The Process and Role of Educational Technology

The article studies the concept and role of educational technology which varies in different educational institutions and countries. In order for educational technology to effectively contribute to the promotion of teaching and learning, it is important that each educational technologist apply the full process of educational technology, covering analyzing problems, needs and existing resources; indentifying aims and objectives; planning and managing learning environment, exploring, analyzing and structuring subject–matter/content; selecting appropriate teaching and learning strategies; selecting, developing, producing and utilizing instructional media, managing teaching and learning processes; and evaluating instructional outcomes.

บทคัดย่อ

บทบาทและขอบข่ายเทคโนโลยีการศึกษา

"เทคโนโลยีการศึกษา" เป็นศาสตร์ใหม่ที่การตีความหมายและขอบข่ายการใช้ยังแตกต่างกัน บทความนี้มีจุดมุ่งหมายที่จะเสนอแนวคิด กระบวนการ และบทบาทของเทคโนโลยีการศึกษาที่จะเสริมประสิทธิภาพการศึกษาให้ดีขึ้น

เทคโนโลยีการศึกษาในฐานะ "ศาสตร์แห่งวิธีการทางการศึกษา" พัฒนามาจากแนวคิดทางวิทยาศาสตร์กายภาพซึ่งเป็นการประยุกต์ผลิตผลทางวิทยาศาสตร์และเทคโนโลยีมาใช้ในการศึกษาและการเรียนการสอน และรู้จักกันดีในฐานะ "โสตทัศนศึกษา" ภายหลังได้พัฒนาการมาเป็นการนำหลักการทางพฤติกรรมศาสตร์ (จิตวิทยา สังคมวิทยา มานุษยวิทยา และการสื่อสาร ฯลฯ) ผสมผสานกับผลิตผลทางวิทยาศาสตร์ และเทคโนโลยีการศึกษาอย่างเป็นระบบ โดยมีการกำหนดขั้นตอนการเปลี่ยนแปลงพฤติกรรมของผู้เรียนอย่างเด่นชัด ด้วยการวิเคราะห์ปัญหา ความต้องการและทรัพยากรที่มีอยู่ กำหนดจุดมุ่งหมาย วางแผนและจัดการสภาพแวดล้อมการเรียนการสอนเลือกและกำหนดกลวิธีการสอน เลือกและผลิตสื่อการสอน ดำเนินการและจัดการเรียนการสอน และประเมินผลการเรียนการสอน

ด้วยแนวคิดทางเทคโนโลยีการศึกษาที่เปลี่ยนแปลงไปจากเดิม จึงจำเป็นต้องนำ "วิธีการจัดระบบ" (Systems Approach) มาใช้กำหนดขั้นตอนการสร้างระบบการสอนที่เด่นชัด

บทบาทใหม่ที่สำคัญยิ่งของเทคโนโลยีการศึกษา มิได้อยู่ที่การผลิตและการใช้สื่อการศึกษา แต่ครอบคลุมการวางแผนการศึกษา การพัฒนาหลักสูตร การออกแบบการสอน การกำหนดกลวิธีการสอน การเลือก ผลิต และใช้สื่อการสอน และการประเมินการศึกษา โดยเฉพาะบทบาทด้านการออกแบบการสอน (Instructional Design) เป็นบทบาทที่กำลังเน้นและส่งเสริมกันในสถาบันการศึกษาต่าง ๆ

เมื่อบทบาทเทคโนโลยีการศึกษาเปลี่ยนไป บทบาทนักเทคโนโลยีการศึกษาจำเป็นต้องเปลี่ยนแปลงไปด้วย โดยทำหน้าที่เป็นผู้ที่จะช่วยให้นักวิชาการด้านเนื้อหาสามารถนำเนื้อหาสาระไปถ่ายทอดให้แก่ผู้เรียนได้อย่างมีประสิทธิภาพ ด้วยการออกแบบ กำหนดวิธีการสอน เลือกและผลิตสื่อในรูปของชุดการสอน และวางแผนการวัดและประเมินการสอนด้วย

ชัยยงค์ พรหมวงศ์

The Process And Role of Educational Technology

Chaiyong Brahmawong[*]

The term "Educational technology" is interpreted and applied differently in many countries in regards to its concepts, scope, and process. This article aims to throw some light on its concept and related process, i.e. systems approach, instructional design, media production, and the role of educational technologists in the teaching and learning process.

1. Concept of Educational Technology

Educational technology is generally thought of as an extension of the so called "Audio-visual Education." In fact, its concept embraces a wider range of techniques in education, both for administration and in instruction.

Have you ever thought of cooking? In the old days, we had to go hunting and fishing for meat and fish. Then, we had to do the cooking along the traditional ways we learned for years from our parents. How about in the area of medicine? Years ago doctors had to grind and mix drugs or medicine for their patients. When the social context changes, many of us can no longer go out hunting and finding food. Doctors can no longer manage to "grind" medicine themselves. Rather, we go to the market and buy meat, fish, vegetables, and concentrate more on being a good cook, and the doctors prescribe the medicines to be prepared by pharmacists. In education, the academics are comparable to doctors. Doctors have the chemists to prepare drugs or medicine for them, but who help the academics to design and give treatment to the content or subject matter (meat)? The answer is, in most case, "no". Academics have to manage to do the "grinding" or "cooking" of subject matter by themselves; and sorry to say, many of them fail to prepare the kind of food tasty enough to be willingly consumed by students. In many lecture halls, students feel sleep and cannot follow what their instructor had to teach them. What most academic needs are the new kind of personnel, educational technologists, who would handle the design, development, and production of course materials based on the "content" provided by the academics. Educational technologists are personnels who apply the concept of educational technology for effective teaching and learning.

Educational technology is a new area of study emerging from the concept of audio-visual education and behavioral sciences. The term "technology" (techno or texere + logos), is literally translated as the "sciences of techniques" making use of applied sciences for operating a certain system or solving a certain problem. Educational technology, as a science of techniques in education, is now a discipline having its own development, nomenclature, structure of content, and mode of inquiry.

1.1 Evolution of Educational Technology Concepts.

Although it had not yet been previously recognized as a discipline, the technique used in education has been in existence for thousands of years since man began to learn how to transfer his knowledge to others. The evolution of techniques may be traced back to the beginning of verbal languages, especially that of writing systems.

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Educational technology evolved from the needs to enhance individuals' learning by using the various techniques and tools to overcome their perception. Realizing the limit of human perceptions, educators have been trying to find ways to help learners learn effectively. Learning from listening, for example, is limited as evidenced from various sayings such as

"Hearing ten mouths is not equal one eye seeing;

Ten eyes seeing is not equal one hand touching;

and ten hands touching is not equal one hand doing."

or

"A picture worths a thousand words."

Since it is clear that man recognizes the limitation of a single perception device and gives emphasis on action oriented learning. This was backed up by some research findings that people learn 75% from seeing; 13% from hearing; 6% from touching; 3% from smelling; and 3% from tasting. The first two, seeing and hearing, are more powerful; thus brought about the introduction of audio-visual aids to help learners learn effectively from both hearing and seeing.

The evolution of concepts in educational technology may be categorized in two aspects: physical sciences and behavioral sciences.

The famous Cone of Experience by Professor Edgar Dale of Ohio State University indicates that people learn better from the more concrete experience such as from direct, purposeful experience, or contrieved, simulated experience, and less effective from abstract experience such as from verbal communication. This was the beginning of physical science concept of educational technology. Educational technology, under the Physical Science Concept, is the process of applying the scienctific and technological outcomes (materials and equipment) in education process. The emphasis is heavily on the use of instructional audio-visual aids or devices in teaching and learning. Consequently, when hearing the term "Educational Technology", one tends to associate it with the term "Audio-visual Education".

Since 1920's, prominent psychologists such as Dr. Sydney L. Pressey, Dr. Normal A. Crowder, and Dr. B.F. Skinner began introducing the concept of "Technology in Education". The well-known new approach was the concept of programmed instruction based on the principles of individual differences. Programmed instruction is a system of education where learning materials, mainly in printed form, are prepared in advance to provide learners with the opportunity to have active participation, immediate feedback, success experience, and gradual approximation. Later, more systematic procedures were developed; blending the original physical science concept to emerge the new behavioral science concept. Educational technology, under the behavioral science concept, is the process of applying communication, psychological, anthropological principles, together with appropriate scientific and technological products, to bring about the most effective behavioral changes for the learners. The emphasis is heavily on "techniques" rather than audio-visual aids.

1.2 Defintion of Educational Technology

Based on the development and concepts mentioned above, the term "educational technology" is presently used in two contexts: (1) a narrow context confining it to media in education, and (2) a broad context as the techniques of education.

In the narrower context, under the influence of the long existence of audio-visual education concept, education technology is thought mainly of the process of media development, production, and use in education. In many universities, the names of Audio-visual Education Departments were changed to Departments of Educational Media or Department of Educational Technology or Department of Educational Technology and Communications, when communication technology become more and more recognized.

In the broader context, educational technology covers the full process of instruction (teaching and learning) from the planning stage to the evaluation stage using the principles of systems approach and instructional design. *In this context, educational technology is the process of applying concepts and principles of psychology, anthropology, sociology, communication in association with scientific and technological products in designing instructional strategies, instructional media, and evaluation of teaching and learning using techniques of systems approach.*

2. The Process of Educational Technology

The process of educational technology embraces eight steps:

(1) Analyzing problems, needs, and existing resources;

(2) Identifying aims and objectives;

(3) Planning and managing learning;

(4) Exploring, analyzing, and structuring subject matter/content;

(5) Selecting appropriate teaching and learning strategies;

(6) Selecting, developing, producing, and utilizing instructional media;

(7) Managing teaching and learning processes; and

(8) Evaluating instructional outcomes.

The above process represent the concept of educational technology being increasingly recognized and put into practice by many educational institutions especially in distance education. In order for educational technology to be effectively applied, systems approach need to be applied as a most vital component of educational technology.

3. Systems Approach in Education

Systems approach is an important tool in educational technology. It is employed to idenify necessary procedure and steps for developing any instructional systems.

You may be used to encountering problems in varying degrees of complexity and they may be either immediate or long term ones in your daily life and at work. You may always wish to move away from the unpleaseant or undesirable situations to the more desirable ones. You may then have to find the techniques to solve the problems or improve your performance so that you can solve the problems and get better outcomes. Have you ever thought of the ways in which you solve your problems systematically? Systems approach is a technique that can really help you accomplish your wish by designing a system to solve your problems or to improve your performances.

3.1 What is systems approach?

A systems approach is the method of designing a new system or improving an existing one for the purpose of solving existing problems or improve the efficiency of the present operation by laying down a set of logical steps that will help accomplish the tasks according to the established goals.

In designing a system to solve problems or improve performances or operation, a series of sequential steps are necessary. First, you have to understand the component of a systems model which may be used as the foundation for developing a new system. The component of a system consists of four main parts : (1) input, (2) Process, (3) Output, and (4) Feedback. (See Fig. 1)
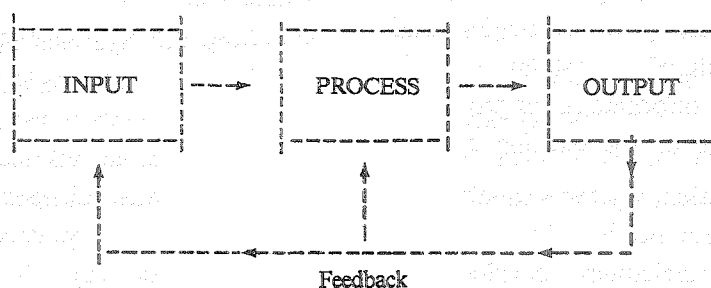

Fig. 1   Components of a system

3.2 Steps in Developing a Systems Model

From the above system component, you may begin to think of sequential steps for solving problems or improving your performances. Here are the four recommended major steps:

(1) conduct a systems analysis, (2) undertake a systems synthesis, (3) construct a systems model, and (4) conduct a systems simulation. (See Fig. 2)
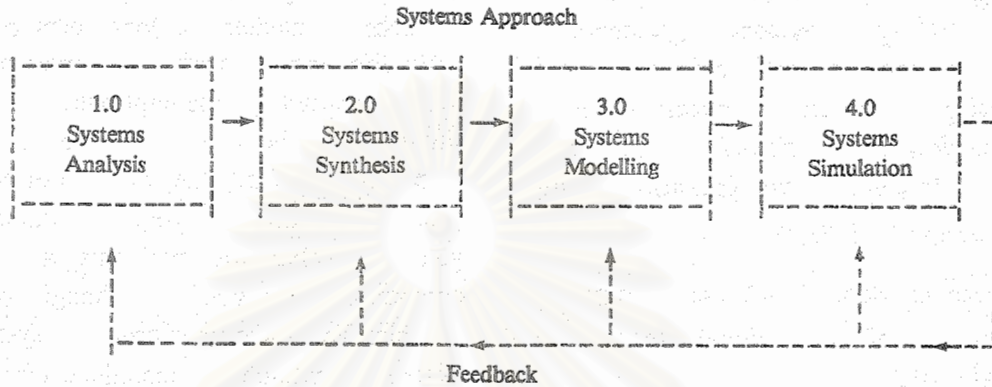
Systems Approach

Fig. 2 Steps in Systems Approach

The four steps for developing a systems model may be described briefly as follows:

Step 1.0 Systems analysis

Systems analysis is the method of identifying parts, components, and their relationships of an existing system using a set of procedures to determine its efficiency and detect possible problems and constrainst that may obstruct smooth operation of the system.

The purpose of systems analysis is to uncertain that the system analyst gets adequate information before proposing any changes which will result in the waste of time, money, and man power. The systems analysis is usually started from outside or the organization by conducting a situational analysis (geographical, demographical, cultural, socioeconomical factors) by analysing the setting in which an organization is situated; followed by organizational analysis (mission, tasks, jobs, strategies and media used). The result of a systems analysis is used as a based - line information for proposing changes or modification of the existing system.

In distance education, systems analysis is used when a new system needs to be developed to ensure effective curriculum development, course and media production delivery, and, evaluation system. It is first step necessary for proposing a new project, system, or for recommending changes.

Step 2.0 Systems Synthesis

Systems synthesis is the stage of creating, designing a new system or improving or modifying the existing system, based on the data and information gathered during systems analysis, by identifying or listing a set of logical steps, identifying new elements or parts, and combining them together with those previously unrelated.

Steps taken during the systems synthesis may include the selection of strategies and methodologies; prioritize steps in sequential order to ensure effective solutions and performances, and identify ways and means for evaluation, and follow-up of the implementation of the proposed new system.

The final outcomes of systems synthesis is the list of steps the new proposed major steps and sub-steps with explanation.

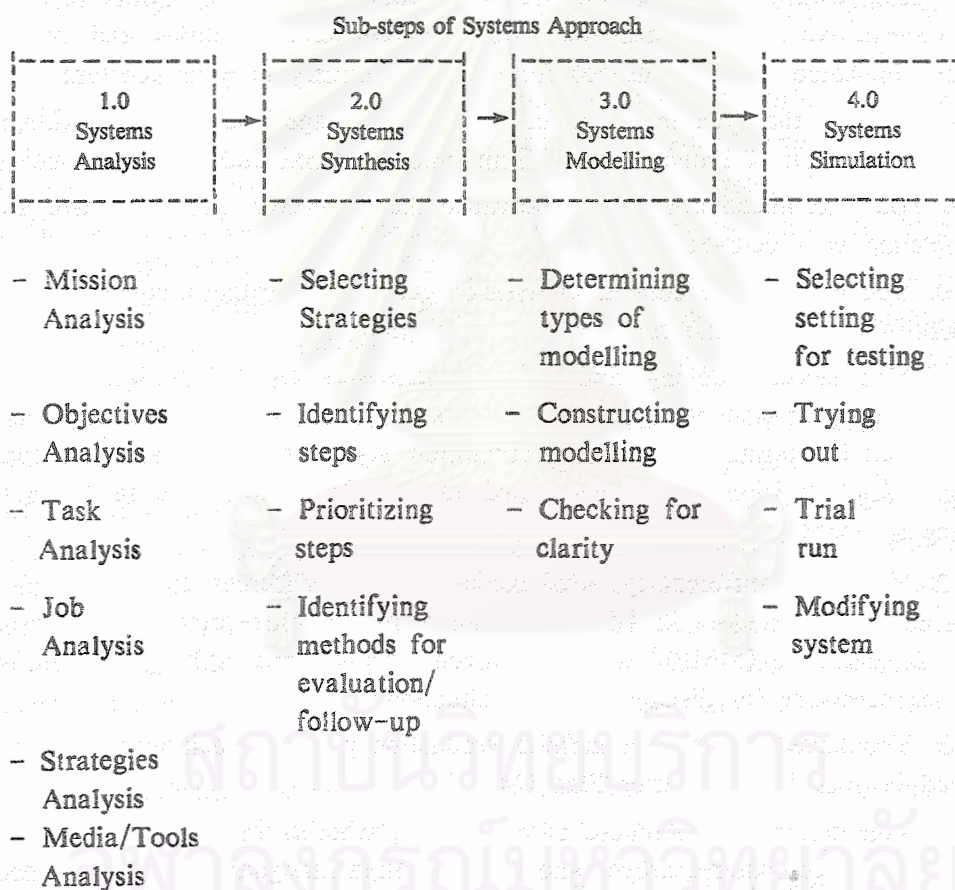### Step 3.0 Systems Modelling

Systems modelling is the design and construction of a systems model or system flow-chart to clearly present all steps by representing all major steps and substeps with blocks, lines and feedback loop. A systems model may be present in a variety of ways. It may be in the form of flow-chart, circles, mathematical or block models, drawn vertically or horizontally.

Step 4.0 Systems Simulation

After a systems model is constructed, you may feel happy and think that a new system is developed. However, it not yet ready for implementation because nothing guarantees if the system really works in the real life situation. To make sure that the new system works, you have to conduct a developmental testing i.e. try it out (pretesting) in a simulated situation and trial run stage (pilot testing) in a real life situation.

From the steps mentioned above, you can develop an instructional system which can be used as a master plan. You can also develop sub-systems for the various activities that need to be standardized and implemented by various disciplines or faculties such as Curriclum Development System, Multi-Media Package Production System, and Delivery System.

The main steps and sub-steps of systems approach vary. The following is just a way of looking at it :

Sub-steps of Systems Approach

1.0 Systems Analysis	→	2.0 Systems Synthesis	→	3.0 Systems Modelling	→	4.0 Systems Simulation
− Mission Analysis		− Selecting Strategies		− Determining types of modelling		− Selecting setting for testing
− Objectives Analysis		− Identifying steps		− Constructing modelling		− Trying out
− Task Analysis		− Prioritizing steps		− Checking for clarity		− Trial run
− Job Analysis		− Identifying methods for evaluation/ follow-up				− Modifying system
− Strategies Analysis						
− Media/Tools Analysis						

4. The Concept of Instructional Design

You may have heard about the two terms: curriculum and instruction. What do you think is the difference between these two?

"Curriculum" is concerned primarily with *what* to teach whereas "instruction" is concerned primarily with *how* to teach. More specifically,

instruction consists of five activities : design, development, implementation, management, and evaluation.

Please take a few minutes to recall the way you design, develop, implement, manage, and evaluate your course from the very first step. Write the steps in a piece of paper.

You might have completed listing the steps, please check if your list covers the following points. Write the √ or × mark in front of the following items :

A. Instructional Design

—— 1. You consider the course description or course syllabus;

—— 2. You analyze target population, i.e. your students;

—— 3. You consider the goals, aims, or objectives of the course against the time allowed for the students to complete the course;

—— 4. You break the course description into "blocks", "unit" and other similar smaller parts;

—— 6. You analyze what are available around you or elsewhere that may be used as parts of your teaching packages;

—— 7. Being aware of the existing setting in your institution in terms of policies and administrative structure, academic structure, production facilities and personnel, you have indicated resources needed for effective delivery of your courses;

—— 8. You feel that you may not be able to manage the course development alone, so you think of requesting help from other academic and non-academic staff;

—— 9. You look ahead and plan in advance the necessary steps you will follow in completing your course;

—— 10. You conduct the content analysis of each unit; writing a concept mapping, and identify the topics and sub-topics for each unit;

—— 11. You select teaching and learning strategies to deliver knowledge and experiences to your students appropriate for each type of media used such as the writing styles for printed materials, presentation styles in audio-cassettes, formats used in video/television programmes, and face-to-face techniques in tutorials or schooling sessions;

—— 12. You select different types of media to teach different topics in each unit so that each medium does its best and write a media blue-print in the form of "Media Master Plan (MMP)" to help prevent duplication; although repetition is sometimes necessary for distance learning situation;

—— 13. You have to foresee a definite production plan for each media component identified in your Media Master Plan (MMP).

—— 14. You determine the modes of evaluation; whether or not to use pre-tests and post-tests, computer-marked and tutor-marked assignments; performance or competency-based tests; and final examinations.

—— 15. You make plan for follow-up of the course after the production is completed and offered to the students.

B. Course Development/Production

—— 16. You train or get trained on how you would use the MMP for developing and producing printed materials and audio/visual media;

—— 17. You coordinate the production of various media according to the MMP;

—— 18. You participate or by yourself write, produce the printed materials and other media;

—— 19. You monitor the completion of the tasks;

C. Implementation/Delivery

—— 20. You teach or deliver to your students, according to the lesson plans, the various media components of the multi-media package;

D. Management of Instruction

—— 21. You manage the resources, organization, personnel, involved in planning, preparation, implementation, and evaluation of the course in the specific period of time;

E. Evaluation and follow-up

—— 22. You evaluate and. follow-up the courses in terms of students' achievement and course evaluation.

From what is listed under five categories, you will find that a course goes through the instructional design stage before it can be delivered to the students. A great and systematic effort is required on your part in advance --long before the time the course is offered to students. This is true whether or not it is in the conventional, face-to-face setting or in the innovative distance education environment— if the instructor is seriously devoted to providing effective instruction to his students. In distance education, where students and instructors are most of the time, separated, the need for good "*instructional design*" and production is extremely great.

4.1 What is instructional design?

Instructional design, an innovative approach in education may be considered a branch of educational technology which establishes the so-called "three-dimension" in education : i.e. administrative, academic, and educational technological dimension.

As mentioned earlier, Educational Technology, under the *behavioural science concept*, is the application of principles and theories in psychology, anthropology, humanities, social science, and communication in designing, developing, implementing, and evaluating the teaching and learning process. As an extension of the *physical science concept* which deals mostly with the application of scientific and technological products (materials and equipment), educational technology gives emphasis to the third component, "the technique". Educational Technology, as the term implies, is the science of techniques embracing the systematic application of materials, equipment, and methodologies in education.

In brief, "*Educational Technology*" may be defined as *the process of analyzing problems, needs, and existing resources; identifying aims and objectives; planning and managing learning environment; exploring, analyzing, and structuring subject-matter/content, selecting appropriate teaching and learning strategies; selecting, developing, producing, and utilizing instructional media; managing teaching and learning processes; and evaluating instructional outcomes.*

Presently, in developing countries, educational technology is still perceived with its physical science or mediated concept as the expansion of audio-visual education to the broader concept of educational media and educational communication. However, the application of the full concept of educational technology as seen in the so-called "Educational Triad": Objectives, Learning experiences, and Evaluation (OLE) is increasingly found in educational institutions in those countries.

Instructional design, as a most important component of educational technology, may be implemented through a variety of approaches in different institutions. Here is a case of Darling Downs Institute of Advanced Education where instructional designed is applied in distance education process :

Darling Downs Institute of Advanced Education (DDIAE), Toowoomba, Queensland, Australia, adopts the concept of instructional design as a part of distance learning course production process.

The term "Instructional Design (ID)" may be viewed as a discipline and as a professional activity.

As a discipline, ID is concerned with understanding, selecting and applying methods of instruction.

As a professional activity, ID is the process of deciding what methods of instruction are best for generating learning experiences that will bring about desired changes in student knowledge and that will develop intellectual skills in a particular student target population for a specific course of study.

The result of instructional design process is an instructional development "blue-print" outlining what methods of instruction and what instructional media are best suited to a particular course content and specific student population. Such a blue-print not only prescribes instructional methods and media but also prescribes procedures for instructional implementation, management, and evaluation.

4.3 Instructional Designers

Who is in charge of Instructional Design?

The types of personnel in charge of ID vary according to the ID concept used in each particular institution.

At the DDIAE, the task of instructional design is undertaken by instructional designers where media production is carried out by media specialists.

Sukhothai Thammathirat Open University (STOU) employs the physical science concepts of educational technology as well as the behavioral science concepts. At STOU, instructional design is perceived as a part of educational technology. It is integrated in the role of an educational technologist who oversees the full process of course production with equal emphasis on media development and production, except the evaluation process which is undertaken by the test specialist. Both educational technologist and test specialist are parts of course production teams.

What is the use of instruction design in your institution? Do you have any persons who are in charge of instructional design and media production?

With the very complicated nature of instructional design, development, implementation, management, and evaluation of a course of study, it is most unusual to find the range of expertise necessary to exploit a range of instructional media in a single individual. Consequently, a multi-disciplinary team approach is needed.

4.4 Steps in Instructional Design

From the concept of ID mentioned above, cetain steps need to be laid down. There are many ways to give logical steps for instructional design: The following is the suggested list of eight steps:

1) Analyze the characteristics of student target population;
2) Analyze the structure of subject-matter,
3) State learning objectives in behavioral terms,
4) Specify approach for instructional development,
5) Select types of relevant media,
6) Identify modes of delivery,
7) Identify modes of evaluation,
8) develop instructional blue-print.

Some of the above steps may be interchangeable. Besides, you might have, in one way or another, gained some experiences and training in course materials development in which certain steps of the ID are undertaken.

5. Role of Educational Technologist

An educational technologist is in charge of instructional design, media design, supervision of the overall production of multi-media component, developmental testing, and evaluation of course packages.

5.1 As an Instructional Designer

Taking the role of instructional designer, the educational technologist (ET) conducts the instructional design, and proposes to a course team after studying the content and objectives of the course and various units. Specifically, the ET pursues the following:

1. Study the course description, aims, and objectives of the assigned course;

2. Propose on the design of course in terms of breaking down of blocks, units, and sections or modules;

3. Assist academics in conducting the content analysis, writing concept mapping, writing statements of concepts, stating behavioral objectives, identifying media components, defining activities and feedback, suggesting the mode of evaluation, and preparing unit or section/module lesson plans;

4. Assist in the process of course-ware development such as presentation techniques of each media component;

5.2 As a Media Specialist

As the media specialist, the ET is the multi-media producer of all media components approved by the course team. As the multi-media producer of all media components of the course, the ET is usually assisted by a group of producers from different media divisions. For example at Thailand's Sukhothai Thammathirat Open University, the ET is assisted by staff members in the Office of Educational Technology such as Educational Radio Division for producing radio programmes, Educational TV Division for producing television programmes, Film and Video Production Center for producing films and video programmes, and Audio-Visual Center for producing audio-cassettes, graphic arts, and tutorial media. In the Open University of Sri Lanka, where media personnel is limited, the ET may need to perform all the production tasks. Specifically, the ET is to perform the following:

1. Develop a Multi-Media Master Plan (MMP) for both the whole course and individual units. If no MMP form available, the ET may need to design one;

2. Prepare and propose to each writer the Media Production Plan based on the MMP. The Media Production Plan contains the themes or main points for each of audio/ radio and video/ TV programmes;

3. Design and develop each individual media component by preparing programme layouts, writing scripts, directing, and producing all the programmes.

4. Supervise the production of each media component;

5. Conduct the developmental testing (tryout and trial run) to determine the efficiency of each media component as a distance learning device;

6. Evaluate and revise media packages after a certain period of evaluation.

5.3 As Evaluation Specialist

In some institutions, the ET is required to perform the role of a test specialist or an evaluation specialist in determining mode of evaluation and preparing test instruments for the course. Specifically, he is to perform the following tasks:

1. Propose and design self-pretest and self-posttest or other types of self-assessment activities;

2. Assist in writing behavioral objectives and giving assignments and feedback to keep the "educational triad" (OLE=Objective, Learning Experience, Evaluation) at work;

3. Assist in the preparation process of course evaluation such as on writing self-pretest (self-assessment tests), self-posttest, assignments (tutor-marked and/or computer-marked), performance tests, and examination. (The action of evaluation is managed by content specialists --academics);

4. Advise the content specialist on how to construct test items beginning from preparing "a test blue-print" based on behavioral objectives, write test items (objective or essay types), try out test items, analyze test items to determine their validity, objectivity, and reliability;

5. Design and develop the "test bank" for each course so that test items of high standard may be deposited in the back for future use.

The role of ET as a test specialist is, however, not common. Many universities employ personnel who have training in Testing and Measurement to perform the tasks. At STOU, for example, test specialist is a component of the course team together with the educational technologist.

In addition to the above role, the ET must be open-minded and innovative to try something new. He must always possess the curiosity to know and find out the results of introducing innovative ideas, conducting research and putting them into practices.

It is important to keep in mind that the ET should not claim the authority in any discipline or subject matter unless he has been trained in the area. *The content specialist should have the final say in the correctness, appropriateness, and the up-to-date state of the subject matter; while the ET should have the final say in terms of formats and types of media used. However, it is ideal if both parties agree on the content, types, and formats of each media component.* During a course production process some years ago, an ET, with some background in the discipline, felt the content of a specific topic given by specialist (academic/writer) of a particular unit was not right, He suggested his views to the writer but were rejected. The writer insisted on the correctness of the content. In

this case, the ET should not on. Other members of the course team who are content specialists should take care of it. On the other hand, if the ET feels his proposed types and formats of media used are appropriate, then his choice should be honored provided that the choice are realistic and appropriate by professional standard.

In brief, the role of educational technologists covers both instructional design, media production, and evaluation of course materials. He must work hand-in-hand with the academics and get the best media package for the course.

Conclusion

The concept and role of educational technology varies in different educational institutions and countries. In order for educational technology to effectively contribute to the promotion of teaching and learning, it is important that each educational technologist apply the full process of educational technology covering (1) analyzing problems, needs, and existing resources; (2) identifying aims and objectives; (3) planning and managing learning environment; (4) exploring, analyzing, and structuring subject-matter/content; (5) selecting appropriate teaching and learning strategies; (6) selecting, developing, producing, and utilizing instructional media; (7) managing teaching and learning processes; and (8) evaluating instructional outcomes.

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