since the basic approach it embodies remains constant, while allowing for varying content and context. At the conceptual level, the model is useful for understanding information processes and terminology. In practice learners and researchers may use it as a basis for planning and implementing information searches and synthesising the findings, and also as a tool for charting research progress and prompting further initiatives. Librarians and information professionals may refer to it in assisting clients to frame information enquiries and strategies. The following example demonstrates the application of the model to an authentic information literacy learning context.

At one Queensland university PLAN-ACT-RECORD-REFLECT provided an effective framework for introducing international students to reflective research concepts and practices. In common with the participants in the study described previously (Hughes 2005; Hughes and Bruce, in press) the information literacy of these student was initially quite limited. A series of inter-related discussions and activities, based around a worksheet that posed a series of questions, engaged the students in the information use cycle. The facilitators - a librarian and a lecturer - were available as 'information consultants' but encouraged the students to work independently and use the worksheet as a reference guide and reflection-prompter. As this activity was related to an undergraduate Business Communication unit it contributed to their discipline learning in addition to increasing their understanding and confidence as self-directed information users. In the course of this activity and during their subsequent information use they were encouraged to 'think around the cycle'.

The model has also proved a useful analytical tool in a research context. PLAN-ACT-RECORD-REFLECT provided the principal categories for Hughes's analysis of interview data relating to international students' online information use. Thus the methodological approach and findings of the study are closely related.

CONCLUSION

The *Reflective online information use model* introduced in this paper responds to an identified imbalance between many university students' IT competence and information literacy, which relate to generally uncritical approaches to information use. The model - which combines principles of reflective practice, action research and information literacy - offers a practical framework with a

sound theoretical base for fostering a critical approach to information use for learning. It supports the understanding and application of the concept of reflective information use and is intended to be used both with and by learners. Information literacy educators may find it useful as a basis for analysing learners' needs and for designing and implementing evidence-based information literacy responses. Learners may use the model as a basis for developing critical and creative approaches to information use that enhance their learning outcomes. Most significantly, rather than focus on specific competencies the *Reflective online information use model* promotes a holistic approach to information literacy for learning. Consequently its potential ranges beyond higher education where it was developed - across a wide range of formal and informal lifelong learning contexts.

REFERENCES

Armstrong, C., Fenton, R., Lonsdale, R., Stoker, D., Thomas, R., Urquhart, C. (2001). A study of the use of electronic information systems by higher education students in the UK. *Program*, 35(3), July, 241-262.

Brown, C., Murphy, T.J., Nanny, M. (2003). Turning techno-savvy into info-savvy: Authentically integrating information literacy into the college curriculum. *Journal of Academic Librarianship*, 29(6), 386-398.

Bruce, C. S. (2002). *Information Literacy as a Catalyst for Educational Change: A Background Paper*. White Paper prepared for UNESCO, the US National Commission on Libraries and Information Science, and the National Forum on information Literacy, for use at the Information Literacy Meeting of Experts, Prague, The Czech Republic, July 2002. (Retrieved November 26, 2005 from <http://www.nclis.gov/libinter/infolitconf&meet/papers/bruce-fullpaper.pdf>)

Bruce, C. S. (1997). *The seven faces of information literacy*. Adelaide: Auslib Press.

Bruce, C.S (1996). From neophyte to expert counting on reflection to facilitate complex conceptions of the literature review. In O. Zuber-Skerrit (Ed.), *Frameworks for Postgraduate Education* (pp. 239-253). Lismore: Southern Cross University Press.

Bruce, C. S. (1992). Developing students' library research skills. *HERDSA Green Guide No. 13*. Campbelltown: Higher Education Research Development Society of Australia.

Bundy, A. (Ed). (2004). *Australian and New Zealand information literacy framework: Principles, standards and practice*. 2nd. ed. Adelaide: Australian and New Zealand Institute for Information Literacy.

Edwards, S. L. (2004). Web-based information searching: understanding student experiences to enhance the development of this critical graduate attribute. In *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June, 2004, Yeppoon*. (pp. 106-113). Rockhampton: Central Queensland University Press.

Edwards, S. L. (2006). *Panning for gold: Information literacy and the Net Lenses model*. Adelaide: Auslib Press.

Edwards, S. L. & Bruce, C. S. (2002). Reflective Internet searching: An action research model. *The Learning Organization*, 9(4), 180-188.

Hughes, H. (2005). Actions and reactions: Exploring international students' use of online information resources. *Australian and Academic Research Libraries*, 36(4), December, 169-177.

Hughes, H. & Bruce, C. S. (in press). Cultural diversity and educational inclusivity: International students' use of online information. *International Learning Journal*.

Jones, S. (2002). The internet goes to college: How students are living in the future with today's technology. *Pew Internet and American Life Project*. Retrieved November 26, 2005 from http://www.pewinternet.org/pdfs/PIP_College_Report.pdf.

Kemmis, S. & McTaggart, R. (1988). *The action research planner*. 3rd ed. Geelong: Deakin University Press.

Logan, J. (2004). *Using an online database searching tutorial to encourage reflection on the research process by undergraduate students*. Paper presented at the Online Teaching and Learning Conference: Exploring Integrated Learning Environment 3 November, 2004, Brisbane. (Retrieved November 26, 2005 from <https://olt.qut.edu.au/udf/OLT2004/index.cfm?fa=getFile&rNum=1587192&nc=1>)

Martin, A. (2003). Towards e-literacy. In A. Martin & H. Rader (Eds.), *Information literacy and IT literacy: Enabling learning in the 21st century*. (pp. 4-23). London: Facet Publishing.

Marton, F. (1986). Phenomenography - a research approach to investigating different understandings of reality. *Journal of Thought*, 21(3), 28-49.

Marton, F. (1994). Phenomenography. In T. Husén & T. N. Postlethwaite (Eds.), *The international encyclopedia of education*. 2nd ed. (vol. 8, pp. 4424-4429). Oxford: Pergamon.

Marton, F., Dall'Alba, G., & Beatty, E. (1993). Conceptions of learning. *International Journal of Educational Research*, 19(3), 277-300.

Schön, D. (1987). *Educating the reflective practitioner*. San Francisco: Jossey-Bass.

Zuber-Skeritt, O. (1992). *Action research in higher education: Examples and reflections*. London: Kogan Page.