MAPPING OF DISTANCE LEARNING IN GEOMATICS THROUGHOUT THE WORLD.

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ABSTRACT

The coming of Information and Communication Technologies (ICT) society allow distance learning to be successful with a prodigious unprecedented development. Yet, all have begun very timidly in 19th century by analogical rudimentary methods. Since the coming of the numeric in 1970 through the creation of CD ROM; followed by the creation of Global Positioning System (GPS) and it freeing in 1990, the putting in place and development of GIS and remote sensing have brought the ICT society characterised by fast and sophisticated communication network that reduce an entire world to become a small village. This context is that of geomatics and ICT that enable distance learning to spread all over the world.

Key words: Distance learning, geomatics, GIS, ICT, remote sensing, website.

1 – INTRODUCTION

According to Barbier P. (2002), “Distance learning (DL) is a vector of the training which experiences a strong recent development”. It is define by many specialists, as a system using communication and information technologies for the sharing, the dissemination and the appropriation of knowledge and know-how. The DL is a great, vast and multiform subject; this situation complicates and widens its definition. The few outlines of definitions which will follow come to some extent from our knowledge as a teacher and the synthesis of our research information. Our paper focussed only on the main groups of geomatic’s distance learning within the world. It began by characteristics and typologies of distance learning.

2 – METHODOLOGY

In 2003, during 6 months, we make a virtual trip on the web in order to try to identify the existing geomatic distance learning website. The data we collect were partially compute in EXCEL software and other information has being mapped using AMPINFO 7.5 and ARC VIEW 3.3 software. The results are presented below by distance learning groups in each continent and by country. The results show the great advance of North America compared to Western Europe. One can noticed too a great interest of many countries of the world in distance learning courses as geomatic is concerned.
3 – TYPOLOGIES AND CHARACTERISTICS OF DISTANCE LEARNING

3.1 – Presental training and e-learning (on line training)

The presentional training is that which requires the presence of learner on the field where the activity of training proceeds. This traditional mode of training gathers the trainer and learners them in the same room called class. It is the wide spread type of classical training and the best shared by all the institutions and the companies. It starts with the training of the alphabet and the writing, while passing by the schools to lead to the formations in the universities, the seminars and the conferences. Essence in this case, it is that learning it and the teacher are present on the spot of formation.

The on line training is a DL which can also be held all the life and which integrates the continuous training. It uses primarily the Web by Internet, Intranet or Extranet with multimedia means, carried out with a computer network. One could also speak “about training on Web” Giguerre P. (2000). It is the most widespread DL nowadays.

E-learning according to Patron L (2003) indicates a teaching delivered partially or completely electronically via Web tools such as Netscape Navigator, through Internet or Intranet using of the multimedia tools (CD ROM, DVD). Gradually, the nature of the e-learning becomes interactive.

3.2 – Distance Learning Characteristics

The Distance Learning is defined as: “a planned training which proceeds in a different place from that usual teaching milieu and which thus requires special techniques of course design, special techniques of training, special methods of communication by an electronic technology and also the special lawful devices” according to M.G.Moore and G Kearslay, 1996 city by P. Giguerre. If in the French language, some specialists like Rogard and Nicolas, (2003) also speak about open and distance learning (ODL); in the English terminology, semantic problems could not arise. Patron L (2003) will speak readily about distance learning to indicate a teaching provided remotely while referring to a studio of reading for distant localizations through video presentations (video conference). It requires neither the moving of learners, nor that of the teacher. So it can be millennium as a virtual class. A virtual class is a form of teaching which uses a technology using the synchronous and interactive communications (according to the curriculum) between the students, the teachers, the tutors and the coordinators. Virtual university, virtual campus is similar terms. It is a virtual room of teaching, where the teacher can poster and exchange his courses, documents, materials, lead a forum, manage and examine on line with feedback. A virtual campus is a campus open remotely via Internet where the students communicate between them and with a tutor in an interactive way, then they are organized in small group called virtual communities which practise a collaborative work, thus developing practices and tools for synchronous and asynchronous exchange on Internet and their capacity with work via the digital or networks. The virtual university is an open university and for all, which uses the new tools (videoconference, Web, etc.) provided by the ICT to teach, diffuse and control its lesson. A virtual seminar is a time devoted to a set of themes by a group made up of tutors and students in a workspace with a remote waiter. The virtual qualifier completely justifies primarily this mode of training in line and increasingly used nowadays.

The characteristics of the DL are summarized in these sentences: the DL is centered on learner; it limits the racial and tribal barriers, it is flexible and easy of access allowing a saving of time and money and developing the way of the initiative and the responsibility at learner. It closely linked learner and teacher by the tutorials lectures. Its topics are relevant and the course materials of a great pedagogic quality. The DL is “a new way of learning, a good way of learning and a serious way of learning” (Title of the CLIFFAD report, 1998).

It is noted that a multiplicity of concepts is used to define and characterize the DL that seems itself a multiform concept using a varied terminology and increasingly current neologisms. For our matter, two terms appear essential and gather all the others: remote training and on line training.

4 – DISTRIBUTION AND MAPPING OF DISTANCE LEARNING WITHIN THE WORLD

4.1 – Short history of distance learning within the world

The DL started within the world in the middle of 19th century; but it is towards the end of the 20th century that it takes its actual expansion (table I). Distance learning will experience a larger development during the 3rd millennium.

This synthesis to be updated requires a mapping showing the current state of the DL development within the world (fig.1) and the main leading groups of DL in geomatic. After the consultation of the website http://thot.cursus.edu/, we made a synthetic graph of main linguistic groups in DL (fig.2).
<table>
<thead>
<tr>
<th>Year</th>
<th>Country, Continent or organization</th>
<th>Main event</th>
</tr>
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<tbody>
<tr>
<td>1840</td>
<td>Canada</td>
<td>First offer of distance learning course</td>
</tr>
<tr>
<td>1890</td>
<td>United States</td>
<td>Launching of distance learning by EducationDirect</td>
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<tr>
<td>1970</td>
<td>UNO</td>
<td>Proposal of a new type of University by U THANT, General Secretary of United Nations</td>
</tr>
<tr>
<td>1972</td>
<td>Canada</td>
<td>Création de la Télé-université in Québec</td>
</tr>
<tr>
<td>1990</td>
<td>United Kingdom</td>
<td>Foundation of UNIGIS International, that lead distance learning in Geomatics</td>
</tr>
<tr>
<td>1993</td>
<td>Europe</td>
<td>Foundation of EUROPACE, aiming to creation of European virtual University.</td>
</tr>
<tr>
<td>1997</td>
<td>Africa (Kenya)</td>
<td>Création of African Virtual University (AVU)</td>
</tr>
</tbody>
</table>
| 1998 | United States                     | Opening of ESRI Virtual Campus (http://www.esri.com/)
| 2000 | France                            | Launching of digital or virtual campus of Francophone movement |
| 2000 | Amsterdam (Netherlands)           | Launching of international virtual University of GIS by UNIGIS |
| 2002 | Tunisia                           | Creation of Tunis virtual University (UVT) |
| 2003 | Japan                             | Opening of Global virtual University of UNO |

Table I: Historical and synthetic overview of distance learning evolution throughout the world.

One can notice an opening of the Anglo-Saxon world represented by the United States, Canada, Australia and the United Kingdom. In addition, the principal groups of DL into geomatic are Anglo-Saxon. Western Europe is also better equipped in that field compared to Eastern Europe. Eastern Asia is in lethargy. Africa and Latin America have only one representative in DL of geomatic, respectively South Africa and Ecuador.

![Fig.1- Main distance learning group and networks within the world](image)

4.2 - Mapping of continental distribution of distance learning

The cartography carried out aims at showing the membership of the various countries to the great groups of DL in the world. Actually there are several groups of remote learning, but we held account primarily groups with continental or
transcontinental expansion. Among these groups of DL, those of geomatic (ESRI, UNIGIS, and NCGIA) occupy more than 50% of the international scene (fig.3) the other groups divide remainder (FRANCOPHONIE, EUROPACE, and AVU). In addition, the Anglo-Saxon countries divide at least 80% of the geomatic DL in the world (the United States, Canada, United Kingdom, and Australia).

4.2.1 – American Continent

The two large countries of North America (Canada and the United States) share the leadership in all DL fields and more specifically in geomatic field (fig.2). The offer is generally centred in medicine, literary, data-processing genius and communication (Web programming). For the specific case of geomatic, two great sets take shape: Canada with Téléuniversité (Teluq) which counts at least 3 universities (Sherbrooke, Laval and Montreal... 300 courses) giving geomatic presential and e-learning trainings supported by the famous TRUST, CRG, CCT. In Anglophone Canada, the Simon Fraser and British Columbia Universities distribute DL in geomatic through UNIGIS and NCGIA (National Center for Geographical Information Analysis) networks. The United States constitutes the other shutter of the geomatic DL in North America. This unintermitting State just like Canada lays out more than 1000 online courses on various topics (medical sciences, physical sciences, medicine etc). As geomatic is concern, we notice two main leadings groups: the University of South Carolina (USC, works with UNIGIS International) and ESRI. ESRI society, which holds the GIS leadership, in addition to the support for the USC, launched in 1998 a virtual campus with more than 80000 students from 170 countries. E-learning topics are based on: GIS, remote sensing, geostatistics, space modelling and GPS. Finally three universities (University of Maine, University of California At Santa Barbara and State University of New York At Buffalo) created the NCGIA which is a consortium of basic research in geographical information sciences with its related technologies. The NCGIA has a geocurriculum catalogue organized in 53 units grouped in 6 modules (http://www.ncgia.edu/).

South America carries certain lethargy in the field of the DL in geomatic. Apart from the Ecuador (a transmitting country) which belongs to UNIGIS group, no country organizes online training in geomatic. Nevertheless, some countries run as that the recipients of e-learning training in geomatics.
4.2.2 – European Continent

Three Universities (The University of Salford, the University of Huddersfield and the Manchester Metropolitan University) in United Kingdom founded UNIGIS INTERNATIONAL in collaboration with University of Salzburg in Austria and Vrije University of Amsterdam in Netherlands. United Kingdom, caps the field of European DL in geomatic. UNIGIS has a postgraduate program that includes 9 to 12 modules and its students came from 45 countries. On the 16 Member States, 12 are European and 8 of Western Europe against 4 in Eastern Europe. France through it High schools like ENSG, ESGT, ENSAM offers DL training in geomatic. It also benefits from ESRI (ESRI society holds a branch in France) experience to develop DL French skill in geomatic field. Belgium through the University of Liege gives DL training in applied geomatic, intended especially for its students. The Central and Eastern Europe is part of the old continent that appears slightly isolated and delayed. The Central and Eastern European (fig.3) countries make effort to bring it selves to the level of their partners of Western Europe. These countries possess four active members in UNIGIS group and more than seven strong members in EUROPACE DL organisation.

Fig 3 - Distance learning distribution in Europe

4.2.3 – Asia continent and Oceania

The e-leaning in geomatic is not well afforded in Asia apart from some receiving countries of UNIGIS DL like India (fig. 4). Surely, the University of Keio in Japan offers online courses in water resources management while China launched on January 8, 2001 a geomatic DL curriculum through the NCGIA and in collaboration with Australia on the following website http://www.fas.harvard.edu/~chgis.

As Oceania is concern, Australia appears as the only giant of this maritime continent which offers online courses in geomatic. Australia country is the membership of the NCGIA and record the 4th rank within the English speaking countries leading the world distance learning in geomatics (behind the United States, Canada and the United Kingdom).
4.2.4 – Africa continent and distance learning

All African countries are involved in distance learning. But, English speaking countries of Africa very well experienced distance learning more than French speaking countries. At a regional scale, West Africa is very skilful than central Africa and Maghreb regions (fig. 5). Maghreb has a very good skill in distance learning with countries like Tunisia, Egypt and Morocco who implement local structures and great capacity building. Southern Africa is the first and the main pole of distance learning in geomatic through South Africa which is the African distance learning superpower. For all the southern African countries are under control of South Africa that totalise more than 80% of Internet users of All African countries. With a great capacity building, South Africa, member of UNIGIS (University GIS) International organised and hosted geomatics distance learning course in the University of Pretoria and Port Elisabeth Technikon.

East Africa is a great pole in black tropical Africa under Kenya’s control that carries housing structures and programs of African Virtual University (AVU), whose courses are focussed in English web programming and fundamental sciences. West African countries, with Senegal as leading country in Distance learning domains, are involved in many distance learning groups such as Francophonie, GDLN (Global Distance Learning Network), AVU. Senegal hosted online courses on law and Internet professional skill.

Central Africa is the last African region in great lethargy as distance learning is concerned even though if the region is involved in e-learning structures. Many countries of this region deal with Francophonie. GLDN structures have not yet being launched in this sub-region (fig.5). Its countries are not involved in the unique African virtual structure (AVU).
5 - DISTANCE LEARNING MAIN GROUPS WITHIN THE WORLD

We identify four main groups of distance learning throughout the world. Among these, we choose the most widespread at the international level like UNIGIS International and FRANCOPHONIE that have a geomatic portal. UNIGIS (http://www.UNIGISINTERNATIONAL.org/) is a very spread group with a geocurriculum centered on GIS, spatial data, database theories and practices using ARCVIEW and IDRISI. Figure 6 gives the distribution of its students, universities, and members states by continent.
In the graph showing FRANCOPHONIE members throughout the world, one can notice that Western Europe is the team leader and the movement is widespread in Central and West African countries either in number of universities than in the number of digital campus and information access centres (fig.7) (http://agence.francophonie.org/).

GDLN (http://www.gdln.org) is a World Bank Group centred on developing countries. It organizes teaching in three main directions: courses, dialogues and development; web programming. The members of this distance learning network are distributed as follows (fig.8). The distribution of those members by continent seems to be equilibrated, but in detail, one can notice a regional disparity (fig.8).

Germany launched online training in ground water management through In WENT in 2000, and there are many students from black African countries such as Burundi, Benin, Cameroon, Central Africa Republic, Ivory Cost, Nigeria, Rwanda, Tanzania, Zambia. But, we have just collected little information about In WENT. AVU (http://www.avu.org/)
is the main continental structure of distance learning and its distribution of member states shows that there are centred on Anglophone countries of East African region and those of West Africa. In September 2003, in Thot Cursus website (http://thot.cursus.edu), we noticed that there were 34 institutions of distance learning in Asia, within 11 countries, 54 in Eastern Europe within 13 countries and 114 in Africa within 26 countries (with 42 belonging to South Africa). INADES training recorded 10 of 114 institutions in 10 countries (Burkina Faso, Burundi, Cameroon, Chad, Democratic Republic of Congo, Ivory Coast, Kenya, Rwanda, Tanzania, Togo).

Thus distance learning in the whole world is leading by English speaking countries; there is no surprise if black francophone Africa is less interested by distance learning because 86.04% of African countries and distance learning groups are located in English speaking countries (fig. 9a & b) such as East and Southern Africa and slightly West Africa and Maghreb regions.

![Fig. 9 a&b - Linguistic groups of distance learning in Africa and within the world (5 September 2003)](image)

6. GENERAL CONCLUSION

Distance learning is a planned apprenticeship that takes place in a different place than the one of usual teaching and training. It requires special techniques of courses conceiving, special techniques of training and special methods of communication by electronic technology. Distance learning doesn’t need the moving or the transfer of neither the learner nor the teacher (Patron 2003); that is the reason why it is call virtual classroom. This teaching form used technology that supported asynchronous and synchronous communication methods between students, teachers, tutors and coordinators. So the group of words such as virtual university, virtual campus, virtual forum and virtual seminar referred to the same reality using Internet and web means to communicate. For the term virtual issued to qualify the type of online training.

The study shows that distance learning is disseminating gradually in Africa; but Anglophone countries of the continent appear involved in many groups and carry more than 86% of institutions while francophone countries are lethargic (it is necessary to note that world leading countries are Anglophone countries such as United States, Canada, United Kingdom, Australia and main groups of distance learning are issued there). It is the case of central Africa region that needs the implementation of capacity building in ICT. If this is not done, this region could miss the actual world history turning point. However, distance learning is bringing good perspectives to the world and particularly to African countries for it reduces brain drain and helps to alleviate poverty. But, the strategies of implementing its tools need the financial and material support of states and NGOs even though if distance learning cannot replace former and classical methods of training that is presental one. Distance learning completes presential training and teaching and brings profit in time, material, cost and human resources.

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http://www.csiss.org/ (Geomatics)
http://www.usher.ca/ (Geomatics)
http://www.reseauteil.cict.fr/ (Remote sensing network of Francophonie)
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Dr Mesmin Tchindjang was born in Douala Cameroon on August 26, 1961.
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\textsuperscript{1} Ph.D thesis in Geomorphology in 1996 at University of Paris 7 in France entitled: The Central Bamileke Plateau and its surrounds: Regional morphology and slopes dynamic. Geomorphological study dealt with Relief, Surface dynamic and Natural Risks.
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General Secretary of The National Geography Committee of Cameroon.
Member of ICA working Group on Colonial Cartography
Member of IGU working group on cultural geography
Founding Member and coordinator of CARGIS; a Cameroonian association of cartographers, GIS and remote sensing
Program manager and coordinator of Postgraduate Diploma and Master of Sciences in EIA in CRESA Cameroon.

Publications:
More than 15 scientific articles focussed on: The weathered pebble of the Bamileke plateau, The geological rock strata in Cameroon, Mining Sand exploitation on the Pan African granite rock of Batie Region, Central Bamileke maars, inundation risks in the Lake Nyos Valley, Erosion and Dissolution potholes on the Lake Nyos pyroclastic dam, tourism and ecotourism.
Supervisor (students research works) of almost 15 Master of Sciences thesis in Geomorphology, Management of natural and touristic resources, Environment with tourism and Eco tourism, Farming transformation in West Cameroon, Sustainable Management of Fauna specimen (CITES Case) in Cameroon, Inundation and risks linked with shallows occupation in Yaounde town, Remote sensing and ecological prospect of biodiversity on Cameroon Mountains after 1999-2000 eruptions.