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Multimedia Learning and Social Work Education

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The use of multimedia technology in social work education predates the web. Innovative social work educators have incorporated images, audio, and video into the curriculum to enrich and enliven teaching ever since it was possible to do so. This paper reviews the literature on multimedia applications in social work education, and places this work in the context of the broader theoretical and empirical literature on learning with multimedia. The debate about the impact of media on learning is discussed; the concept of 'affordances' for learning is introduced; and research informed principles for effective multimedia design are identified.

The paper concludes that the robustness of social work studies of multimedia learning would be improved if they were more obviously connected with concepts, frameworks and findings from the wider learning technology literature; if the instructional methods they embodied were more explicitly described and more directly founded on principles of effective multimedia design; and if evaluations consistently included appropriate measures of learning gains as well as learners' perceptions.

Keywords: Multimedia; Learning Technology; Learning; e-Learning

Introduction

The use of multimedia technology in social work education predates the web. Innovative social work educators have incorporated images, audio, and video into the curriculum to enrich and enliven teaching ever since it was possible to do so. Some of these applications of multimedia within social work education find their way into social work journals, usually in the form of case studies. These studies, however, are often presented without reference to the wider empirical and theoretical literature on learning from media, and are frequently over-reliant on learner self-report data. Since it seems likely that the future of social work education will include further

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experimentation with multimedia, it is important that studies into the effects of media within social work education are explicitly connected with the wider learning technology literature, and based on robust research methodologies.

This article attempts to build a bridge between social work educational research on multimedia applications and some of the debates, concepts and theories within the wider learning technology literature. Recent literature on the use of multimedia in social work education will be reviewed before introducing three aspects of the learning technology literature relevant to learning with media: the media versus method debate; the concept of affordances; and research-based design principles derived from a cognitive theory of learning with media.

Multimedia Use in Social Work Education

Seabury & Maple (1993) were early advocates of the use of interactive multimedia in social work education and reported on the use of self-instructional interactive videodisk technology to teach social work practice skills including interviewing, crisis intervention, and groupwork. Evaluating users' perceptions of the crisis intervention programme, Seabury & Maple (1993) found the majority of respondents were positively disposed to the programme, felt that their knowledge had increased, and believed they would be better able to apply crisis theory. As technology advanced the programme migrated to CD-ROM and Seabury (2003) reported that both the crisis counselling programme and another programme on assessing the risk of suicide were received positively by students although no data were offered. The crisis counselling programme was recently reported to be in use with social work students at Florida State University but no data on learners' reactions or learning gains are offered (Siebert & Spaulding-Givens, 2006).

Cauble & Thurston (2000) investigated the effects of a distance education interactive multimedia child welfare course on the knowledge, attitudes and self-efficacy of social work students. Driving the development of this course was a concern to provide access to training at a distance for rural social workers 'thus saving on time away from the office as well as the expenses of transportation and lodging' (Cauble & Thurston, 2000, p. 429). Students received pre-tests and post-tests on their confidence, knowledge and self-efficacy in relation to the five units included in the course. Significant increases were found in both confidence and knowledge yet the complexity of controlling variables in educational research was illustrated when one of the groups involved in the study was found to have made significant gains in knowledge and confidence on a control unit they had not viewed. Therefore, as Cauble & Thurston (2000) state, 'the entire increase in knowledge cannot be attributed to viewing the units' (p. 434).

Hansen *et al.* (2002) conducted a study of the effectiveness of an interactive multimedia CD-ROM designed to instruct social work and health professionals in listening skills. The study found significant gains in the understanding of conceptual material for novice students and self-reported gains in confidence in the use of listening skills. Students also expressed positive views on the helpfulness of the programme.

Ouellette *et al.* (2006) report on a study to explore similarities and differences between two groups of students undertaking a course on interviewing skills: one group undertook the course wholly online and the other experienced a conventional face-to-face course. This study was not set up to compare a multimedia group with a non-multimedia group since both the online and face-to-face groups made use of video, although the online group made more extensive use of video to compensate for the lack of face-to-face contact. The study included a self-report on students' perceptions of the learning experience; and, on completion of the course, the students submitted a 10-minute video of a simulated interview for assessment by an independent expert. There were no statistically significant differences between the two groups in their views of the programme, their self-reported confidence levels, or skill acquisition as rated by the independent expert. Whilst the findings add to the growing number of comparisons between online and face-to-face courses that report no significant difference (Russell, 2001), that this should be the case in the context of a practical skills-based course is remarkable.

Shibusawa *et al.* (2006) described the use of video role-plays to support learning in the context of a Masters level social work course on couples' therapy. The video files were hosted in a web-based environment that supported online discussion and reflection. Adding a significant new feature, the system also allowed students to 'clip' or 'excerpt' portions of the video to attach to their messages about the video role-plays, thus focusing discussion on very specific portions of the action. The study collected self-report data from a student questionnaire and focus groups and reported positive views on the use of the technology to support learning.

Ballantyne & Knowles (2007) compared the reactions of social work students on a problem-based learning course using a multimedia case, with the same students' views of learning from text-based case studies. The study was conducted with three groups of students: two enrolled in a Canadian social work course, the other on a social work course in Scotland. The self-report results indicated positive views on the use of the multimedia case scenarios with both Canadian and Scottish students agreeing that their learning was significantly enhanced and that the multimedia case offered a richer and more authentic context for learning.

Multimedia is increasingly finding its way into traditional classroom presentations as an adjunct to lectures. Butler & Yaffe (2006) compared learning gained from a lecture delivered under three conditions: a lecture without slide presentations (control); a lecture using slides containing text only; and a lecture using slides containing text and decorative (i.e. unrelated to the content) clip-art pictures. Knowledge retention was not significantly different between the three groups on a post-instruction quiz two days after the lecture; but both experimental groups were found to have significantly lower mean scores on lecture-related questions four weeks after the lecture. In one of the few social work studies of multimedia to report a negative impact, Butler & Yaffe (2006) concluded that electronic slide presentations, with and without clip art, *reduce* student learning. In contrast, Hallet & Faria (2006) compared the use of 'advanced multimedia' as an adjunct to a lecture to present information to social work and speech and language therapy students. They found

that under the multimedia condition students recalled more information and expressed a preference for multimedia both immediately after the lecture and three weeks later.

This brief review includes a range of educational applications of multimedia in social work education and the positive views of students in most studies. The main contention of this article is that our understanding of the findings reviewed above may be enhanced, and the design of future social work studies into multimedia and other learning technologies improved, if social work education developers and researchers contextualise their work in the wider learning technology literature. The remainder of this article will now focus on three aspects of this literature: the media versus method debate; the concept of affordances; and research-based design principles derived from a cognitive theory of learning with media.

The Learning Technology Literature

Media versus Method

Many, though not all, of the social work studies described are written as if the key independent variable in the study is the multimedia content. Yet this multimedia content or activity is always situated in a particular curricular approach, a particular instructional design. One of the most well-known and significant debates in the field of learning technology is the media versus methods debate with Clark (1983, 1992) and Kozma (1991, 1994) as the main protagonists [see Clark (2001) for a collection of the key papers]. The opening salvo was fired by Clark (1983) when, following an extensive review of the literature, he concluded that, 'The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition' (p. 445).

Clark's argument is founded on a critique of studies claiming to show the learning benefits of more technologically advanced media (e.g. computer-based programmes) over more conventional media (e.g. face-to-face interaction, text books etc.). These studies, asserts Clark, confound the method of instruction with the media used to convey instruction and where differences in learning exist, these can be shown to derive from the benefits of one instructional method over another (e.g. drill and practice, guided discovery, providing feedback etc.). Clark highlights, for example, the finding that differences between computer-based and conventional teaching largely disappear when the same teacher is used in both treatments. Other differences, he argues, can be attributed to the presence of uncontrolled variables between the two treatments and/or the novelty of the unconventional treatment (an effect that tends to disappear over time).

Since, in Clark's view, any alternative media can be used to deliver the same instructional method and media in themselves provide no learning benefits, properly conducted studies should show no significant difference between learning situations using different media. Comparative studies of educational media, argues Clark,

should focus on factors that media can influence, such as costs, and conduct cost–benefit analyses to evaluate costs incurred by the delivery method against benefits gained by, for example, providing access at a distance (Clark, 2000).

Considering the social work case studies reviewed above: the finding of no significant difference by Ouellette *et al.* (2006) is entirely in keeping with Clark's predictions; and he would have sympathy with Cauble & Thurston's (2000) concerns to use technology to offer wider access to child welfare workers. However, missing from both of these studies is any reference to comparative costs—an essential part of the argument for the use of potentially expensive new media according to Clark (2000).

Clark's thesis has not gone unchallenged and every now and again the media versus method debate re-emerges within the learning technology literature (see, for example, Moreno, 2006). Kozma (1991, 1994) contended that particular media do have attributes that can be harnessed to promote effective learning in specific learning situations. Although agreeing with Clark that the overall instructional method is critical, Kozma (1991, 1994) argued that media and method cannot be separated neatly, and that understanding how learners interact with media in a given learning situation remains an important research task. Agreeing with both sides of the debate, Ehrmann (1995) stated that Clark's argument is nonetheless more important in helping to steer educators and researchers away from seeing the latest technology as a necessary good and drawing attention to the vital importance of good instructional design.

The Affordances of Multimedia Technology

Whether they can be considered to cause learning or not, learning technologies—from books, through whiteboards to virtual learning environments—bring different kinds of affordances into the learning situation. But what do we mean by *affordances* in the context of educational multimedia?

Although the concept of affordances is widely used in the learning technology literature, as McGrenere & Ho (2000) point out, it is used in different ways in different contexts. The perceptual psychologist James J. Gibson (1977, 1979) is attributed with introducing the idea of affordances to refer to properties of the physical world that afford an organism certain actions: so a level surface affords walking; a tree affords climbing. These affordances of the natural environment are always relational and not the same for all organisms: the surface tension of pond water affords walking for some insects but not for other creatures.

Donald Norman (1988, 1999) appropriated and popularised the notion of affordances within the field of product design, highlighting the way in which well-designed products—from doors, through teapots to video recorders—communicate their designed-for use to users. Norman was primarily interested in how product designers could harness the *perceived affordances* of artefacts so users would be able to work out their physical affordances without needing to refer to written signs or manuals. A door handle, for example, may be designed to suggest pulling, or the flat plate on a door designed to suggest pushing. Gaver (1991) argued for the relevance of

Table 1 Media Forms, Methods and the Learning Experiences Supported (Laurillard, 2002, p. 90)

Learning experience	Method/technologies	Media forms
Attending, apprehending	Print, TV, video, DVD	Narrative
Investigating, exploring	Library, CD, DVD, Web resources	Interactive
Discussing, debating	Seminar, online conference	Communicative
Experimenting, practising	Laboratory, field trip, simulation	Adaptive
Articulating, expressing	Essay, product, animation, model	Productive

the concept—especially the idea of perceived affordances—to the graphical design of human–computer interfaces that suggest the functions of digital media.

Kirschner *et al.* (2004) distinguished the *technological affordances* of artefacts and media [as described by Norman (1988) and Gaver (1991)] from what they describe as *educational affordances*. For Kirschner (2002) an educational affordance is '… the relationships between the properties of an educational intervention and the characteristics of the learner … that enable particular kinds of learning by him/her' (p. 19). Even more relevant to our present concern, Laurillard *et al.* (2000) discussed the affordances of multimedia for learning in an investigation of 'the design features that afford activities that generate learning'. Laurillard (2002) also argued that different learning media support the educational process in different ways and offered a typology of five principal forms: narrative media; interactive media; communicative media; adaptive media; and productive media (see Table 1 for details).

Typologies like these can help educational designers consider the educational affordances of media (digital and non-digital) when planning a range of learning experiences to create the conditions for effective learning. They can also provide useful analytical categories for educational researchers interested in exploring the impact of media on learning. In the context of the social work studies described above it is possible to see how the developers who designed the course described by Ouellette *et al.* (2006) were able to harness the particular affordances of digital media to support the learning experience for distant students by providing access to streaming multimedia files of interview skills (*narrative* media), and enabling them to create and submit their own video for peer and tutor assessment (*productive* media). Similarly, in the study by Shibusawa *et al.* (2006) we might speculate that the new *interactive* and *communicative* affordances provided by a web-based environment—enabling students to select, annotate and email video clips—might support a new and improved approach to learning about interview skills from media, although the data provided by Shibusawa *et al.* (2006) are not yet sufficient to support this proposition.

Multimedia Learning Principles

If the concept of affordances can help developers and educators identify the particular attributes of learning technologies—both digital and non-digital—required to support a specific instructional approach, Mayer (2005) and Moreno

(2006) draw attention to the attributes of learners. They have argued for learning technology development that recognises principles for the creation of multimedia content grounded in a cognitive theory of multimedia learning. Mayer's cognitive theory of multimedia learning (Mayer & Moreno, 2003; Mayer, 2005) is based on three assumptions about the way humans normally process information: the *dual channel* assumption—that humans possess separate channels for processing visual and auditory information; the *limited capacity* assumption—that humans can only process a limited amount of information in each channel at any one time; and the assumption of *active processing*—that humans are actively engaged in the learning process attending to incoming information, organising it into coherent mental representations, and integrating this new information with prior knowledge.

On the basis of a series of replicated empirical findings, consistent with a cognitive theory of multimedia learning, Mayer (2003) described principles for the effective design of multimedia learning materials. Moreno (2006) revised and expanded on these principles to produce 10 principles for multimedia design and their corresponding theoretical rationales [the practical application of these principles to the design of educational multimedia is explored in detail in Clark & Mayer (2008)]. The first five principles are based on reducing cognitive overload and the last five are about enhancing essential cognitive processing (see Table 2).

From a design and development perspective the principles help to ground multimedia design in human psychology rather than the capabilities of media alone. From a research and evaluation perspective they draw our attention to the idea that, before we consider the impact of multimedia on learning, we must also attend to whether the multimedia has been designed well or badly. The principles, and the underlying cognitive theory of learning with media, may well account for some of the findings of the social work studies described above. For example, the finding by Butler & Yaffe (2006) that decorative clip art on PowerPoint slides had a negative impact on learning is consistent with the *Coherence Principle* that 'Students learn better when extraneous material is excluded' (Moreno, 2006, p. 65). The contrasting finding by Hallett & Faria (2006) that multimedia used as an adjunct to a lecture had a positive impact on learning may be an illustration of the *Multimedia Principle* that, when relevant graphics are used 'students learn better from words and graphics than from words alone'. Unfortunately, neither study offers enough detail of the method of delivery or multimedia design to allow us to make clear judgments.

Conclusions

It seems likely that, just as in other subject areas, social work education will continue to integrate multimedia and other new technologies into mainstream educational practice and that social work educators will continue to evaluate these applications. Mayer (2003) argues for a rigorous approach to e-learning research and development based on three elements: (a) evidence: in the form of replicated findings from rigorous research; (b) theory: that leads to testable predictions about how people learn within electronic environments; and (c) applications: theory-based principles to

Table 2 Ten Design Principles Derived from a Cognitive Theory of Learning with Media and their Corresponding Theoretical Rationales (Moreno, 2006, p. 65)

Principle and description	Theoretical rationale
Modality	
Students learn better from words and graphics when words are spoken rather than printed	Spoken words are processed in the auditory channel, thereby leaving the visual channel to only process the graphics and expanding effective working-memory capacity
Verbal redundancy	
Students learn better from graphics and narration than from graphics and redundant narration and text	When words and graphics are both presented visually, the visual channel can become overloaded
Temporal contiguity	
Students learn better with concurrent rather than successive corresponding words and graphics	Concurrent words and graphics can be held in working memory at the same time and thus learners are more likely to build mental connections between them
Spatial contiguity	
Students learn better when multiple sources of visual information are integrated rather than separated	Non-integrated sources of information force learners to hold one source in working memory while attending to the other; mental connections between them are less likely to occur
Coherence	
Students learn better when extraneous material is excluded rather than included in a lesson	Extraneous material competes with relevant materials for cognitive resources and disrupts the process of organisation by priming learners to organise the material around inappropriate schemas
Multimedia	
Students learn better from words and graphics than from words alone	When relevant graphics are added to words, learners are induced to select and connect both materials, which contribute additively to constructing a mental model
Personalisation	
Students learn better when explanations are personalised rather than non-personalised	Personalised messages heighten students' attention, and learning is more likely to occur as a result of referring the instructional material to him/herself
Guidance	
Novice students learn better when given principle-based explanations than they do when asked to infer principles by themselves	Novices lack proper automated schemas to help them select and organise the materials, thus learning is more likely to occur when explanations provide a guiding schema
Interactivity	
Students learn better by manipulating rather than by passively observing others manipulate the materials	Interactivity encourages the processing of new information by engaging students in an active search for meaning
Reflection	
Students learn better when given opportunities to reflect during the meaning-making process	Reflection promotes learning by encouraging more active organisation and integration of new information with prior knowledge

guide the design of electronic learning environments that can then be evaluated in use. The studies of multimedia use in social work education fall—for the most part—into the last category. However, the robustness of these studies as subject-specific applications would be improved if they were more obviously connected with

concepts, frameworks and findings from the wider learning technology literature; if the instructional methods they embodied were more explicitly described and more directly founded on principles of effective multimedia design; and if evaluations consistently included appropriate measures of learning gains as well as learners' reactions.

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References

Ballantyne, N. & Knowles, A. (2007) 'Enhancing student learning with case-based learning objects in a problem-based learning context: the views of social work students in Scotland & Canada', *Journal of Online Learning & Teaching*, vol. 3, no. 4, pp. 363–374.

Butler, M. D. & Yaffe, J. (2006) 'Clip art or no clip art: a lesson from cognitive science for social work educators', *Journal of Technology in Human Services*, vol. 24, no. 2/3, pp. 119–134.

Cauble, E. A. & Thurston, L. P. (2000) 'Effects of interactive multimedia training on knowledge, attitudes, and self-efficacy of social work students', *Research on Social Work Practice*, vol. 10, pp. 428–437.

Clark, R. E. (1983) 'Reconsidering research on learning from media', *Review of Educational Research*, vol. 53, pp. 445–459.

Clark, R. E. (1992) 'Facilitating domain-general problem solving: computers, cognitive processes and instruction', in *Computer-based Learning Environments and Problem-solving*, eds E. DeCorte, M. C. Linn, H. Mandl & L. Verschaffel, Springer-Verlag, New York.

Clark, R. E. (2000) 'Evaluating distance education: strategies and cautions', *The Quarterly Review of Distance Education*, vol. 1, no. 1, pp. 5–18.

Clark, R. E. (2001) *Learning from Media: Argument, Analyses, and Evidence*, Information Age Publishing, Connecticut.

Clark, R. C. & Mayer, R. E. (2008) *e-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Educational Multimedia*, 2nd edn, Pfieffer, San Francisco.

Ehrmann, S. C. (1995) 'Asking the right questions: what does research tell us about technology and higher learning?', *Change*, vol. 27, March–April, pp. 20–27.

Gaver, W. W. (1991) 'Technology affordances', in *Proceedings of the CHI ' 91 Conference on Human Factors in Computing Systems: Reaching through Technology*, Los Angeles, eds S. P. Robertson, G. M. Olson & J. S. Olson (eds), ACM Press, New Orleans.

Gibson, J. J. (1977) 'The theory of affordances', in *Perceiving, Acting, and Knowing: Toward an Ecological Psychology*, eds R. E. Shaw & J. Bransford, Lawrence Erlbaum, Hillsdale, NJ.

Gibson, J. J. (1979) *The Ecological Approach to Visual Perception*, Houghton Mifflin, Boston.

Hallett, T. L. & Faria, G. (2006) 'Teaching with multimedia: do bells and whistles help students learn?', *Journal of Technology in Human Services*, vol. 24, no. 2/3, pp. 167–178.

Hansen, F. C. B., Resnick, H. & Galea, J. (2002) 'Better listening: paraphrasing and perception checking—a study of the effectiveness of a multimedia skills training program', *Journal of Technology in Human Services*, vol. 20, no. 3/4, pp. 317–331.

Kirschner, P. A. (2002) 'Can we support CCSL? Educational, social and technological affordances for learning', in *Three Worlds of CSCL: Can We Support CSCL?*, ed. P. Kirschner, Open University of the Netherlands, Heerlen.

Kirschner, P., Strijbos, J., Kreijns, K. & Beers, P. J. (2004) 'Designing electronic collaborative learning environments', *Educational Technology Research and Development*, vol. 52, no. 3, pp. 47–66.

Kozma, R. (1991) 'Learning with media', *Review of Educational Research*, vol. 61, no. 2, pp. 179–212.

Kozma, R. B. (1994) 'Will media influence learning? Reframing the debate', *Educational Technology Research and Development*, vol. 42, no. 2, pp. 7–19.

Laurillard, D. (2002) *Rethinking University Teaching. A Conversational Framework for the Effective Use of Learning Technologies*, Routledge, London.

Laurillard, D., Stratfold, M., Luckin, R., Plowman, L. & Taylor, J. (2000) 'Affordances for learning in a non-linear narrative medium', *Journal of Interactive Media in Education* .

Mayer, R. E. (2003) 'Elements of a science of e-learning', *Journal of Educational Computing Research*, vol. 23, no. 3, pp. 297–313.

Mayer, R. E. (2005) *The Cambridge Handbook of Multimedia Learning*, Cambridge University Press, New York.

Mayer, R. E. & Moreno, R. (2003) 'Nine ways to reduce cognitive load in multimedia learning', in *Web-Based Learning: What Do We Know? Where Do We Go?*, eds R. Bruning, C. A. Horn & L. M. Pytlik Zillig, Information Age Publishing, Greenwich, CT.

McGrenere, J. & Ho, W. (2000) 'Affordances: clarifying and evolving a concept', *Proceedings of the Graphics Interface Conference*, May, Montreal, Canada.

Moreno, R. (2006) 'Learning in high-tech and multimedia learning environments', *Current Directions in Psychological Science*, vol. 15, no. 2, pp. 63–67.

Norman, D. A. (1988) *The Psychology of Everyday Things*, Basic Books, New York.

Norman, D. A. (1999) 'Affordances, conventions and design', *Interactions*, vol. 6, no. 3, pp. 38–41.

Ouellette, P. M., Westhuis, D., Marshall, E. & Chang, V. (2006) 'The acquisition of social work interviewing skills in a web-based and classroom instructional environment: results of a study', *Journal of Technology in Human Services*, vol. 24, no. 4, pp. 53–75.

Russell, T. L. (2001) *The No Significant Difference Phenomenon: A Comparative Research Annotated Bibliography on Technology for Distance Education*, 5th edn, IDECC, Montgomery, AL.

Seabury, B. (2003) 'Online, computer-based, interactive simulations: bridging classroom and field', *Journal of Technology in Human Services*, vol. 22, no. 1, pp. 29–48.

Seabury, B. & Maple, F. (1993) 'Using computers to teach practice skills', *Social Work*, vol. 38, no. 4, pp. 430–439.

Shibusawa, T., VanEsselstyn, D. & Oppenheim, S. (2006) 'Third space: a web-based learning environment for teaching advanced practice skills', *Journal of Technology in Human Services*, vol. 24, no. 4, pp. 21–33.

Siebert, D. C. & Spaulding-Givens, J. (2006) 'Teaching clinical social work skills entirely online: a case example', *Social Work Education*, vol. 25, no. 1, pp. 78–91.