アジアの成人向け開放遠隔学習における脳研究の意義[1]
Implications of Brain Research for Adult Open and Distance Learning in Asia

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開放遠隔学習（ODL），脳研究，成人学習者，アジア
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ABSTRACT

アジアの高等教育の開放遠隔学習（ODL）は驚くべき成長を享受しており，新しい提供形態が開発され，新しいプログラムや機関が作られ，輸出入の流れが拡大している．しかし，アジアのODL教育者の教え方には変更の余地があり，そのためには成人学習者の学び方をさらに理解する必要がある．本稿では，成人学習者を対象としたアジアのODLの実践を検証し，成人の学び方を理解する上での脳研究の意義を論じ，アジアという文脈で成人学習者の教育法を変えていくことに対する成人教育学的な意義を検討する．最後に将来のアジアのODLに向けた提言を述べる．

Open and distance learning (ODL) is enjoying phenomenal growth in Asian higher education, new forms of provision are being developed, new programs and institutions are being created, and the flow of import and export is being expanded. However, there is still need to change how Asian ODL educators teach, which requires a better understanding of how adult learners learn. This paper examines practices of Asian ODL for adult learners, discuss implications of brain research to understand how adults learn and explore andragogical implications for changing how we teach adult learners in the context of Asia. It concludes with a set of recommendations for future Asian ODL.

Introduction

In recent years, there has been tremendous growth and diversity in open and distance learning (ODL) over the world. In particular, the Asian region, with over 56 percent of the global population, has developed over 70 universities that are dedicated to open access to education, including ten out of 20 of the world's mega universities [2] serving nearly six million active adult learners all together (Jung, 2007a).

Technology is a major contributor to this dramatic growth of ODL for adult learners in the region. According to a report published by the International Telecommunication Union (2004), in the past few years growth rates for fixed land lines, mobile subscribers, and Internet users in Asia has surpassed the single digit growth rates seen in other regions. The number of Internet users in Asia as of 2006 is approximately 379 million, 35 percent usage of the world. Further, four Asia countries (China, Japan, India, and Korea) are among the top 10 countries with highest number of Internet users. With the development of information and communication technology (ICT) infrastructure in the region, ODL institutions in Asia have adopted ICT to support supplementary modes of instruction and, more importantly, as a means of improving student services and providing interactions.

Whereas advanced ICT offers options to both expand educational opportunities and improve quality of ODL for adult learners, and the most promising option to instantly connect to, and learn from anyone in the world, anywhere in the world and at any time, it poses new challenges related to learning strategies focused on adults, that is, andragogical issues. It is reported that most ODL institutions are not achieving the fundamental changes necessary to maximize adult learning benefits of advanced technologies that can provide more interactive, learner-oriented and rich learning experiences for adults (Jung, 2007b; Zemsky & Massy, 2004).

With regard to slow or limited andragogical changes, some argue that structure of ODL institutions is too rigid to incorporate technological advancement (O'Hearn, 2000). Some blame lack of institutional support systems while others indicate that e-learning success depends on the full cooperation and support of instructors and students (Garrison & Cleveland-Innes, 2005; Holley, 2002; Leem & Lim, 2007). Many suggest need for innovative learning strategies specifically for adult learners based on a better understanding of how adults learn.

While early brain studies suggested that brain changes more or less stop in early years, more recent Magnetic Resonance Imaging system (MRI) and brain research has discovered that the development of human brain, especially the frontal cortex, continues well into adulthood. As a famous proverb says, it is never too late to learn. Our brain has "continued plasticity" or a capability to adapt to changing environment and learn new ideas until old age. But at the same time, brain changes and functions need to be maintained by various learning opportunities and practices. It is known that the connections between neurons of the adult brain change as a function of use. In a study that compared brains of the expert London cab drivers who had practiced their route everyday with those of the noncab driving men with the same age, it was found that the size of the hippocampus, the area that plays a major role in spatial navigation, of the cab drivers was much larger than the other men and was related to years of cab driving. A study with musicians revealed the similar result (Blakemore & Frith, 2005). Brain research, as a part of learning sciences, provides some answers as to how ODL approaches need to be designed and implemented to offer more effective learning opportunities to adult learners.

This paper attempts to examine practices of Asian

ODL for adult learners with focus on teaching and learning strategies, discuss implications of recent brain research to improve these practices, and explore andragogical implications for changing how we teach adult learners in the context of Asia.

Course structure, academic interaction and social networking

Learning scientists disagree with the assumed superiority of the well-structured presentation of course materials and suggest introducing more interactive learning strategies (Carver, 2006; Latchem et al, 2008). Unfortunately, many ODL institutions have adopted the transmission and acquisition style of instruction in their ODL to serve a large number of students. This is especially the case in many Asian countries where Confucianism, a collectivist and a high power distance culture (Hofstede & Hofstede, 2004) prevails, and 'tell-and-listen' and lectures by academics or other well-known figures are still regarded as important for the success of ODL. For example, Ozkul and Aoki (2006) observe that Japanese instructors and adult learners prefer ODL via TV-broadcast or video-recorded lectures and real-time videoconferencing lectures to text-based materials and asynchronous discussions. This is because these media enable the learners can replay the recordings until they are confident that they have grasped the content and the instructors' intentions and see their instructors on the screen. Wang (2007) reveals that three-quarters of Chinese universities' online courses are videorecorded lectures, less than half included discussion boards or opportunities to post questions and none involved collaborative learning. Many other Asian scholars (Bijan-Zadeh, 2000; Jang et al, 2003; Latchem & Jung, 2009; Zhang, 2005) report the lack of interactions in their ICT-supported ODL courses.

This so called executive approach to design and implementation of ODL for adult learners views the role of an instructor as a course manager deliberately choosing course content, carefully designing and developing course materials, selecting most appropriate instructional methods, executing complex distance teaching and learning processes, and bringing desirable outcomes. Course content is usually treated as something outside ourselves. Since content is something that students are to acquire and something that teachers are to teach, effective and efficient selection and design of materials and methods are the most important aspect in this distance teaching approach. The advantage of the executive approach is that it provides a detailed means of transporting course content from a subject matter expert to ODL media such as TV-broadcasts, textbooks or online sites, and finally to the mind of a group of ODL learners. Understanding students' personal needs and learning styles or building interactive network between the instructor and students is given little attention. Even though this executive approach has promoted learners' mastery of course content, it has failed to provide effective instructional environments for adult learners whose interests often go beyond content mastery.

More recently, some ODL providers in Asia have begun to integrate more imaginative and educationally sound strategies in teaching adult learners and move away from the executive approach. For example, rather than simply delivering lecture content, an online class of the Beijing Normal University in China provides reading articles, selected video lectures given by experts, and cases via video clips and also offers Q & A sessions with instructors via online and video conferencing (Huang & Zhou, 2006). Each of these online activities will be followed by a face-to-face session in order to promote discussions and help tutors observe learners' authentic learning progress. In Korea about 70% of the universities and all of the cyber universities have incorporated web-based discussion boards in their e-learning programs and some universities have

established learning communities on the Internet to promote collaborative knowledge building between instructors and students (Jang et al, 2003; Leem & Lim, 2007). Yangdanhua (2005) observes that China, interactive discussions are incorporated in case-based online courses in finance and economics and reports positive learning results. Jung et al (2002) evidence that active interactions between instructor and adult learners and among adult learners promote learning performance and satisfaction in an online class.

In these interactive ODL courses, instructors play a facilitator role and promote various interactions. This facilitator approach places a high value on adult learners' experiences, inviting them to interactions and collaborative activities. Compared with the executive approach employed in most Asian ODL institutions, this facilitator approach focuses more on adult learners' experiences and ideas and less on content itself. Instructors who adopt this approach tend to believe that the focus, extent and depth of the learning depend as much upon the inputs of the learners as those of the teachers. More examples of applying the facilitator approach and emphasizing interactions in recent Asian ODL can be found in Sharma and Mishra (2006) and Latchem and Jung (2009).

Especially integration of social networking strategies in adult ODL is well supported by recent brain research. A number of brain studies find that adult brains including those of the elderly are stimulated and encouraged by social networking to a greater extent than occurs with younger adults (McAuliffe, 2007; OECD, 2007; Varlinskaya & Spear, 2008). Active social networking with others while maintaining independence is known to be one of the most effective ways of adult learning (Parasuraman, Tippelt, & Hellwig, 2007) and preventing adult brains from deteriorating or atrophying. This result suggests that one-way lecture mode for adult learners in most Asian ODL institutions needs to be blended with a rich and stimulating environment in which both academic and social interaction is important. Whereas academic interaction focuses on course topics, social interaction is related to social encouragement and support. Social networking with peer groups, friends and family members are one of the most important factors affecting learning success. In the Korea National Open University, there are now over 700 student-formed groups in the various fields of study and more than 40% of the students participate in one or more of these weekly. Meeting in the evenings, they work through materials prepared by study group members or online materials provided by KNOU staff and graduates. Jung et al (1995) found that these groups are highly motivational, provide a feeling of togetherness, and improve retention and performance. Besides face-to-face meetings, today's advanced software, ranging from simple instant messaging and email to more elaborated ones such as threaded discussion boards, wikis and blogs, has provided a socially connected environment for dispersed adult distance learners in the Open University of Malaysia,

Problem-solving approach

Only few Asian ODL institutions currently exploit the possibilities of problem-solving approaches for linking theory, research and real-world situations (Japanese Ministry of Economy, Trade and Industry, 2005; Lee, 2006; Lim, 2007). This is unfortunate because it is shown that when learners engage in task analysis and problem-solving, bring their experiences and problems into the learning and invite their colleagues to contribute ideas, the learning can be so much deeper and more meaningful, particularly for adult learners (Dhanarajan, 2005, Leung, 2007). Moreover, cognitive sciences and constructivism have already built a strong theoretical and empirical basis for developing deeper understanding through

problem solving and authentic activities (Jonassen & Rohrer-Murphy, 1999; Kolodner, 2006; Sawyer, 2006).

Several brain studies support that meaningful activities and problem-solving are better suited for adult learners to maximize their inputs in learning than expository approaches. They reveal that adult learners in general are much faster to perceive and act upon the core concept of the matter to hand and to see the 'big picture' in a complex problem situation (Goswami, 2006; McAuliffe, 2007; OECD, 2007), even though there is individual variation in cognitive decline (Raz, et al., 2005). Moreover, adult learners are better than young adults in abstract conceptual thinking and planning, and develop better judgment. As adults, we may lose the sharpness and speed of young people's thinking and memorizing as we grow older, but we also gain a new capability for recognizing broader perspectives and drawing upon earlier experience and learning (Parasuraman, Tippelt, & Hellwig, 2007). A recent finding (Cohen, 2005) is that adults tend to use both hemispheres of the brain in cognitive activities whereas young adults tend to favor one side of the other depending on the task. For example, when young adults are given some language problems, they use exclusively the left side of the brain but during visual-spatial processing, the right side of the brain dominates. During their cognitive processing, youth tend to focus on finding the answers. On the other hand, more mature learners use both sides of the brain when processing the same tasks and consider more than one solution or even accept contradictory ideas or solutions, which implicate that the older brains can be more creative and more efficient in certain intellectual tasks. The integration of two hemispheres of the brain with age, research shows, stimulates the development of a flexible, broader view and reduced effects of emotion.

Reflective and positive learning environment

Learning scientists argue that reflection through conversation or even by oneself is critical in deep understanding. Reflection engages students in a process where their own problem-solving processes are compared with those of other students, and/or experts so that students themselves can understand their learning processes and find a mental model of expertise. Reflection also involves students in comparing their performance to that of others and to assessment criteria so that students can identify their weaknesses and factors affecting better performance (Collins, 2006). In a majority of Asian ODL institutions, opportunities for self- or group-reflection are seldom provided often due to the large number of students and time constraints. For example, Anadolu University has to provide hundreds of mid-term and final examinations and re-sits for more than 1 million students taking - and have the results in under three weeks. Most of the exam questions are multiple-choice.

Brain research suggests the idea of providing emotionally positive and non-threatening environments to adult learners during self- and group-reflection processes. Mather and Carstensen (2003) find that when pairs of faces are presented, older adults are less likely to attend to negative than to neutral or positive faces. A similar result is found in a functional MRI study (Mather, et. al., 2004) that older people react more actively to positive images than to negative stimuli whereas younger ones respond equally to negative and positive stimuli. These findings imply that adult learners more likely achieve better learning outcomes in positive environments since they tend to pay more attention to the things that make them feel good. Especially in reflection or assessment situations where adult learners are compared their performance to that of others and to evaluation criteria, positive feedback that highlights strong points and spots weak points

in a non-threatening manner would lead to improved learning, which is rare in Asian ODL practices.

Conclusion

ODL in Asian higher education has achieved a great deal. However, the paradigm shifts called for in education for the 21stC challenge expository assumptions and practices. Learning sciences and brain research suggest that there is need to redesign and refashion an ODL environment in such a way that it becomes a coherent means of engaging adult learners in a knowledge-creating endeavor. In this context, technology becomes more than information repository or a mail exchange system (Scardamalia & Bereiter, 2006); it serves as a platform for student-centered, teacher-facilitated knowledge building activities. Brain research tells us that ODL educators need to present and liberate a learning environment which promotes adult learners' creative thinking and synthesizing abilities. In this environment, adults should be encouraged to employ their strong brain functions – the integration of both brain sides - to develop flexible and creative ideas more efficiently. And adult learners should be able to express and share their own ideas via ICT-enhanced social interactions. There still lies a great challenge in designing a distance learning environment that presents an optimal state of cognitive challenge for the adult brain without causing too much stress or strain (Jung, 2007b). Adaptive presentation and adaptive navigation technologies can respond to cognitive differences of each learner in these challenging courses.

There is also need for high-quality professional development to help all ODL educators see how new knowledge of learning sciences and brain research can be integrated in all forms and level of ODL. Teaching practices can change only when teachers change how they teach. Thus, to bring changes and improve quality of education, the most important investment an institution can make is to ensure that its teachers continue to learn. Professional development and commensurate reward and recognition are needed to empower individual ODL educators and communities of ODL educators to make complex decisions in designing and redesigning their courses; to identify and solve problems; and to connect theory, practice, technology, and student outcomes. Professional development also should enable ODL educators to offer students the learning opportunities that will support them to create meaningful knowledge and to successfully develop complex problem solving skills.

There also needs to be continuous and elaborated research and evaluation into the short-and long-term impacts of major changes in ODL practices. This research not only needs to be undertaken by researchers per se. but by the teachers, tutors, instructional designers and media producers so that they can monitor and build upon their successes and shortcomings. And a lot more 'indigenous' research is needed into the cognitive processing and influences on ways of thinking, learning and interacting among Asian adult learners. Such research and evaluation should include compulsory and comprehensive student evaluations of teaching, and sufficient responses to student concerns should be provided.

Finally, a systemic view needs to be brought in the change process. We need to ensure that policy-making, planning and organizational and resource management are such as to encourage and support the kinds of transformations illustrated above and improve ODL system-wide and not simply in the odd class, program or individual institution.

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Notes

1. The early version of this paper was presented at the E-Learn 2009 conference (http://www.aace.org) at Vancouver, Canada on October 28, 2009.
2. http://portal.unesco.org/education/en/ev.php-URL_ID=42857&URL_DO=DO_TOPIC&URL_SECTION=201.html