EDUCATIONAL TECHNOLOGY - CONCEPTS
AND IDENTIFICATION OF VOCABULARY IN THE DOMAIN*

Lam Thi Hoa Binh**

*VNU University of Languages and International Studies,
Pham Van Dong, Cau Giay, Ha Noi, Vietnam*

Abstract: The term *educational technology* (ET) has been mentioned in recent decades, but its concepts are many and keep changing over time. Pedagogic improvements to meet the needs of theoretical and practical knowledge in new professions and the ever-evolving technology of information and computer have made educational technology incredibly dynamic. On analyzing a number of notable concepts of educational technology having been used in Vietnam and in the world, the article specifies the widely accepted definition of educational technology in the 21st century, clarifies its typical features as a foundation to identify the scope of specialized vocabulary which can be used to compile handbooks and dictionaries to fill the gap of ET specialized lexicography in Vietnam.

Key words: educational technology, concepts, specialized vocabulary, lexical units

1. Introduction

The 21st century witnesses the expansion of technology with vigorous impacts on the economy as well as many aspects of socio-political life around the world. Craig Rock (2018) wrote "*when it comes to technology, one thing you can count on is that nothing is going to stay the same*". Technology does not only change people's habits, activities but also their mindset. In industries, rapid development of technology requires thorough understanding and practical application of huge amount of knowledge. The shift from mass production to knowledge economies (Organisation for Economic Cooperation and Development, 2013) puts constant pressure on education in changing its concepts, forms and even contents.

Meanwhile, in education, the presence of technology gives way to a revolution in teaching and learning methods, teaching information exploiting techniques, learning assessment, and creates significant changes in educational concepts. High integration of information technology in teaching tools, methods and techniques combined with teaching contents formed in a multi-dimensional interaction space between learners and teachers in diverse academic environments is gradually replacing the conventional methods and contents. Moreover, the limitless resources from unceasingly connected multimedia media keep changing instructors' and learners' perception and approach to knowledge. All the theoretical and practical changes in education are reflected in educational technology. Therefore, learning about educational technology is indispensable for education growth in the digital age.

** Corresponding author.
Email address: binhlth1973@vnu.edu.vn

In Vietnam, the Government's Resolution 29-NQ/TW dated 4 November 2013 brings out a fundamental solution in higher education reform to the year of 2020 emphasizing the renewal of contents, methods, training procedures, educational management, and enhancing scientific and technological activities. On 25 January 2017, the Prime Minister's Decision Nº. 117/QĐ-TTg approved the Project of "*Strengthening the application of information technology in managing and supporting the activities of teaching, learning and scientific research to improve the quality of education and training in the periods of 2016-2020 and up to 2025*". On 15 January 2019 the Prime Minister approved the Project of "*Improving the quality of higher education in the period of 2019-2025*" emphasizing the enhancement of scientific and technological activities to support innovation in teaching, training management and technology transfer. These legal documents reinforce the importance of technology in education, as well as the need to access new knowledge in research and education management.

The term of *educational technology* (ET) has been known for decades but occasionally defined in Vietnam. Since it was first introduced as instructional techniques in elementary education, there have been few other definitions whereas the international efforts of giving a complete definition of ET still continue. In fact, inconsistent viewpoints of ET make it complicated to identify the scope of the study and the specific vocabulary used in the field. On analyzing common ET concepts and its scope of study, the article singles out a widely accepted concept of ET and defines the range of vocabulary in the domain for lexical compilation in handbooks and dictionaries.

2. Educational Technology Concepts and Definitions

2.1. Technology and Educational Technology

The early concepts of ET and its application was first introduced in the early 20th century in Western Europe, the United States, and Russia to fix the weaknesses in traditional teaching, develop learner-centred techniques and methods for more effective teaching process (Pham, 2012). Until recently, ET has at times been referred to as teaching tools, namely projectors, TV screens, interactive whiteboards, etc. However, the word "technology" brings more senses than such tangible objects. Various viewpoints of technology can be seen through definitions in such dictionaries as Oxford, Webster's, Collins, etc. The Oxford English Dictionary (online) (n.d.) defines "technology" as "*the application of scientific knowledge for practical purposes, especially in industry*". Several other dictionaries, such as The American Heritage Dictionary (2009), Collins Dictionary (2003), Random House Kernerman Webster's College Dictionary (2010), refer to technology as "*applications, methods, theories and practices used to achieve desired results, especially in industry and commerce*". From social research perspective, Luppicini (2005) defines "technology" as "*the organization of knowledge to achieve practical goals and also the tools and techniques to do so*" (p. 104). The above concepts synthesize the concepts of technology in many aspects of scientific knowledge, methods, theories, practices, and even the organization of knowledge to achieve certain goals.

In Vietnam, the term "technology" was considered coming from the field of industry and defined as "*general methods to produce, create, change the condition, character or form of materials or semi-product in manufacturing process for the finished*" in Vietnamese Dictionary written

by Hoang (1992, p. 218). The concept of technology was marginally changed in 1999 when it was described as "*the common names of manufacturing methods…*" (N. Y. Nguyen, 1999, p. 456). Though there's little change in definitions of technology in printed Vietnamese dictionaries, some Vietnamese online dictionaries have caught up with the up-dated notion of technology. However, the term of ET has not yet been defined in printed editions.

The difference in the concepts of technology and the expansion of such viewpoints in various fields undoubtedly result in the diversity of ET concepts over the decades. According to ET researchers and practitioners, giving an official definition of educational technology is not simple for three main reasons. Firstly, it (ET) is developed from the field of application. Therefore, unlike most sciences which base on one defined theoretical foundation, educational technology adopts theories from more than one profession and field. In the process of merging, these theories and their significance are probably reshaped. Secondly, rapid development of scientific majors that constitute ET entails a series of intellectual and conceptual changes. It is a great challenge to form an updated definition covering all the new features. Thirdly, the definition of educational technology must reconcile the tangible and abstract conceptions of ET as modern tools as well as advanced processes. Broadly speaking, the ET concept should be approached from both material and conceptual perspective. Contradiction of the two distinct components may lead to confusion in definition or dealing with concepts that go beyond the domain.

2.2. Prominent Concepts and Definitions of Educational Technology

One of the popular concepts in educational technology is associated with the success of the audio-visual revolution in education and training programs starting from the First World War with the development of mastery learning and programed instruction in the 1950s pioneered by Skinner and James Finn (Robey et al., 1978; Reiser & Dempsey, 1987). The first concept of ET was closely linked with audio-visual communication. Ely (1963, pp. 18-19) stated "*audiovisual communication is the branch of educational theory and practice concerned with the design and use of messages which control the learning process*". This definition merges the fields of communication and education in a way that their messages, theories and application were used to support the learning process. The term of ET is not apparently demonstrated but hidden in educational theory and practice, and considered a branch of the industry.

Early attempts to clearly define ET are AECT's (Association of Educational Communications and Technology). The expansion of ET activities in the 1970s brought more evidence for the judgement that ET was no longer recognized as a branch but a field of study: "*Educational technology is a field involved in the facilitation of human learning through systematic identification, development, organization and utilization of a full-range of learning resources and through the management of these processes*" (AECT, 1972, p. 36). Similarly, Mitchell (1972) described ET as a field of study and practice connected to all aspects of an educational organization, system and process in which the resources allocated for certain educational outcomes could be widened.

From system perspective, ET is assumed to expand beyond specific teaching objectives. In 1977, ET's definition was restated as "*a complex, integrated process involving people, procedures, ideas, devices and organization for analyzing problems and devising, implementing, evaluating and managing solutions to those problems*

involved in all aspects of human learning" (AECT, 1977, p. 1). In conformity with this conception, there are definitions describing the process of learning development and management using instructional designs and assessment (Banathy, 1996; Michell, 1972; Plomp & Pals, 1989). Plomp and Pals (1989) specify ET on three mutual interactive aspects including: i) technical facilities developed to support teaching and learning process; ii) processes used for instructional development, design, and assessment; iii) synthetic theories to analyze and solve problems in specific contexts from different perspectives and correlations.

Other studies on ET take into account the entire research, teaching and learning activities both in theory and practice on the basis of technological resources (Richey, Silber & Ely, 2008). In 2007, the nature of ET practice was noticed in the definition by AECT. *"Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources"* (Januszewski & Molenda, 2008). Moreover, approaching ET for specific fields of study namely teaching methodology, educational psychology, communication technology, computer technology, etc. also draws considerable attention (Dusek, 2006; Hickman, 2001; Hlynka & Jacobsen, 2009; Lakhana, 2014). Researchers at the University of New Delhi (India) refer to educational technology in a broader sense that it *"includes the development, application and evaluation of systems, techniques and aids in the field of teaching and learning. The shape of the future education system is associated with drastic changes under the influence of technology"* (Indira Gandhi National Open University, 2009, p. 5).

The frequent changes in ET concepts show the gradually broadened perception of the field for more complete in scope and more detailed in its approach. The ET concepts are not only specified from the concrete technology of realia, equipment, media, software but also from abstract notion of knowledge, methods and creative thinking within the field to maintain, develop and improve educational activities. The concept of Brückner (2015) generalizes most characteristics of ET in a definition that *"educational technology refers to all valid and reliable educational science such as equipment, as well as processes and procedures, that are derived from scientific research, and in given context may refer to theoretical, algorithmic or heuristic processes. Educational technology does not necessarily imply physical technology"* (p. 1).

Meanwhile, in Vietnam, the early ET conception was initiated by Ho (1994) as instructional techniques in *"organizing and controlling the teaching process by a technical procedure handled by professional solutions or pedagogical skills"*. Though it has been applied successfully for decades in a number of primary schools in Vietnam and realizing psychological and educational theories in teaching and learning, the ET merely shows processes and techniques to teach two particular subjects (maths and Vietnamese) for first grade learners. Therefore, it deals with only part of a broader phenomenon called educational technology in the 21st century.

Similarly, recent research in Vietnam carried out by C. T. Nguyen (2002), Pham (2008, 2012), Ngo (2012) and some other educators, notifies the existence of up-to-date concepts of ET yet mainly focuses on instructional techniques. In the book of *Instructional Technology*, Ngo (2012) affirms that the definition of educational technology has much broader meaning than instructional technology but does not mention what ET is. Four out of six chapters in the book concentrate on the process of instructional design, using multimedia technology in teaching, and designing

electronic lectures employing teaching software. According to Pham (2012), learning technology should be designed to control the learning process to change the learning procedures from "Teacher lectures – learner remembers" to "Teacher designs – Learner applies" and that the teacher's design should be applied by any learner to make a desired product even with or without teacher's presence.

2.3. Characteristics of Educational Technology

The prominent ET concepts and definitions show that ET covers a vast scientific area not only within education but also other fields related to it. From technological perspective, technology either comes from a separate science applied in education to support teaching activities known as technology in education or from education itself to change educational theories and practice known as technology of education.

Technology in education specifies its application in research, manufacture and production that affects many aspects of the teaching process especially in instructional activities. It can be specialized as:

- Hardware like machines, tools and equipment for teaching and learning, such as computers, tablets, projectors, realia, connection devices, terminals, etc.

- Software such as computer programs, computer-based or online teaching-learning management systems, digital resource management systems, educational administration systems, etc.

- Instructions, guidelines, training notes supporting educational activities, manipulation and management that go along with the above-mentioned tools and systems.

Technology of education is not an external factor. It is a system of approaches to educational issues and stays in learning designs, assessment and management. It contains knowledge and understanding of teaching and learning methods, assessment, educational psychology, communication and information theory which are used as basis in teaching practice, utilizing equipment and forms to exploit different skills effectively and applying them to impart and acquire knowledge.

The interaction between the external and internal technology in education results in higher integration between them. The concept of technology integration in education and the application of TPACK (Technological Pedagogical Content Knowledge) at schools worldwide is an example showing the unification of technology in education. Then, there would be changes in educational theories, methods and even philosophies to meet the needs of various scientific fields in the education system. In fact, ET is becoming a systemic entity dealing with management, operation, improvement and development of education and represents itself in:

+ *Supporting educational activities* by providing means and types of communication as well as educational methods in different learning contexts. In every teaching-learning environment, regardless of face-to-face, online or out-of-school environment, a discipline develops its own instructional methods supported by equivalent technological tools and equipment. Online interactive facilities, virtual classrooms, learning management systems (LMS) ensure effective performance of teaching and learning in all conditions.

+ *Synthesizing multidisciplinary theories* on education, psychology, philosophy, technology, communication and related fields of study. On integrating technology with other disciplines, teaching and learning theories in the area may be adapted to fit the requirement of the new environment.

+ *Having high applicability* for always being adjusted to the growth of science and technology through application, development and improvement of instructional methods, techniques and theories to obtain best efficiency. The most obvious example is the development of interactive technology from the beginning of the century. Applications such as virtual classrooms, online forums, synchronous and asynchronous interactive technique, etc.,. break most of the principles in a traditional classroom, establish new activities, approaches to knowledge and equivalent form of management and evaluation.

+ *Improving education* in a comprehensive way, for it is located in the correlation between many fields of research and application. The development of one field may bring about systemic changes and improvements to the whole industry.

+ *Keeping on changing* with the development of science, technology and their components. At that time, not only the teaching content needs to change, but also the teaching methods, manipulation techniques or applications. The continuous development of science and technology will result in corresponding effects on education, especially specialized education.

The ET concepts, its definitions and characteristics are crucial information to help define ET and its scope of study. The information is also used as background to identify ET in term of language in general and specialized vocabulary in particular.

3. Lexical Studies and Vocabulary Identification in Educational Technology

3.1. *Lexical Studies in Educational Technology*

In lexicography, a small amount of ET specialized vocabulary has been included in education dictionaries in recent decades, such as *Dictionary of Education* (Wallace, 2015); *Family dictionary of Education Terms* (The Office of the Education Ombudsman, 2011); *Greenwood dictionary of Education* (Collins & O'Brien, 2003); *Education Dictionary* (Georgia School Boards Association - GSBA, 2012); *Encyclopedia of Educational Theory and Philosophy* (Phillips, 2014),… However, meanings of most ET keywords can only be found in monolingual or bilingual computer technology dictionaries such as *Dictionary of Computer and Internet Terms* (Rigdon, 2016), *Information technology dictionary – English - Vietnamese* (Dong & Luong, 2015), *French dictionary of Information Technology* (Pyper, 1989), *Elsevier's dictionary of Industrial Technology* (Philipsborn, 1994),... or online technology dictionaries such as *TechTerms computer dictionary, IT dictionary for Computer Terms and Technology, IT terminology, Dictionary Plus Science and Technology* (Oxford University, 2016),… The number of lexicographic materials on ET vocabulary is limited, including printed dictionaries, online glossaries, dictionaries, handbooks, and encyclopedias, such as *Dictionary of Library and Educational Technology* (Rosenburg & Elsbree, 1989), *Interactive techniques* (Yee, 2020)*, Essentials of Instructional Technology* (Malik & Pandith, 2011; Rather, 2004), *Edshelf* (n.d.)*.* Notable publications focusing on ET concepts and terms are several, comprising *A Handbook of Educational Technology* (Ellington, Percival & Race, 1993 & 2005), *The Educational Technology Handbook: A comprehensive Guide. Process and Products for Learning* (Hackbarth, 1996); *The K-12 Educational Technology Handbook* (Ottenbreit-Leftwich & Kimmons, 2020)*, Encyclopedia of Educational Technology* (Kovalchick & Dawson, 2004; Spector, 2015).

In ET lexical publications, linguistic contents are categorized in two main areas of education and technology. The knowledge is allocated in chapters and sections showing

minor lexical arrays of educational activities, pedagogical theories, technological pedagogical content knowledge (TPACK), educational and technological management, legal and ethical issues in online education. In each section or chapter, there are headwords or entries with full explanation, meanings and information of the words' origin and usage, etc. The books demonstrate all facets in education as well as educational components and participants. It also shows the interdisciplinary nature of ET in combining all educational activities (not just instructional activities), specific knowledge and theories, research activities with technology.

It is worth noticing that the current ET dictionaries and encyclopedias do not comprise a big sum of entries, and the entries of education outnumber those of technology. Moreover, the entries of technology focus more on the techniques applied in educational management than in techniques and technological procedures used in the field. Regardless of how large the volumes are, the number of entries in most lexical publications is limited (about 300-400 entries), and barely adequate to meet the current needs.

In Vietnam, though the term of educational technology was known in late 1970s, modern theoretical researches on ET are occasionally made. Therefore, ET materials such as books, dictionaries and handbooks are almost vacant. The *Dictionary of Education* compiled by V. G. Nguyễn (2001) is one rare publication on education collecting vocabulary in the domain. However, lexical units on ET can hardly be found in the dictionary.

Generally speaking, the current ET researches show more ET lexical studies abroad than in Vietnam. This causes a shortage of information as backbone knowledge for further studies in terms of

concepts and lexicography. Nevertheless, despite the large number of ET publications, most foreign materials do not meet the needs of the majority of Vietnamese people in consulting new terms and concepts in native language. Monolingual ET handbooks and dictionaries in English focus on complicated terms and concepts which are considered up-to-date in developed societies while most Vietnamese readers are in need of basic ET words, terms and usage for immediate understanding. Another factor that makes foreign ET materials hard for Vietnamese readers is the affluence of information provided in each entry. Filtering long passages for a small piece of concept or information takes time and effort and sometimes is irrelevant to common readers. Therefore, it is significant to promote basic research and lexical studies to help educators and researchers in Vietnam acquire ET knowledge comprehensively and effectively.

3.2. ET Vocabulary Identification

From the lexical studies which have been carried out so far, it is worth noticing that the scope of specialized vocabulary in a certain major is generally determined by the scientific areas it focuses on. These areas are defined in concepts, definitions and basic theories of the major. On compiling a lexicon, based on typical resources of the field such as specialized documents, materials of different forms, the vocabulary will be gathered. However, this does not mean that every single word appearing in the field is recorded in the edition. Each edition has its own system of entries with a particular classification depending on the size of research, the purpose of usage, specific lexical units selected, and relevant information provided in each entry.

Similarly, selected lexical units in ET should reflect the main aspects of education and technology. From the recent concepts and definitions specified by AECT,

Brückner (2015), we limit the fields related to ET and decide materials for vocabulary collection. In our small-scale research, we confine the number of documents and materials to a practicable level. All the words in the 12 materials comprising glossaries, dictionaries, encyclopedias and handbooks on education, technology and educational technology are analyzed by the concordance AntConc 3.5.9 to get 368,397 tokens[1] shown in 14,616 word types[2]. Among the high frequency word forms, we exclude functional units which have no lexical meaning but most commonly used in all types of text. The hapax legomena are also counted out. Those remains are content words that denote objects, titles, names of units or organization in the education management, characterizing concepts, methods, techniques of teaching, assessment and other educational activities. In this study, we do not tend to separate technical terms or semi-technical units but the lexical units of high frequency in the targeted population (for many of them are used inter-disciplinarily and may not possess unique meaning as technical terms do (Chung & Nation, 2003; Lâm, 2014). Therefore, the selected units can be nouns, nominal phrases and adjective phrases. In technology, names of software, programs, their functions and operation are essential because they show important knowledge recently used in education and how the applications function to realize educational activities. After all, the ET vocabulary can be defined in a lexical system as follows:

1- Lexical units related to education, educational activities and technology of education

- Lexical units describing techniques and methods of teaching.

- Lexical units indicating tools, visual aids, machines, teaching and learning materials.
- Lexical units referred to products of learning, research, recording and evaluating achievements in learning activities.
- Lexical units referred to entities participating in the teaching-learning process, learning management supporting teaching and research activities.
- Lexical units referred to the space and environment where teaching-learning activities take place.
- Names of theories often used in research, analysis, synthesis, and application for changes in teaching methods. They are not pure educational but philosophical, psychological, cultural,…

2- Lexical units related to technology in education

- Names of software, processing programs, technological applications in education.
- Lexical units describing technical parts or structure, operation, manipulation and operation of computer programs.
- Lexical units of information and communication technology.

The combination of education and the technology built in education or simulated educational activities may result in certain overlapping of words and definitions in the two arrays. This makes it difficult to distinguish which words belong entirely to technology from those used only in education. However, the hierarchic classification of ET specific vocabulary in topics and subtopics will provide readers a

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[1] Token: the appearance of one word form or a lexical unit in a reading text, a data bundle or a piece of conversation (Gardner, 2013).

[2] Wordtype: one or more letters clustered to make a unique word form (Gardner, 2013).

broad comprehension of the research system, educational activities and theories, corresponding technologies and the merging tendency of technology in education.

4. Conclusion

In short, theoretical research on educational technology is very necessary in Vietnam in the current time. It helps to define the scope of research and determines the linguistic content for specialized dictionaries. The system of basic concepts and specialized vocabulary in educational technology helps learners grasp essential knowledge in ET and serves as background in research and teaching on digital platforms of the 21st century. It helps boost educational activities to catch up with the progress of digital technology. ET vocabulary identification is the initial step in building bilingual ET dictionaries to support language research, education research, foreign language teaching, and multidisciplinary education in Vietnam.

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Khoa Tiếng Anh, Trường Đại học Ngoại ngữ, ĐHQGHN,
Số 2 Phạm Văn Đồng, Cầu Giấy, Hà Nội, Việt Nam

Tóm tắt: Thuật ngữ Công nghệ giáo dục (CNGD) đã được đề cập trong nhiều thập kỷ, nhưng đến nay vẫn còn nhiều quan niệm khác nhau về CNGD và các quan niệm này luôn thay đổi. Những cải tiến trong phương pháp giảng dạy đáp ứng nhu cầu tri thức trong các ngành nghề mới kết hợp với một lĩnh vực luôn không ngừng phát triển và biến đổi như công nghệ thông tin và công nghệ máy tính đã biến công nghệ giáo dục trở nên vô cùng năng động. Thông qua phân tích một số quan niệm đáng chú ý về CNGD ở Việt Nam và trên thế giới, bài viết xác định khái niệm được chấp nhận rộng rãi ở thế kỷ 21, những đặc điểm nổi bật của CNGD, làm cơ sở cho việc nhận diện phạm vi từ vựng chuyên ngành trong việc biên soạn sổ tay và từ điển, góp phần lấp dần khoảng trống trong nghiên cứu từ vựng chuyên ngành CNGD ở Việt Nam.

Từ khóa: công nghệ giáo dục, quan niệm, từ vựng chuyên ngành, đơn vị từ vựng