Innovating research topics in learning technology: Where are the new blue oceans?

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Introduction

Learning technology (LT) is a transdisciplinary field that has been influencing human development in various academic subjects and industries for almost a century. A number of studies and theories have investigated the attributes, design, development, applications, impact, effectiveness and efficiency of various technologies in human learning in diverse disciplines and contexts. However, so far there has been no design research published concerning the creation of novel LT research topics. Since Surry (2005) calls for more researchers and practitioners to fully realise the importance of the study of change—which is critical to the future of LT research—we may need to think about viable ways to make this field more successful.

Value is what is important in learning, teaching or research related activities (Richey, 1998), and this paper reports on design research which is intended to validate and refine the guidelines for generating ‘value innovation’ (Kim & Mauborgne, 2004a) in LT research, with the aim of helping researchers and practitioners create new or previously unidentified research topics or questions. The five guidelines—inspired by the blue ocean strategy (BOS; Kim & Mauborgne, 2004b)—present refreshing insights. Twelve LT practitioners and researchers were invited to provide their constructive comments on the effectiveness of the guidelines while using LT tools to test a novel framework composed of the components of the widely accepted ADDIE instructional design model and Gagne’s (1985) nine events of instruction. The guidelines were then refined in a series of rigorous qualitative research procedures based on feedback from the 12 practitioners and researchers. In addition, novel LT research topics are demonstrated in this paper in accordance with the author’s research findings in three government-supported research projects. The queries raised from the expert review for refinements on the guidelines and the framework, the future research agenda and conclusions are all provided in this work.
New research topics for advancing knowledge and developing its applications

Creative research topics are always needed when we conduct research in order to advance knowledge and develop new applications in LT with regard to technological evolution, paradigm shifts in learning and value innovation (Richey, 1998). Some scholars attempt to find current research trends or some existing problems of research outcomes in an effort to provide a new direction. For example, Shih, Feng and Tsai (2008) identify the recent research trends in papers published in the five major LT journals from 2001 to 2005, finding that the most popular research topics were instructional approach, learning environment and meta-cognition.

Latchem (2006) links most papers published in the British Journal of Educational Technology (BJET) from 2000 to 2005 to three topics in the Author Guidelines: (1) evaluating and monitoring, (2) problems and potential of new technologies and (3) curriculum development and course design. However, it is open to question whether the recent research trends and topics genuinely reflect the needs of LT practitioners and researchers. Kanuka, Rourke and Laflamme (2007) review the literature and indicate that new guidelines or models which can help conduct LT research on the most advanced computer technologies are still insufficient. It seems that the recent research trends and outcomes are not yet able to match up well in order to meet the needs of LT researchers and practitioners to further develop what Richey (1998) calls ‘useable knowledge’. Thus, we may need new research topics and research methodologies to improve the current situation.

The need for value innovation in LT research

Since new technologies have been continuously emerging, research-proven or theory grounded guidelines and devices that can simulate innovative LT research topics and questions are desired (Latchem, 2006; Richey, 1998). LT in this study is defined broadly as technologies that can be used to facilitate human learning in various fields and contexts. Value—which is significant in the process or product of learning (Reid & Petocz, 2004; Reigeluth, 1999; Richey, 1998)—plays a key role in LT. Likewise, the value of LT should be that, when applied or guided properly, technologies can facilitate human learning efficiently and effectively, with more personal enrichment or enjoyment. Value in instructional design, for example, is important for guiding the selection of the goals, scope, guidelines, method and situation for its theories or models (Reigeluth, 1999). Liu (2005) suggests that an instructor should develop hybrid instruction or blended learning based on identified values, including proficiency of a skill or language as the ultimate goal, learner-focused learning, customised learning, active learning and interactive learning. Other identified LT values, to name only a few, include assessable technology for teaching and learning (Ferdig, 2006), direct instruction, adjunct instruction, facilitating the skills of learning, facilitating social skills and widening horizons (Hartley, 2007).

Along with the evolution of LT integrated into teaching and research of various fields and disciplines (Boylan, 2004), innovation is considered playing a major role in improv-
ing the current state and scope of LT contexts and developments (Chou, 2005; Hannan, 2005). However, when it comes to ‘value innovation’ (Kim & Mauborgne, 2004a) in LT research, some questions still need to be answered. For example, how can we create or innovate values to promote LT research? Are there any other values that we have not yet identified? If so, what are they, and how can we take advantage of these new and meaningful ideas? LT practitioners and researchers need to think about these questions and try to answer them when developing and promoting LT.

The BOS for value innovation in LT research
The BOS was designed to help companies jump from competitive, crowded contexts (red oceans) to innovative, developmental territory (blue oceans) for future business and opportunities (Kim & Mauborgne, 2004b). Kim and Mauborgne argue that companies continuously benefit from operating in such blue oceans, which they define as industries or market spaces that do not exist now but will be created or invented soon and in which new demands and profitable opportunities will be generated. The BOS has been widely discussed and applied in industrial and academic fields (e.g., see Mantovani, 2006), and LT practitioners also need a similar strategy to innovatively apply LT in current domains as well as create new domains for future research and development.

The research methodology
According to Collins, Joseph and Bielaczyc (2004), design research has been developed as a new method ‘to carry out formative research to test and refine educational designs based on principles derived from prior research’ (p. 15). It was applied in this study for the researcher to validate and refine (1) the guidelines adapted from the BOS and (2) the novel framework composed of the components of the widely accepted ADDIE instructional design model and Gagne’s (1985) nine events of instruction. In this qualitative study, it was assumed that value innovation in LT research topics would bring about more cutting-edge research and developments in academic and industrial fields. This study is a response to Rushby’s (2007) call for new methodologies to help create applicable research questions or topics in LT.

The research questions and research procedures
The research questions driving this study are: ‘Are there any guidelines for developing novel research topics or questions with value innovation in LT as new technologies constantly emerge?’ and ‘if so, what are they?’ The five guidelines for value innovation in LT research (see Figure 1) with a novel framework (see Table 1) were reviewed by 12 LT practitioners and researchers—both with a PhD degree and at least 5 years of LT teaching and research—from three different colleges (Business/Management, Science and Liberal Arts) at six universities in central and southern Taiwan in mid-2007. However, it should be noted that the review of the literature began in 2004.

The participants were selected based on purposeful sampling and convenience sampling. They were provided with the introduction and documents of the research, and were asked to provide their constructive comments on the effectiveness of the guidelines while using LT tools to test the novel framework to see if they could formulate any novel
research topics or questions. To be more specific, they were asked to try LT tools (eg, Second Life, YouTube and Skype) with the five guidelines (in Figure 1) in any of the 45 areas (in Table 1) to generate 10 research topics and/or questions, and then to use the available databases in libraries (eg, ISI Web of Knowledge) or freely accessible online search engines (eg, Google Scholar, Yahoo and ez2find) to see if the newly devised research topic or question had never been used in LT research before. The expert review questions for them to answer included

1. what do you think about the guidelines for value innovation in LT research?
2. What guideline(s) may work well?

![Figure 1: The guidelines for value innovation in LT research from the red to blue oceans](image)

Table 1: A framework of the 45 possible areas for generating new research topics in learning technology

<table>
<thead>
<tr>
<th>Gagne’s nine events of instruction</th>
<th>Analysis</th>
<th>Design</th>
<th>Development</th>
<th>Implementation</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain attention</td>
<td>Area 1</td>
<td>Area 2</td>
<td>Area 3</td>
<td>Area 4</td>
<td>Area 5</td>
</tr>
<tr>
<td>Inform learner of objectives</td>
<td>Area 6</td>
<td>Area 7</td>
<td>Area 8</td>
<td>Area 9</td>
<td>Area 10</td>
</tr>
<tr>
<td>Stimulate recall of prior learning</td>
<td>Area 11</td>
<td>Area 12</td>
<td>Area 13</td>
<td>Area 14</td>
<td>Area 15</td>
</tr>
<tr>
<td>Present stimuli with distinctive features</td>
<td>Area 16</td>
<td>Area 17</td>
<td>Area 18</td>
<td>Area 19</td>
<td>Area 20</td>
</tr>
<tr>
<td>Guide learning</td>
<td>Area 21</td>
<td>Area 22</td>
<td>Area 23</td>
<td>Area 24</td>
<td>Area 25</td>
</tr>
<tr>
<td>Elicit performance</td>
<td>Area 26</td>
<td>Area 27</td>
<td>Area 28</td>
<td>Area 29</td>
<td>Area 30</td>
</tr>
<tr>
<td>Provide feedback</td>
<td>Area 31</td>
<td>Area 32</td>
<td>Area 33</td>
<td>Area 34</td>
<td>Area 35</td>
</tr>
<tr>
<td>Assess performance</td>
<td>Area 36</td>
<td>Area 37</td>
<td>Area 38</td>
<td>Area 39</td>
<td>Area 40</td>
</tr>
<tr>
<td>Enhance retention and learning transfer</td>
<td>Area 41</td>
<td>Area 42</td>
<td>Area 43</td>
<td>Area 44</td>
<td>Area 45</td>
</tr>
</tbody>
</table>

(3) What guideline(s) may not work well?
(4) Can you develop new research topics or questions based on the guidelines? If so, what are they?
(5) Do you have any suggestions or comments?

The five guidelines and the framework were then refined with more detailed information based on the experts’ constructive comments in a series of rigorous qualitative research procedures, including ‘categorical aggregation’ (analysing the formative data and categorising them based on the five expert review questions above) and ‘direct interpretation’ (drawing preliminary conclusions based on the emerging themes and correspondence from the data; Stake, 1995). In addition, the refined guidelines and framework were sent back to the 12 reviewers via email attachments to get their feedback, which was then used to enhance reliability, accuracy and trustworthiness. Two more minor refinements were made after the verification.

Results and queries raised by the experts, along with my responses

All of the 12 LT practitioners and researchers found the guidelines and the framework useful and innovative, and they created at least one research topic or question that had never been used in LT research before. Eleven of them formulated at least two novel research questions; seven reviewers created at least one new research topic. I double-checked those innovative or previously unidentified research topics and questions. However, the experts also provided some suggestions, which are presented below after my interpretation and syntheses, and with their verification:

- ‘You should provide explanations for each of the guidelines.’ Ten experts said.
- ‘You should offer a specific framework for each academic or industrial field to make it more meaningful and helpful.’ Seven of them suggested.
- ‘You had better involve overseas LT experts to further refine the guidelines and framework.’ Eight experts advised.
- ‘You may introduce the newly refined guidelines and framework to the students and colleagues to promote LT research.’ Seven of them commented.
- ‘Please do not share my newly devised research questions and topics with others. I will use them later.’ Five reviewers requested.

I took all of the above advice, added more detailed explanations to the guidelines, and made some revisions on the framework accordingly. Moreover, there were also some further questions:

- ‘When we create new research topics (domains) in LT applications with the guidelines and framework, can we do these tasks without the involvement of LT tools?’ Two experts asked.
- ‘Based on the guidelines and framework, how can we initiate research questions or topics in the areas that we are not familiar with?’ Four reviewers asked.

My response to the first query is yes and no. When we create new research topics and questions in LT, as Kim and Mauborgne (2004a) suggest, we need a different kind of mindset and logic with a systematic view to look for new opportunities inside and
outside the context, or even in an unidentified domain. Likewise, with value innovation, we may or may not use LT tools in devising new research topics; it depends on the nature of the research. My answer to the second query is that we should search the latest literature in the area related to the research question we have in mind, and learn the relevant trends over the past 5 years or more. New ideas will be created if we link the literature of new domains to what we know is still lacking in the literature. Transdisciplinary issues will also generate more innovative ideas and domains for research and development (Kim & Mauborgne, 2004b).

The five refined guidelines for value innovation in LT research
The five guidelines for value innovation in LT research with detailed information—refined based on the comments from the expert review—are as follows:

1. Creating previously unidentified research topics from different viewpoints: to explore transdisciplinary knowledge we need to be aware of the conditions and possibilities of integrating the diverse perspectives of various disciplines.

2. Making the research collaborative: we should work with practitioners and researchers in different departments and colleges, or with different backgrounds (Latchem, 2006), but we need to be careful about the conflicts that may be inherent in the meeting of different perspectives.

3. Generating and capturing a new research demand/question with personal insight and consulting with others: we should search and review the latest literature in various transdisciplinary fields in databases and search engines for new LT tools, areas and demands, using our own direct intuition, prior experience and imagination. We should then ask reliable experts for their opinions on the newly self-devised research topic or question in order to obtain a better research design.

4. Surpassing the value/cost trade-off and focusing on successful innovation: we should aim to realise short-term and long-term plans in an organised way with reasonable expenses, and anticipate unexpected outcomes. While in the research process, we should prioritise successful innovation, not the value/cost ratio. New opportunities, including financial support, are likely to come from this approach (Kim & Mauborgne, 2004b).

5. Aligning the whole system of individual/organisational research activities in pursuit of more efficiency, effectiveness, impact and added value: we need to work independently, but with the relevant research activities fostered by others in the workplace or learning organisation. We should always remember that new ideas, with direct and indirect innovation that drives creativity, are the ultimate goal. What we should treasure most is the positive influence that the research, with new LT tools, will bring about. However, it should be noted that the possible negative effects of using LT tools is a good research question that remains to be investigated (McPherson, 2005).

The refined framework for LT and computer assisted language learning researchers and practitioners
Based on the comments from the experts, the 45 areas in Table 1 were refined to the components which appear in Figure 2, while Levels 1, 2 and 3 were categorised by the
well-constructed locus of control, which is a popular term in educational psychology used to determine who controls or facilitates learning. To be more specific, it is designed for LT and computer assisted language learning (CALL) researchers and practitioners to meaningfully innovate research topics or questions, and is developed based on the taxonomy of Internet-based technologies integrated into language curricula (Liu & Chen, 2007), in which specific research topics and questions can be generated. The three levels are as follows:

Level 1: self-controlled learning with the learning content is the feature of CALL programmes, including language tutorials, testing, games, simulations (eg. Second Life), language learning interactive websites (eg. BBC Learning English), corpus-based, concordancer-supported websites (eg. CANDLE website by Liou et al, 2006).

Level 2: self-controlled, peer-supported learning without learning content dominates the use of the communication-mediated communication (CMC) tools. These tools can be synchronous (eg. chatting within online games or applications such as MSN Messenger) or asynchronous (eg. email and forums). In addition, there are one-way communication tools (without peer support), such as streaming media, Real Player, Media Player, QuickTime, as well as two-way communications, including Skype, email, blogs, Wikipedia, Second Life and others.

Level 3: teacher-led, self-controlled and peer-supported learning provide multi-channel learning opportunities to language learners on learning management systems (LMS), including Moodle, the open-source Sakai project, Blackboard and WebCT.
Some novel LT research topics or blue oceans, as examples

Following the five guidelines mentioned above, the following research topics were created based on the research findings and latest literature review in the three government-sponsored LT and CALL related research projects in 2005–2007.

- Global, long-term research topics: currently we are lacking knowledge about the international, intercontinental and long-term (5 years or more) effects and comparisons of various LT tools with many research topics, as described in the Author Guidelines in *BJET*. Latchem (2006) calls for more studies on the ways to narrow the gap between developed countries and under-developed countries. For instance, the newly devised, low-cost personal computer released in 2007—Eee PC by ASUS of Taiwan—can be an excellent research target and topic for narrowing the digital divide in poor areas and countries.

- New taxonomies and instructional design models and theories for various LT applications on CALL: Liu and Chen (2007) call for more researchers to develop novel taxonomies to meet various needs in LT studies. For example, there are no applicable taxonomies of analysis, design, development, planning, implementation, management and evaluation of CALL with state of the art technologies. In addition, at present there is no instructional design model or theory about language learning and Second Life.

- A third category to be investigated other than LT process and product: is the individual and interpersonal vitality, enrichment and enjoyment of using digital learning.

- Novel added values: added values can be related to research, business or another domain. With inquiry learning, collaborative learning and guided learning with practice, as suggested by de Jong (2006), for example, LT innovation on CALL will lead to new developments of artificial intelligences in linguistic, communicative, intellectual and emotional aspects, including social and cultural topics (Vinge, 2006), cost-effective topics, multiple intelligences and others.

The future research agenda and conclusions

I will recruit another dozen LT practitioners and researchers from at least four different colleges (eg, Engineering, Medicine, Management and Social Science) in Taiwan and in other countries (the UK, the USA and others)—with the same qualifications and research procedures used in this study—to review the improved guidelines and framework, which will be further refined if required. International perspectives are needed to further examine and enhance the effectiveness and generalisability of the guidelines, as Collins *et al.* (2004) suggest. The comparisons of different viewpoints from researchers with various backgrounds and nationalities will be conducted in the next study. In addition, I will develop one framework for one discipline, eg, e-learning, and with such discipline-specific frameworks more new research topics or blue oceans, will be generated.

LT, as a transdisciplinary field, is broad and diverse in its nature. With the Internet as both a research tool and domain, as claimed by Vinge (2006), the computer (hard-
ware), the communication system (software) and the user constitute the ultimate ‘creativity machine’, which provides various contexts and opportunities to foster innovation. I hope the refined guidelines and framework presented in this paper will be helpful to interested researchers and practitioners, and look forward to learning new guidelines, devices and blue oceans in LT from you.

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