

Pedagogical Designs for Generation of Contents for the Community

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Introduction

When one talks about growth of technology applications in education, one normally asks a question: we are moving towards what? Probably the appropriate answer is, *towards a convergence point of technologies* & what is that? The answer is, *towards a Virtual Reality i.e. a "virtual classroom"* & what is a virtual classroom? The answer is, *where the distance between the teacher and the taught is nil*. And finally, how one can make the distance nil? The answer is by generating good e-contents and by making them available to all those who wish to learn. E-contents are basically a package that satisfies the conditions like i.e. minimization of the distance, cost effectiveness, user-friendliness and adaptability to local conditions. As per www.answers.com, we can define e-content as follows

E-content: Digital content that can be transmitted over a computer network such as the Internet.

Digital content: Products available in digital form. It typically refers to music, information and images that are available for download or distribution on electronic media.

According to Webster dictionary, "pedagogy" refers to the whole context of instruction, learning, and the actual operations involved therein. So our task in this section would be to define how to develop strategies so that the e-content that we offer our students come good with respect to the context of instruction as well as learning. It would also entail the operations i.e. the accessibility, acceptability and user-friendliness of these contents. In this section, we discuss various pedagogies involved in generation of e-content. We have further talked about various types of educational contents that are suitable for treatment as e-content.

From content to e-content

One can find enormous literature on the development of content. Then why are we discussing the pedagogical issues of e-content generation. It is because e-contents differ from conventional contents in many ways. It is also because technology has changed the way in which we learn. Let us see what changes are there in the pedagogy:

Table 1: "The way we learn"








S. No.	Old Way	New Way
1	Textbook with illustrations	Computer based interactive lesson
2	It is a teacher's job to explain	It is still a teacher's job to explain
3	It is a students' job to make the connections	The connections are already made visually

	between theory and fact – if they can	on the students’ computers
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Source: AeL eContent, SIVECO Romania, Bucharest, Romania, www.siveco.ro

E-contents are technology based and technology does serves as an aid to learning. According to Mayer (2005), “multimedia learning is defined as learning from words (e.g., spoken or printed text) and pictures (e.g., illustrations, photos, maps, graphs, animation, or video)”. So what are included in the learning in the new scenario are online instructional presentations, interactive lessons, e-courses, simulation games, virtual reality, and computer-supported in-class presentations. The following table shows that technology stimulates the learner and gets the learner involved in the learning.

Table 2: *Technology vs. Psychomotor Domain*

Books are an extension of BRAIN	
Video is an extension of EYE	
Audio is an extension of EAR	
Audio Conference is the extension of MIND & VOCAL CHORD	
Computer is an extension of Fusion of MIND, HANDS & EYES	
Satellite Technology is an extension of HUMAN REACH	
Computer Network is an extension of HUMAN CO-OPERATION	

Source: Based/Inspired by the famous DAEWOO ad. by Marshall Macbun)

So what we would expect from e-contents that it should be able to stimulate the learner in such a way that he utilizes the maximum of its potential in learning.

Moore’s approach of “Structure” & “Dialogue”

According to Parer (1995), “Quality in distance teaching is based on a well-structured design plus dialogue and communication”. These designs are based on Moore’s (1973, 1980) three dimensional theories of distance education with learner dialogue and structure i.e. the learner is independent, he interacts with the instructor and element of course design thereby responds to his needs. Moore views highly structured programs as more “distant” than low-structured programs with high dialogue.

In conventional set-up the learners go to a classroom and attend a lecture. The learning activity begins in the classroom and ends there only. According to Moore, distance education that is essentially a form of independent study, is heavily dependent on two characteristics:

(1) Dialogue

(2) Individualisation (lack of structure)

“Dialogue” can be interpreted by the expression “academic interaction” aimed at effecting teaching & learning. In a classroom set-up, dialogue can take place with the ‘word of mouth’ while in Distance Education it takes place by using the communication technologies. Thus high dialogue is essentially minimization of distance between learner & the instructor, whereas ‘structure’ can be interpreted as the high correlation between the components of curricula of program & the learner.

This concept has a high importance in the case of e-contents also as what is the aim of e-contents: It is to provide the learners the same kind of environment that they get in a conventional setup. Various combinations of dialogue and structure can occur in different categories. Moore postulated that the actual distance between the learner and the teacher should not be mentioned by the spatial distance between the two but in the terms of degree of dialogue & structure between the two.

Generations of Distance Education

Taylor (2001) characterizes the growth of DE in terms of ‘generations of technologies’ adopted by ODL institutions keen on providing the support to its teaching-learning processes According to Fozdar & Kumar (2007), “Recent generations of ICTs have given rise to new opportunities for sharing information, resources, and experiences, as well as providing networking opportunities with student peers, tutors, and the institution of higher education itself”. The generations of distance education are classified as follows:

Table 3: *Generations of Distance Education*

Generation	Model	Delivery Technologies
First Generation	The Correspondence Model	Print
Second Generation	The Multimedia Model	Print, Audio Tapes, Video Tapes, Computer based learning (CML, CAL, IMA), Interactive Video (Disk, Tape)
Third Generation	The Tele-learning model	Audio Conferencing, Video Conferencing, audio-graphic communication, Broadcast TV/Radio
Fourth Generation	The Flexible Learning Model	Interactive multimedia (IMM) Online, Internet based access to WWW resources, Computer mediated communications
Fifth Generation	The Intelligent Flexible Learning Model	Interactive multimedia (IMM) Online, Internet based access to WWW resources, Computer mediated communications using automated response systems, campus portal access to institutional process and resources

Source: Taylor (2001)

The aim of giving this discussion here is to highlight the kind of delivery technologies e-content entails. One could say that the fifth generation distance education or the intelligent flexible learning model is only possible through e-content. Let us now discuss what is to be embedded in these e-content.

Cognition

According to Wikipedia, the term cognition ("to know") is used in several loosely related ways to refer to a faculty for the human-like processing of information, applying knowledge and changing preferences. The concept of cognition is related to abstract concepts like mind, reasoning, perception, intelligence, learning etc. It addresses to the capabilities of the human mind. We will discuss two theories that are fundamental in addressing the cognitive domain.

Constructivist theory

Constructivism refers to the property of human beings formulate a more concrete meaning of subject matter when they reflect on experiences while constructing their own understanding. According to Bruner (1966), "Each learner generates his or her own "rules" and "mental models," which are used to make sense of experiences". Bruner (1966) states that a theory of instruction should address four major aspects:

- ◆ Predisposition towards learning,
- ◆ The ways in which a body of knowledge can be structured so that it can be most readily grasped by the learner,
- ◆ The most effective sequences in which to present material, and
- ◆ The nature and pacing of rewards and punishments

According to Bruner, good methods for structuring knowledge should result in simplifying, generating new propositions, and increasing the manipulation of information. Whenever and wherever some learning happens, some information is transformed, some meaning is derived, some hypothesis formed and a concept is formed on the basis of decision-making process of the learner.

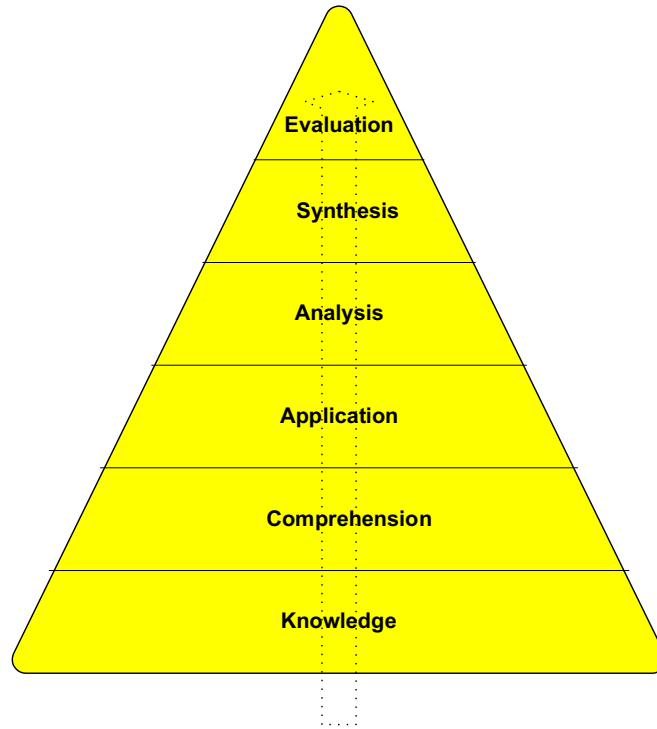
Bruner's theory of Constructivism falls into the cognitive domain. Learners are considered to be creators and thinkers through the use of inquiry, and the role of experience in leaning. Bruner developed a method of teaching called Discovery Learning, which utilizes his theory of Constructivism.

Bloom Anderson Revised Taxonomy of Educational Domain

Anderson & Krathwohl (2001) provided a revision of Bloom's taxonomy for the instructional designers. They included a broad set of classifications for learner cognitive processes that should be included in instructional objectives. This revised taxonomy is useful to ascertain the levels of learning for an instructional unit. Pickard (2007) explained this by citing (Anderson & Krathwohl, 2001, p 23), "The Revised Bloom's Taxonomy (RBT) is seen as "a tool to help educators clarify and communicate what they intended students to learn as a result of instruction". Incorporated

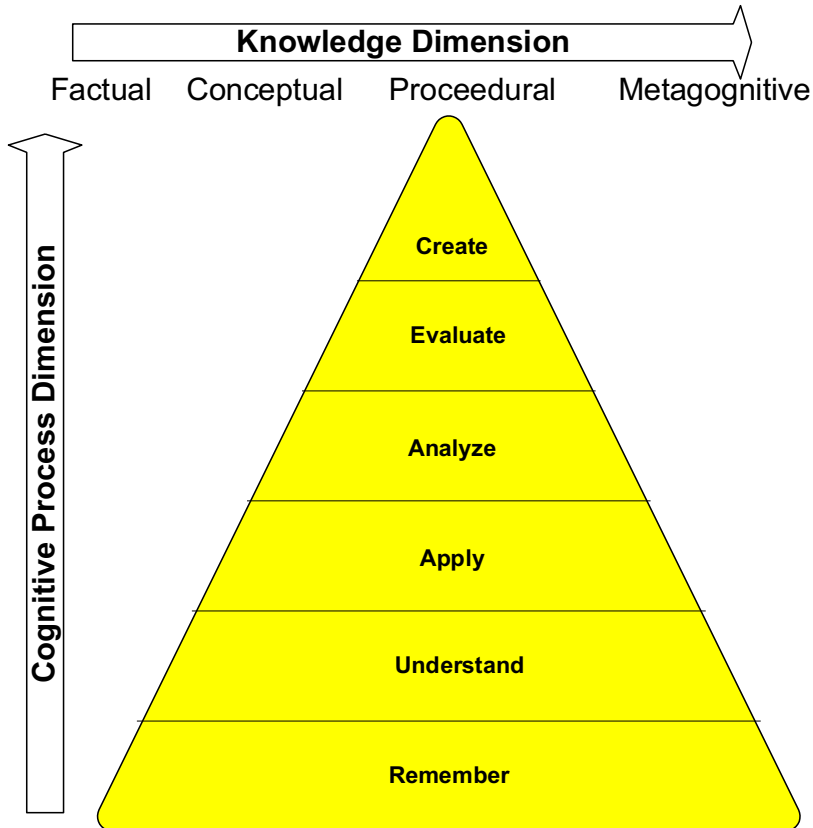
into the RBT are advances in teaching and learning since publication of the original. The figure given below highlights the revised taxonomy

Figure 1: *Bloom's Taxonomy*



Source: Based on Anderson, L. (2006)

Figure 2: *The Revised Bloom's Taxonomy*



Source: Based on Anderson, L. (2006)

RBT is having two dimensions. Since students are now deemed as active participants, constructivist perception comes into picture here. Other significant point about RBT is the knowledge dimension that moves from factual level of knowledge to the meta-cognitive level. This is essentially a movement from basic facts to awareness and knowledge about one's own thinking. RBT has great applications in design of instruction. According to Pickard (2007), "Use of the RBT enables educators to specify how they expect students to use specified knowledge and thus provide learning experiences to assist students to reach that cognitive stage".

Two more concepts are worth mentioning in context of e-contents. These are use of a model for e-contents that is didactic in nature and using e-contents as learning objects. Let us discuss the aforesaid concepts.

Didactic Model

One proposition is that e-contents should essentially be didactic in nature. The term "didactic" refers to contents such as self-instructional material, audio and video that convey some moral, fact or learning. In distance education, the self-instructional materials are essentially didactic in nature. The philosophy behind this is that self-instructional materials try to bridge the gap between the teacher and the taught. The philosophy stands good for the e-content generation too. An interesting example here is the "*Jataka kathas*" that we all have read many a times in our childhood. This property enables the learner to learn without shedding tears.



According to Selinger (2004), “e-content should be seen as a tool to improve the understanding, engagement and motivation of learners; to provide a safe environment for them to experiment and explore their conjectures; and to test their understanding using novel assessment methodologies based on trial and improvement; simulations and manipulation of models”. The didactic nature of e-contents seems to fulfill this condition as the learner while reading the didactic content builds an understanding and then the moral of the story reinforces that understanding.

Learning objects

According to Wiley (2000), learning objects are small (relative to the size of an entire course) instructional components that can be reused a number of times in different learning contexts. Learning objects differ from the traditional media in the sense that it can be simultaneously delivered, accessed and used with respect to time and place. Wiley gave a working definition of learning object as “any digital resource that can be reused to support learning.” Digital resources could be large (entire web pages that combine text, images and other media) or small (digital images, live data feeds, video or audio snippets, small bits of text, animations, and smaller web-delivered applications, like a Java calculator).

Table 4: Taxonomy that differentiates between learning object (LO) types

SNo	Type of LO	Example
1	<i>Fundamental</i>	A JPEG of a hand playing a chord on a piano keyboard.
2	<i>Combined-closed</i>	Video of Example at 1 with accompanying audio.
3	<i>Combined-open</i>	A web page combining example at 2 together with textual material.
4	<i>Generative-presentation</i>	A JAVA applet generating a set of staff, clef, and notes, and then presenting a chord identification problem to a student.
5	<i>Generative-instructional</i>	An EXECUTE instructional transaction shell (Merrill, 1999), which both instructs and provides practice

Source: Wiley (2000)

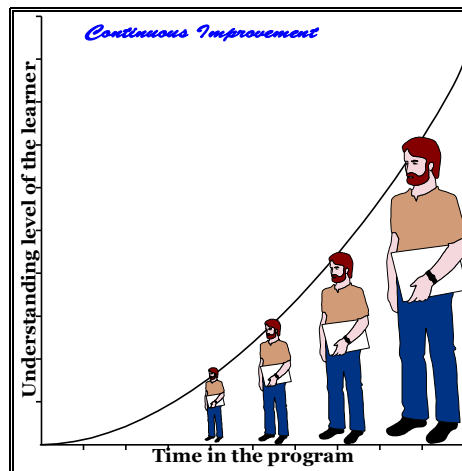
Learning objects provides immense opportunities in instructional technology and therefore it is mandatory to discuss it while discussing the pedagogical aspects of e-contents.

Types of educational contents suited for e-contents

After discussing various theory and concepts let us now see as what kind of educational contents are suitable for conversion into e-contents.

1. Learning by doing and learning by Investigation

Learning by doing refers to the capability of learners to improve their understanding by regularly repeating the same type of action by applying some innovation from their end. This kind of learning can be seen in Toyota production system. They use a strategy called “Kaizen” which means “continuous improvement. On the other hand, learning by investigation refers to process of acquiring knowledge by inquiring into a matter through formal procedure of discovery.



2. Learning by using themes

The word “thematic” refers to “relating to” or “constituting” a topic of discourse. This is helpful in arousing the interest of the learner. In this, the teacher builds a theme around a topic that is to be taught. The learners learn in a fun manner and thus learning is much more effective. An example of this is Iditarod Race, which takes place in Alaska each March. This race is used by home schooling families for learning



Iditarod Web Project 2000

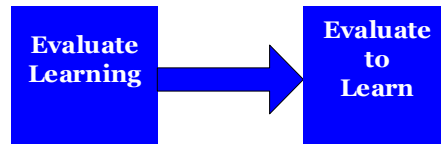


An interactive web project designed
by fifth grade students
to share their knowledge of Alaska
& The Iditarod Sled Dog Race with others.
We invite you to come play and learn!

3. Learning by testing/evaluation

The way education is provided have been changed but the way in which we assess the students for whether they have learnt what is taught hasn't changed. There is a need to look at the

student-evaluation differently from the point of view of educational outcomes. Evaluation of students must be multi-level and support continuous improvement of methodology to achieve the learning objectives.



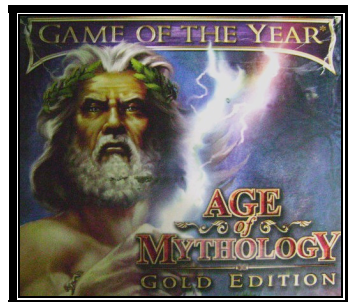
4. Learning by Simulation

Simulate means “to imitate”. If a learner is given an imitation of a real life situation that otherwise he would not be able to witness then it leaves an impression that lasts for a long time. Examples of this are games like Microsoft’s flight simulator.



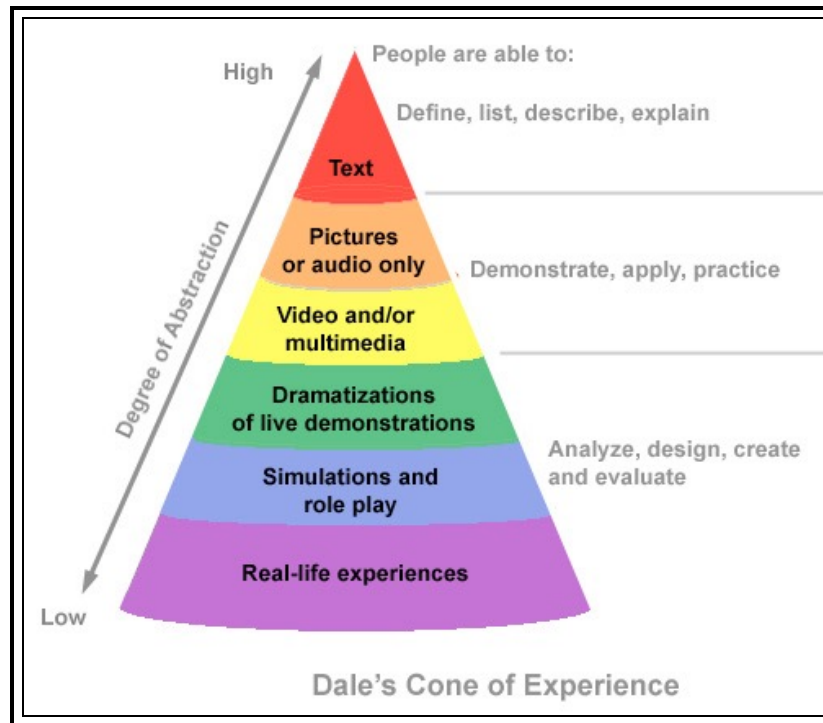
5. Learning by Role-Playing

Role-playing can help in learners getting involved with the problem. It arouses their interest. In a role-playing situation the learners are supposed to translate their knowledge into action by creating a strategy. This transforms their learning into a challenge. This enhances the chances of learning well as they use their own innovative ideas to find solutions to the problems that come their way. Examples of this can be witnessed in kids who do not even know how to read but are successful in playing tough computer games.



Edgar Dale’s Cone of Experience

Edgar Dale, often cited as the father of modern media in education, postulated the "cone of experience" on the basis of experience with learners. The cone's utility in selecting instructional resources and activities is relevant today also. The cone is based on the relationships of various educational experiences to real life. This is the tone with which we begin this section. According to Cone of experience, "The more sensory channels possible in interacting with a resource, the better the chance that many students can learn from it. We have reinforced this concept also when we discussed the relationship between psychomotor domain and technology.



Finally, if we see the last three layers of this cone, we would appreciate the type of contents that we proposed in the previous section. As per Dale's cone of experience, these e-contents would make the learner able to analyze, design, create and evaluate.

Summary

According to Dias (2007), "the learning design a teacher can produce depends on a number of independent variables: the nature of knowledge we want to teach/pass on, the learning pedagogies that can be put into practice and the learner motivation. One can say then that the amount of possible "learning designs" is infinite". The pedagogical strength of e-contents can be further stressed with the help of table 2 where we pitched technology vis-à-vis psychomotor domain. What e-contents are poised to do is to use the natural information processing abilities possessed by humans. It is said that people are visual minded. They retain 20% of what they hear. 50% of what they hear and see. And probably, 100% of what they hear and see and do. This is what e-contents are poised to do and what e-contents are intended for.

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