

# Revisiting Retro Technology to Extend Educational Opportunity to Teachers in Remote Schools

Hui Tian Teo AND Widad Othman

Open University Malaysia

Malaysia

jteo@oum.edu.my

widad@oum.edu.my

**[Abstract]** The need to be true to its' tagline, *University for All*, OUM is constantly looking for new initiatives and mode of learning to enable every one to have access to education regardless of their ethnics, geographical locations, cultural backgrounds and technological infrastructures. Having served the '*pedalaman*' (remote) students OUM understands their needs and constraints when it comes to ODL. Current ODL depends largely on the more advance mode and technology to deliver content and enrich its learning and teaching processes. Its access and coverage are heavily dependent on extensive technological infrastructure available only in certain areas, usually urban and sub-urban. In this case the availability of internet connection, be it dial-up or broadband is crucial for the success of the ODL.

Taking this constraint as a challenge to provide 'education for all', The Faculty of Education (FEL) has decided to search for a new mode to run its ODL to enable students in the '*pedalaman*' to enjoy the same privileges as their counterparts in the urban and sub-urban areas. The search proposed to make new what is considered to be an 'older' technology; two-way radio. It is one of the earlier communication tool used for distance education for students in remote areas in the United States, Canada and Australia and is chosen for its simplicity, inexpensive, easy to set up and ability to transmit to very remote areas.

**[Keywords]** Shortwave, two-way radio, *pedalaman*, education for all, interior, new mode, remote, TUPE, blended learning model

## Introduction

Open University Malaysia (OUM) is committed to provide education for all regardless of their ethnics, geographical locations, cultural backgrounds and technological infrastructures. This is why the university is so focused on looking for new and innovative ways to ensure learning opportunities are offered to the widest range of learners possible. According to Widad (2008) with its extensive infrastructure and resources for online learning, OUM has been entrusted by the Teacher Training Division under the Ministry of Education to upgrade the academic qualifications of their primary school teachers. The Ministry of Education wants to see at least 50% of their primary school teachers, who hold teaching certificates and diplomas, to be degree holders by 2010. Two programmes were identified for teachers in the primary schools; Bachelor of Teaching in Primary Education (BTPE) and Bachelor of Teaching in Pre School (BTPS). These two programmes are offered to all teachers who want to upgrade themselves and meet the requirements set by the ministry. The two programmes attract teachers from all over the country ranging from urban, semi urban to rural and even the 'remote' (*pedalaman*) schools.

Widad (2008) continued that The Open and Distance Learning (ODL) mode is used because of its three key characteristics; accessibility, flexibility and learner-centredness. A brief description of the characteristics is stated below:

- Accessibility
  - Accessible to people who cannot attend regular classes due to social, structural or personal reasons.
  - Not limiting: people with disabilities can have access
  - Learning resources adaptable to different media
- Flexibility
  - Physical flexibility to study at a time and place that suits learners.
  - Educational flexibility to study in a manner appropriate for learners' needs.
  - Content, sequencing and structure of ODL programs are developed to support learners and are not strictly fixed like conventional academic institutions.
- Learner-Centredness
  - Provides education and training in a way that prioritize learners' needs, rather than institutional convenience.
  - Enables learners to pursue their studies in a way that is appropriate for their circumstances, learning goals and styles.
  - Provide good quality learning materials in appropriate, accessible media, and gives sufficient support to ensure learners have a good chance of successful learning.

This goes well with the Ministry of Education as teachers do not have to be absent from school and be on study leave and able to learn at their own pace and time while still be in service. The ODL model was fine tuned and OUM's blended learning model was adopted for this purpose.

The remote teachers faced three constraints in their endeavour to further studies. The constraints are:

- Their location in the remote areas which limits their mobility to learning centres for the fortnightly face-to-face tutorials;
- Their teaching duties which did not permit them to leave their young students during school days; and
- The inaccessibility to the internet

To address these constraints and challenges OUM's blended learning model was further fine tuned into The Tutorials, Revision and Examination (TUPE) Model for the '*pedalaman*' teachers. With this model, teachers from the '*pedalaman*' will be assigned to the nearest Teachers Training Institute (TTI) and study during the school holidays. Teaching and learning therefore is fully face-to-face.

While this mode of learning seems to solve their problems, OUM still finds this restraining, as access to these students are limited to the time they are at the TTIs. In order to enrich and add value to their learning experience, the Faculty of Education and Languages (FEL) in OUM would like to try out new mode of communication and interacting with these students that will lead to a new mode of learning. The new mode must be able to address two issues for the '*pedalaman*' students. The first one is to enable them to have constant communication and access to OUM and vice versa and the second is offer them a new mode of learning closer to the existing blended model which spread wider in time. Since the remote areas lack basic amenities such as 24/7 electricity supply and communication infrastructure like cellular coverage, fixed line telephone and television broadcast signal, FEL decided to search for technology that could operate in this restricted environment and is able to fit these four criteria; interactive, easy to set up, low cost and ability to reach remote areas where the learners are. FEL could not find the solution when it looked forward into hi-tech communication technology of today since it does not meet all the four criteria required. The faculty decided to look into retro technology which is less demanding on technology infrastructure and cost. The use of two-way radio (TWR) is proposed as it is able to support the learning and teaching environment of the '*pedalaman*' and fits the four required criteria. It also shows promising expansions capabilities.

### **The success stories**

Radio and distance learning have long history together. One excellent example would be the Alice Springs School of the Air in Australia. Started in 1951, it utilises various communication technologies to keep in touch daily with students, home tutors and teachers. To summarise, it started with short wave radio technology that provides a one

way delivery mode and evolves into a two-way satellite equipment that enabled 'Interactive Distance Learning' in real time powered by the software such as REACT (Remote Education and Conference Tool) today. Its' long history of success can be found on its website <http://www.assoa.nt.edu.au/>.

Besides the Alice Springs School of the Air, various countries have reported success in using radio technology to enabled learning in remote places. In India for instance, though a little different in nature, through its All India Radio (AIR) broadcasts nearly 2000 programme hours daily in 24 languages and 126 dialects (Vyas 2002). There is even a suggestion in 2004 to set up an alternative link to connect education institutions via radio packets that would be called 'Amateur University Network' (AMUNET) especially in developing nations where high speed broadband infrastructure is scarce or non-existence (Skoric, 2004).

While we can see how students can directly benefit from the few examples above, the indirect learning that students will acquired is equally exciting. Students will be able to practically network and interact with people all around the world or out of this world. For example, a group of students at Enloe Magnet High School in Raleigh, North Carolina who made a call to astronaut Michael Fincke onboard the International Space Station (ISS) circling earth (NASA, 2008). A more down to earth example would be how an in-classroom 'ham' radio helps students become amateur radio operators and learn various skills through it (Weaver, 2003).

### **The way forward is backward**

Dhanaraj (2009) observed that with the emergence of fast, intelligent, inexpensive and high capacity learning technologies the practice of open distance learning, in the developed world, has been moving towards the 4<sup>th</sup> and 5<sup>th</sup> generation technologies where multimedia courseware embedded in a comprehensive web enabled learning management systems provide both synchronous, asynchronous and highly interactive learning environments. While this might be the way forward for open distance learning, we must remember that the infrastructure needed to support this must also be equally fast, intelligent and of high capacity. Not many countries especially in South East Asia qualify, as many still do not have the sophisticated and adequate infrastructures.

While looking forward to new technologies as they come along, distance learning provider must remember that they are definitely not a solution to everything especially when there is a lack of availability of such infrastructures like in the remote areas in Malaysia.

What is more important is to use whatever technology (or the lack of it) that could support and provide the basic essentials to function effectively as mentioned by Dhanarajan (2009) which are basically managing and delivering content effectively and efficiently to maximise learning. Sometimes as in this case, the way forward with the '*pedalaman*' students is to go backward and revisit older technology that could be sustain in the remote ecosystem.

### **Two-Way Radio**

The use of two-way radio in distance education is not a new phenomenon. According to the website Absolute Radio, distance education dates back to at least as early as 1728 and the use of broadcast technology to enhance distance education starts in the early 20<sup>th</sup> century. Countries like United States, Canada and Australia has been using this technology to offer remote students the chance to get education. For example, According to Conboy (1983), The Country Education Project in Victoria, Australia, tested the use of two-way radios to bring educational resources to isolated children studying correspondence courses in small rural high schools and to increase interaction among rural schools. The result was positive with all users reported to be enthusiastic about the radio system and felt it improved their subject understanding. Though there are problems with reception, scheduling, and the lack of visual information, most participating schools have purchased the cost effective equipment.

Long-distance radio communication takes place by means of electric waves reflected from one of the ionised regions of the atmosphere, the time of travel of the waves from the emitting station up to the reflecting layer and back to the earth being usually a small fraction of a second as explained in Nature.com as shown in Figure 1 taken from Ascilite.com below.

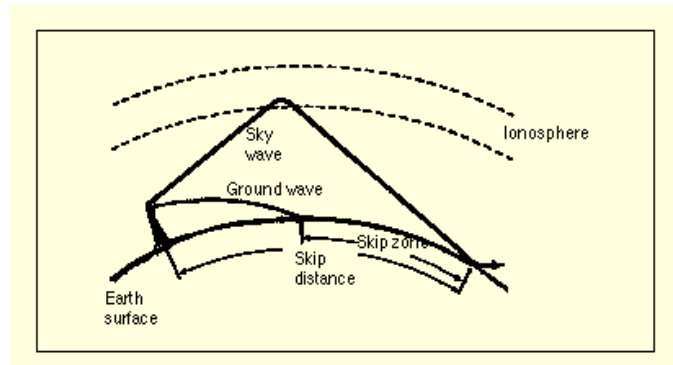


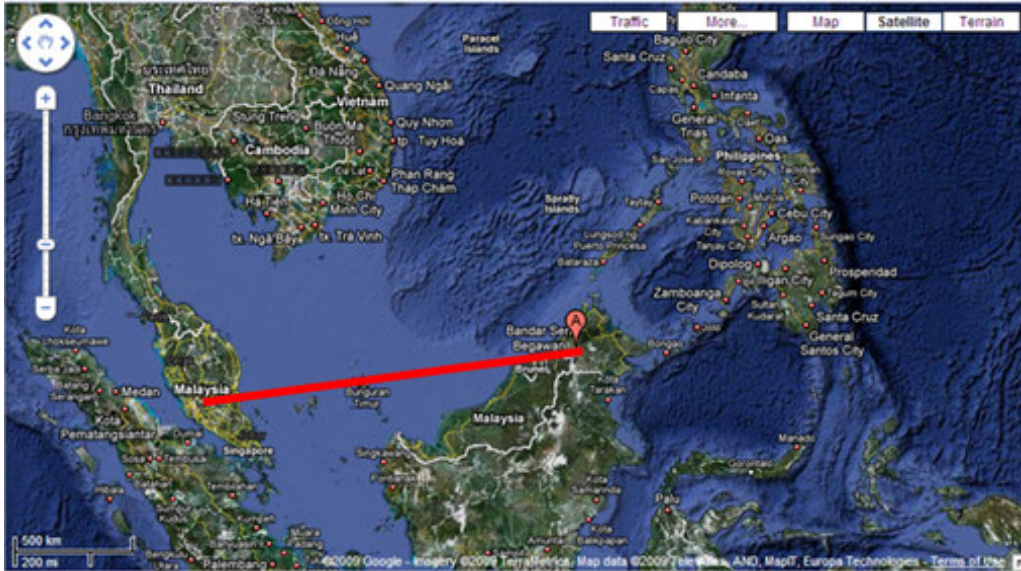
Figure 1: Short Wave radio reflection by the ionosphere

Two-way radio operators may use a wide range of radio communications technology including "shortwave", VHF, UHF and microwave radio systems. Setting up the facility is straightforward as instructed in the equipment manual and the initial cost is inexpensive for a technician class operator.

### **Collaboration, logistics and benefits**

FEL does not have the needed expertise or license to set up and operate a two-way radio facility but it has vast experience in running open distance education. Since operating the two-way radio required technological expertise and an operator license, collaboration between FEL and the Malaysian Communication and Multimedia Commission (MCMC) is proposed. This collaborative effort will provide the necessary tools and infrastructure for this initiative to work. While FEL concentrates on the pedagogy, andragogy and the instructional system design, MCMC will provide the technical expertise and technology needed to set up and operate the two-way radio facilities.

An experimental and feasibility study will be conducted in the interior of Keningau, Sabah as this is the furthest learning centre and geographically challenging to access. A proposed team will be set up between FEL and MCMC to set up and run two experimental facilities. One facility will be in OUM Headquarter in Kuala Lumpur and another will be at the remote station off Keningau.



Source: Google Maps

For the purpose of this proposed project, a basic set up and equipment is required for transmitting only voice signal. Such set up and equipment is inexpensive but provides effective and efficient way of communicating with the students at all time. Though there are types of radio as shown in Figure 2 below, this initiative only requires two base station radios. Additional types of radios can be added on later if needed.



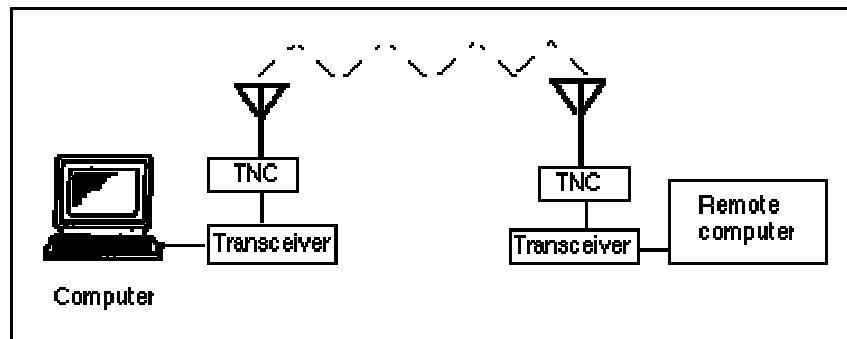
Figure 2: Types of Radio

Source: [www.hamradio.com](http://www.hamradio.com)

One of the greater benefits of using two-way radio is there is not much cost involved after the initial set up, except for maintenance cost and annual license fee, as there is no transmitting cost unlike the cellular network. It requires low power consumption and can run on a 12V car battery that can be recharged using solar panels where electricity is not available. Mobility can be achieved by getting a mobile or handheld unit. Additional station can be easily added on to form a network and by utilising packet data it is possible to transmit computer data. An excerpt taken from OLNT'90 Proceedings in Ascilite.com explains briefly how computer data can be transmitted.

*From its first steps in Montreal, Canada, in 1978, to its current AX25 protocol implementation established in 1982 by the Amateur Radio Relay League of America, packet radio provides the means through which computer data may be transmitted, error free, on the radio frequency spectrum. It represents one of the fastest growing areas in amateur radio today.*

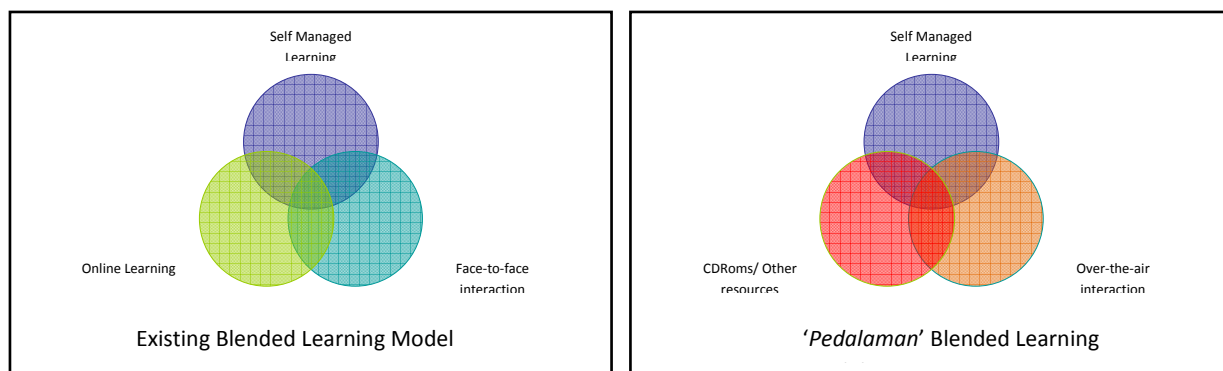
In short, packet radio replaces the telephone line with a radio channel. Rather than connecting the modem to a phone line, a specially modified modem known as a Terminal Node Controller (TNC) connects the computer to the microphone and speaker circuits of a radio transceiver (Figure 3).



**Figure 3:** Computer communications by radio

### New mode of learning and capacity building

As mentioned by Pauls (2003) interaction is important in online courses as transactional distance theory describes the pedagogical relationships that exist in a distance education environment where the teaching behaviours are executed apart from the learning behaviours (Moore, 1972). “According to the theory, there are three key constituent elements that define every distance education programme: dialogue, structure, and learner autonomy” (Jung, 2001). Dialogue refers to the interaction between teachers and learners. Structure refers to the flexibility and responsiveness of an educational program. “Learner autonomy is the extent to which learners make decisions regarding their own learning and construct their own knowledge based on their own experience” (Moore & Kearsley, 1996). The proposed initiative not only meet all three elements mentioned above but will also provide a new mode of learning for the ‘pedalaman’ students and build new capacity for FEL. Instead of only having one mode of learning i.e. TUPE, students in the remote areas can opt for a modified version of the usual blended learning model comprises of self-managed learning, over the air interaction and CD-ROMs. Figure 4 below compares the regular blended learning with the proposed ‘pedalaman’ blended learning.



**Figure 4:** Comparison between existing blended learning with the ‘pedalaman’ blended learning

Learning stations which is located in the remote areas and nearer to the ‘pedalaman’ students can be set up to cut down travelling time and regular communication and interaction can be established between the faculty and the ‘pedalaman’ students as well as between students at learning stations. This will encourage greater interaction among tutors and students as well as students with students. Besides direct usage of two-way radio for learning-teaching

processes for FEL, there are lots of resources out there available on shortwave radio. Equip with a tape recorder students can do more than just listening, they can record news, talk show, interviews, language classes and others for later use.

The setting up of remote learning stations would also build new capacity for FEL and OUM as they could generate new revenues from students who are unable to travel to learning centres (in this case TTIs) which usually are located far away from them in the urban or sub urban area due to various reasons such as financial difficulties, health problems, physical constraints and others.

## **Conclusion**

Open distance education rely heavily on self-manage or self-directed learning, so providing motivation and tools for learning become crucial in this mode of learning. While technology changes almost overnight not all countries have the capability to match this with the right and proper infrastructure. For places that lack such support, the setting up of remote learning stations using two-way radio prove to be a potential in terms of providing value added service to students, providing alternative mode of learning and constant communication with the faculty and fellow students. For as long as the 'modified' blended learning meets faculty and learners expectations and needs it does not matter on what technological platform it is riding on. Besides this, this proposed initiative and learning model has the potential of generating new revenues and expanding the existing capacity of the university. Students in remote places, who have no access to education before, due to various reasons of their own, will now have the opportunity to upgrade themselves with tertiary education. The potential to expand with time and needs makes two-way radio even more attractive, especially the ability to transmit and receive computer data through radio signal. This will definitely enrich the learning experience of students in the remote areas. What is more important and satisfying will be the ability to offer these students the same opportunity and access to education as their colleagues in the urban and sub-urban areas.

## **References**

Alice Springs School of the Air - Australia. (n.d.). *Alice Springs School of the Air - Australia*. Retrieved March 10, 2010, from <http://www.assoa.nt.edu.au/>

Ascilite. (n.d.). OLNT'90 Proceedings: Diggins - enhancing distance education through radio-computer communication. *Am scilite - Home*. Retrieved November 22, 2009, from <http://www.ascilite.org.au/aset-archives/confs/olnt90/diggins.html>

Bruce D Weaver. (2003, January). On the air learning. *Teaching Pre K - 8*, 33(4), 50-51. Retrieved March 13, 2010, from ProQuest Education Journals. (Document ID: 270614701).

Conboy, Ian (1983). *Two-Way Radio in Schools: An Evaluation of a High Frequency Short Wave, Two-Way Radio Trial*. Education Resources Information Center, ED238634.

Dhanarajan, G., T. M, Wang (2009). Open Distance Learning: Managing Change-Building Capacity. Paper presented at International Forum on Open and Distance Education, Beijing, China.

Distance Education. (n.d.). *Absolute Astronomy*. Retrieved November 23, 2009, from [www.absoluteastronomy.com/topics](http://www.absoluteastronomy.com/topics)

Jung, I. (2001). *Building a theoretical framework of web-based instruction in the context of distance education*. *British Journal of Educational Technology*, 32:523-534.

Miroslav Skoric.( 2004). *The Amateur Radio as a Learning Technology in Developing Countries*. Fourth IEEE International Conference on Advanced Learning Technologies (ICALT'04). icalt, pp.1029-1033.

Moore, M. G. (1972). *Learner Autonomy: the second dimension of independent learning*. *Convergence*, 5:76-88.

Moore M. G. and Kearsley, G. (1996). *Distance education: A system view*, Wadsworth, New York.

NASA; Students Talk Live With NASA Astronaut Aboard Space Station. (2008, December). *Education Business Weekly*,14. Retrieved March 13, 2010, from ProQuest Education Journals. (Document ID: 1602235191).

Nature. (n.d.). Short Wave Radio Echoes : Abstract : Nature. *Nature Publishing Group : science journals, jobs, and information*. Retrieved November 22, 2009, from <http://www.nature.com/nature/journal>

Pauls, T. (2003, March 3). *The Importance of Interaction in Online Courses*. Paper presented at OLN Conference: Windows on the Future 2003. Easton, Ohio.

REACT. (n.d.). *Consensus*. Retrieved March 10, 2010, from <http://www.consensus.com.au/SoftwareAwards>

Vyas, R., Sharma, R., & Kumar, A. (2002). Educational Radio in India. *Turkish Online Journal of Distance Education*, 3(3). Retrieved March 11, 2010, from <http://asiapacific-odl.oum.edu.my/C23/F398.pdf>

Widad, Othman. (Assoc. Prof) (2008, October 14). Educational Opportunity for teachers in Remote School Through Open University Malaysia Learning Model. Paper presented at *The 22nd AAOU Annual Conference, Tianjin, China*.