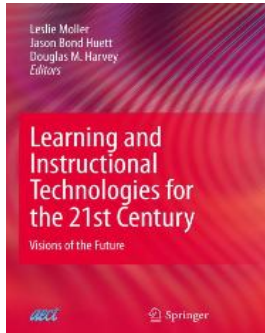


LEARNING AND INSTRUCTIONAL TECHNOLOGIES FOR THE 21ST CENTURY

Leslie Moller, Jason Bond Huett, Douglas M. Harvey (Eds.) 2009,
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As an edited book, "Learning and Instructional Technologies for the 21st century" provides us a sense of integrated puzzle or a big picture which consists of valuable contributions and forward looking ideas in many chapters regarding instructional technology design, development, application, tools, models and views for the 21st century.



In preface, Leslie Moller, an Associate Professor and former Chair of the Technology for Education and Training Division at the University of South Dakota, introduces the book and explains readers how the first AECT Research Symposia resulted a series of reading from leading scholars in instructional technology field. He admits the importance of technology with the main advantages of enabling advanced learning designs, paradigms and learning interactions and adds "...without consideration to the *process* of learning and all that it involves, technology, by itself, is not going to make a real difference." He also implies that what we should do is not just adding better or more technology to an existing system but do *start over and create an entirely new system*.

The first chapter by J.M. Spector titled "Adventures and advances in instructional design theory and practice" deals with the transformations in the planning and implementing instruction along with new technologies, changing work conditions and advances in cognitive psychology. Spector implies that technology changes what people can do and the way they teach and learn.

Especially with the help of cognitive psychology, we are much more aware of memory and its role in learning. He reviews many studies related to cognitive learning and effective instructional design methods and synthesized their findings in the form of naturalistic educational epistemology:

- *"Learning is fundamentally about change.*
- *Experience is the starting point for learning and improved understanding.*
- *Context determines meaning as interpreted and constructed by individuals.*
- *Relevant contexts are often broad and multi-faceted; effective learning integrates multiple aspects of new contexts with existing knowledge and understanding.*
- *Effective learning begins from a position of humility and uncertainty."*

Spector also claims that “the inability to conceptualize education as involving complex and dynamic systems inhibits progress”. And he provides an overview of research related to learning and assessing complex domains along with systems-based approaches. Now the emphasis is on:

- viewing technology as an ongoing part of change and innovation, and
- using technology to support higher-order learning in more complex and less well-defined domains.

Spector provides examples of studies using educational technology to improve complex problem-solving skills and higher-order learning outcomes. And he outlines a NSF project titled “The DEEP methodology for assessing learning in complex domains” which is developed by Spector and Kozzalka in 2004. “The use of annotated problem representations to determine relative levels of expertise in biology, engineering and medicine” is investigated in this problem-oriented project. In conclusion, he claims that “the real work of systematically and systemically improving learning and instruction- has only just begun” and I agree with him.

In second chapter, Gibbons and Rogers define a non-traditional view of the structure of instructional designs which they call “a theory of design layering”. They briefly describe their design approach and examine its implications for daily practice with the relation of instructional theories to instructional design. They think that several conceptions in design literature remind us “the figure of the blind gurus and the elephant” and almost 40 years, application of processes and category systems was the dominant metaphor of instructional design. However, alternatives emerge recently as they provide a different way of looking at the elephant. The instructional theory design they offered aims to accomplish following goals:

- “Giving designers a tool to create quality designs more consistently,
- Facilitating communications about designs and theories,
- Allowing designers to work efficiently in design teams with a greater degree of mutual understanding,
- Suggesting functionalities for more advanced and productive design tools,
- Allowing experienced designers to convey design knowledge and judgment to novices more quickly.”

Gibbons and Rogers provide a set of propositions about their design theory here since they submitted a full treatment of their approach as a chapter in “Instructional-design theories and models, volume III” book edited by Reigeluth and Carr-Chellman. Two of the propositions they provide include, dividing design problem into sub-problems of solvable size and decomposing the functional design problems as Gibbons described (content, strategy, control, message, representation, media-logic, data management). As a benefit of this approach, design includes successive constraint placement since “each design includes its own unique combination of layers at the most detailed level ... layers are created or destroyed according to the decisions and dynamics of a given project”. Gibbons and Rogers cited that instructional theories consist of sets of specialized, mutually-consistent design languages including defined terms among multiple layers which correspond to design layers.

By thinking this similarity of instructional theories and design layers, they noted that “design theory provides the structural framework within which specific instructional theories can be analyzed and compared.” Gibbons and Rogers’ theory of design layering seems worthwhile for further reading and elaboration as a whole.

In the third chapter, Clarke and Dede mention the importance of innovation's "scaling up" which means adaptation of a successful innovation in local settings, various contexts. They discuss a research framework for how to design for scale in education and offer a case study on the "River City MUVE" curriculum, which is a technology based innovation designed to enhance engagement and learning middle school science as they reported. River City is multi-user virtual environment (MUVE) aims to teach middle school science (HU, 2007). In this environment, students interact with digital artifacts such as online microscopes via their "avatars" simultaneously. They can travel in the timeline and use their scientific knowledge and tools to solve illness problems of River City residents. Research findings reveal that the students in the River City treatment are engaged in scientific inquiry and in higher-order thinking skills. As the researchers express, through design-based research strategies they are determining what contextual variables constitute conditions for success in implementing River City and developing heuristics for robust variants in settings. I think this study is remarkable with its design approach and case study findings.

The fourth chapter by Jonassen reminds us what the meaningful learning is and how it occurs. It is indicated that "meaningful learning occurs when learners are active, constructive, intentional, cooperative and working on authentic tasks". He discusses the concept of mental models and adds that representing an individual's mental model; several forms of evidence are needed.

These forms are; structural knowledge, performance/procedural knowledge, image of system, metaphors, executive knowledge, beliefs, collaborative group mental models, activity-based knowledge, conversational/discursive knowledge, social/ relational knowledge and artifactual knowledge.

He implies that "an important goal of all educators and especially technology educators is to help learners to develop their theories about how the world works, that is to construct mental models."

Afterwards, he specifies the ways that models can be used to facilitate mental model construction and describes a number of environments such as ThinkerTools, EcoBeaker, Agent Sheets and other micro worlds. For example, Thinkertools as a type of microworlds is "both a computer-based modeling tool for physics and a pedagogy for science education based on scientific inquiry" (Mediawiki, 2009). He concludes that mental models are the best evidence for meaningful learning and with the help of model-based software applications, students can effectively build their internal mental models of the phenomena they are studying.

Strobel and Tillberg-Webb, in the fifth chapter, emphasize the socio-cultural implications of technology integration (which are usually neglected) and claim that the importance of developing a humanizing framework of instructional technology is in that it empowers each educator to critically evaluate his/her beliefs about technology. The humanizing framework they provide is considered to serve as the starting point for reflection on the impact of human interaction in educational technology practice.

The sixth chapter introduces us online professional development courses for teachers grounded in an inquiry-based learning model called "Learning to Teach with Technology Studio (LTTS)". Wise et al. examine this system's role of collaboration in learning in online environments. Their 9-year studies' resulted that in this context, individual mentoring, rather than a peer group, works better to meet the teachers' goals. They concluded with the contribution of LTTS as a rich learning environment not only for their participants but also for them and researchers as well.

Goldman and Dong, in the seventh chapter, calls the readers to reconnect the underlying epistemologies of learning, teaching and research through a deeper understanding of the points of viewing theory (POVT) meets multimedia representations of teaching, learning and research. They claim that with the digital video evolution and social networked cultures; learners, teachers and researchers in distributed communities will gain knowledge and tolerance of diverse ways of living through learning about each other.

In the eighth chapter, Reigeluth, Carr-Chellman, Beabout and Watson compare a number of systemic change approaches to K-12 school innovation ranging from idealized design to leveraged emergent design, school-wide to district-wide transformation and key-leader directed to broad-stakeholder-directed transformation. Their intend is not to recommend one of them, but stimulate discussion and understanding each of them from many aspects.

Morrison, Ross and Lowther, in the ninth chapter, provide that their 3-year implementation of a one-on-one laptop program in a Midwestern school district came up with the finding that a technological innovation can serve as a change agent in making learning more problem-based and constructivist. Interestingly, the students who owned laptops and transformed classroom environment got better in writing and problem-solving comparing to control group students.

The tenth chapter by Yamagata-Lynch and Smaldino outlines how the use of activity systems analysis in K-12 school and university partnership evaluation meetings affected participant communication process. In the eleventh chapter, Driscoll first introduces himself and then overviews the chapters in this book with his comments. And he complains about the educational policies such as "Pay for Performance". He states that affecting school performance, however, is the critical shortage of teachers in the state. Such comments need to be considered by decision-makers in education worldwide.

In the last chapter, Foshay commented on the chapters in this book and he outlines three major themes run through the chapters which are:

- "We have moved from a process orientation (the systems approach) to a design orientation.
- We are learning how to connect context with design.
- We are learning to deal with the important, not just the interesting."

And he notes that now we are in the age of complex cognitive learning and expertise.

The audience of the book perhaps includes anyone who wonders how instructional technology can provide really effective and meaningful learning in several domains and what has not been covered enough yet in instructional technology era. Therefore,

I would like to note that the book helps closing a gap in the instructional technology research for the 21st century with many implications from case studies and experimental studies with students and teachers. And finally, I think it is nice and promising to hear these for the future of instructional technology era that *"technology, by itself, is not going to make a real difference"* (Moller) and *"we are learning to deal with the important, not just the interesting"* (Foshay).

I wish that all instructional technologists, instructional designers and policy makers take (at least) these into consideration for future curricular activities and reflect upon the role of IT in 21st century learning contexts with the help of IT research findings and developments.

REFERENCES

Mediawiki (2009). ThinkerTools–EduTech Wiki. Retrieved in March 23, 2010, Available at <http://edutechwiki.unige.ch/en/ThinkerTools>

HU (Harvard University) (2007). The River City Project: Introduction. Retrieved in March 23, 2010, Available at <http://muve.gse.harvard.edu/rivercityproject>

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