back

Incorporating 4MAT Model in Distance Instructional Material – An Innovative Design

Alexandra Nikolaou [alenikola@yahoo.gr], Maria Koutsouba [makouba@phed.uoa.gr], Assistant Professor, Department of Physical Education and Sport Science, University of Athens, Greece

Englsih Abstract

In an attempt to improve the effectiveness of distance learning, the present study aims to introduce an innovative way of creating and designing distance learning instructional material incorporating Bernice McCarthy's 4MAT Model based on learning styles. According to McCarthy's theory, all students can learn effectively in a cycle of learning that consists of eight steps, which adapt to all learners' learning styles. For this reason, Bernice McCarthy's 4MAT Model is analysed, its innovative application to distance learning material is discussed, while an example of material directed to teachers for the purposes of a training course concerning the art of Drama of the kindergarten curriculum is presented.

Greek Abstract

Περίληψη

Αποτελεί κοινό τόπο ότι το διδακτικό/μαθησιακό υλικό παίζει σημαντικό ρόλο στην εκπαίδευση από απόσταση. Σκοπός της εργασίας αυτής είναι η πρόταση ενός καινοτόμου σχεδιασμού εξ αποστάσεως διδακτικού/μαθησιακού υλικού με τη χρήση του 4MAT Model της Bernice McCarthy σύμφωνα με το οποίο όλοι οι μαθητευόμενοι μπορούν να μάθουν αποτελεσματικά μέσα από έναν κύκλο μάθησης, ο οποίος περιλαμβάνει οκτώ βήματα, τα οποία είναι προσαρμοσμένα σε όλα τα μαθησιακά στυλ των μαθητών. Για το σκοπό αυτό, παρουσιάζεται το μοντέλο, αναλύεται η εφαρμογή του στην εξ αποστάσεως εκπαίδευση, ενώ πραγματοποιείται και εφαρμογή του σε επιμορφωτικό υλικό νηπιαγωγών στο γνωστικό αντικείμενο της δραματικής τέχνης για το νηπιαγωγείο.

Keywords: distance instructional material**,** learning styles**,** 4 MAT Model

List of topics

Introduction

Creating and designing instructional material are among the most important issues in distance learning, according to Lionarakis (2008). Designing of distance learning material constitutes a more complicated procedure than it is in conventional education. This is because in distance education, instructional material tends to be the basic and only learning source, while a high degree of autonomy is demanded by the learners (Dekkers & Kemp, 1995). In particular, distance learning material constitutes a "pre-sketched" and "stored" teaching method, which, according to Giossos and Koutsouba (2005), has been designed in order to serve specific learning goals and is addressed to specific groups of learners. Accordingly, distance instructional material takes the place of the teacher in distance education to a great extent.

On the other hand, educators have, for many years, noticed that some students prefer certain methods of learning more than others (Diaz, 1999). These learning preferences, called learning styles, form the unique learning preference of the learner and help teachers in designing individualized teaching. Because of the

influence they have on the effectiveness of teaching and instructional material, learning styles have attracted the interest among the researchers, while individual differences are also of particular interest to distance educators, as Logan and Tomas (2002) state, since distance instructional material should be designed in a way that it can meet each learner's needs. Based on these, the aim of the present study is to introduce an innovative way of creating and designing distance learning instructional material incorporating Bernice McCarthy's 4MAT Model based on learning styles. For this reason, Bernice McCarthy's 4MAT Model is analysed, its innovative application to distance learning material is discussed, while an example of material from Drama education is presented.

Selection of the 4MAT Model

Learning styles were originally proposed by Allport in 1937 (Liu & Ginther, 1999) and refer to an individual's habitual or typical way of perceiving, remembering, thinking and problem solving. As Logan and Thomas (2002) support, learning styles can be considered as the extension of cognitive styles, while, according to Sabry and Baldwin (2003), learning styles ground on psychological basis and constitute permanent and unchanged human characteristics.

Since their introduction, a considerable amount of research has been carried out in this area. However, an overall, holistic theory of learning styles does not exist (Santo, n.d.). DeBelo (1990) claims that there are nearly as many definitions of learning styles as there are theorists. Theorists view learning styles in different terms and their methods for assessments and observations differ. In the following table (Table 1) the most known learning style theories and models are presented.

Table 1: Learning styles Theories & Models (source: Karagiannidis & Sampson, 2004, p. 3)

Name	**Learners' Categorization**	**Assessment Instrument**	**References**
Kolb Learning Style Inventory	Divergers (concrete, reflective) Assimilators (abstract, reflective) Convergers (abstract/active) Accommodators (concrete/active)	Learning Style Inventory (LSI), consisting of 12 items in which subjects are asked to rank 12 sentences describing how they best learn.	Kolb, 1984; Kolb, 1985
Dunn and Dunn – Learning Style Assessment Instrument	Environmental, Emotional, Sociological, Physical factors.	(i) Learning Style Inventory (LSI) designed for children grade 3-12; (ii) Productivity Environmental Preference Survey (PEPS) – adult version of the LSI containing 100 items.	Dunn& Dunn, 1978; Dunn & Dunn, 1999
Felder – Silverman – Index of Learning Styles	Sensing-intuitive, Visual-verbal, Indicative-deductive, Active-reflective, Sequential-global	Soloman and Felder questionnaire, consisting of 44 questions	Felder, 1996; Felder & Silverman, 1988
Riding- Cognitive Style Analysis	Wholistis-Analytics, Verbalisers- Imagers	CSA (Cognitive Style Analysis) test, consisting of three sub tests based on the comparison of the response time to different items	Riding & cheema, 1991; Riding, 1994
Honey and Mumford- Learning Styles Questionnaire	Theorist, Activist, Reflector, Pragmatist	Honey and Mumford's Learning Styles Questionnaire (LSQ), consisting of 80 items with true/false answers	Honey and Mumford, 1992

Gregoric – Mind Styles and Gregoric Style Delineator	Abstract Sequential, Abstract Random, Concrete Sequential, Concrete Random	Gregoric Style Delineator containing 40 words arranged in 10 columns with 4 items each; the learner is asked to rank the words in terms of personal preference	Gregoric, 1979; Gregoric, 1982
Mc Carthy - 4 Mat System	Imaginative, Analytic, Common sense, Dynamic	A learning cycle depending on learning styles and brain dominance	Mc Carthy, 1980; Mc Carthy, 1997
Gardner – Multiple Intelligence Inventory	Linguistic, Logical-mathematical, Musical, Bodily-kinesthetic, Spatial, Interpersonal, Intrapersonal	An instrument consisting of 8 questions	Gardner, 1993a; Gardner, 1993b
Grasha- Riechmann – Student Learning Style Scale	Competitive-Collaborative, Avoidant-Participant, Dependent-Independent	90 items self-report inventory measuring the preferences of both high school and college students	Hruska-Riechmann & Grasha, 1982; Grasha, 1996
Hermann – Brain Dominance Model	Quadrant A (left brain, cerebral), Quadrant B (left brain, limbic), Quadrant C (right brain, limbic) Quadrant D (right brain, cerebral)	120 questions that refer to four profile preferences codes corresponding to each quadrant	Hermann, 1982 Hermann, 1995
Mayers-Briggs – Type Indicator	Extroversion, Introversion, Sensing, Intuition, Thinking, Feeling, Judgment, Perception	(i) MBTI (Mayers-Briggs Type Indicator), ii) Kiersey Temperament Sorter I and iii) Kiersey Character Sorter II	Mayers & Kirby, 1994; Mayers, et al, 1998

In the present study, Bernice McCarthy's 4MATModel, which is among the various theories that define individual's learning styles, was selected. The selection of the particular theory was based on specific reasons. This theory constitutes not only a creative combination of various previous theories of learning styles, but also this creative combination is further expanded (Nikolaou, 2010). In particular, McCarthy, being a teacher herself since 1958, at all levels of education from kindergarten to college, observed the different ways in which students learn. After a long study, the researcher developed her theory in 1972. McCarthy's 4MATModel is a teaching model that combines the fundamental principles of several long-standing theories of personal development such as those of Kolb, Lotas, Jung, Piaget, Fisher, Grecorc etc. with current research on human brain function and learning (www.aboutlearning.com).

In addition, 4MAT Model is a learning model that is addressed to all the learners at the same time. In particular, according to Santo (n.d), there are three basic approaches that concern learning styles and teaching. Due to the first approach, a person's individual learning style is identified through several

different style instruments and then instruction is adopted towards that person's strengths and preferences. The second approach aims at strengthening the weaker learner's learning styles, that is firstly a person's learning style is identified and then instruction is adapted towards the opposite preference. The third approach does not even attempt to identify a learner's learning style, but rather uses different instructional methods in the overall course design in order to reach all learners. 4MAT Model belongs to the third approach. Being a teaching model that is addressed to all the learners at the same time meeting their needs and preferences, it is considered to be a suitable model for the designing of distance instructional material (Nikolaou, 2010).

Presentation of the 4MAT Model

In 1972, McCarthy developed the 4MAT Model in order to help teachers organizing their teaching, based on differences in the way people learn. According to McCarthy (1990, p.31):

> *4MAT is an eight-step cycle of instruction that capitalizes on individual learning styles and brain dominance processing preferences. 4MAT Model has been developed in basis of two major premises: 1. people have major learning styles and hemispheric processing preferences and 2. designing and using multiple instructional strategies in a systematic framework to teach these preferences can improve teaching and learning*

According to McCarthy (1990), all people feel, reflect, think and do, but they linger at different places along the way. These "lingerings" form people's learning style preferences. Differences in people's learning styles depend on many parameters such as, who we are, where we are from, how we see ourselves, what we pay attention to and what people ask and expect of us.

In Kolb's theory (McCarthy, 1990), whose work forms the theoretical basis for 4MAT Model, two major differences in how people learn are described: how they perceive and how they process. Some people, in new situations, respond primarily by sensing and feeling, while others think things through. Of course, no one has only one response and excludes the others. However, in their reactions, people hover near different places on a continuum (Figure 1) and that hovering place is the most comfortable place.

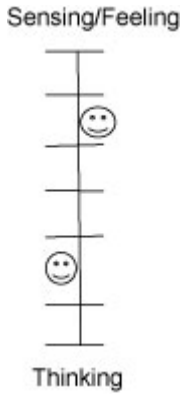

Figure 1. Continuum of Perception (source: McCarthy, 1990, p.31)

Those who perceive in a sensing/feeling way, attend the actual experience itself. They immerse themselves directly and they perceive through their senses. On the other hand, those who think through experiences, attend more to the abstract dimension of the reality analyzing what is happening. Both kinds of perception are quite different. However, they complement rather than exclude each other. Both are equally valuable and both have strengths and weaknesses.

Perception alone, however, does not equal learning. The second major difference is how people learn, how they process new experience and information, so as to make them part of themselves. Some people are watchers and reflect by filtering new experience and information through their own experience. Others are doers first as they act immediately and they reflect only after they have tried something out (Figure 2). Both ways of processing information are also equally valuable.

Figure 2: Continuum of Processing (source: McCarthy, 1990, p.31)

When the two dimensions of perceiving and processing are juxtaposed, a four-quadrant model is formed. The resulting structure delineates of four major learning styles (Table 2).

Table 2: Basic characteristics and teaching methods of the four learning styles

Learning styles	Characteristics	Teaching method

According to Gregory and Chapman (2007), 4MAT Model defines the four different learning styles of the learners, but they do not exclude that all learners are able to function in all four learning style areas, having a tendency of preference in one learning style. Thus, if teachers provide experiences in all four learning style areas during the teaching process, they help all learners to learn easier and effectively and, at the same time, they increase learners' learning style range.

Additionally, McCarthy incorporated current research on human brain function and learning, into her theory. Current research has proved that: a) Both hemispheres of the human brain (right and left) process information and experience in different ways, b) both hemispheres are equally important for the whole brain functioning and c) individuals rely more on one mode of processing than the other especially when they approach new learning (About learning, 2002; McCarthy, 1990). Research describes left mode as serial, analytic, rational and verbal, while right mode as global, visual and holistic. Left mode processing is systematic. Problems are solved by looking at the parts and sequence is critical. Right mode processing seeks patterns and solves problems by looking at the whole picture (McCarthy, 1990). According to McCarthy (1990), the reality is that people approach learning with their whole minds, with their intuition, their beliefs and their subjectivity intact. Accordingly, educators/teachers should take into account both ways of the brain function while designing their teaching courses.

Combining Kolb's theory with the theories about hemispherisity dominance, McCarthy created 4MAT learning cycle. In Figure 3 there is a learning cycle that combines the four learning styles with the right and left brain mode and the 8 steps of learning. According to McCarthy (1990, p. 33)

> *if all four learning styles are taught to all learners in a cycle that alternates from right to left mode information processing, and if in doing this, all styles are equally valued, this integration will allow learners to be comfortable some of the time and stretched and challenged at other times. And because it is clear that all learners need all segments of the cycle, the entire cycle then becomes more valuable than any segment.*

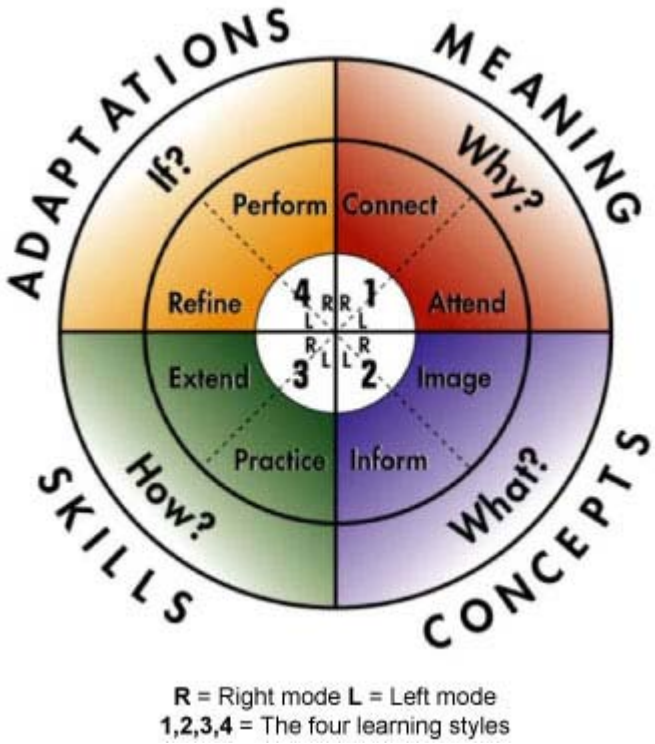

Figure 3. The 8 steps of learning, the four learning styles and the right and left mode learners inside the learning cycle (source: http://www.aboutlearning.com/what-is-4mat.html)

Teaching according to 4MAT Model

McCarthy resulted that a learning cycle should include eight steps of teaching/learning (Scott, 1994; McCarthy & McCarthy, 2006; McCarthy & O'Neill-Blackwell, 2007). These eight steps are presented in Table 3.

Table 3: The 8 steps of the 4MAT Model (source: McCarthy & O'Neill-Blackwell, 2007)

The 8 steps of the 4MAT Model	
What the learners do	

	**Connect**: establish relationship between content and how this connects to their lives
	**Attend**: analyze what happened in "Connect"/notice similarities and differences
	**Image**: visualize the concept
	**Inform**: receive information/define theories and concepts
	**Practice**: apply knowledge and skills learned to real-life situations
	**Extend**: experiment with new knowledge and skills

	**Refine**: analyze application/refine their practice/assess their progress
	**Perform**: demonstrate an original application

These eight steps of learning derive from the adaptation of the four learning styles using right and left brain dominance. Alternation between right and left brain activities is crucial for the whole brain functioning. Accordingly, McCarthy's 4MAT Model helps in designing a balanced teaching and gives all learners the opportunity to learn in their own preferable way. Using 4MAT Model, both brain hemispheres are caused to function and learners learn to adapt in other learning styles as well (Figure 3). All learners get the same education, in the same mode and for the same amount of time (McCarthy, 2007; DeBello, 1990).

According to McCarthy and O'Neil-Blackwell (2007), before starting designing the instructional material, the designer will need to do the following:

1. Define the learners outcomes in terms of both content and skills
   The designer should be sure about what the learners will learn and what they will be able to do after the training. The designer should be able to answer to the following questions:
   - What will the learners know and be able to do better?
   - How will the learners connect these ideas to their studies and, in some cases, to their personal lives?
   - What new skills will the learners have and what will these skills give them access to?
   - How will the learners demonstrate what they learn?

2. Mind map the content, looking for how the content is connected
   Once the designer has defined what the learners should be able to do at the end of the learning experience, the designer is ready to find types of content that might be included in the instructional material. The designer must begin by mind mapping the essence of the content, the details that support the main ideas and the relationships among them. This part of the designing procedure describes step 4 (Inform) of the 4 MAT learning cycle. Important questions for the designer are the following:
   - How will the designer deliver the information to the learners?
   - Will there be interaction? Will the distance learning instructional material interact with the learners and ask them to react to what they are learning?

3. Define the concept
   The designer is searching for the common ground that connects all the learners to the instructional material. Concept holds together the content of the training design. The decision regarding which concept to use, depends on the context, which is defined by the learners, their backgrounds and the present situation. The designer begins by reviewing the content and looking for a big idea that encompasses all of the content. Effective concepts:
   - are core, essence ideas
   - form bridges that link the learners' experiences to the content
   - have immediate relevance for the learners
   - establish relationships between topics

4MAT Model and distance learning material: an example

In this section an application of the 4MAT Model in the designing of distance instructional material is presented. The example of the distance instructional material concerns the area of Drama in kindergarten and is addressed to kindergarten teachers for the purposes of a possible distance training course. The example forms a chapter entitled "Physical actions' method" and is based on Sonia's Moore book "The Stanislavski System". It is formed according to the principles of the designing of distance instructional material, the principles of adults' education and the principles of the 4MAT model (Nikolaou, 2010, Nikolaou and Koutsouba, 2011).

The designer does not follow the same sequence (steps 1-8) as this used to deliver training. The reason is that the designer needs to be clear about the expected results and then conceptualize the content (McCarthy, 2007). Similarly, the learning goals of the content and what the kindergarten teachers would be able to do are also defined. The learning goals, which form the expected results, are described in the introduction of the example. Following that, a quick mapping of the content is formed focusing on the ways the new information, relative examples and relative exercises-activities would be delivered to the learners, according to the four learning styles of the 4MAT Model. Then, the concept is defined and forms the common base that will connect the learners with the instructional material. Taking into account the kindergarten teachers' previous experience (studies, teaching experience and training courses), a conceptual bridge in order to connect new information with the existing cognitive background of the learners is presented.

The instructional material starts with an Introduction section where the Learning Goals and the Expected Results are described. Then, the 8 steps of the learning cycle follow (Figure 4). In this case, the 8 steps of the learning cycle are:

- In the first step, "**Connect**", the learners are connected with the main concept of the material. The connection is accomplished in an experiential way (observation of their own physical actions). The step aims to arouse their interest, concerning the content.
- In the second step, "**Attend**", the learners are involved mostly with physical expression by seeking for differences and similarities in the ways people express their feelings. A relevant example is presented.
- The third step, "**Image**", starts with an Activity according to which the learners are asked to observe carefully some photos and express their thoughts about the physical expression and the emotional situation in which those people are. An available answer is presented at the end of the example. The aim of this step is the learners to form themselves the concept "Physical actions" before reading the information given to them in the next step.
- In the fourth step, "**Inform**", new information is delivered, putting emphasis in the basic parts of the concept and the details as well. This step begins with the Section "Improvisation and Expression" and includes the basic Stanislavsky's discovery that concerns the unbreakable relation between physiological and physical factor in a person's life. An example of this relation is following in order to help the learners understand it thoroughly. Then, the 2nd Activity asks the learners to watch a particular DVD, which is part of the instructional material. Learners will observe and record the actors' physical actions and emotional situations in order to confirm Stanislavsky's view about the unbreakable relation between physical expression and emotional condition. At the end there is additional information that supports all the previous.
- In the fifth step, "**Practice**", learners will have the opportunity to practice or demonstrate their understanding of all the information they have studied in the previous step. They start with the 3rd Activity which concerns Improvisations. After performing the improvisations the learners record their emotions and they answer to the basic question "Did their emotions lead them to the particular physical expression?" In the following 4th Activity learners are asked to perform more improvisations and are encouraged to record themselves with a camera.
- In the sixth step, "**Extend**", the learners will experiment with their new knowledge, connecting all they have studied with the area of Drama in kindergarten curriculum. They will use the new information in real conditions. There is a relevant example.
- The seventh step, "**Refine**", starts with some questions that concern the emotions and the physical expression of the children and the kindergarten teachers' role as animators. The learners will have the opportunity to improve and refine all of the new information they have got in the previous step. In the 5th Activity, the learners are encouraged to invent their own activities and improvisations for their class in which the differentiation in physical actions according to particular conditions is obvious.
- In the eighth step, "**Perform**", learners are encouraged to apply the new information by creating activities of physical actions for the children of their class. Moreover, they are asked to encourage children to invent and create physical action activities themselves and perform them in the area of Drama in the kindergarten curriculum.

Figure 4. The 8 steps of learning according to 4MAT Model in "Physical actions' method"

Conclusion

Important issues concerning the effectiveness of learning emerged in McCarthy's 4MAT theory are summarized in the following: 1. Individuals perceive and process new experience and information in their own preferable way and these preferences form their unique learning styles and 2. When new information is delivered to learners by different teaching methods, it leads to higher levels of performance, concerning the learning process. The 4MAT teaching/learning model McCarthy suggests in her theory, forms a complete teaching guide for teachers and a complete learning experience for the learners. Its greatest advantage among other learning style models is that it does not ask learners to "fit" themselves in a particular learning method according to their learning style. To the opposite, 4 MAT Model accepts the existence of four learning styles and suggests a teaching designing that includes all the learning styles preferences. At the same time learners have the opportunity to move in the other learning style areas and increase their own learning style repertoire.

The application of the 4MAT Model in distance instructional material suggests a balanced method of delivering new information in a total of learners having different characteristics and learning styles. Moreover, the teacher's physical absence and the consequent absence of direct contact between teacher and learner are almost extinguished. While in conventional education teachers can answer to learners' questions during the teaching process, in distance education it is the instructional material that takes the place of the teacher in distance. Subsequently, distance material adapted to all four learning styles, according to 4MAT Model, offers various and different ways/methods of teaching and learning for the total of learners, minimizing the possibilities of posing questions or asking for explanations by the distance learners. 4MAT learning cycle covers the total of learners and each learner discovers new information with his own learning style. In addition, each learner absorbs new information through a variety of different methods. "Physical actions' method" is not an extensive application of the 4MAT Model in distance instructional material. More research should be carried out in other scientific areas as well so as to assure the validity and expansion of the model's use in distance education. On this basis, 4MAT Model could constitute a designing guide for distance instructional materials, in various scientific areas, education levels and groups of learners, improving the quality and effectiveness of distance instructional material.

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