

ADVANCING COLLABORATIVE GEO-INFORMATION INITIATIVES THROUGH JOINT EDUCATION PROGRAMMES AND OTHER REGIONAL SOLUTIONS: OPPORTUNITIES, CHALLENGES AND LESSONS LEARNT

O. E. Thontteh^{a,*}, O. Kufoniya^b

Regional Center for Training in Aerospace Surveys (RECTAS)
Off Road 1 Obafemi Awolowo University Campus PMB 5545, Ile-Ife, Osun State, Nigeria

[URL:http://www.rectas.org](http://www.rectas.org)

Email: athontteh@rectas.org, bkufoniya@rectas.org & jidekufoniya@yahoo.com

Commission VI WG VI/3

KEYWORDS: International cooperation, Capacity building, Geo-information, Spatial data infrastructure, Joint education, Technology transfer.

ABSTRACT

A working definition of international cooperation or collaboration used in this paper is the linking up of institutions for the purpose of providing Geo-information science related solutions for training and capacity building for sustainable development. International cooperation exists either as a North-North, South-South or North-South regional links. The benefit of the interactions between institutions is assessed based on their regional effectiveness. Using the joint education programme between the Regional Centre for Training in Aerospace Surveys (RECTAS) and the International Institute for Geo-information Science and Earth Observation (ITC) as example, the benefits, challenges and lessons learnt were discussed. As a sample population to indicate the efficacy of collaborative training, the graduates from two out of three academic sessions of the programme provided information on the impact that the RECTAS/ITC collaborative education have had on their performances since returning to their different organizations. The obvious benefits include higher capacity utilization, the development of personnel who understand both foreign and local concepts of the GI technology applications and all these at a highly reduced cost. Secondly; they are beginning to form the bulk of the trainers in this field in other educational institutes. On the other hand the challenges include the tendency for high personnel turnover and inadequate infrastructure in the home organisations of the trained personnel to put what has been learnt into practice.

1. INTRODUCTION

International cooperation or collaboration is used in this paper to describe linkages between two or more institutions for the purpose of providing Geoinformation science related training and capacity building for sustainable development from local, national, regional to global environments. As of date, there are innumerable Geo-Information (GI) technology developments and other initiatives which aim to promote rapid advancement in the use and application of GI knowledge. Earlier on at the inception of the development and the utilization of GI related tools and technology, there existed a regional divide between the physical location i.e organizations and training institutions where advanced technology and tools e.g geodata products, software and hardware technologies, current textbooks and other training material existed and was being used and where these were not being used. These usually existed in institutions of Europe and America. At other LDC locations where such technology and tools were not available for use in training and spatial applications, the regions' aim to build the needed capacity for Geoinformation management is frustrated. Through this notion, mention can be made of the fact that development of such technologies as the inventions of digital Land Surveying and Photogrammetric instruments in the early 1900's, the invention and launch of Earth Observing Satellites such as LandSat and SPOT in the early 1970's were developed and used extensively in the more developed countries for Geo-information production. To the contrary, less applications in this field of Geoinformation were carried out in the LDCs during this period. Till today, the regional divide still exists today several decades after the debut of these inventions. In the

example in Figure1 below: This figure Indicates regional locations where there is adequate capacity to carry out space satellite operations. It is evident that although several satellites have been launched by several African countries the full capacity for the effective operation of these satellites are still located in other regions of the world, primarily the North.



Figure 1: ² Global Satellite Operating countries

Another vivid example of the instance of the North region having more advanced technology and better effective distribution for the purpose of GI applications and research is shown by an image posted on this website (<http://www.spotimage.fr/web/en/211-the-group.php>) Accessed April 28 -30, 2008. (I was not granted permission to use the image hence it is not included here.) The image showed the international distribution location (indicated with red dots) for the satellite data and other products of SPOT Image. From the obvious spread of the red dots representing these distribution locations around the world, It can be seen that no location exist

within the African subregion from where these products are distributed. This connotes some implications which may affect the availability, ease of acquisition and ultimately the use of this technology for training and capacity building within the African subregion.

With the growth of these and other related inventions came the need to fast track capacity building in the field of GI technology. This cause and effect relationship resulted into the emergence of advancement in Geoinformation education in the advanced regions of the world which is classified as the 'North' where the inventions were already established. This advancement subsequently lead to a widening gulf between them and other regions within the LDCs which are referred to as 'South' regions. In the more recent times, it has become imperative that these technologies have to be applied in the south to ensure resource sustainability and maximization of crucial earth resources by the regions of the North. This is expected to bring immense benefit to the teeming populations and all other things related to life around the world. It is only practical to initiate international cooperation to help bridge the gap in technology and capacity of personnel with the intension of creating maximum capacity utilization in the field of Geoinformation for wholistic global development. For this course, various international agreements and collaborations were entered into by organizations and institutions of learning from regions of the North with those in the south. These international cooperations led in several ways to technology transfer, partnerships for developments and exchange of personnels and equipment for the purpose of promoting organizational development for both organizations of the north and south regions. These forms of collaborations and partnerships also have played a significant role in Geoinformation education, training and capacity building. These international cooperations was spearheaded by some prominent organizations such as ITC in the Netherlands, Ordinance surveys of Britain and education institution and mapping agencies in Canada (Where most of the older generation of surveying personnels in the Nigerian National Mapping Agency were trained).

The approach adopted for this paper is firstly a revisit of some of the changing terrains of education and capacity building through international cooperation. Also in-depth discussion is done on the concept of joint education programme (JEP). This is show cased using the ITC/RECTAS example and its influence on regional capacity building and how effective this has been in meeting the needs of the African organizations for the purposes of sustainable resource management through Geoinformation knowledge. Other areas of interest showcased here considered other networking efforts that cannot be directly classified as teaching/training but form tools and veritable instruments or infrastructure that promote advancement of Geoinformation education among several regions of the world. These include Software partnership between proprietary organizations and training institutions.

The primary motivation for this study is to use the avenue of this conference as a medium to document the silent contributions being made and the changes being effected through international collaborations in the fields of training and capacity building. From other records and conferences it is discovered that the impact of collaborative education is not yet seen as matured enough to be documented despite the fact that it is having profound effects especially in the aspect of building critical Geoinformation capacity for mapping and other geo related organizations in LDCs, e.g Asia and Africa. This paper is geared towards preventing the possibility of missing the

opportunity to document the early stages in the trend of evolution of collaborative education.

2. REVISIT OF TRENDS IN INTERNATIONAL COOPERATION FOR CAPACITY BUILDING

As stated in Thonteh, O., 2005¹, early records of actual implementations of forms of collaborative education programmes around the world especially between institutions in Africa and other developing countries with institutions in the advanced regions of the north dates far back to the early 1960s. Most of the early attempts comprised of an old system whereby brilliant individual students were admitted from several Geoinformation related organizations from the south regions around the world and these students are trained with state of the art and advanced Geoinformation related technologies. This saw the era of several trained personnel in various geo information related organization receiving foreign education in this field as is the case of the older generation in the Nigerian National Mapping Agency. As time went by, then came the advent of another form of capacity building through the invitation of foreign Geoinformation or mapping organizations to participate in the mapping and surveying activities in the south regions (these mapping and surveying activities were the primary in-road of Geoinformation applications and Technology into most LDCs.). In this instance some of the personnel from the local National Mapping Organisations (NMOs) who were usually few in number and the invitation was far between where incorporated into the projects at very rudimentary levels. In some ways, through this approach, capacity was built for such partnering organizations of the LDCs. These earlier approaches fell short of producing the needed critical capacity that was sufficient and easily adaptable to the local georelated organizations for which they had been trained.

With further attempt to implement a more effective solution, the approach and strategy of the current joint education programme JEP was initiated. This has reveal some remarkable dividends above the earlier methods discussed above and it displays great potentials for more rapid and effective growth in the development of critical capacity (as required by the institutions of the south) within a short length of time. In the fore front of promoting the international collaboration through the joint education programme is the Institute for Geo-information Science and Earth Observation (ITC). ITC as an institution has remained very relevant in the aspect of international collaboration for capacity building in Geoinformation education as it partners with institutions in the south for the purpose of technology transfer and capacity building. This is evident in it's dynamic and responsive structures to support the JEP which it has developed over several years. The primary reason for the JEP was firstly it was discovered that training selected or hand picked brilliant persons from an organization usually does not result in an avenue for effective capacity building for such a person's department or organization upon his return to that organization. the reason for this range from the fact that his absence from his home organization for a lengthy period of time will initially constitute some problems of readjustment upon his return and the need for him to reorient himself/herself to current situations which has evolved in the cause of his absence. Secondly, being an individual, it is more likely that the training which he undertook abroad was in his own field of specialization. Since most of the other personnel in his department or organization may not necessarily be in his field of

expertise, it becomes almost impossible to transfer this knowledge to others in that organization i.e although a lot of resources (both from scholarship source and manpower productivity hours) have been committed to training him, the outcome is not commensurate with the invested resources on this personnel. Eventually such a person becomes under utilized and the organization also does not fulfil it's capacity utilization. Therefore, training, re-training and capacity building moves slowly spanning through a lengthy period before a sizeable number of the work force can be trained or retrained. This is also coupled with the fact that technology advancement in the tools and other components of the geospatial information sciences and application is evolving at jet speed. Eventually such personnel will become a source of high personnel turnover as they move onto other organizations where there are more people of the same training level and usually with up to date equipment and more attractive remuneration because of their foreign education. Besides the JEP, some other forms of collaborative education initiative which will be discussed in this paper.

3. PROMINENT JOINT EDUCATION INITIATIVES IN GEOINFORMATION TRAINING AND CAPACITY BUILDING

3.1 ITC/RECTAS Joint Education program

ITC and RECTAS being old players in the arena of international Geoinformation education transfer, they have shown great evidence of much dynamism and sensitivity to regional changing needs in this field of education. ITC currently runs a variety of joint education programs with many organizations and institutions of the south. Primarily the aim of this initiative is to establish an international cooperation for the transfer of urgently needed Geoinformation technology to the regions of the south with a focus on reduction of overall cost and increasing the number of beneficiaries at these trainings while reducing the length of time these beneficiaries will spend out of their home organization for the purpose of capacity building and still acquire state of the art training with Geoinformation tools and skills which are easily adaptable to their local environments. The list of the various education collaboration which ITC currently operates can be found at http://www.itc.nl/itc_worldwide/educationpartners.asp. From this listing, many countries of the south are in partnership for the purpose of joint education with ITC these countries include Bolivia, China, Ghana, Iran Namibia Nigeria and Tanzania. At each of these locations the implementation of the Joint Education program (JEP) initiative come in a variety of ways ranging from Undertaking full courses of study in student's home countries using ITC course wares and curriculum with support from ITC in terms of staff and institutional infrastructure to segmenting a full course where by some aspect is taught locally using ITC curriculum and some parts done at ITC in the Netherlands. The primary aim for the JEP initiative is to achieve timely and cost effective capacity building of the bulk of personnel for Geoinformation related organizations from the regions of the south. This type of initiative is a prominent case of a North – South regional collaboration.

3.2 Assessing the Regional Effectiveness of joint education initiatives using ITC/RECTAS JEP Programme.

The collaboration between these two institutions provided an ideal atmosphere to test the strength of international cooperation whose impact will ripple across many countries of the south

region. This example looks at the effect of this in Africa, A continent of the south which greatly requires rapid advancement in Geoinformation technology transfer and implementation for sustainable development. On the other hand, ITC has been at the fore front of developing and transferring Geoinformation education since the 1950's in which it has developed much valuable expertise. This expertise has put ITC on the cutting edge of the changes in the Geoinformation technology science and applications. This is also coupled with it's experience of implementing many successful Geoinformation projects in many continents of the south. Upon this platform the two institutions had a basis for collaboration and this collaboration showed potentials for much regional effectiveness. In addition, other very vital premise for this collaboration include; comparable ICT infrastructure between ITC and RECTAS, with RECTAS having sufficient high speed computer equipped with the latest software technologies and commensurate internet infrastructure which supports both wired and wireless internet connection on it's campus. Also the mandate of RECTAS to provide Geoinformation education to the African subregion makes it a likely partner with ITC for this purpose. Also, the fact that both institutions offer complimentary technologies in education facilitated the cooperation. These cogent factors from the out set of the initiative accorded it a very high potential for regional effectiveness. The RECTAS/ITC JEP admitted it's first set of trainee in-take in the 2004/2005 academic session. From this time the JEP program has shown a sustained increase as indicated in figure 2 below. This sharp increase in the number of in-take immediately after the takeoff of the JEP at RECTAS is believed to be a factor of the resultant high benefits that trainees began to experience from the JEP. These benefits show some marked positive difference from the older curriculum.

The new curriculum is now synchronized with that of it's collaborating institute – ITC i.e the trainees were exposed to the same standard of technology in terms of instruction, equipment and practical exercises as their European counterparts at ITC taking the same courses. As a result of the high quality of education that is provided through the JEP, the criteria for admitting students have become more stringent. The structure of this JEP is designed in a manner that is meant to increasingly engender the concurrent integration of the advanced Geoinformation skills acquired by the trainees into their local organizations hence a projection to have the course run completely at RECTAS, Nigeria (a physical location whose distance is nearer to the trainee's home organisations) by year 2010.

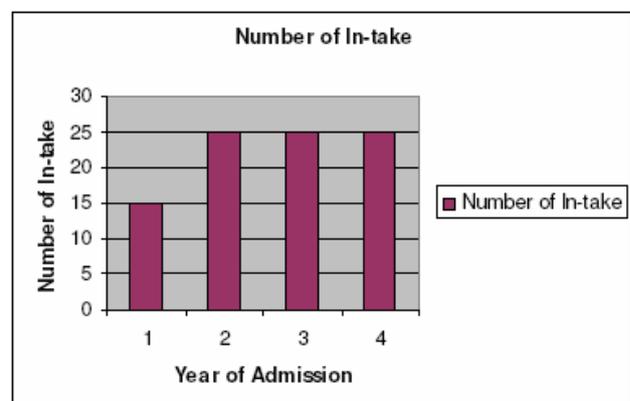


Figure 2. The Graph showing the sustained increase in trainee intake since the beginning of the Joint Education Program (JEP)

3.3 Opportunities, Challenges and Lessons learnt from the RECTAS/ITC JEP:

3.3.1 Opportunities

As it can be observed from the in figure 2, there is a remarkable sustained increase in the total number of trainees which the JEP has attracted since it began at RECTAS. This translates into a high number of personnel trained for several Geoinformation related organizations in the African subregion thereby reducing the total length of time that would have been required to retrain the same number of trainees under other types of international cooperation for training other than the JEP. The high point of the JEP initiative bothers upon the fact of training career level personnel with advanced and up to date Geoinformation technology who are thoroughly adaptable to the activities of their organizations immediately upon completion of their training. Achieving this particular goal is highly ensured through providing similar curriculum for trainees in RECTAS as those used at ITC and providing all these in an African environment. With the highly reduced financial cost at which the course is provided to the organizations, it becomes more affordable to send more trainees at a less cost. The more the trainees who benefit from this program, the higher the constancy of the trainees who are able to benefit from the program the faster it will be for the organization (from where the trainees come) to attain regular upgrading of it's activities.

The JEP has develop well trained regional personnel with diverse capacity who are equipped with skills to uplift the standards of their organisation's activities having being exposed to international standards of training with hands on experiences of Geoinformation applications applicable to their local environment. The essence of this is in the fact that while the student is under the tutelage of skilled instructors, he can practice his new learnings in his home organization and receive assistance on time with his/her efforts. This reduces the many challenges of integration of a new technology into an organization without someone with much knowledge in such a field for support. In some instances, the training is also customized to accommodate the training a large groups of personnel with varied background and different intellectual levels.

During the research carried out for this paper, graduates from two previous sets (2005 and 2006 graduation) of the JEP program at RECTAS were contacted. Although the response rate was not very high but the following statistics we generated from it. About 75% of the responses indicate that the new skills which they gained from undergoing the training in the JEP have made much difference in their work upon their return to their home organizations. Another phenomenon discovered is that the program has shown training the trainer effect, about 11% of the total graduates within this period are now involved in training in Geoinformation in different African institutions. Also the JEP arrangement makes provision for regular training and retraining of the lecturers who teach in the program at RECTAS. These are trained at ITC and in turn help to maintain the high quality and standard of the training for the JEP. The map of Africa below in Figure 3 indicates the African countries that have benefited from the RECTAS/ITC JEP program at RECTAS. This is indicated as the countries shaded in green colour.



Figure 3. Map of Africa showing the African countries that have benefited from the JEP program at RECTAS

3.3.2 Challenges

The challenges which face this Joint Education (JEP) include; The fact that the rapid popularity of the program may quickly reduce the current healthy faculty to student ratio. There is also the risk of producing very highly qualified personnels who will have much difficulty fitting into obsolete GIT work places when the rate of production of training the personnel is not equally complemented by the rate of upgrading of equipment in the organizations. Other challenges in this respect that affect regional effectiveness of the JEP especially in Africa include Low level of national infrastructure such as electricity and low band width for internet connectivity!. Also, maintaining comparable Geoinformation education standards with those of it's European counterpart especially in the multilingual (English and French) environment in which the training is being carried out at RECTAS. As a result of the multilingual issue the most daunting challenge at the moment is the inadequacy of current and up to date textbooks and literature (which have a high frequency of update in keeping up with the GI technology). This is especially worse in terms of acquiring textbooks and other literature in French language.

3.3.3 Lessons Learnt

Our experience has shown that the JEP as a type of collaborative education has largely proven that by this method there would be the possibility of faster capacity building and technology transfer in the regions of the south especially Africa.in this case. The highly reduced cost of training a mass of personnel in a local environment with international standard equipment and instructions will remain an attraction to most LDC organizations for a long time to come. Also targets and goals set by both institutions are largely met although sometime highly challenging.

4. OTHER EFFECTIVE REGIONAL COLLABORATIVE INITIATIVE

4.1 Erasmus mundus scholarship program

This is a scholarship program in the line of facilitating international cooperation. This arrangement provides cooperation and mobility program in the field of higher education³. The Geoinformation training under this scholarship has a consortium of four (4) institutions from Austria, Sweden, Poland and the Netherlands. The very attractive part of this initiative is that it enables students from LDCs who benefit from the scholarship to experience at first hand master level education at a multiple of European Union institutions. This scholarship also supports EU nationals who wish to study in institutions in the LDCs. This type of collaboration will pass for

both North-North collaboration (when it is considered in terms of the organizations that are involved) and it can also be considered in some form as a North-South collaboration when you consider the percentage of the beneficiaries who come from the LDC regions.

Although this approach of international cooperation for the purpose of education and capacity is very fanciful, full of adventures (as the students travel from one country to another) and also the fact that it will produce very specialized professionals, but the regional effectiveness of this will be highly limited by the fact that only young people in the higher academic brackets can participate and secondly the restrictions on the type of participants rules out the possibilities of having most of the personnel currently employed with most of the geo related organization in the LDCs participate in the program and hence limiting its regional effectiveness. This also tends more towards the earlier trend where one person is trained for a long time with a lot of money and such a person become too skilled for the local organization for which he/she is expected to fit into upon the completion of his training.

4.2 Example of a South-South collaboration -RECTAS / O.A.U

An example of a South-South collaboration which is gaining momentum is the educational collaboration between the Regional Center for Training in Aerospace Surveys (RECTAS) and the Obafemi Awolowo University (O.A.U) Ile-Ife. In this scenario, RECTAS, partners with O.A.U to provide the Geoinformation component of a recognized master degree course since RECTAS has a thriving curriculum in Geoinformation education and is well equipped for this purpose. This has not gained too much grounds as of now but indicates great potential which will ensure that (especially in the Nigerian environment) the well trained professional with relevant skills in Geoinformation become common place and also that institutions in the same regions and at relatively close spatial location will learn how to engage the strength of local partner organizations in the aspect which is not in either organization's primary field of expertise.

4.3 Bilateral Software agreements that provide infrastructure for JEP collaborations

To strengthen the frame of the JEP as a form of collaborative education, there have been spirited efforts by organizations producing proprietary software to collaborate with institutions of developing economies to ensure that the GI training received at these LDC institutions are of comparable quality and standard with those of Europe and America. The outcome of these efforts is revealed through the agreement which ITC has with ESRI, makers of ArcGIS. Also Clark University Laboratories makers of IDRISI have signed a similar agreement with RECTAS. Under these agreements, the software producer donates software to support the training institution where the trainees are taught with these companies state of the art software during the trainings and upon graduation each trainee is provided with a student copy of the software. Besides the attainment of up to date training for the trainee, he is also equipped to carry out meaningful Geoinformation impact on his organization upon his return even in the event that he may have to wait for a while after the completion of his training before his organization can be adequately equipped. In this instance, the student is kept in practice, he is also able to do some work and some of the training for other personnel can begin in earnest in his organization with the copy of the software which he was given upon graduation. This is a very strong support for the JEP as it

works to eliminate the former challenges of trainees returning to obsolete equipment in their organization. This is a solution that has increased the regional effectiveness of the JEP program since this benefit will be enjoyed by trainees from different African countries. This can also be considered as some form of North-South collaboration for the purpose of capacity building.

5. CONCLUSION

In this paper, much attention was given to enumerating salient positive effects which collaborative education has brought to different regions of the world. Since there is always an urgent need for organizations to build critical capacity, an international collaboration such as the JEP will always be in high demand albeit that it will require constant modification with changing trends. It is evident that it has the potential for training a critical mass of career level personnel within a short period of time and at a highly reduced cost than would have been possible through other initiatives. Also, the possibility of accommodating a variety of professional and skill levels of personnel within the same program gives it an edge over sending one brilliant individual for training abroad at a time. The issue of training with world standard technology in a home environment makes the capacity building effort of the JEP easily adaptable to the immediate work environment of local organizations in LDCs which is a prime requirement for effective capacity building. This paper discussed some of the premise upon which a successful collaboration can be based to ensure that its benefits will be maximized with the shortest period possible. Although the challenges of regional collaboration for the purposes of capacity building which is able to transcend across nations and regions of the world are daunting especially for African countries, these should not be considered as a complete barrier as the benefit for the collaborating organization or institutions always outweighs the cost of overcoming the challenges. This benefit include having valuable contribution for GI technology advancement through making available for use an earlier technology i.e contributions are made based on experiments carried out at regional locations which the producers of the technology would not have much access to. It is noted that the inclusion of the software collaboration builds a strong frame to support the JEP training. On this account there is a need for textbooks and current journals collaboration to further strengthen this frame.

REFERENCES

- 1. Thontteh.O, 2005.** Collaborative education as a tool for geospatial information technology advancement: An innovative problem solving methodology for less developed countries. AARSE 2006 conference, pp 125
- 2. Wikipidia** http://en.wikipedia.org/wiki/Space_agency accessed on May 08, 2008. Image posted April 18th 2007.
- 3. Erasmus Mundus** http://ec.europa.eu/education/programmes/mundus/programme/back_en.html

