MULTIPLE INTELLIGENCES AND THE DESIGN OF WEB-BASED INSTRUCTION

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ABSTRACT

Howard Gardner's Theory of Multiple Intelligences (Gardner, 1993) has provided a wealth of evidence that learners utilize a variety of different mental processes during instruction. While much has been written concerning the possible benefits of this theory for traditional learning situations, the current article focuses on multiple intelligence strategies that can be implemented within the relatively recent field of Web-based instruction.

INTRODUCTION

With the current shift towards more distance-based education and training (including Web-based instruction), instructional designers must work to achieve their instructional goals using a broad variety of instructional methods. While traditional instructional strategies have proven to be effective in a wide-ranging series of learning environments, designers should also be willing to investigate additional perspectives that will assist them in the delivery of materials sometimes at great distances. The challenge of the current instructional designer is to create educational materials that are instructionally sound while delivered effectively through their intended media.

Designing instruction for learner populations who choose to learn at some distance from a traditional classroom presents an opportunity to effectively apply Howard Gardner's Theory of Multiple Intelligences (Gardner, 1993) through the general design of course content, the use of specific instructional activities, general communication, and improved participant interaction. The appropriate use of these eight intelligences will also increase the likelihood that the learner will retain new knowledge and remain an active learner during the entire instructional process. Finally, incorporating Multiple Intelligence theory into the design of instruction can provide multiple avenues for learning based on an individual's preferred style

regardless of the discipline or the geographic dispersion of the intended learners.

GARDNER'S THEORY OF MULTIPLE INTELLIGENCES

Howard Gardner is well known for his studies of the development of human cognitive potential in normal and gifted children. Through the examination of child prodigies, gifted individuals, brain damaged patients, normal children, normal adults, experts in different areas of work, and individuals from a variety of cultures, Gardner (1993) has developed a theory that describes and supports the existence of a number of intelligences available to individuals.

Understanding these types of intelligence and their impact on learners can greatly assist educators, teachers, trainers, and instructional designers in their development and implementation of learning materials. Gardner (1993, p. 4) states, "Only if we expand and reformulate our view of what counts as human intellect will we be able to devise more appropriate ways of assessing it and more effective ways of educating it."

The theory of Multiple Intelligence states that humans are born with a certain amount of intelligence, with specific intelligences being dominant and others recessive and the potential to harness or develop all intelligences being possible (Gardner, 1993). The shaping of the intelligences is nurtured by our culture and education and to truly work within all intelligences, one must have an understanding of their intelligence's strengths and weaknesses.

Specifically, Gardner (1993) describes eight intelligences: linguistic, logical-mathematical, spatial, musical, bodily kinesthetic, interpersonal, intrapersonal, and naturalistic. A rich research base that combines physiology, anthropology, personal and cultural history supports Gardner's model (Silver, Strong & Perini, 1997) and attention to these intelligences and their impact in the classroom is significantly changing education.

Linguistic intelligence is the verbal or written ability to draw on semantics, syntax, linguistics, word forms, and meanings (Gardner, 1993). A poet is an obvious example of someone with a high degree of linguistic intelligence, as are writers, novelists, and essayists. Linguistic intelligence is also one of the most highly regarded intelligences and well known since it is an integral part of our educational system.

To awaken linguistic intelligence, Lazear (1991) suggests reading or writing a story, having a discussion with an individual and expounding on ideas, learning the meanings and use of new words, researching a topic of interest and speaking about it, and recording thoughts and ideas in a journal.

Logical-mathematical intelligence is the combination of logical, mathematical, and scientific ability (Gardner, 1993). This intelligence does not have its origin in the audio or verbal spheres, but rather it is the ordering, reordering, and assessment of various objects and their impact on other objects. An individual who works as a mathematician, logician, engineer, or scientist has high logical-mathematical intelligence.

The logical-mathematical intelligence is a highly regarded intelligence and

is an integral part of our educational system with its focus on tests like the SATs (Gardner, 1993). To initiate the logical/mathematical intelligence, Lazear (1991) describes creating an outline of a hobby or event (including subtopics and sub-points), practicing analytical thinking by comparing and contrasting two objects, creating a rational explanation for an absurd idea or product, and following a recipe or other directions.

Spatial intelligence is the ability to form a mental model of a spatial world, object, or pattern and then maneuvering the image to operate in that environment (Gardner, 1993). Examples of professionals with high spatial intelligence include sailors, engineers, surgeons, sculptors, and painters.

Individuals with this form of intelligence are usually described as visual or visionary with active imaginations, and are capable of being able to visualize how something is going to look before it is completed. Within this realm, Lazear (1991) suggests working with artistic media, designing skills to communicate an ideas or opinions, designing a house and its color scheme, intentionally day-dreaming, and engaging in imagination exercises that place the individual in a different time or place.

Musical intelligence is one of the earliest intelligences to emerge (Gardner, 1993). Components of musical intelligence begin at a young age with attention to the physical components of music (e.g., pitch, tone, resonance, and timbre) as well as the emotional components created within the music.

Specifically, musical intelligence is the process of hearing specific rhythms, instruments, tones, and lyrics and synthesizing how they fit into a selection of music. To stimulate this type of intelligence, Lazear (1991) suggests listening to a variety of music, observing its impact on your mood or timing of a significant event, singing to express an idea or event, humming to create different types of vibrations in your head, and playing nature tapes while listening to different rhythms and patterns.

Bodily kinesthetic intelligence is the ability to solve problems using one's whole body or parts of the body. The core competencies of this intelligence include working skillfully with objects and mastery over one's body movements and using the body for expressive purposes (Gardner, 1993). Examples of pro-fessionals with bodily kinesthetic intelligences are dancers, swimmers, athletes, and actors.

Individuals who have bodily kinesthetic intelligence are animated in their actions and learn best by doing. To stimulate this form of intelligence, Lazear (1991) suggests role-playing or performing a dramatic enactment, playing non-competitive games that involve physical movement, practicing physical activi-ties such as dance or sport, and becoming more aware of your body's daily activities as it functions.

Interpersonal intelligence is described as looking outside of oneself and understanding other people (Gardner, 1993), including the ability to self reflect, analyze emotions, and predict reactions to various situations. Politicians and reli-gious leaders are examples of people who demonstrate interpersonal intelligence.

Exposure to person-to-person interaction and engaging and analyzing reac-

tions to thoughts and opinions are the fundamentals of interpersonal intelligence. In order to strengthen interpersonal intelligence, Lazear (1991) suggests engaging in team activities, actively listening within groups or individually, reading non-verbal clues, predicting what a person will say next, and practicing different ways of communicating using body movements and gestures.

Intrapersonal intelligence is the ability to form an accurate, representation of oneself and then being able to use that model to operate effectively. It is the ability to notice and make distinctions among other individual's moods, temperaments, motivations, and intentions (Gardner, 1993).

Intrapersonal skills allow for self-reflection and learning through one's thoughts and feelings (and how they relate to the larger scheme) as well as understanding how people feel about themselves. To activate intrapersonal intelligence, Lazear (1991) describes practicing mindfulness of everything that is going on, observing thoughts and actions as if removed from the situation, objectively evaluating decision-making activities and strategies, and writing a response to the question "Who am I?".

Naturalist intelligence is the most recent intelligence to be added to the original seven categories, through distinguishing among, classifying, and using features of the environment (Pennar, 1996). Specifically, it is the natural instinct of animals or humans to react to the environment and make judgments about survival.

In our daily function, the environment impacts the way we act and react to certain situations or actions, with this form of intelligence providing a response based on our survival instinct or other similar internal mechanisms. In order to develop natural intelligence, Lazear (1991) describes taking a walk in a park, studying the way organisms relate to one another in nature, and observing how nature and daily living correlate with one another.

Together these eight intelligences are the framework for Howard Gardner's Theory of Multiple Intelligences. Evidence of this theory is shown in our primary and corporate education systems, educational software, instructional design strategies, mainstream media programming, and our management and professional development programs. Pennar (1996, p. 107) states, "From hiring and promoting to the daily search for solutions, a multifaceted approach that captures and takes advantage of all ways of thinking and learning can only enhance creativity and innovation".

APPLICATION OF MULTIPLE INTELLIGENCES THEORY TO ON-LINE LEARNING

Utilizing the principles of Multiple Intelligence theory and the dynamics of the Internet allow instructional designers to develop learning experiences that are diversified, exploratory, guided, and soundly constructed. By utilizing Web design principles and understanding the types of learning technologies available, educators, instructors, and instructional design professionals can create instruction that meets and exceeds expectations, creating opportunities to incorporate activities that appeal to the eight intelligences and thereby increase learner

responsiveness. With its accessibility and user friendliness, Web-based instruction is probably one of the most flexible types of instruction, providing a forum where all intelligences can be represented and cultivated regardless of the physical location of the student (Nelson, 1998).

The Internet also provides a variety of software tools for instructional designers and users to aid in the learning process. Nelson (1998, p. 91) states, "The Internet provides many tools that are the same or very similar to traditional teaching and methods, such as tutorials, simulation drill, practice, and multimedia." These new Internet-based tools provide multiple avenues for learning as well as the overall design of effective Web-based instruction and essentially fall into five categories: communication, listservs, chat forums, computer conferencing, and class Web sites (Nelson, 1998).

E-mail is the most common communication tool of the Internet, and is basically an asynchronous, electronic messaging system used for organizational and personal communication. Its use in Web-based training, however, appeals to learners who have heightened intelligences in linguistic, interpersonal, and intrapersonal areas.

Within a Web-based class, an instructor can e-mail a student a class assignment or a response to a question. In this case, the feedback would be individual (interpersonal intelligence), with the student having the opportunity to reflect on the comment (intrapersonal intelligence) and respond back to the instructor (linguistic intelligence). Finally, the action of typing the email to express the question or respond to the instruction is a demonstration of linguistic intelligence, with the overall communication between the student and instructor demonstrating interpersonal intelligence (Nelson, 1998).

Expanding on these tools, a Web-based class can also include opportunities for students to work independently — one-on-one, or with peers. Other types of communication (linguistic intelligence) include linked assignments, additional articles, and multimedia videos or graphics to supplement and reinforce the topic of study. In this case, linguistic intelligence is the primary mode, however, other intelligences such as intrapersonal intelligence are stimulated as well.

The second type of Internet tool is a listserv, which functions as an electronic mailing list with students or faculty being able to send and receive communications to everyone on the list. Nelson (1998, p. 92) describes this type of tool as "emailed-based, asynchronous group communication" which can be set up for a specific class or as a focused group topic. Students can also subscribe to listservs outside of class to share information and discuss topics for a broader learning experience. For example, a student who is studying a mathematical procedure can subscribe to specific subject listservs that are devoted to mathematical discussions and expand their learning by communicating with others who have similar interests.

Listservs appeal to learners who have heightened intelligences in the areas of linguistics, intrapersonal, and interpersonal. Activities which can be incorporated into instruction with this Internet tool include collaborative writing projects and small group activities utilizing communication among students from different locations. Listservs also provide opportunities for linguistic learners to

write, reflect, and communicate among their peers to express opinion, rationale, and meaning. For these learners, listservs are an electronic avenue to satisfy the needs of their linguistic intelligence.

For interpersonal and intrapersonal intelligences, listservs allow for person-to-person interaction, learning, and more of a group-learning atmosphere. "Working cooperatively and skillfully with others is not only very humanizing, it is very effective" (Lazear, 1991, p. 116). In addition, a learner with high inter-personal intelligence would benefit from a listserv because of the group discussions and collaborative projects. Learners with high intrapersonal intelligence will enjoy the flexibility of a listserv as well as their participation in self-reflective exercises which allow them to reflect on their knowledge and their own feelings.

A third tool for learning via the Internet is a chat forum, described as "real-time, text-based communication between individuals and groups" (Nelson, 1998, p. 92). Similar to listservs, chat forums allow individuals to communicate via e-mail on any topic, but also allow conversations to be saved, categorized, and printed for future reference. Chat forums (like listservs) appeal to all the intelligences since classes can meet at a pre-assigned time for real-time, instruc-tor-facilitated discussion or lecture, with smaller focus groups breaking out as necessary to discuss various topics in greater depth. In addition, chat forums also appeal to individuals who are linguistically intelligent and also meet the needs of those who require the interaction and reflection of interpersonal and intraper-sonal intelligences.

Another tool that can be used in conjunction with the Internet is videoconfer-encing. This type of tool allow users to conduct meetings between two or more participants at different sites by using computer networks to transmit audio and/or video data. For example, a point-to-point (two-person) video conferenc-ing system works much like a videotelephone, with each participant using a video camera, microphone, and personal speakers to communicate over an elec-tronic network. In a similar manner, multi-point videoconferencing allows three or more participants to sit in a virtual conference room and communicate as if they were all sitting next to each other in the same room. From a multiple intelli-gences perspective, these tools appeal to learners who are linguistic, interper-sonal, intrapersonal, bodily kinesthetic, and visual spatial.

Finally, class Web sites can be utilized to simulate the activities of a tradi-tional classroom with instructors provide relevant links to various Web sites related to the course content, while incorporating sound, graphics, and simula-tions to create a virtual classroom. With these tools, class syllabi, tests, quizzes, and scores can be posted to an individual Web site, which can also support the use of chat rooms and collaborative learning as well as the publication of student projects. To transfer and test specific learning objectives in this type of environ-ment, an assignment can be developed for students to collaboratively create a Web site (interpersonal), with some students preferring to do the writing or prob-lem solving (linguistic and logical) and others developing graphics, sounds, and video clips (visual, musical).

CONCLUSION

Instructional designers are now being asked to design their educational materials more quickly while using a more diverse set of delivery methods. While traditional classroom facilitation remains the preferred style of instruction (in most situations), professionals in the field are also becoming much more aware of various technological trends, including the growing use of the World Wide Web for instructional purposes.

The theory of Multiple Intelligences is an effort to understand how culture and various disciplines shape human potential (Silver, Strong & Perini, 1997). By being informed about Multiple Intelligence Theory and its applications to various instructional environments, educational professionals can make better decisions concerning the design and delivery of effective instruction.

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