Diverse Ways of Knowing and Learning: The Impact of Culture

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Abstract: Medical educators tend to approach teaching and learning grounded in their disciplines (content areas of expertise), culture of origin, and their own learning styles and ways of knowing. This article reviews dimensions for medical educators to consider in preparing themselves and their learners for maximum effectiveness through a lens of cultural awareness and understanding. Internationalization and advances in technology and communication have forever changed knowing and learning as we once knew them. Developments in communication and transportation permit work and learning to occur across many boundaries with large geographical and cultural distances. Audio- and teleconferencing, web-based delivery (both synchronous and asynchronous), internet resources, and email allow for work and learning to occur seemingly with no boundaries. However, the boundaries that do persist are typically due to misunderstandings related to cultural differences among the people and their educational institutions. These results are apparently based on the assumption that technology is either culture-blind or culture mitigating and hence that we can overcome distance and difference. Yet when we draw on social science (cultural anthropology), cognitive science (distinct learning activities and multiple intelligences) and educational psychology (learning styles) and test that assumption, we learn that our education practices, including applied technology, can be even more effective by keeping culture in mind. Specific instructional techniques have been identified as most effective across learning styles and include advance organizers and case method. These techniques also facilitate the stages of learning regardless of culture.

Keywords: Education technology, learning styles, culture, teaching style.

INTRODUCTION

Medical educators must take into account changing demographics, globalization, and technology as the sociocultural conditions most shaping the learning needs in today's world [1]. With regard to changing demographics, we have more adults than youth and older adults, we are more highly educated, and there is increasing cultural and racial/ethnic diversity. Educators tend to approach teaching and learning grounded in their disciplines (content areas of expertise), culture of origin, and their own learning styles and ways of knowing. In this paper we review dimensions for medical educators to consider in preparing themselves and their learners for maximum effectiveness through a lens of cultural awareness and understanding.

This topic will be approached from two perspectives: 1) cultural, which takes into account the sum total of ways of living built up by a group of human beings and transmitted from one generation to another; and 2) dimensions or scope, which refers to the aspects of culture that affect how we learn and how we approach medical education. The purpose of this review is to anticipate and address barriers to learning that might result from misunderstandings related to cultural differences among the people and educational institutions involved. We will also explore various ways that people learn from a cultural perspective, broadly defined, and how technology impacts the learning process.

Internationalization and advances in technology and communication have forever changed knowing and learning as we once knew them. Developments in communication and transportation permit work and learning to occur across many boundaries with large geographical and cultural distances. Audio- and teleconferencing, web-based delivery (both synchronous and asynchronous), internet resources, and email allow for work and learning to occur seemingly with no boundaries; however, the boundaries that do persist are typically due to misunderstandings related to cultural differences among the people and their educational institutions. There is evidence that when learners select their preferred delivery medium the effectiveness of technology based learning is even greater [2]. These results are apparently based on the assumption that technology is either culture-blind or culture mitigating and hence that we can overcome distance and difference. Yet when we draw on social science (cultural anthropology), cognitive science (distinct learning activities and multiple intelligences) and educational psychology (learning styles) and test that assumption, we learn that our education practices, including applied technology, can be even more effective by keeping culture in mind.

CULTURAL PERSPECTIVE

A significant study of workplace values as a reflection of country culture was conducted by Geert Hofstede, a Dutch

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psychologist. He examined work-related attitudes and values of comparable groups of managers working in a multinational company (the branch offices and subsidiaries of International Business Machines, IBM) that operated in 40 countries As a result, Hofstede established five dimensions of culture [3]: 1) *power distance*--the degree of acceptance that power is distributed unequally (perception of not actual distance); 2) *individualism vs. collectivism*—the extent to which people define themselves independently (individualism) or as part of a group (collectivism); 3) *masculinity vs. femininity*—the value placed on traditionally male or female values (as defined by Western world); 4) *uncertainty avoidance*—the degree to which people minimize uncertainty through rules and structure; and 5) *long vs. short term orientation*—a society's "time horizon" in terms of importance placed on past, present or future which Hofstede added as an additional dimension [4]. With over 116,000 questionnaires in 20 languages and seven occupational levels across 50 different countries, Hofstede found that there are national and regional cultural groupings that affect the behavior of societies and organizations, and that these groupings persist across time [3, 5]. For each of the dimensions, country profiles were computed which Hofstede viewed as reflecting broad dimensions of culture.

Hofstede's work has been criticized for various reasons including lack of representativeness of national populations and lack of replicability across all dimensions. In a replication study of Hofstede's work, power distance and individualism were replicated but not uncertainty avoidance or masculinity [6]. Overall, Hofstede's dimension of collectivism/individualism seems to be the strongest with regard to distinguishing organizations (see for example [7]).

However, in studies related to medical education and medical practices, the dimensions of power distance and uncertainty avoidance were relevant in the adoption of an integrated and problem-based curriculum in Europe [8] as was power distance in the study of cultural dimensions related to antibiotic use in Europe [9]. This study also revealed the "possible effect of cultural dimensions on wealth and vice-versa: Power Distances covaries negatively with a country's wealth. Uncertainty avoidance influences consumer behaviour."

So as we educate and work with people from around the world, there are some ways to increase likelihood of success. The tables below are based on Hofstede's work [10]. The *educator hypotheses* and *some comparisons* are by the authors.

1. Power/Distance (PD) Refer to Table 1

This refers to the degree of inequality that exists - and is accepted - among people with and without power. A high PD score indicates that society accepts an unequal distribution of power and people understand "their place" in the system. Low PD means that power is shared and well dispersed. It also means that society members view themselves as equals.

Application

According to Hofstede's model, in a <u>high</u> PD country like Malaysia (104), you would probably send reports only to top management and have closed door meetings where only a select few, powerful leaders were in attendance. *In a <u>low</u>* PD country like Austria (11) team projects with members selecting the team leader from among their membership might be most effective.

2. Individualism (IDV) Refer to Table 2

This refers to the strength of the ties people have to others within the community. A high IDV score indicates a loose connection with people. In countries with a high IDV score there is a lack of interpersonal connection and little sharing of responsibility, beyond family and perhaps a few close friends. A society with a low IDV score would have strong group cohesion, and there would be a large amount of loyalty and respect for members of the group. The group itself is also larger and people take more responsibility for each other's well being.

Application

Hofstede's analysis suggests that in the Central American countries of Panama and Guatemala where the IDV scores are very <u>low</u> (11 and 6, respectively), a marketing campaign that emphasizes benefits to the community or that ties into a popular political movement would likely be understood and well-received. *In <u>high</u>* IDV countries such as the United States and Australia (91 and 90 respectively) audiences are likely to anticipate or perceive the personal benefit before participating.

3. Masculinity (MAS) Refer to Table 3

This refers to how much a society sticks with, and values, traditional male and female roles. High MAS scores are found in countries where men are expected to be tough, to be the provider, to be assertive and to be strong. If women work outside the home, they have separate professions from men. Low MAS scores do not reverse the gender roles. In a low

Table 1.

	Characteristics	Tips	*Educator Hypotheses*
High PD	Centralized companies. Strong hierarchies. Large gaps in compensation, authority, and respect.	Acknowledge a leader's power. Be aware that you may need to go to the top for answers	*Educator as expert.* *Implications for competition and collaboration among learners.*
Low PD	Flatter organizations. Supervisors and employees are considered almost as equals.	Use teamwork Involve as many people as possible in decision making.	*Team assignments.* *Co-design.* *Peer learning.*

Table 2.

	Characteristics	Tips	*Educator Hypotheses*
High IDV	High valuation on people's time and their need for freedom. An enjoyment of challenges, and an expectation of rewards for hard work. Respect for privacy.	Acknowledge accomplishments. Don't ask for too much personal information. Encourage debate and expression of own ideas.	*Obvious relevance of content to individual learners.*
Low IDV	Emphasis on building skills and becoming masters of something. Work for intrinsic rewards. Harmony more important than honesty.	Show respect for age and wisdom. Suppress feelings and emotions to work in harmony. Respect traditions and introduce change slowly.	*Draw on learners experience.*

MAS society, the roles are simply blurred. You see women and men working together equally across many professions. Men are allowed to be sensitive and women can work hard for professional success.

Application

Japan is highly masculine with a score of 95 whereas Sweden has the lowest measured value (5). According to Hofstede's analysis, if you were to open an office in Japan (high), you might have greater success if you appointed a male employee to lead the team and had a strong male contingent on the team. In Sweden (low), on the other hand, you would aim for a team that was balanced in terms of skill rather than gender.

Table 3.

	Characteristics	Tips	*Educator Hypotheses*
High MAS	Men are masculine and women are feminine. There is a well defined distinction between men's work and women's work.	Be aware that people may expect male and female roles to be distinct. Advise men to avoid discussing emotions or making emotionally-based decisions or arguments.	*Monitor participation of members for gender based deference.*
Low MAS	A woman can do anything a man can do. Powerful and successful women are admired and respected.	Avoid an "old boys' club" mentality. Ensure job design and practices are not discriminatory to either gender. Treat men and women equally.	*Anticipate inclusive behavior around gender.*

4. Uncertainty/Avoidance Index (UAI) Refer to Table 4

This relates to the degree of anxiety society members feel when in uncertain or unknown situations. High UAI-scoring nations try to avoid ambiguous situations whenever possible. They are governed by rules and order and they seek a collective "truth." Low UAI scores indicate the society enjoys novel events and values differences. There are very few rules and people are encouraged to discover their own truth.

Application

Hofstede's Cultural Dimensions imply that when discussing a project with people in Belgium, whose country scored a 94 on the UAI scale (high), you should investigate the various options and then present a limited number of choices, but have very detailed information available on your contingency and risk plans. (Note that there will be cultural differences between French and Dutch speakers in Belgium!)

Table 4.

	Characteristics	Tips	*Educator Hypotheses*
High UAI	Very formal business conduct with lots of rules and policies. Need and expect structure. Sense of nervousness spurns high levels of emotion and expression. Differences are avoided.	Be clear and concise about your expectations and parameters. Plan and prepare, communicate often and early, provide detailed plans and focus on the tactical aspects of a job or project. Express your emotions through hands gestures and raised voices.	*Assignment clarity.* *Formally elicit ideas.*
Low UAI	Informal business attitude. More concern with long term strategy than what is happening on a daily basis. Accepting of change and risk.	Do not impose rules or structure unnecessarily. Minimize your emotional response by being calm and contemplating situations before speaking. Express curiosity when you discover differences.	*Opportunity for reflection.* *Create opportunities for new ideas outside formal assignments.*

Participants from countries with <u>low</u> UAI scores such as Singapore (8), Jamaica (13), or Denmark (23) seem likely to accept open-ended assignments and potentially negotiate final versions.

5. Long Term Orientation (LTO) Refer to Table 5

This refers to how much society values long-standing, as opposed to short term, traditions and values. This is the fifth dimension that Hofstede added in the 1990s after finding that Asian countries with a strong link to Confucian philosophy acted differently from western cultures. In countries with a high LTO score, delivering on social obligations and avoiding "loss of face" are considered very important.

Application

According to Hofstede's analysis, people in the United States and United Kingdom have <u>low</u> LTO scores. This suggests that you can pretty much expect anything in this culture in terms of creative expression and novel ideas. The model implies that people in the US and UK don't value tradition as much as many others, and are therefore likely to be willing to help you execute the most innovative plans as long as they get to participate fully. (This may be surprising to people in the UK, with its associations of tradition!).

Table 5.

	Characteristics	Tips	*Educator hypotheses*
High LTO	Family is the basis of society. Parents and men have more authority than young people and women. Strong work ethic. High value placed on education and training.	Show respect for traditions. Do not display extravagance or act frivolously. Reward perseverance, loyalty, and commitment. Avoid doing anything that would cause another to "lose face".	*Group success.* *Private discussion of opportunities to learn.*
Low LTO	Promotion of equality. High creativity, individualism. Treat others as you would like to be treated. Self-actualization is sought.	Expect to live by the same standards and rules you create. Be respectful of others. Do not hesitate to introduce necessary changes.	*Individual success.* *Stretch for team goals.*

Hofstede's cultural dimensions contain elements of non-country or non-geographic culture including gender, ethnic and religious diversity related to how we know and learn. People learn and "know" differently and culture impacts the process. In *Women's Ways of Knowing*, Belenky and colleagues proposed some ideas about education and learning in women and ways in which women interact with and approach the world [11]: 1) silence; 2) received knowledge; 3) subjective knowledge; 4) procedural knowledge; and 5) constructed knowledge. Silence, the first way of knowing, involves dependence on authority with limited ability to define oneself. The second way of knowing is received knowledge where one receives and reproduces knowledge by listening to others. Next is subjective knowledge where knowledge is viewed as personal, private, and based on intuition. The fourth stage is procedural knowledge in which knowledge is obtained objectively using reason versus feeling. The fifth way of knowing is constructed knowledge, where one understands the contextual nature of knowledge and is able to integrate individual opinions and self with the outside world. Although Belenky's work has suffered much criticism regarding its replicability and choice of research methodology, the work nevertheless suggests that gendered learning does in fact represent diverse ways of knowing and that women and men may approach learning differently.

Educational thought and practice often gets lumped into schooling so that education becomes equated to formal classes and learning. Formal learning is distinguishable from informal learning that occurs in everyday life; other sources of knowledge come from religion, family, and cultural customs and traditions. In a comparison of Western and African systems of thought, Jegede suggests that Western learning is very much individual in nature with knowledge "documented" and in African culture, learning is more community oriented with oral traditions predominating as the manner in which knowledge is transmitted [12].

A consideration of non-Western and indigenous knowledge allows for a broader perspective on how people learn and know within a local or community context. As George (1999) [13] suggests that indigenous knowledge is not found in school curricula or even taught in schools in the typical manner but rather is passed down orally from one generation to the next through storytelling, poetry, ceremony, dreams and art, etc. Indigenous elders are often thought of as "cultural professors" [14]. Other philosophical and religious systems of thought such as Buddhism, Islam, Hinduism, and Confucianism are additional non-Western approaches that suggest possibilities about other ways of learning. The Western notion of learning emphasizes the split between mind and body whereas many other cultural traditions of learning involve more somatic and spiritual aspects. In contrast, the non-Western perspectives put greater emphasis on interdependent, communal, holistic, and informal learning.

The Confucian way of thinking and learning is not to acquire a specific vocation or skill. Rather, learning for adults emphasizes spiritual development and becoming fully human. The primary notion of learning is to imitate the virtues of another person. Imitation of the sages is considered to be true learning. Another important concept according to Confucianism is to learn from everyday experiences as we

journey through life. The Confucian way of learning is a continuous integrative process between the self and nature while engaging in commitment, continuous effort, and a holistic approach. To reach the highest excellence, which is considered to be the ultimate purpose of adult learning, eight steps should be followed: 1) investigation of things; 2) extension of knowledge; 3) sincerity of will; 4) rectification of the mind; 5) cultivation of one's personal life; 6) regulation of the family; 7) national order; and 8) world peace. In this Confucian concept, both peer learning and individual, independent learning are important. In the Confucian way of thinking, teachers are highly respected and the expectation is that learners obey their teachers [1].

The Hindu perspective on learning emphasizes spiritual growth and a connection of the mind and body. Oral tradition is a common method of teaching and starts early with storytelling to children. The Vedas, ancient Sanskrit scriptures, are at the heart of Hinduism and are believed to be the absolute authority for Hindu culture. Messages from the Vedas are passed down orally and through dance and music which helps to keep Hindu traditions alive. In contrast to the Western goal of knowledge acquisition in learning, the objective of Hindu learning is to understand oneself first through self-discovery and then to progress to a more holistic understanding of the universe which includes the idea of connection to the universe. Such an approach to learning allows the Hindu learner to access knowledge through various modalities (e.g., stories, meditation, music, etc.) which in turn may result in a higher level of spirituality [1]. Like Confucian learning, there is a sacred and revered relationship between teacher and learner in the Hindu tradition of learning.

People and the value of self-determination are central in the Maori concepts of learning. *Ako*, the Maori word for learning, is the same word for teaching, recognizing the overlapping nature of the dispensing and receiving of knowledge. Much of the Maori approach to learning must be understood within the socio-political context of the Maori people alongside contemporary New Zealand dominant culture. Knowledge construction occurs through traditional tribal structure and customs. Within the tribal structure, there are smaller units of extended family which serve as a "fundamental unit for living and learning" [1, p. 232]. Currently, the Maori are claiming their autonomy from New Zealand. One way this has occurred is that the Maori have established their own lifelong educational system with coinciding sites of learning where knowledge is defined by and constructed specifically for the Maori people. Maori educators follow six sub-principles, consistent with the principles of the Treaty of Waitangi, which guides the lives of Maori people: 1) relative autonomy, 2) cultural aspirations, 3) reciprocal learning, 4) mediation of difficulties, 5) extended families, and 6) collective vision or philosophy [15].

In African indigenous education, the emphasis is on living harmoniously with family, community, society, and spirits of one's ancestors. This concept is reflected in the Zulu *ubuntu* philosophy which translates to "humanism of human beings collectively" [1, p. 235] and in the Setswana concept of *botho* which means humanism. To reach these societal values, collective learning, oral instruction, dreams and visions, and informal education are all considered valid methods of knowing and learning. Participatory education through ceremonies and rituals and other interactive customs is common in African indigenous education because of the recognition that knowledge is contingent upon the cultural and religious context which includes storytelling, myth, folklore, practical experience, and taboos. In African tradition, each person is expected to be a productive worker and participate in the dual role of teacher and learner.

The Islamic perspective gives special credence to education and seeking knowledge. The primary learning sources are the Qur'an and the *hadith* (collection of sayings from Prophet Muhammad). The Islamic religion is more than just a theological concept or religion—it is considered a way of life that affects all aspects of life from hygiene to socialization patterns [16]. Learning and education, according to Islam, are considered sacred—a way to become closer to Allah (God) and His creation. Cook describes that in Islam, education serves to unite a person's rational, spiritual and social dimensions [17]. Communal learning is emphasized as a way not only to enhance the individual but to elevate the community and society at large. Like many other non-Western approaches to learning, the relationship between teacher and learner is considered sacred and one is supposed to display *adab* (discipline of body, mind, and spirit) in interactions with one's teacher. Muslims believe that seeking, reflecting, and sharing knowledge are noble acts that bring one closer to Allah. The Islam perspective emphasizes that lifelong learning is expected—"like a drop of water in the sea, one can never complete acquiring knowledge" [1, p. 235].

COGNITIVE SCIENCE (LEARNING ACTIVITIES AND MULTIPLE INTELLIGENCES)

Acquisition of knowledge is one of the stages of learning. The cognitive sciences, including educational psychology, have provided valuable "lessons" regarding the neurobiological basis of memory formation and learning. Learning involves three stages: acquisition of information (physical encoding in the brain), retention of information, and the ability to retrieve that information when needed. Gardner's work on multiple intelligences [18] and Kolb's Experiential Learning cycle theory of learning [19, 20] are supported by recent cognitive science research. Information must be accessible when it is needed or appropriate. In order to form a memory (acquisition), information must catch our attention. There are two types of attention: semantic (how the world works) and episodic (associated with time, place or people). Memory retention is enhanced by addressing interference (the effect that other information has on learning or retaining new materials). Interference can be proactive, which occurs when the new information is inconsistent with what we already know – stereotyping is a pernicious example. Retroactive interference occurs when new information interferes with what we had already learned, but only when the information is similar to the first information [21] Memory access is related to how memories are organized such as categories, hierarchies and/or schemas. The initial stage of learning is more difficult due to lack of related information in categories with which associations can be made. "The context in which information is learned also plays a role in its accessibility," indicating learning in a work context as a key to success – enhancing likelihood of applying learning [21, p. 3].

The potential of application of learning is also enhanced by understanding and leveraging multiple intelligences as identified by Gardner. Gardner proposes that the traditional idea of intelligence based on IQ tests is far too limited [22]. He expanded intelligence to include eight types of intelligence which accounts for a broader range of human potential: 1) linguistic intelligence (word smart); 2) logical-mathematical intelligence (number/reasoning smart); 3) spatial intelligence (picture smart); 4) bodily-kinesthetic intelligence (body smart); 5) musical intelligence (music smart); 6) interpersonal intelligence (people smart); 7) intrapersonal intelligence (self smart); and 8) naturalist intelligence (nature smart). Gardner's concept of multiple intelligences [22] allows for different possibilities of learning especially when a traditional approach is not working. Each type of intelligence has a corresponding methodology. For instance, using words corresponds to linguistic intelligence or using self-reflection corresponds with intrapersonal intelligence. The use of numbers, pictures, music, physical experiences, social experiences, and natural world experiences are all alternatives to facilitating learning. Gardner says that schools in the Western world generally do not operate from such a philosophy and instead emphasize linguistic and logical-mathematical intelligence. He suggests that teachers should be trained in non-traditional ways of incorporating music, cooperative learning, art, multimedia, field trips, self reflection and more.

How we learn has been considered not only in academia but in the business world as well. Weisbord [23] suggests that we only know when we listen to each other and that "what is, is, whether we can make sense of our experience or not" [23, p. 68]. Underlying this philosophy of knowing are assumptions about learning that we find helpful to the discipline of medical education. Each learner has an individual approach to learning. Every learner learns at a different rate. This implies we must be patient and aware of different levels or rates of learning and we must understand that rate depends on the content. Learners have different perceptions and learn different things from a common experience (implies sharing of perceptions and discussion, acceptance of other viewpoints and worldviews). Learners learn best from their own experience (implies openness to many ways of knowing and learning). Learners can be teachers, which implies participation and drawing on all expertise not just teacher. Learners benefit from trial and error with appropriate feedback (both positive and critical according to established guidelines for giving feedback).

This "better understanding of what constitutes intelligence and how people in learn" is important and correlates somewhat to learning styles as described by Kolb [24] (as depicted in Fig. **1**):

Kolb suggested that learning involves a cycle of four discrete steps: 1) Concrete experience leads to 2) reflective observation on that experience, followed by the 3) development of theory through abstract conceptualization. The theory is then tested by 4) active experimentation that generates new experiences. Reese reports that "a few studies have correlated Kolb's learning styles with teaching methods and learning outcomes in medicine. First year medical students' learning styles significantly influenced development of their patient interviewing skills. Conversely, however, the different learning styles of faculty and residents in a pediatric set-
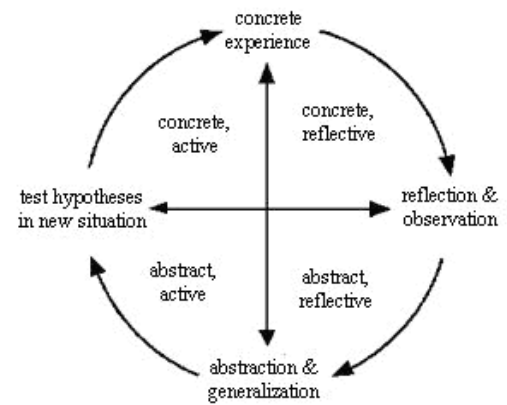

Fig. (1). Kolb's experiential learning cycle.

ting led to less efficient learning because instructors tend to teach using methods that would appeal to their own personal learning style rather than that of the learners [21, p. 5]. Applying what we know from this research suggests focusing on appealing designs of learning materials (instructional design) and appropriate data organization.

Organizing educational materials is meant to enhance recall and transfer of learning. An advance organizer is a cognitive strategy proposed by Ausubel in his Subsumption Theory [25], which allows the learner to recall and transfer prior knowledge to the new information being presented. This theory is based on the idea that learning is facilitated if the learner can find meaning in the new information. If a connection can be made between the new information and previous knowledge, the learning experience will become more meaningful to the learner leading to retention of the new information. The advance organizer is not a strategy used by the learner, but rather an instructional strategy used by the teacher. In essence, the advance organizer is a brief, general presentation given by the teacher before presenting the new material to introduce the new lesson. Recall of previous knowledge relevant to the new knowledge is important when designing the advance organizer. It should provide a bridge that links the known to the unknown, by including an abstract outline of the new information and a restatement of old knowledge. Theoretically, this will encourage transfer and application of old knowledge, to make the new knowledge more meaningful to the learner [25, 26]. The authors believe that advance organizers potentially work across cultures because it is an integrative approach that respects the lack of separation of mind and body found in non-Western learning.

Research consistently supports the use of case-based learning to mitigate impacts of cultural, learning style, and generational differences. In medical education there are key features of the best practice of using cases: 1) reconceptualize new and old material through an active process; 2) conceptual understanding connects information in several categories; 3) explain student learning strategies and techniques explicitly so students will access and use according to needs; and 4) incorporate self-directed learning [21]. Case-based learning is also supported by a study by Shannon [27] that concludes that teaching students metacognitive strategies which will help them become more self-directed learners.

A meta-analysis of cognitive styles showed that field independent/field sensitive styles seem to track with Hofstede's cultural dimensions. Most teachers and the curriculum favor field-independence, and grades reflect that preference. In addition locus of control or belief of how much control the student believes s/he influences his or her environment impacts learning. Cognitive and learning styles are influenced by ethnicity across social classes within ethnic groups; while locus of control is primarily a class variable [28]. Similar to Hofstede's cultural dimensions, characteristics of groups can help us understand groups but not individuals.

Learning styles, cognitive styles and the integration of teaching techniques are incorporated into idea of Microburst Teaching and Learning, a strategy for combining various teaching styles and methods to interest and motivate students with different and sometimes disparate learning styles for the ultimate purpose of enhancing and strengthening the learning process [29]. The Microburst Model encompasses key elements of both educational theory and practice into an identifiable and malleable framework. This framework uses culturally sensitive approaches and applies different teaching methods and teaching styles which are interchanged and presented in brief "bursts" of time (see Fig. **2**).
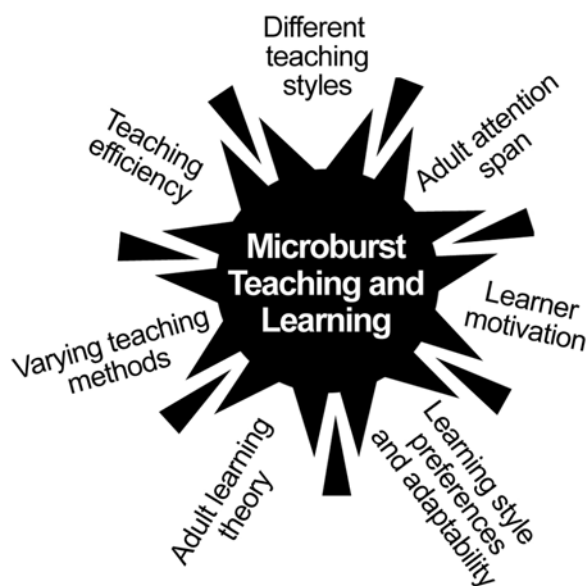

Fig. (2). Microburst model of teaching and learning.

These teaching "bursts" must accommodate and acknowledge adult learning theory, adult attention span, learner motivation, the variety of learning styles found in residents/medical students, and the need for efficiency. The Microburst Model can reduce monotony for teachers because they are continually stretching their repertoire of teaching styles and methods. It challenges learners to also stretch their abilities and learning styles, contributing to lifelong learning skills. The success of the Microburst Model as a strategy to address learning style preferences depends on faculty who have been trained in the knowledge, skills and attitudes necessary for addressing learning style differences. Faculty need to: 1) know how learning occurs; 2) be sensitive to individual learning style preferences; 3) be able to help learners identify their learning strengths and weaknesses; and 4) be able to use a variety of methods to help learners accomplish the myriad of objectives that comprise medical education.

TECHNOLOGY AND LEARNING

Implications of learning style, cultural dimensions, and attitude have been considered in the application of new technology. Educator attitudes toward technology are related to challenges to perceptions of the teacher's role, which shows a lack of understanding of the capabilities of the technology being integrated into the curriculum. Computer software reflects cultural preferences for analytic and linear thinking, and culture-specific logic and rules. These cultural preferences can be mitigated by arranging the learning experience so that learners can select if they work alone or in groups; this allows for both teacher and peer modeling. Technology offers the opportunities to be consumers of knowledge by not only getting the correct knowledge but also by a self-assessment of why they got the correct answer. This also eases educator-assessment of learners understanding of concepts [30].

Learners' attitudes toward educational technology should be considered both from cultural and generational perspectives. In the northeastern US Individualists and Collectivists differ in their receptivity and use of different media types for distance learning. Individualists are not inhibited by any form of distance learning although they prefer interactional media. Mediated communication is enhanced by relationships for the Collectivists so they can leverage the various distance learning media types [31]. In contrast, a study of 22-35 year old adult learners at the University of Memphis, found no relationship between attitude use of technology and students' learning style [32].

Technology affects learning styles as well as the development of educators. Learners are becoming more fluent in multiple media and in simulation based virtual settings. We see communal learning involving diverse, tacit, situated experience with knowledge distributed across a community and a context as well as within an individual. There is a greater balance among experiential learning, guided mentoring, and collective reflection. Learning is expressed in non-linear and associational representations, suggesting access to a variety by a variety of cultures. Learners and educators co-design learning experiences personalized to individual needs and preferences. In addition, educators utilize knowledge sharing among students for co-instruction. They use case-based participatory simulations in presentations and other instructions. Finally, assessment includes evaluation of collaborative activity and knowledge creation as represented in a variety of ways. Educators also require formative feedback on their effectiveness as faculty [33].

CONCLUSION

Educators tend to approach teaching and learning grounded in their own disciplines, culture, learning styles, and ways of knowing. These are lenses which affect their educational efforts, and can potentially act as barriers to optimal educational effectiveness. These barriers can be overcome by applying knowledge of self, of others and other cultures to educational practices. Medical educators can draw on tools and other disciplines to optimize learning of multi-cultural learners. Technology is not culture-neutral; it

can be used in conjunction with other instructional techniques to allow both individual and group learning. Specific instructional techniques have been identified as most effective across learning styles: advance organizers and case methodologies. These techniques also facilitate the stages of learning regardless of culture.

Medical educator attitudes toward technology and the teaching style repertoire covered above will influence effectiveness, as will cultural competence. The authors have proposed a model of intercultural adjustment composed of three elements: 1) intrapersonal competence (knowledge of self); 2) interpersonal competence (knowledge of self and others); and 3) cultural competence (application of knowledge of one's own and other's cultures). From these three components comes something new: intercultural adjustment incorporated into the context we all share. Most cultural competence approaches have been singular in their approach, focusing only on one main element within cultural competence (usually knowledge, skills, or awareness). This model of intercultural adjustment depends on the situation or context and requires knowledge, skills, and awareness about one's strengths intrapersonally, interpersonally, and culturally [34].

REFERENCES

[1] Merriam SB, Caffarella RS, Baumgartner LM. Learning in adulthood: A comprehensive guide. 3rd ed. San Francisco: John Wiley & Sons, Inc. 2007.

[2] Liu C-H, Chiang T-C, Huang Y-M. Assessment of effectiveness of web-based training on demand. Interact Learn Environ 2007; 15(3): 217 - 35.

[3] Hofstede G. Culture's consequences: International differences in work related values. Beverly Hills, CA: Sage: 1980.

[4] Hofstede GH. Culture and organizations. New York: McGraw Hill: 1997.

[5] Hofstede GH. Culture's consequences: comparing values, behaviors, institutions, and organizations across nations. Thousand Oaks, CA: Sage 2001.

[6] Merritt A. Culture in the cockpit: do Hofstede's dimensions replicate? J Cross-Cultur Psychol 2000; 31: 283-301.

[7] Triandis HC, Dunnette MD, Hough LM, Eds. Handbook of industrial and organizational psychology. 2nd ed. Palo Alto, CA: Consulting Psychologists Press 1994; vol. IV.

[8] Jippes M, Majoor GD. Influence of national culture on the adoption of integrated and problem-based curricula in Europe. Med Educ 2008; 42: 279-85.

[9] Deschepper R, Grigoryan L, Lundborg C, *et al.* Are cultural dimensions relevant for explaining cross-national differences in antibiotic use in Europe? BMC Health Serv Res 2008; 8(1): 123.

[10] Hofstede's Cultural Dimensions Understanding Workplace Values Around the World. Mind Tools Ltd; access date: February 10, 2009 Available from: http://www.mindtools.com/pages/article/newLDR_66.htm

[11] Belenky MF, Clinchy BM, Goldberger NR, Tarule JM. Women's ways of knowing: The development of self, voice and mind. Tenth anniversary edition. New York: Basic Books 1997.

[12] Jegede OJ. Science education in nonwestern cultures: toward a theory of collateral learning. In: Semali LM, Kincheloe JL, Eds. What is indigenous knowledge? Voices From the Academy. New York: Falmer Press 1999; pp. 119-42.

[13] George JM. Indigenous knowledge as a component of the school curriculum. In: Semali LM, Kincheloe JL, Eds. What is Indigenous Knowledge? Voices From the Academy. New York: Falmer Press: 1999; pp. 79-94.

[14] Graveline FJ. Indigenous learning. In: English LM, Ed. International encyclopedia of adult education. New York: Palgrave Macmillan 2005; pp. 304-9.

[15] Bishop R, Glynn T. Culture counts: changing power relations in education. London: Zed Books 2003.

[16] Bigby J. Cross-Cultural Medicine. Philadelphia: American College of Physicians 2003.

[17] Cook BJ. Islam versus Western conceptions of education: Reflections on Egypt. Intern Rev Educ 1999; 45(3/4): 339-57.

[18] Gardner H. Frames of mind: The theory of multiple intelligences. New York: Basic Books 1983.

[19] Gardner H. Multiple intelligences: The theory in practice. New York, NY: Basic Books 1993.

[20] Kolb D. Experimental learning. Englewood Cliffs, NJ: Prentice-Hall 1984.

[21] Reese AC. Implications of results from cognitive science research for medical education. Med Educ Online 1998; 3(1): 2.

[22] Gardner H. Intelligence reframed: Multiple intelligences for the 21st Century. New York: Basic 2000.

[23] Weisbord MR, Janoff S. Future search: An Action guide to finding common ground in organizations and communities. San Francisco: Berrett-Koehler Publishers 1995.

[24] Kolb D. Experimental learning. Englewood Cliffs, NJ: Prentice-Hall 1994.

[25] Introduction to Advance Organizers. Guides and Tutorials. com; access date: February 10, 2009. Available from: http://www.guidesandtutorials.com/advanceorganizers.html

[26] Cues, Questions, and Advance Organizers. Northwest Educational Technology Consortium; access date: February 10, 2009. Available from: http://www.netc.org/focus/strategies/cues.php

[27] Shannon S. Using metacognitive strategies and learning styles to create self-directed learners. Inst Learn Styles Res J 2008; 1(Fall): 14-28.

[28] Banks J. Ethnicity, class, cognitive, and motivational styles: research and teaching implications. J Negro Educ 1988; 57(4): 452-66.

[29] Vaughn L, Gonzalez del Rey J, Baker RC. Microburst teaching and learning. Med Teach 2001; 23(1): 39-43.

[30] Chen C. Cultural diversity in instructional design for technology-based education. Br J Educ Technol 2007; 38(6): 1113-6.

[31] Anawke U, Kessler E, Christensen E. Distance learning and cultural diversity: potential users' perspective. Intern J Organ Anal 1991; 7(3): 224-43.

[32] Cox T. Learning styles and students' attitudes toward the use of technology in higher and adult education classes. Inst Learn Styles Res J 2008; 1(Fall): 1-13.

[33] Dede C. Planning for 'neo-millennial' learning styles: implications for investments in technology and faculty. Educause Q 2005; 28: 11.

[34] Vaughn L, Phillips R. Intercultural adjustment for cultural competence in shared context: "the company we keep". Intern J Interdiscipl Soc Sci 2009; 3(11): 1-12.