Instructional Design Models: What a Revolution!

By: Qais Faryadi Ph.D. Candidate

University: UiTM Malaysia 2007 (qais@speak-arabic.com)

Abstract

This review examines instructional design models and the construction of knowledge. It further explores to identify the chilling benefits of these models for the inputs and outputs of knowledge transfer. This assessment also attempts to define instructional design models through the eyes and the minds of renowned scholars as well as the most outspoken educational psychologists such as Gagne, John Keller and so on. The review also summarizes a brief outline of these state of the art models for a better understanding and designing of future instructional design in the field of education.

This critical analysis further investigates the significance of having a sound instruction in motivating our young learners to gain knowledge faster, to remember and the same time to continue learning. This paper also attempts to outline the good futures of an effective instructional design from the lens of distinguished scholars such as ASSURE, Gagne and John Killer. The role of interactive multimedia in creating educational instructional design is also discussed. Recommendations are delineated in the later stage.

1. Introduction

Instruction design is called "Science" because it follows a set of theories and methods and it is concerned with inputs and outputs of information. Instruction design is also called as an "art" because it is related with creativity and shows a designer's talent and capabilities. *(George M. Piskurich 2006). "Instruction design is really a set of rules or procedures, you could say, for creating training that does what it is supposed to do". (George M. Piskurich).*

Instructional design is a process of learning which explains lessons, course, learning and support activities in a unit of learning. *(Rob Koper 2006). Hashem Fardanesh, (2006)* describes instructional design as follows: *"instructional design could be defined as the prescribing and forecasting optimal instruction methods for achieving desired changes in knowledge, skills and attitudes of designated students".*

In other words, instructional design is a method which the instructor or the designer uses an available resources to meet learners demand for a knowledge transfer. (Patricia 2005) puts the instructional design as: "Instructional design is a systematic method for conceptualizing, creating, and carrying out instructions". According to (Richard Buchanan 2000) a good design can be defined not only to be creative, stylish with extraordinary visual look, but it must consider human engagement in its activities.

The designer must appreciate the deep involvement of human characteristics in its design. Instructional designers are convinced that with the help of information technology, they can deliver their message across the classroom loud and clear. They can transfer the power of learning right at the hands of the learners just by the click of a mouse (Robert A. Reiser 2001). As such, educators are forced to think carefully how to design a striking and useful multimedia courseware that takes advantages of current state of the art technology without compromising learner's needs, motivation and critical thinking skills in the process.

Teachers and instructors are advised to make their multimedia courseware interactive, motivating and above all relevant with plenty of action oriented presentations (Luann K. Stempler 1997). According to Luann K. Stempler (1997) a good instructional design should have the following futures: (1). Screen design such as color, animations, text and graphics should visually excite the learner and the location of various buttons on the screen for a better navigation. (2). Interaction and feedback allows the learner to be active participants through out the courseware. Meaningful interactivity provides an opportunity for better learning environment. Encouraging feedback is equally important in reinforcing learners of any misconceptions (Robert A. Reiser 2001).

(3). Students should be given more control over the content of the package. The control buttons should be easily understood by the learner. Remember, all students do not have the same learning pattern. (4). The use of color, graphics, animations, audio and video are a very effective means of knowledge transfer and these futures must be considered very carefully.

2. ASSURE Model

The ASSURE model was developed by Heinrich and Molenda in 1999. It is a well-known instructional design guide using constructivist perspective which integrates multimedia and technology to enhance the learning environment (Patrick Lefebvre 2006). *"Careful planning will increase the effectiveness of instruction"* (Daniel Callison 2002).

According to the ASSURE Model of Instructional Design, the designer should follow the following important criteria: (1).**Analysis:** The audience should be studied prior to the conception of the design. Learners' skills, prior knowledge, attitude, age, grade and learning style must be taken into consideration. According to Hap Aziz, *"In order to select the best media and technology for the delivery of instructional content, it is essential to identify and analyze the audience"*. (Hap Aziz, OIT. 1999).

(2).**Statement of the Objectives:** The lesson objectives must be clear and sound. The instructor must state what the learner will achieve in the end. The most important objective can be summarized as follows: objective about intended audience, their learning behavior, learning conditions such as equipments, maps, dictionaries, note taking and the degree of proficiency of a learner to be eligible to continue further. Statement of the objective also involves systematic planning and procedure (Daniel Callison 2002). The instructor should be able to observe students behavior as a result of the model. This is very important for further evaluation of the model. According to Gagne, *"It is necessary to translate the needs and goals into objectives that are sufficiently specific to guide the instructor in teaching and the learner in studying"* Gagne, R. M. Briggs, L. J, & Wager, W.W. (1992).

(3). **Selection of Media:** Relevant media and content materials such as sound, graphics, text animations and videos must be selected for effective learning outcomes. *"As we know, instructional technology the convergence of computer and communications technology within the realm of teaching and learning has already had profound effects on education at all levels."* (Philip H. Swain 2003)

The duty of the instructor is to bridge the new technology with the existing materials. Instructors must understand how technology is used to educate learners. Because of the exciting attributes of technology the question of what to teach and how to teach must be addressed (Judith J. Lambrecht 1999). (4). Utilization of materials: The instructor must make the lessons interesting by choosing appropriate materials to be used by the learners. Even the room/classroom conditions and equipments, lights and facilities must be appropriately suitable for learning conditions.

(5). **Require Learners Performance:** Instructor should provide ample opportunity for the students to practice the lesson and must be given adequate feedbacks for improvements. The lesson should include a variety of meaningful activities for the students to participate in problem solving and critical thinking. This will allow the learner to communicate with the teacher and receive valuable feedback.

(6). **Evaluation**: Evaluating the entire lessons is very crucial for further improvements. Instructor must evaluate to see whether his/her objectives are achieved. Before presenting the lessons again, appropriate revision and correction must be done.

Table 1: ASSURE

Instructional Design according to ASSURE

Analysis	State Objectives	Selection of Media	Utilization of Material	Require learner Performance	Evaluation
Audience, learners skills, prior knowledge, age, grade and attitude, learning style	Clear and sound objectives, achievements, intended audience, behavior, learning conditions, equipments, maps, dictionaries, planning	Media must be relevant, sound, graphics and animations, blend technology, learner education, instructor education	Positive utilization, make interesting lessons, appropriate materials, Classroom conditions, equipment, lights and facilities.	Opportunity, practice the lesson, give feedback, activities, critical thinking, problem solving, useful communication	Evaluate lesson, objectives, revision again, correction, tests.

3. Gagne's Model

This theory of learning stipulates that learners learn in different ways. To achieve the best learning methods, we need different types of instructions. Gagne as a military research director in 1958 was not satisfied with theories about instructional design by his predecessors and began to formulate his own principles of learning. (Rita C. Richey 2000) observed instructional design as a two folded phenomenon: it is either macro-design which provides overall direction on the instructional design or micro-design which provides strategies about creating lesson plan and procedure to carry out those plans. Gagne's contributions are related to the later phase.

According to Gagne an instructor must provide adequate instruction to the learner to learn effectively. The instructor must make sure that each instruction is mastered before going to the next level (Gagne, R. (1962). Gagne latter, classifies learning into five major categories such as, verbal information, intellectual skills, cognitive strategies, motor skills and attitudes(Robert A. Reiser 2001). He points out that in order to learn effectively, different internal and external conditions are very crucial for each type of the learning.

According to this theory, internal conditions are the state of the mind like attention, motivation and remembrance. It is the kind of skills and capabilities which the learner has mastered already. While external conditions refer to the learners' actions, such as arrangement of motivational events and more importantly its timing. It is something to do with the instructor in arranging the information during the instruction (Patricia L. Smith and Tillman J. Ragan 2000).

Gagne argued that there are five dynamic conditions which actively contribute in a knowledge transfer. His first condition of learning refers to verbal information (Robert M. Gagne and M. David Merrill 2000). Verbal information something to do with cognitive information processing like a computer. In another words previous information is stored in the memory of the learner such as facts, principles and procedures.

It will be available when needed. So it is automatic and it does not require how to do things. In another word, it is just a recall process. An intellectual skill according to Gagne, falls into his second conditions of learning. It indicates learner's capability to distinguish objects such as symbols; features and the learner must be able to identify white color from the black. He should be able to differentiate a smooth surface from that of a rough. More over, the learner must have basic skills on concepts and problem solving skills. The third categories of learning outcomes according to Gagne are that of cognitive strategies. In this situation learner is in control of the situation. He/she learns based on trial and error. As such, the learner learns in multiple situations while monitoring their own behavior to achieve an outcome.

In this kind of situation the duty of instructor is to pose a problem and leave it to the learners to critically analyze and respond. Attitudes are the fourth principles of Gagne's learning hierarchy and it is categorized as an important domain of the learning process. According to this theory attitudes consist of sets of values which a learner gives to given situations. It is an internally motivated process. If there is more internal motivation then there will be more achievement. As a result of internal motivation, the learner will show more positive attitudes towards completion of a particular task, so the instructor has to assist the learner by motivating him/her to achieve positive outcomes.

Motor skills are the final conditions of learning outcomes prescribed by Gagne. He is of the view that learning happens when a learner is physically ready to learn. The learner must be physically fit to perform a task. So according to him, all of the learning conditions are simple and specific and can be applied to a classroom for excellent outcomes (Gagne, R.1985). (Wayne A. Nelson 2000) noted that learning the above skills facilitates knowledge gain. These skills are prerequisite skills for learning and must be learnt in a correct order.

Table 2: Gagne's instruction design

Instructional Design According to Gagne

Verbal information	Intellectual Skills	Cognitive Strategies	Attitudes	Motor skills
Cognitive information, processing, computer, information stored in memory, principles and procedures. Automatic function, recall process.	Distinction capabilities, object recognition, symbols, features, intelligence, skills, problem solving skills,	Learner in control of situations, Trial and error concepts, monitor own behavior, learning in multiple situation, outcome achievement, questions. answers	Set of values, situation, internal motivation, positive and negative attitudes, task completion,	Learner physically must be ready. Mentally must be ready.

Apart from five principles of learning conditions, Gagne has also introduced nine more instructional events to enhance learning conditions. Study indicated that nine events of Gagne's instructions are actually effective in helping the students to become independent learners if it is followed correctly (Hoskisson, Dale Young, Ed;D 1989). These events include: gaining attention of the learner, set the objectives of the study, review previous lesson before teaching, presentation, providing guidance to the learner, asking for the response from the learner, providing feedback for the learner, assessment and evaluation and finally enhancing learner's retention (Kearsley, G. 1994).

Gagne's principles of learning cover many areas of learning and it is in fact an important contribution to the body of knowledge. Gagne as a military man, concentrated on the intellectual skills of the learners only (Peter J. Patsula 1999). Although Gagne's theory of learning lately became well known on learning outcomes, *nine events of instructions* and *learning conditions,* however, the efficiency of this theory has been questioned by constructivist ideology of learning (Strauss, Sidney1972). Regardless of the critics by other theories, Gagne's theory of learning can be used by teachers and instructors in the classroom to achieve real outcomes. According to him a teacher is an evaluator, designer and a manager. He believes that in order to achieve outcomes, teachers should evaluate their students more often for their progress. Further more, he suggests that teachers should use a variety of media to transfer information to the learner for effective retention.

Gagne's theory is very easy to implement by teachers in the classroom, because it is based on hierarchical learning (Jocelyn Tyler. 1995).Gagne's theory provides instructors a useful theoretical basis for approaching instruction, especially in higher-order thinking and complex cognitive (Heinich, R., Molenda, M., & Russell, J. D., (1993). His fine advice for the instructors is that it is not important which theory to apply in teaching, but the most important thing is the objective to be achieved. This theory will continue to assist instructors in developing more effective and useful learning instructions and will carry on the legacy of Gagne's instructional design by influencing the field of design research in the future (Susann L. Wurster 1998).

4. Keller's ARCS Model

Motivation is an important component of any instructional design (John E. Barbuto, Jr. 2006). We learn because we are motivated and enjoy the process of learning (Ping Xiang, Ron E McBride, April Bruene 2006). Motivation can be achieved through learner's participation and confidence. Students must be challenged to apply the new knowledge gained in the real life (Nancy H. DEwald 1999).

Once the learners are satisfied that what they learn is working in the real situation, they will be motivated and will continue to learn. Moller, Leslie Alan (1993) intelligently puts: *"Learning influences and dominates human life. Infants begin to satisfy their basic needs through learning. Adolescents develop the skills and knowledge to became independence and productive through learning. Learning is so integral to human development that it is difficult to imagine life without this activity"*.

Instructors need to stimulate learners to learn. John Keller created an instructional design called the ARCS Model. This model according to (Jason Bond Huett 2006) stimulates and motivates learners to continue learning. Jason indicates that current studies claim that motivation accounts for 16% to 38% of learners achievements. The ARCS Model of instruction connotes attention, relevance, confidence and satisfaction and it is very important phase in enhancing students learning behavior. *"Motivation is the length and direction of effort expended by the learner in pursuit of achievement. One cannot rely strictly on the presumed entertainment value of the instructional materials to provide motivation"* (Jason Bond Huett). In other words, instructional design cannot be solely entertaining only; its contents should be educationally relevant to the students.

Study (John, M. Keller, Katsuaki, Suzuki 2004) indicates that the ARCS model of instructional design is in fact a systematic motivational design of learning. This study applied the concept of ARCS model into e-learning and the result showed a positive motivational outcomes. Educators who wish to educate their learners for a life long learning attitude; must make their piece of instruction more enjoyable. Only then, the learners will continue to learn even after the course has ended. (Ruth Small 2000).

The ARCS model of instructional design is a well-instructed design and one of the most measurable and motivational instruction. An instructional design is considered to be effective not because of instructor's creativity, but it is something to do with the learner as well (Sherry R Crow 2006). As such, the learner must value the instruction at hand and he/she must believe that they will gain knowledge.

According to (Small 2000) the ARCS model offers four major phases for an effective and motivating instructional design: *"(1). Attention strategies for arousing and sustaining curiosity and interest, (2). Relevance strategies that link to learners' needs, interests and motives, (3). Confidence strategies that help students develop a positive expectation for successful achievement and (4). Satisfaction strategies that provide extrinsic and intrinsic reinforcement for effort"* (Ruth Small 2000).

"The ARCS Model of Motivational Design is an easy-to-apply, heuristic approach to increasing the motivational appeal of instruction. ARCS provide a useful framework for both the design and improvement of the motivational quality of a range of informational entities from classroom instruction to Internet resources and increase the likelihood that these entities will be used and enjoyed" (Small 1997). (Wang, Jun 2000) According to (Jerry T. Fernandez 1999) the ARCS model of instructional design is a sequential process and it is a prerequisite for learning. These conditions keep learners interested. If the learner's attention is disturbed, motivation is lost and there will be no effective learning.

Table 3: ARCS

Instructional Design According to ARCS

Attention	Relevance	Confidence	Satisfaction
Interest, arouse, curiosity, perceptual arousal, surprises, Question marks. Pose problem, brainstorming,	Learners needs, interest and motives. Objectives and goals presentation, achievements, explain the objective of the lesson, project	Positive expectation, reinforcement. Criteria for assessment, performance, list of evaluation, others achievements,	Learner satisfied about learning, reinforcements, testimonies of previous students, motivational feedback, provide certificates, awards,

	presentation, orally and writing, format of lesson must be clear and related, students provide own example.	success opportunities, provide feedback. Personal responsibilities of students, acknowledge students hard work.	

5. Discussion

Instructors and the gate keepers of information must realize that conceivably the best way to transfer knowledge to their students is by creating state of the art instructional design. As such, teachers are forced to realize that learners can hear them loud and clear if the information presented is integrated with technology. The instruction must be motivating and must arouse students' critical thinking skills.

Teachers are advised to make their instructional design interactive and above all relevant to the learners' needs. According to Luann K. Stempler (1997) a good instructional design should have the following futures: (1). Screen design such as color, animations, text and graphics should visually stimulate the learner and the location of various buttons on the screen for a better navigation. (2). Interaction and feedback must be given due attention because feedback allows the learner to be active participants through out the courseware. Meaningful interactivity provides an opportunity for better learning environment. Encouraging feedback is equally important in reinforcing learners of any misconceptions (Robert A. Reiser 2001).

(3). Students should be given more control over the content of the package. The control buttons should be easily understood by the learner. Remember, all students do not have the same learning pattern. (4). The use of color, graphics, animations, audio and video are a very effective means of knowledge transfer and these futures must be considered very carefully.

Having realized the importance of instructional design in knowledge shift, instructors are advised to utilize field-tested methodologies of teaching and models of instruction in order to achieve their prime objectives in the classroom. A well designed instructional curriculum is dependant on the multicultural environment of the classroom. A professional educator always strives to have a balance between the curriculum and the learners' needs. Student's diversity in the class should be a factor in a successful manipulation of any instructional design. *"Therefore, multicultural educational course design must account for the stereotype, ethical, and racial myths that abound the education system"*. (David R. Blunt. 2006).

For an effective instructional design, the designer must carefully plan his/her piece of design. Critically well arranged and ahead planning, can assure knowledge gain among the learners (Heinrich & Molenda 2005). According to Andy, Kevin, and Voon, *"Successful multimedia learning system requires well-planned and skillfully written contents, attractive and functional graphic design, and rapid implementation at a reasonable and affordable cost. Quality in video producing is no longer a luxury; it is a necessary"*. (Andy Lock Yen Low, Kevin Lock Teng Low & Voon Chet Koo 2003).

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