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Handbook of Research on Educational Communications and Technology

(Book Review)

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As a variety of information and communication technologies (ICT) have been emerging and evolving in different contexts and fields, it is estimated that ICT integrated education will become normal in entirely online learning environments and in blended courses over the next five to ten years (Mayadas *et al*, 2009). In terms of research and development in educational technology (ET), the pioneers and some practitioners have already been experiencing it for several decades ; however, in terms of the paradigm shift in ET research and development, we have travelled only a short distance down the path of a thorough educational and conceptual reconfiguration (Ely, 2008). Hence, research concerning how to choose, use, design, develop, implement, manage, and evaluate appropriate ICT with cutting-edge methodology and theory—in learning, instruction, training, and beyond—has become necessary and crucial in the diverse and broad field of ET (Liu, 2008).

This is the third edition of a *Handbook*, with the first appearing in 1996, and the second in 2004. The latest edition reflects the fact there that there have been a number of new technological developments and innovative educational utilizations of emerging ICT over the last few years. There are 56 chapters in the six major parts of the *Handbook*, with a total of almost one thousand pages. The wide-ranging contributions in this third edition show that it has met the needs of the nearly 200 members of the Association for Educational Communications and Technology (AECT), who provided (a) their feedback on the second edition, and (b) details of what they would like to see in this new edition, which were collected via an online survey. This strategy for updating the work effectively illustrates the thoughtful efforts of the four co-editors, all of whom are well-established ET scholars.

This *Handbook* may be viewed as one of the most thought-provoking works of the current ET research paradigm. It is not only a collaborative and insightful academic handbook comprised of numerous research inputs, but is also a professional association-led (AECT) collection of many research outputs. Obviously, the aim of this comprehensive *Handbook* is to provide state-of-the-art analyses, syntheses, and summaries of the theory and practice of ICT use in education and educational research in the U.S. and other countries. It systematically introduces and discusses the relevant (a) foundations, (b) strategies, (c) technologies, (d) models, (e) design and development, and (f) methodological issues of ET in education and educational research, with a special focus on each of these six major areas. Therefore, novice and experienced practitioners and researchers, as well as other interested faculty members, graduate students and readers, may find much of value in the way that this work highlights the meaningful interrelationships and relevant forms among users (including instructors and learners), ICT applications, and situated learning contexts that promote and enhance traditional and innovative technology-enhanced learning and instruction.

What makes this edition especially valuable is that the theoretical focus of the *Handbook* is provided in a series of chapters on the historical and theoretical foundations and evolution of this broad and engaging topic. As a trans-disciplinary field, ET has been criticized by some for a lack of solid theoretical foundations (Mishra & Koehler, 2006). Fortunately, the seven chapters in "Part I: Foundations" provide a series of convincing historical, theoretical, and philosophical concepts, along with their background and development, in order to offer multiple perspectives on ET. The main purpose of the these chapters is to help this professional field establish a fundamental knowledge base—as drawn from the past and present academic, educational, and inquiring experiences in ET and other relevant disciplines. Consequently, interested researchers and practitioners can utilize this knowledge to meaningfully

construct their own views on ET research and development. For instance, Chapter 1 reviews the historical foundations of this field, taking a broad view of educational media; Chapter 2 analytically explores the theoretical foundations of this field in four relevant areas (including the psychology of learning, communications theory, human-computer interaction, and instructional design and development); Chapter 7 meaningfully constructs the philosophical foundations for the ET field with the seven philosophical perspectives (including Objectivism, Realism, Empiricism, Rationalism, Idealism, Relativism, and Pragmatism) and the five psychological perspectives (including Behaviorism, Cognitivism, Cognitive contructivism, Sociocultural/historicism, and Situativity theory). Readers will benefit from the clearly structured overview of the milestones and key players in the foundation, development and evolution of ET that is presented in this part of the work.

Most of us realize that the aim of ET is making effective and efficient use of appropriate ICT in various situated learning contexts for educational purposes. In "Part II: Strategies", readers may learn a variety of helpful instructional or learning strategies that can be used in specifically defined learning environments. The authors do a great job in these seven chapters of clearly demonstrating the use of various strategies, with vivid and inspiring descriptions, explanations, and examples. For example, Chapter 8 uses illustrations and figures to demonstrate how to apply research-based guidelines to support learning with various types of media. These guidelines are derived from four related learning theories: (a) information-processing theory, (b) dual-coding theory, (c) cognitive load theory, and (d) Baddeley's model of memory. In addition, Chapter 14 discusses comparisons of Merrill's first principles of instructions and other recently developed instructional design principles, in order to stimulate more rigorous research to evaluate the validity of such principles. These research-driven strategies and guidelines for real practices consciously and concisely offer critical thinking with regard to the design and development of ET, all embedded in the form of the tactics, models, figures, and tables that are used throughout this part of the book.

The sixteen chapters in "Part III: Technologies," which constitute the largest part of the *Handbook*, identify, introduce and discuss the so-called "upstream technologies" (referring to analysis, planning, and design) as well as "downstream technologies" (referring to development, deployment, and evaluation), by considering various ICT uses in education. Some prominent topics in this part include programmed technologies, computer-mediated technologies, knowledge-based technologies, blended learning, adaptive technologies, learning objects, and open source and open standards. These upstream and downstream technologies can be treated as what Heinich *et al.* (1999) term "soft technologies" (which refers to well-designed instructional processes, models and techniques that are developed with behavioral and social methods and theories in mind in order to bring about desired outcomes with the use of hard technologies, which are composed of hardware and software). In these chapters, readers will learn from the clear descriptions and commentary on the current use of various ICT tools with upstream and downstream technologies, as well as their impact on education.

In recent years, autonomous learning has received growing emphasis, so models that can guide, promote, and enhance effective and efficient learning are desired. Interested readers will find "Part IV: Models" valuable and important, because it introduces various new approaches to facilitate learning that are designed to be used in schools, universities, workplaces and beyond. These new models and approaches are well-designed and -developed in terms of soft technologies, with or without the use of ICT. Readers will explore the current prevailing research topics, including cooperative learning models, cognitive apprenticeship approaches, adaptive instructional systems, problem-based learning, performance improvement approaches, resource-based training, and domain specific approaches in this profession-oriented part of the work.

Practitioners and researchers may be curious as to why some stakeholders are doing better than others in similar contexts and situations, what the best practices are for these professional activities, and how they can develop themselves to become professional educational technologists or instructional designers of ET. The eleven chapters in "Part V: Design and Development" focus on the research towards professional practice and development in this field. Readers will realize the high-quality know-how from several significant dimensions of instructional design and technology, including instructional design competencies, task analysis, performance assessment, evaluation models and methodology, system design for changes, and others.

One of the apparent advantages of this *Handbook*, and of "Part VI: Methodological Issues," is that the research paradigm in technology-enhanced learning and teaching, and the relevant research on it, are consciously and explicitly introduced and discussed. Readers will benefit from the four chapters on theory development, research designs, data collection and analysis, and foundations for the future in this part of the work. Chapter 54 especially

focuses on the recognized research paradigms and the paradigm shift in research with regard to instructional design and methodological approaches of ET in this ever-changing professional field. This chapter also provides help on how to identify, design, and investigate research questions—in order to choose the appropriate method with regard to quantitative, qualitative, or other inquiry research. Just as Shih *et al*. (2008) try to identify the current research trends and possible new research directions for e-learning studies, the eight co-authors of Chapter 54 discuss the research papers published in the *Educational Technology Research & Development* between 1994 and 2005 to provide new research directions and research topics, along with the relevant research methodologies and issues. Moreover, readers will learn much important know-how with regard to how to collect and analyze formative data in various phases of their inquiries in Chapter 55.

In terms of structure in this *Handbook*, the four co-editors arrange related topics in the same part in order for readers to systematically capture the overview and the main ideas of the related chapters. In terms of format within each chapter, the co-authors thoughtfully provide an abstract, keyword definitions, an introduction, the main texts, and references, so that readers can better understand the content and be able to continue reading further on their own. Theoretically speaking, this well-chunked food for thought will certainly inspire readers' reflections on the information it contains. Technically speaking, the add-on information in each chapter means that they are all clearly organized texts that provide the key terms and main concepts in each of the well-specified domains and areas that they cover.

One minor shortcoming of this *Handbook* is the lack of an introduction to cutting-edge technologies and their possible applications in education, as well as how we can learn from them. For example, context-aware ubiquitous computing technologies (Hwang *et al*., 2009; Liu & Hwang, 2009) foster immediate learning by using sensors and RFID readers and tags, or by using the Global Positioning System (GPS; Ogata *et al.*, 2008). But educational applications of these two types of new ICT are lacking in the *Handbook*. Although such technologies are not yet in common use, possibly due to issues of cost or inaccessibility, I believe that most readers would enjoy the opportunity to learn more about possible directions in formal and informal learning with the most advanced technologies, and hope that the next edition of the *Handbook* will provide such a chapter.

I would also like to suggest that a more comprehensive survey should be conducted in order to receive a broader perspective concerning the research methodologies and topics that should be included in the next edition, as well as new ways to develop or identify such research tools and directions. Maybe the editor of the next edition of the *Handbook* or other interested authors should conduct an online survey of AECT members and non-members, and of researchers and practitioners in developed, developing, and under-developed countries, in order to uncover unexplored or unidentified research issues and directions in ET and ICT. This would then make the next edition even more useful in enabling readers to conduct novel or innovative studies based on emerging ICT in a broad range of contexts, learning situations and educational settings.

However, these are minor criticisms, and overall I feel that the *Handbook of Research on Educational Communications and Technology (third ed.)* could well be *Educational Technology & Society*'s Best Research Handbook for 2009, if such an award existed. I highly recommend this collection of so many excellent works at such an affordable price to all novice and experienced stakeholders, graduate programs, and university libraries in our field and beyond, as I am convinced that it will enable readers to conduct innovative and beneficial research in educational communications and technology.

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