Mobile Technologies in Support of Distance Learning

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ABSTRACT :

Mobile devices and services have the potential to introduce novel innovations in the area of learning and education. The main advantages of these devices, namely limitless mobility and small size, can bring new dimensions to the learning processes of the students. But, despite these clear advantages mobile devices are not commonly used in the distance learning settings. For instance, current course management systems, like WebCT, do not support a mobile device connection. They are designed only toward the PC environment. The Problem Processing Assistant (PPA) is a web-based learning tool that combines the characteristics of digital portfolios with the functionality of open problem solving and idea generation tools. PPA can also support learners in distance learning settings A mobile extension of the PPA tool is implemented to enrich its functionality. Using a mobile device, students can compose and read carry-on notes, which brings the PPA closer to the actual learning situation. Extension is implemented using the Multiple Representation Mobile Adaptation (MRMA) framework.

1. INTRODUCTION :

Many types of portable devices have started to proliferate in the field of learning and education. New technology will be embedded in every corner of society. M-learning (mobile learning) in our case is defined as the ability of using handheld devices to access learning resources (Kinshuk & Goh, 2003). Students can log on to the learning environment using several different platforms from diverse locations. Learning is not necessarily tied to a specific environment or learning space.

Handheld devices include a wide range of technologies from "Mobile Internet" devices, such as mobile phones with Internet connection to Personal Digital Assistants (PDAs), and handheld computers designed to be personal information managers (Uther,

2002). Mobile devices are able to work in two ways; stand alone or online. Stand-alone applications make a connection to the server provider whenever required. In this case, the mobile device does not remain in constant connection with the server. Online applications, on the other hand, have a direct and constant access to the service provider.

It is clear that mobile devices can bring new elements to the students' learning process. Soloway et al. (2001) went even further stating that as long as computers are not ready-at-hand, they will not be used in a routine, day-in, day-out fashion and that there will be little or no impact on basic education. M-learning devices have the potential to reach this level. However, m-learning technologies are not yet very common in education. Smith (2003) presented a range of projects applying PDA

technology. Some of the projects are in the pilot stage, but in all cases both instructors and students are still learning about the advantages and technical difficulties of the mobile devices. A number of recent classroom experiences have also proven that handheld devices are able to support a wide range of learning activities, like brainstorming, writing and peer editing (Curtis et al., 2003).

In the following section we will first go through the possibilities of mobile devices in the field of learning and education. The third section introduces the general Multiple Representation (MR) framework for content adaptation. The MR approach provides recommendations from the perspective of adapting user's preferences and current domain knowledge. Next two sections deal with the mobile device extension, presenting the Multiple Representation Mobile Adaptation (MRMA) approach.

Section six describes how the MRMA approach adapts the PPA system towards mobile devices. The students are able to access the system by using several different platforms from diverse locations.

2. MOBILE DEVICES IN DISTANCE LEARNING – PROMISES AND THREATS

Tella (2003) reported that m-learning was capable of producing elements that can be used to solve a problem, shared between the different members of community as part of the global problem-solving process. He viewed cybertextuality, network-based education, from the user's perspective, as a meaningful way to be and to act. Cybertextuality emphasizes the learners' power to experiment, navigate, choose and interpret the information they need. The tools of m-learning can enhance, and expand the cognition of their users to support these actions.

Tirri (2003) reported the potential of mobile learning as a way to change the learning activities brought by the possibility to access any of the information that is available through the Internet. Also mobile devices enable cognitive support that can accompany the learner everywhere.

Furthermore, location information and user activities can be monitored for building adaptive models of learners.

On the positive side, the promising characteristics of handheld devices are (Smith, 2003)

small size – high portability;

instant access – no waiting for 'boot-up';

flexible – for supporting a wide range of learning activities; and

price – technology is relatively cheap.

Thus far the main weaknesses of the mobile devices are the small screens and difficult data input. For example, most mobile devices have card-size screens and very limited input methods. These factors are not to be taken too lightly since the design of a handheld interface has a significant role on users' experience with the device. For instance, users often find scrolling through multiple screens of information or entering large amount of text to be troublesome (Luchini et al., 2003). Also unstable data storage and security of personal information are major issues.

However, despite the number of projects involved with the mobile technologies, only few focus on utilizing mobile devices in distance learning settings. Furthermore, even less research is conducted in the field. The following examples give a picture of the type of activities related to the use of mobile devices in distance learning.

A study by Waycott (2002) evaluated the use of PDAs as a tool for reading course materials in a distance learning setting. This study examined the impact that PDAs had on the activity of reading the materials. Her findings indicated that the students had major difficulties to skim-read the text, and they had to adopt new ways of reading the material. It was also found that the students had difficulties in picking up visual cues, such as headings, and some usual cues, like page numbers, were not available in PDA. She pointed out that the relationship between the new tool and existing tools was important. She concluded that if the mobile device complemented rather than conflicted with existing tools, it was more like to be successfully adopted.

Roccetti et al. (2001) evaluated the technical requirements for mobile devices in

distance learning settings. They examined what type of technology was available (or needed) for handling different media types; text and images, digital audio and video, and audio and video live conferencing. They found that the most important problems posed for mobile applications were;

1. bandwidth and delay requirements
2. availability and responsiveness requirements

Chang et al. (2003) presented the concept of the Ad Hoc and Mobile Classroom, and eSchoolbag systems developed in Tamkang University and the National Central University, Taiwan. With these systems one can construct a ubiquitous learning environment to support both indoor and outdoor activities in learning. The primary functions of the Ad Hoc Classroom and eSchoolbag systems were an electronic blackboard for transmitting drawings, a powerpoint broadcasting system for providing powerpoint slides, a voice and image transmission system for transmitting voice and images to each student's mobile device, and a text transmission system for extra explanations.

These above examples do not take into consideration adapting the current learning environment to mobile devices. For instance, major course management systems, such as WebCT, are designed solely for PCs. The Multiple Representation Mobile Adaptation (MRMA) approach has been designed to fill this need for mobile adaptation by providing guidelines for content adaptation to e-learning and mobile environments (Kinshuk & Goh, 2003).

3. THE MULTIPLE REPRESENTATION APPROACH :

The Multiple Representation (MR) approach tackles the presentation of domain content in three ways; - multimedia objects selection; navigational objects selection; and the integration of multimedia objects

3.1 Multimedia Objects Selection

The MR approach facilitates the presentation of domain content to the learner with suitable multimedia objects, as and when required, according to the learner's preferences, current level of domain competence, and familiarity with the learning environment. Various recommendations are described below.

3.1.1 Task Specificity and the Learner's Competence

The MR approach recommends the selection of multimedia objects on the basis of the tasks to be carried out. For example, audio is good to stimulate imagination, video clips for action information, text to convey details, and diagrams for conveying ideas (Alty, 1991). The selection of objects should also consider the level of the learner's domain competence. For example, an abstract concept could initially be introduced with the help of animation, and later on, at a higher level of abstraction, the representations could be more complex requiring more cognitive processing (Rogers & Scaife, 1997).

3.1.2 Expectations

The selection of multimedia objects should take care of the expectations of the learner and the domain about representation of the tasks. For example, a learner who is looking for an overview of the structure of the middle ear may expect to see just a graphic representation, but from the domain's point of view, textual details are also necessary to emphasize some intricate details. The system in that case should try to present graphical representation along with textual intricate details.

3.1.3 Reference & Revisits to Already-Learnt Domain Content

In the process of learning, it is many times necessary and desirable to refer to already-learnt domain content in different contexts. The MR approach favors revisiting the same domain content in different contexts, using similar multimedia objects as used before, for the following reasons;

a) Referencing enforces links between concepts (the one currently being learnt and the referred one);

b) It enhances the mental model of a previously learnt concept and helps in

generalizing its applicability in multiple situated scenarios;

c) It provides ease in learning a current concept by making familiarization with past learning experiences.

3.1.4 Use of Multi-Sensory Channels

The selection of objects should adequately use the visual, aural and tactile senses of the learner. If any of the sensory channels is not being used at the time of learning, the chances of getting distraction due to this channel are high.

3.1.5 Context-Based Selection of Multimedia Objects

When there are more than one multimedia objects available for representation of the same task or concept, the presentation should use the most suitable object for that particular context.

3.1.6 Authenticity of Multimedia Objects

Schematic diagrams and animations of the processes may not show the real objects but they are helpful in understanding the underlying processes. In such cases, the system should keep the learner aware about the authenticity of the representation by suitable messages.

3.2 Navigational Objects Selection

Navigation in typical educational systems takes place through various links provided in the system. Rada (1995) has pointed out that the link does not say what happens to the screen when the user activates the link. The important point to consider is the proper match of the learner's expectations of the outcome while activating a link with the presentation of an actual resulting interface.

According to the MR approach, the selection of links should not distract the learner's attention from the main task of learning. The existence of a link should be as transparent as possible. The MR approach identifies six types of navigational links concerning learning processes.

a) A direct successor link leads to a successive domain unit in the knowledge hierarchy within the current context.

b) A parallel concept link leads to an analogous domain unit for comparative learning or to a unit related to another aspect of the currently-being-learnt domain content.

c) A fine-grained unit link leads to very contextual fine details of the domain content once some missing or misconceptions are identified in the learner's understanding (Patel & Kinshuk, 1997).

d) A glossary link leads to a pop-up 'spring loaded' module (Nielsen, 1996) in the exploration process, which is available only while the learner is interested in it and is explicitly doing something to keep it active (such as pressing the mouse button).

e) An excursion link leads to a learning unit outside the current context (Kashihara et al., 1997).

f) A problem link leads to problems related to the current conceptual unit.

Different types of links should be clearly identified for their types (Benyon et al., 1997), and their representations should be consistent throughout the system.

3.3 Integration of Multimedia Objects

In many situations, the presentation of the domain content demands more than one multimedia object at a time on the screen for suitable representation. A number of studies have also showed improvement in learning through more than one multimedia object for the same domain content compared to a single object. The ADGA Group (1996) has suggested that learning improved as the number of complementary stimuli and different cognitive resources used to present learning content increased. But not all possible combinations of multimedia objects are adequate from a learning point of view.

Consideration should be given to how best to combine multiple multimedia objects in relation to different learning tasks (Rogers & Scaife, 1997). The following are some recommendations regarding the integration of multimedia objects to be observed during the design process of educational systems.

There should not be more than one observation multimedia object at a time on the screen, except for comparison studies where more than one active observation are required

agents such as the graduates themselves, outside reviewers and prospective local employers all seem to want less focus on the theory and more on the practicalities for social development and returns on investment.

Some details are included next (drawn from a wider report). In Bangladesh, learning was only cooperative and usually one-way from the teacher to the student, without student-to-student interactions, using print, radio, television and audiovideo cassettes (Tandon, 1998).

In mainland China, there was some use of multimedia technologies, but these were not interactive. The multimedia did not allow student interaction even for navigational purposes. Most learning was standardized and linear in content from the teacher to each student. However, in Hong Kong (China), despite more institutional awareness to build in collaborative learning opportunities, students rarely engaged in active collaborative learning online, not using for example a bulletin board provided for this express purpose (Robertshaw, 2002). Robertshaw found that the bulletin board was mainly used for sharing views and sometimes massively (2002). Similar cooperative sharing of experiences and views occurred also in Indonesia (see below). Research has been reported from Hong Kong on how to encourage students to engage collaboratively online. Tang & Fung, (2002) discovered in a comparative study of two contexts that accrediting online participation was more effective than having optional participation, and also bringing in the students' prior practical experience was more effective than a rather theoretical content. Also they confirmed that the wider the diversity in students then the more collaborative learning takes place in the asynchronous forum (having had 196 students on one course, compared to only 42 in the other). In another study, Shin et al. (2002) found that when participation was optional then the achieved quality of learning was related to the amount of participation. And when participation was an accredited part of the course then the achieved quality of learning was more related to the student's individual perception of an institutional 'presence' rather than to the amount of participation. Thus research in Hong Kong can be seen to be challenging the problem of facilitating collaborative asynchronous e-learning.

In India, technologies were seen to lower costs but that interactions were only one-way and so cooperative. Panda and Chaudhary (2001) reported only one-way interactivity – either in institutional content delivery, or in student accessing content on the internet, while two-way telephony was needed to add some interactivity to television delivery. Manohar (2002) reported two-way computer-mediated communications were used at one university, but that poor infrastructure was to blame for why wider use of two-way collaboration was impractical. In India, the most useful media was print, followed next by face-to-face contact at a study centre with other students and / or a tutor. Research at another university delivering business courses (Thilagavathy & Namasivayam, 2002) found 60% of students thought that a course delivered at a distance was not adequately linked to future employment and was too theoretical. IGNOU has reported similar findings. Vyas, Sharma, & Kumar (2003, p. 125) concluded the way forward should be towards less structure and more dialogue to better serve the individual wants and needs of each student. They were concerned with undergraduate learning.

In Indonesia, most education is and will likely remain in conventional mode using postal services and face-to-face

communication (Belawati, 2002). When asynchronous computer conferencing was provided in two trials of the new technology specifically for collaborative group learning used for in-service university teacher training, the participants were found to move over into a chat-room for synchronous discussions whenever any difficulty or

interesting point developed (Lawanto, 2000).

In Iran, new technologies are seen only in terms of their capabilities to deliver massive amounts of texts (Vaziri, 2002). Access is dealt with as meaning access to knowledge, to books, and other content resources. Mohamadi (2002) reported that video-

conferencing and internet communications cannot replace face-to-face education at Payame Noor Open University.

In Japan, most distance education is in vocational and technical training, and is cooperative not collaborative. Computers and the internet are used only for access to content, and also for sending content to one another using multimedia (such as digital cameras and email). In higher education, Kawachi (2002a ; 2002b) found that students use the internet only for accessing knowledge, cooperatively, and do not engage in collaborative learning for example using listserves or bulletin boards – even in their native language. Multimedia is highly advanced with widespread use of wireless media including digital-audio-video cameras inside mobile pocket-phones which can access the internet, or send digital audio-visual and text data, but these are not used for educational purposes - except perhaps for non-academic student support services. There was an Asian e-Learning Network (AEN, 2002) Conference in July 2002, held in Tokyo, resulting in several graduate collaborative e-learning projects, linking seven leading e-learning centres in Tokyo (mainly in one-to-one collaboration in these early stages) with one centre in Malaysia, one in Philippines, one in Thailand, and one in Viet Nam. However, Tsuji et al. (2002) report that in the case of the Japan–Viet Nam, a face-to-face lecture was simply transmitted in voice and video by telephony, and discussions were live synchronous. The quality of the transmissions in these cases is not without technical problems - and discussions (in both the instances of graduate-level trials in which I participated) were mainly social pleasantries, with occasional requests for repetition or re-phrasing. As such they were cooperative and not collaborative. The use of English as a non-native language as medium in these

transnational endeavours was a factor in not achieving collaborative learning. It is not yet clear whether such synchronous cooperative learning through videoconferencing stimulates or not a follow-up unintended asynchronous collaborative aspect : Chen & Willits (1999) in Factor Analysis of Dialogue in videoconferencing (with the first factor being the intended synchronous in-virtual-class interaction) found a second factor of asynchronous out-of-class (mainly through e-mail) interactions. Others have suggested the reverse ; - that asynchronous interaction led to synchronous interaction - for example Lawanto (2000) in Indonesia.

In Korea, the Korean National Open University, Seoul, is the leading centre of excellence in Asia (Srivastava & Venugopal Reddy, 2002, p. 51). They use interactive video-conferencing, and conduct interactive tutorials with distance students. Many universities collaborate to form virtual universities which offer an increasingly wide range of course options to their students and externally to others in lifelong education and training. These Korean virtual universities are now becoming global – though limited to only the native language. Kim Hyesoo & Cheol-Hyeon (2002) found that students at KNOU wanted easier access to online learning resources and more help from tutors – both indicating a continued dependence on traditional ways of learning. Their availability of e-learning technologies suggests that asynchronous collaborative learning might be being used.

In Malaysia, Saleh (undated) reports that highly advanced learning technologies have now been designed at the Universiti Sains Malaysia, using CMC synchronous audiovisual conferencing over the internet at 384Kbps incorporating full-motion 30fps video. Saleh reports that if adequate public funds were provided then their system could be constructed as part of the dream

Multimedia Super Corridor. In moving for the synchronous face-to-face conferencing system, she explains that if she were a student she "would like to see the lecturer, or at least to listen to his or her voice" (p. 6). So, despite the advanced technologies, research in Malaysia still seeks to emulate the conventional classroom. Reports were

unclear, but what evidence there is suggests they use cooperative learning.

In Pakistan, distance education remains based on print, radio, and television (Tandon, 1998).

In the Philippines, the UP OU relies heavily on face-to-face interaction. At the

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Polytechnic University (PUP OU), similar strategic dependence on face-to-face interaction is also widespread, and though print-based courses are the norm. However, they find that their students "learn more by direct experience and least prefer reading" so the emphasis on print media has resulted in students "performing unsatisfactorily academically" (Sabio, 2002, p. 128). The lack of infrastructure is the root-cause for the weak uptake of e-learning, with high recurrent costs associated with connectivity for using the internet and email. Researchers in Asia often point to the high attrition rates from Western distance education and see the emphasis on theory to be one aspect worthwhile avoiding if they in Asia aim to reach a maximum number of their population, to reduce poverty and eliminate illiteracy - aims which they feel are not priorities in Western distant education. High local context relevance is seen as crucial for e-learning in Asian countries : to counter the very high attrition rates reported from western distance education (ranging between 28 and 95% attrition), Dalit (2001) advocates more-regionally-specific Asian approaches. She concluded that a student-centred open learning approach with high personal relevancy will be best for the Philippines "to serve the unique characteristics and needs of the Filippino learner" (Dalit, 2001, p. 103).

In Singapore, reusable learning objects are actively being developed for helping students learn collaboratively (Joung & Kim, 2002). Each structured learning object self-contains the objectives, contents and guides to other emerging e-resources, and the collaborative learning activities for the students. Thus they are researching the development of e-learning through a flexible structure of many learning objects which can be selected by each student according to and responsive to their different individual

learning needs and wants. Some of these units appear to be cooperative one-way but interactive multimedia, while others may foster collaborative learning among students in a group.

In Sri Lanka, there are highly developed e-learning programmes with online interactive multimedia with discussions (probably synchronous) and virtual laboratory capabilities. These likely stimulate collaborative critical thinking among the participants. However, Coomaraswamy has pointed out that future employers find the courses too theoretical and irrelevant to employment needs (Tandon, 1998).

In Thailand, multimedia presentations in lecture-format in the Thai language have recently been put onto CD-ROM, and these are distributed through the internet to their students, who can download and study them off-line (Boondao, 2002). At present these CD-ROMs are rudimentary in content, and e-learning as such is cooperative and one-way or at the individual level.

In Viet Nam, use of learning technologies has been largely limited to enabling graduate students to participate in transnational interactions (Robinson et al., 2001), for example in cooperative synchronous sharing of knowledge through computer-mediated face-to-face mode with Japan (Tsuji et al., 2002).

3. DISCUSSION :

3.1 Scaffolding for Collaborative Learning :

The current practice of online and distance education is largely dependent on whatever technologies are available and the repertoire of skills of the tutor. Students are usually encouraged to work together to solve tasks and are given much freedom to use

whatever resources in whatever way they choose. A high drop-out rate from open and distance learning is not unrelated to this somewhat haphazard approach to 'teaching' using technologies. While several guides have been published for how to teach and learn online, these have largely been descriptive or case studies, and

transmissibility to other contexts has not been adequately covered. Transmissibility of western methods into Asian contexts is particularly susceptible to being impractical. There is therefore a need for research into the educative effectiveness of learner support systems and the various scaffolding

schemes that might be proposed..

The four-stage model for critical thinking to learn (given in Figure 1) as a scaffold has been tried out in practice and its effectiveness has been evaluated (Kawachi, 2003b, in press). The model as a scaffold has been tested out in small groups, and in large classes divided into small groups, at both the undergraduate and at the postgraduate level, in Japan. It was not completely successful. This was due to the limited duration of the courses and the levels of maturity in the students. The limited duration of the shorter (six-month) courses meant that the self-pacing or un-paced nature meant the students could not complete the full learning cycle. The low levels of maturity in the undergraduate younger students meant that they found much difficulty in navigating Stage 3. Despite Stage 3 bringing difficulties for some students, the largest hurdle was found in moving from asynchronous collaborative Stage 2 to asynchronous collaborative Stage 3. This needs discussion. The task activities of Stage 3 require the students to raise doubts about others, to question the teacher and the text, and to search for ones own opinion even though this might be against the old established opinions of others in authority. One reason for the students not moving into Stage 3 was that the activities of Stage 3 were inconsistent and incongruous with their own life or cultural view of the world (for example see Briguglio 2000, p. 3, for a discussion of Jones 1999 unpublished report). While adults generally have more experience than adolescents from which to draw additional information so they can be expected to be more questioning during learning from a teacher or other resource. The 'flip-side' to this is that collaborative learning also brings into question their own understanding of the world and adults are more likely to hold a

fairly complete and (to the individual) dependable view of the world, so adults may find Stage 3 argumentation to be too threatening to their Self-concept. On the other hand, younger or immature adults can be expected to not yet hold adequate foundational knowledge with which to engage the Stage 3 questioning and answering. Therefore in these ways Stage 3 collaborative learning can be troublesome for all ages of students – and more so if the world of the student mismatches that of the course-writer and tutor, as is often the case when Asian students engage a western course. Specific scaffolding of some sort must be deployed, and if students were made aware of the need for collaborative learning, when choosing a course, then they are more likely to persist and to succeed.

3.2 Benefits Accruing :

The benefits from deploying the collaborative learning Stages 2 and 3 have been reported by Brandon & Hollingshead (1999) and Feather (1999) to be 'increased student responsibility, initiative, participation, learning and higher grades, as well as increased communication with their peers through discussion of course concepts' (McWhaw, 2003, pp. 80-81). However, most of these of actually prerequisites for collaborative learning, and of their lists perhaps only increased learning can be considered as an outcome. Increased opportunities for reflection should also be added to their lists. (The aspect of 'higher grades' is an artifact : if assessed according to western values then higher grades are going to be obtained, while if assessed according to Asian values including the time expended for marginal if any pragmatic benefit then grades are likely unaffected.) Since these collaborative Stages 2 and 3 are better undertaken in asynchronous mode, then some record of participation can be

used for assessing grades. That students are aware of this can be extrinsically motivating and can pre-empt group members from free-loading or just lurking. Continuous assessment can be adopted and furthermore if there is a summative examination then the tutor and institution have some background on the student's writing skills and aptitude that might identify or prevent suspicions of plagiarism. The asynchronous discussion can be recorded and used for peer assessment as well as for self-assessment. So these collaborative Stages are useful to allow a range of different assessment methods to be agreed upon by the students

themselves, the tutor and institution. This fosters maturity, responsibility, and active participation. Bates & Poole (2003, pp. 245-247) has indicated that awarding points for the quality and frequency of postings online may motivate students to participate. It has even been suggested that negative points be given for non-participation in order to move students into participation (McWhaw et al., 2003), though readers might worry that accruing a large balance of negative points during a course might be de-motivating to a struggling student.

3.3 Tutor Interventions :

From Figure 1 and the details of the four stages, it is clear that the core Stages 2 and 3 of collaborative learning need tutor interventions in order for the student to progress. From the corresponding categories of Moore's (1993) theory of transactional distance, these two core Stages are characterized by added Structure. This is shown in Figure 2 below.

What forms of added structure would best serve the Asian student needs more research. In the western literature various techniques have been recently suggested. Bates & Poole (2003) report in depth their advice on moderating online learning. They clearly find (p. 237) that initially and finally there should be opportunities for synchronous discussions among students, away from tutor intervention – corresponding to Stage 1 and Stage 4. And they recognize that after the initial stage, there is a need for the tutor to move the students away from sharing knowledge cooperatively to the students giving reasons and requiring reasons from others in collaborative argument – corresponding to Stage 2 and Stage 3. It is also noteworthy that they agree with Bullen that there is a need for silence (no tutor Dialogue) during the early collaborative phase - corresponding to Stage 2 (see Bullen, 1997, p. 39, and Bullen, 1998). Students must give evidence and reasons behind their opinions during their collaborative Stage 2, and this requirement gives added Structure tto their discussions. At this time (Stage 2, S+ D-), there is no tutor educative dialogue. If the tutor intervenes, it is only to give some clarification of concepts being negotiated by the students, or to direct students to other resources from which to prosecute their lines of argument (Bates & Poole, 2003, p. 234 ; Bullen, 1997, p. 39).

Students in Asia would likely benefit from specific scaffolding closely moderated by the tutor to assimilate the necessary collaborative learning skills. Skills that could be practiced either before the course or early on during Stage 1 as an aside, or as a recourse from Stage 2 and Stage 3, include online etiquette, empathy and turn-taking (Kawachi, 2003a ; Probst, 1987 ; Zimmer, 1995), setting appropriate and achievable goals, critique, giving and responding to feedback and so on (Colbeck et al., 2000 ; Oliver & Omari, 2001). Such closely-moderated skills training can constitute the added structure required as scaffolding which - after skills acquisition - can properly be removed.

Collaborative learning in a group by definition brings the added benefit of acquiring the new shared co-constructed knowledge. In learning environments such as found in Asia where learning is cooperative only, then individualism and competitiveness are the usual hallmarks, and all learning that does occur is of so-called old knowledge. The insertion of collaborative learning Stages means that all participants share equally in acquiring the new knowledge and group bonding is promoted. More than this, each student develops the social values of working with and helping others in the awareness that the

common good will be promoted. Seeing value in disagreement and in the ultimate resolution from collaboration enhances personal development and induces a passion towards lifelong learning. That such collaborative learning remains difficult to achieve, even in the West, should not deter institutions in Asia from engaging the collaborative process themselves

3.4 Summary of the Need for Scaffolding to promote Collaborative Learning in Asia :

It is important to distinguish cooperative learning from collaborative learning (for
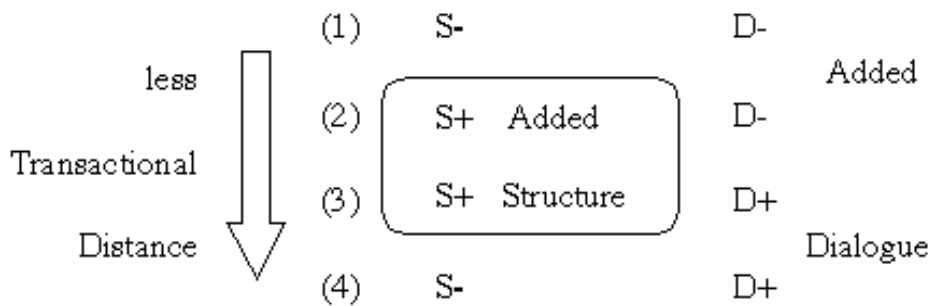
Figure 2 : Detail showing the core stages of added Structure in the learning process

more details see Kawachi, 2003a). Cooperative learning essentially involves at least one member of the group who 'knows' the content soon to be learnt by the other(s). Learning takes place through the 'knower' – for example the text or the teacher delivering the content to be learnt. Collaborative learning on the other hand follows a scientific process of testing out hypotheses. A participant publicly articulates his (or her) own opinion as a hypothesis and being open to the value of conflict allows this to be negated if possible by others, in which case the original participant or another offers up a modified or alternative hypothesis for public scrutiny. In collaborative learning, disagreement and intellectual conflict are desirable interactions. All participants share in co-constructing the new knowledge together, and this learning occurs inside the group as a type of consensus achieved through analysis and argument. In collaborative learning, there was no 'knower' prior to the learning process taking place (in contrast to the situation of cooperative learning). The research in educational media from many rural regions of Asia is currently concerned with the cooperative learning modes seen in Stage 1 and Stage 4, with an avoidance of collaborative learning through critical thinking seen in Stage 2 and Stage 3. It is a Western view that education should aim to develop reflective critical thinking skills in the student (especially in adults in lifelong learning, and in teacher training). This translates to a need for promoting collaborative learning not just cooperative. Experiential learning does have a significant role to play but this is only after the collaborative process, after alternatives to current practice have been argued out and the students then test out their findings in their own context - through experiential learning. Collaborative learning is an essential stage in the overall cognitive development cycle of learning. In collaborative learning, the participants

(having reflected upon and conceptualised their own practices) articulate their individual practices and being open to the value of contradiction allow others to question and seek rationale behind the practice, and they defend their practice with reasons, and through such hypotheses testing are open to consider other ways which are also examined by the group. Only after this group collaborative process, does the individual take what they feel is best and go away and test out this new way in their own practice, experientially and publicly. Only in the first and last stages is cooperative learning used. The core stages are collaborative and theoretical in nature.

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Approaches to learning differ between cultures, and Asian students have been discovered to prefer approaches different from those of Western students (Kawachi, 2002c), though overall-stereotyping is unreliable because individual and local differences show wider variations than found between Asian and Western students (Kember and Gow, 1991). For instance, differences in approach to learning have been identified in three different groups of Chinese according to their local cultural context (Hong Kong, Malaysia, and Singapore) (Smith & Smith, 2000). Fu and Townsend (1998) found that Chinese students approach their writing English differently, while Ayers and Quattlebaum (1992) have found that English test proficiency was not correlated with overall academic achievement. Cross-cultural differences rather impact on the time expended for interacting and on the quality of learning achieved in terms of the extent to which a deep - as opposed to a surface - approach to learning is adopted (Kawachi, 2002b). The dilemma here is that if students copy the required way of writing – the vocabulary, the rhetorical design, and the acceptable conclusions (in the college or professor's context) then a high grade can be obtained. In contrast, if the students re-interpret the content to be relevant in their own context and write in their own culturally-deep way, then they may be marked down as misunderstanding and not fluent and be given a failing low grade (Kawachi, 1999a; 1999b; 2002c). This dilemma is at the centre of the philosophical difference between distance education and open learning : where 'distance education' seeks to impose uniformity and conformity to an institutional standard, while 'open education' seeks to value and foster the diversity of the students (Edwards, 1995).

In Asia, technologies are used for access to content. This can be described as asynchronous and cooperative, where cognitive learning takes place individually, after the inter-group interactions, through social reconstruction of the received information. During the e-learning cooperative knowledge-sharing process, the student is passive and similar to being in conventional education. In the West, Spender (2002) has noted that the diversity of knowledge available through the internet as non-narrative media means that students will need to become more active learners to question and discern what content they access. This questioning and selectivity are not yet apparent in Asian students generally. Students should take more advantage of computer-mediated communications to interact collaboratively. Spender (2002, p. 25) characterises e-learning as collaborative and identifies the specific characteristics of e-learning which distinguish Asian e-learning from Western, and suggest that e-learning does not generally take place in Asia. In only those few places of excellence, where collaborative e-learning may be taking place in Asia, this is usually only at the post-graduate level – for example transnationally in the Asian eLearning Network (AEN). However, e-learning essentially depends for its success by addressing local needs within the local context, and how far such transnational cross-cultural e-learning can succeed is yet to be seen. The collaborative development of reusable learning objects in video-cassette format across national and cultural borders was found to be too difficult even pairwise between the technologically advanced centres of FernUniversitat (Germany), KNOU (Korea), Stanford University (USA), UAJ (Japan), and the UKOU (Britain), according to research by Nagaoka (2002) who attributed the difficulty to the finding

that the aims and targets of education were too largely different among the ODL institutions.

Some research notably from the centres of excellence in Hong Kong, Japan, Korea, and Singapore is concerned with the collaborative modes seen in Stage 2 and Stage 3. These stages involve questioning one's knowledge and practice, and the

knowledge and practice of others, and questioning the content to be learnt. These might be interpreted as not typically Asian - but Western - values in education. Indeed research in the West is particularly focused on the collaborative phases of learning. Western research clearly identifies the issue of forming early on a community of

learning, characterising Stage 1 and the movement to reduce the maximum transactional distance towards development of Transactional Presence (Shin, 2002). In Asia, the few centres of excellence that do exist are rapidly developing e-learning, and these centres are becoming more focused and concerned with research into collaborative learning. To what extent can these centres help the rural regions of Asia move beyond the traditional cooperative modes of content acquisition and experiential learning ?

The digital divide in Asia may currently be widening. If the digital divide is to be reduced, these centres of excellence should put new research efforts to promoting collaborative learning in the rural regions. The rural regions of Asia in turn need to consider more theory and critical thinking in their research., and consider adopting scaffolding to promote collaborative learning in a group.

REFERENCES :

Abrami, P.C., Chambers, B., Poulson, C., De Simone, C., d'Appolonia, S., & Howden, J. (1995). *Classroom connections : Understanding cooperative learning*. Toronto : Harcourt Brace.

AEN, (2002) *The Asian e-Learning Network.* http://www.asia-elearning.net/

Ayers, J.B., & Quattlebaum, R.F. (1992). TOEFL Performance and success in a master's program in engineering. *Educational and Psychological Measurement, 52*, 973-975.

Bates, A.W., & Poole, G. (2003). Effective teaching with technology in higher education : Foundations for success. San Francisco, CA : Jossey-Bass.

Belawati, T. (2002). Harnessing the use of information and communication technology (ICT) in Indonesian distance education : A

conceptual design. *Proceedings of the 16th AAOU Annual Conference* (p. 126). Seoul, Korea : Asian Association of Open Universities.

Boondao, S. (2002). From classroom to compact disc and the web. *Proceedings of the 16th Annual Conference* (p. 140). Seoul, Korea : Asian Association of Open Universities.

Brandon, D.P., & Hollingshead, A.B. (1999). Collaborative learning and computer supported groups. *Communications Education, 48*, 109-126.

Briguglio, C. (2000). Self directed learning is fine – if you know the destination! In A. Herrmann, & M.M. Kulski (Eds.), *Flexible futures in tertiary teaching : Proceedings of the 9th Annual Teaching Learning Forum*. Perth : Curtin University of Technology. Retrieved May 14, 2003, from http://cea.curtin.edu.au/tlf/tlf2000/briguglio.html

Brookfield, S.D. (1987). *Developing critical thinkers*. San Francisco, CA : Jossey-Bass.

Bullen, M. (1997). *A case study of participation and critical thinking in a university-level course delivered by computer conferencing*. Unpublished doctoral dissertation, University of British Columbia, Vancouver, Canada.

Bullen, M. (1998). Participation and critical thinking in online university distance education. *Journal of Distance Education, 13*(2). Retrieved February 24, 2003, from http://cade.athabascau.ca/vol13.2/bullen.html

Chen, Y-J., & Willits, F.K. (1999). Dimensions of educational transactions in a videoconferencing learning environment. *American Journal of Distance Education, 13*(1), 45-59.

Colbeck, C.L., Campbell, S.E., & Björklund, S.A. (2000). Grouping in the dark. *Journal of Higher Education, 71*, 60-83.

Dalit, J.B. (2001). Access, equity and gender issues in open and distance learning. *PUP (Polytechnic University of the Philippines) Open University Journal on Open and Distance Learning, 2*(1):88-108

Dewey, J. (1933). *How we think : A restatement of the relation of reflective thinking to the*

educative process. Lexington, MA : D.C. Heath and Company.

Edwards, R. (1995). Different discourses, discourses of difference : Globalisation, distance education and open learning, *Distance Education, 16*(2), 241-255.

Feather, S. (1999). The impact of group support systems on collaborative learning groups' stages of development. *Information Technology, Learning, and Performance Journal, 17*(2), 23-34.

Fu, D., & Townsend, J.S. (1998). Cross-cultural dilemmas in writing: Need for transformations in teaching and learning. *College Teaching, 46*(4): 128-133.

Holmberg, B. (1983). Guided didactic conversation in distance education. In D. Sewart, et al. (Eds.), *Distance Education : International Perspectives* (pp. 114-122). London : Croom Helm.

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Perspectives (pp. 114-122). London : Croom Helm.

Joung, Y.R., & Kim, S.Y. (2002). Design template framework of learning object for reusable e-learning contents. *Proceedings of the 16th Annual Conference* (p. 109). Seoul, Korea : Asian association of Open Universities. [http:www.aaou.or.kr]

Kawachi, P. (1999a). Language curriculum change for globalization. paper presented at the *34th Annual RELC Seminar – Language in the Global Context : Implications for the Language Classroom*. Singapore : SEAMEO RELC.

Kawachi, P. (1999b). Accommodating diversity in approaches to learning. *Saga University Guide and Research in Progress, 3*, 12-14..

Kawachi, P. (2002a). Why the sun doesn't rise : Empirical findings that explain the exclusion of Japanese from online global education, and suggested solutions. *Global E-Journal of Open, Flexible and Distance Education, 2*(1). Retrieved May 18, 2003, from http://www.ignou.ac.in/e-journal/contentsII?PaulKawachi.htm

Kawachi, P. (2002b). Poverty and access : The impact of language on online collaborative learning for Japanese learners. In H.P. Dikshit, S. Garg, S. Panda, & Vijayshri (Eds.) *Access & equity : Challenges for open and distance learning* (pp. 159-170). New Delhi : Kogan Page.

Kawachi, P. (2002c). On-line and off-line reading English rates : Differences according to native-language L1, gender, and age. *Proceedings of the 16th Annual Conference*. Seoul, Korea. Asian Association of Open Universities.

Kawachi, P. (2003a). Choosing the appropriate media to support the learning process. *Journal of Educational Technology, 14*(1), 1-18.

Kawachi, P. (2003b). Empirical validation of a multimedia construct for learning. In S. Mishra, & R. Sharma (Eds.), *Interactive multimedia in education and training*. New Delhi : Idea Group (in press)

Kember, D., & Gow, L. (1991). A challenge to the anecdotal stereotype of the Asian student. *Studies in Higher Education, 16*, 117-128.

Kim, Hyesoo, & Cheol-Hyeon Roh (2002). Three approaches to increase the quality of distance education in Korea. *Proceedings of the XV Annual Conference* (p. 74). New Delhi : Asian Association of Open Universities.

Lawanto, O. (2000). Applying interactive learning technology in improving teaching quality training for faculty members at Universitas Surabaya Indonesia. *Proceedings of the International Learning and Sharing Forum on Empowering Universities and Small Medium Enterprises,* Annual Conference of the Association of Asia and Pacific Universities. Surabaya, Indonesia. Retrieved April 29, 2003, from http://gdenet.idln.or.id/country/ar_indonesia/IMPR_TEACH_full.htm

Manohar, K.M. (2002). Reaching the unreached in higher education : The role of ODL in the digital era. *Proceedings of the 16th Annual Conference*. Seoul, Korea : Asian Association of Open Universities.

McWhaw, K., Schnackenberg, H., Sclater, J., & Abrami, P.C. (2003). From co-operation to collaboration : Helping students become collaborative learners. In R.B. Gillies, & A.F. Ashman (Eds.) *Co-operative learning : The social and intellectual outcomes of learning in groups* (pp. 69-86). London : RoutledgeFalmer.

Mohamadi, M. (2002). Presentation of a video program in a practical course in geology. *Proceedings of the 16th Annual Conference* (p. 113). Seoul, Korea : Asian Association of Open Universities.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp22-38). London: Routledge.

Nagaoka, R. (2002). Similarity and diversity among the way ODL universities follow in the age of ICT revolution and possible open collaborative relationship among them. *Proceedings of the 16th Annual Conference*

(p. 118). Seoul, Korea : Asian Association of Open Universities.

Oliver, R., & Omari, A. (2001). Student responses to collaborating and learning in a web-based environment. *Journal of Computer Assisted Learning, 17,* 34-47.

Panda, S., & Chaudhary, S. (2001). Telelearning and telelearning centres in India. In C. Latchem, & D. Walker, (Eds.), *Telecentres : Case studies and key issues* (pp. 149-157). Vancouver, BC : Commonwealth of

Learning. Retrieved August 24, 2002, from http://www.col.org/Telecentres/telecentres_intro.htm

Probst, R.E. (1987). Transactional theory in the teaching of literature. *ERIC Digest* ED 284 274. Retrieved April 24, 2002, from http://www.ed.gov/databases/ERIC_Digests/ed284274.html

Robertshaw, M. (2002). Enhancing peer-to-peer.

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support through the internet. *Proceedings of the XV Annual Conference* (p. 117). New Delhi, India : Asian Association of Open Universities.

Robinson, B., Le Van Tran, & Tran Duc Vuong (2001). Viet Nam. In O. Jegede, & G. Shive, (Eds.), *Open and distance education in the Asia Pacific region* (pp. 237-254). Hong Kong : Open University of Hong Kong Press.

Sabio, C.J. (2002). Understanding distance educational learning in the Philippines : Profile and study habits. *Proceedings of the 16th Annual Conference* (p. 128). Seoul, Korea : Asian Association of Open Universities.

Saleh, M.N. (undated, c2000). *The future of distance education in Malaysia : The role of information technology*. Presentation as part of a Funding Application to the Malaysian Government, added to a review of Distance Education in Malaysia. Retrieved April 24, 2003, from http:gdenet.idln.or.id/country/ar_malaysia/CR_Malaysia.htm

Shin, N. (2002). Beyond interaction : The relational construct of 'Transactional Presence'. *Open Learning, 17*(2), 121-137.

Shin, N., Jegede, O., Yau, J.S-W., Chung, L.H-M., & Chan, J.K-Y. (2002). An exploration of the effect of online learning environment on distance learning. *Proceedings of the 16th Annual Conference.* Seoul, Korea : Asian Association of Open Universities.

Smith, S.N., & Smith, P.J. (2000). Implications for distance education in the study approaches of different Chinese national groups. *Journal of Distance Education, 15*(2), 1-11. Retrieved November 22, 2002, from http://cade.athabascau.ca/vol15.2/smithsmith.html

Spender, D. (2002). E-learning and its future. *Paper presented at the Global Summit in Australia*. Retrieved April 26, 2003, from http://www.educationau.edu.au/globalsummit/papers/d_spender.pdf

Srivastava, M., & Venugopal Reddy, V. (2002). Is information and communication technology reshaping the learner support? Association of Indian Universities *University News, 40*(4), 43-54.

Tandon, N. (1998). *Barriers to information and communication technologies encountered by women*. Asian Region, Report on Gender Barriers to ICT. New Delhi : Commonwealth Educational Media Centre for Asia. Retrieved April 3, 2003, from http://www.col.org/wdd/

Tang, T. K-W., & Fung, Y. Y-H. (2002). A comparison of two learning communities in the digital era – how contexts and functions affect online participation in distance learning courses for teachers. *Proceedings of the 16th Annual Conference.* Seoul, Korea : Asian Association of Open Universities.

Thilagavathy, N.S.S., & Namasivayam, N. (2002). Imperatives of research in market-oriented strategy for open and distance education of Madurai Kamaraj University, India : a case study. *Proceedings of the 16th Annual Conference.* Seoul, Korea : Asian Association of Open Universities.

Towns, M.H. (1998). How do I get my students to work together? Getting cooperative learning started. *Journal of Chemical Education, 75*, 67-69.

Tsuji, M., Kubo, D., Taoka, F., & Teshima, M. (2002). The role and issues of international tele-education : Lessons learned from the Japanese experience. *Proceedings of the XV Annual Conference* (p. 96). New Delhi : Asian Association of Open Universities.

Vaziri, A. (2002). Education in the era of information and communication technologies. *Proceedings of the 16th Annual Conference* (p. 102). Seoul, Korea : Asian Association of Open Universities.

Vyas, R.V., R.C. Sharma, & A. Kumar (2003). Delivery tools of distance learning in psychology through internet : An overview. In N.K. Chandel, R. Jit, S. Mal, & A. Sharma (Eds.), *Psychological implications of information technology* (pp. 124-140). New Delhi : Deep & Deep Publications.

Zimmer, B. (1995). The empathy templates : A way to support collaborative learning. In F. Lockwood (Ed.), *Open and distance learning today* (pp. 139-150). London : Routledge.

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