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A Brief Study of Learning Cartography and Mapping Techniques

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Abstract— Cartography is **the study and practice of making and using maps.** Combining science, aesthetics and technique, statistics methods, cartography builds on the premise that reality (or an imagined reality) can be modeled in ways that communicate spatial information effectively understanding and learning. Learning cartography is one of the most popular techniques used to identify knowledge in organizations. Using Learning mapping techniques, a large and complex set of Learning resources can be acquired and navigated more easily. Learning map has attracted the expert attention as an assessment tool in recent days and is expected to measure deep conceptual understanding and allow experts in instituations to characterize relationships between basic of idea within a domain visually.

Here the very critical issue is how to identify and choose an appropriate Learning map technique. This paper aims to explore the different types of Learning mapping techniques and give a general idea of their target contexts to have the way for choosing the appropriate map. It attempts to illustrate which techniques are appropriate, why and where they can be applied, and how these mapping techniques can be managed. The paper is based on the comprehensive review of papers on Learning map techniques. In addition, this paper attempts to further clarify the differences among these Learning map techniques and the main purpose for using each. It is recommended that subject specialist must understand the purpose for which the map is being developed before proceeding to activities related to any learning process dimensions in order to the appropriate understanding map techniques .

Keywords – Mapping techniques- methods and apparatus, Cartography- Art of designing maps, comprehensive review- Detail analysis and synthesis of using mapping techniques. Organizations- Institutions of mapping and cartography. Illustrate – to explain by maps and diagrams.

INTRODUCTION

Now days, it is axiomatic for many instituations that understading management is a corner stone for the success. Learning management can be summarized in the phrase "Learn, present, increase!" learn is tacit 'Main Learning', present means understanding of topics is data that is written down and documented (explicit Learning), and Grow is considered as collaboration toward innovation and stimulates new Learning (1). Deep understanding of these simple knowledge can radically develop the capability required to compete with other organizations (2). According to the Organization for Economic Cooperation and Development (OECD), Knowledge can be classified as follows: learn-What, learn-Why, learn-How and Know-Who (3). Wilke (4) highlighted that the most important responsibilities of knowledge management are to envisage Learning for experts. Learn mapping is one way that allows Learning to be represented graphically through *nodes* to represent main thoughts and *links* leading to representing the interrelationships between the ideas.

This paper is a comprehensive review of various types of available Learn mapping techniques and gives a general idea of their purpose. It attempts to illustrate which methods are appropriate and why, where they can be use, and how these mapping techniques can be managed. Thush, this paper clarifies the differences among these Learning mapping methods. The rest of the paper is structured as below: section two is reviewing some related works followed by definition of the Learning map in section three. Section four is about using Learning maps followed by the classification of Learn maps is discussed in section five. Finally, the techniques of Learning mapping are reviewed and concluded in section six. These are all methods will be used in future of geographical period.

1. RELATED WORKS

Numerous studies have attempted to set up a guideline to develop learning maps. For example, Alexandra and Simon (5) focused on the application of learn mapping in open learning. They demonstrated how learning maps can help organize learning in several contexts such as: learning design, learning path planning and problem solving, on online learning, and distance education. Besides, Eppler (6) offers a basic map for learning classification pedestal on the tasks management of learning These tasks consist of four steps : learning identification maps, learning creation and development, application and assessment maps. This categorization is not wide-ranging, multipurpose, and accurate enough to be used in learning management. However, Davies's (7) research on mind mapping; argument mapping and concept mapping demonstrated the differences in each of these mapping tools and outlined the various types of tools available as well as their advantages and disadvantages. Liebowitz (8) combined the use of the analytic hierarchy process (AHP) with social network analysis (SNA) to produce interval/ratio measures for using in an organization's knowledge map. Moreover, Kim et al. (9) offered a technique to develop a learn map for an industrial organization via capturing and demonstrating organizational knowledge. Thus, they stated that learning map is the best tool to represent learning in an organization. Finally, Watthananon and Mingkhwan (10) presented a method using learning map to explain. understanding associations that enable users in an organization to see associations of learning and provide them the path to access the learning stored within a learning base. In addition, they presented ways of increasing efficiency of

learning management with the use of learn maps. In these technique we are able to development of cartography.

2. RESEARCH METHODS

This paper reviewed many books and research papers to identify the existing learning mapping techniques. The review led us to seventeen types of learning mapping techniques and gave a general idea of their purpose and context. In addition, it is illustrated that what is learning methods ?, why are these methods develop?, where are use of the methods?, and how can we use these methods? these mapping methods can be organized to help and guide the knowledge managers in any instituation. Finally, the selected learning techniques are summarized, analysis and their interrelationships are shown to different learning types identified in our research as learning of many facts and many objects. These techniques will be easy formed of cartographical maps.

3. LEARNING MAP

Learning map means understanding maps, it is shows relations among procedures, simple ideas and competency and provides easy and effective access to learning sources (10). According to Zhang et al. learning (3) map is defined as a method to retrieve the learning that is arranged via learning experts and institutions. Another description for the learning map is the geographical view of learning inside an organization illustrating the owner, location, and value using method of organizational learning (11). According to Grey (12), a learning map portrays the knowledge flow throughout the enterprise and helps to steer, both tacit and explicit learning. learning maps do not provide, but indicate tools for learning maps (13) and as Davenport and Prusak (14) state:"Learn maps are guides, not repositories". It's growth in knowledge or understanding of cartographical mapping.

3.1 Using a learning Map

Learning map gives a holistic overview of learning resources. It's uses in solving problems of geographical, economical and socio-cultural. Therefore, it determines and clarifies the needed learning to achieve strategic goals in a more simple and friendly manner. Data presented in the learning map helps directors to observe issues and discover risks. Constructing learning map assists directors to build up and enhance training and educational support systems to achieve successful team working and see knowledge relations within and across learning areas in organizations (15).

3.2 What aspects are mapped?

Objects of learning can be text or hypertext to receive explicit learning. Thus, explicit learning exists generally in hypertexts on the Web or texts on the Intranet which we view them as documents. The following table to explain of make something of example the most important objects that can be used in mapped .

TABLE 1: Objects that can be mapped

Type of Learning	Objects
Tacit learning	• Expertise, skill, experience • Location, accessibility, contact address • Relationships/networks
Explicit learning	• Subject, objectives • Location • Ownership • Users • Access right • Use in future
Tacit organizational process learning	• The people with the internal processing learning
Explicit organizational process learning	• Codified organizational process learning

4. LEARNING TYPES AND MAP CLASSIFICATION

Learn First of all, it is needed to clarify what is meant by learning in learning mapping. There are two types of learning maps, explicit and tacit (17). Explicit learning can be documented, illustrated and symbolized. On the other hand, tacit learning is in individuals' minds and hard to express or document. The other classification of learning consists of three categories (18): 1. Descriptive learning (Learn-what), also referred to as declarative, provides a description of an aspect, situations and facts or techniques(18). 2. Procedural learning (Learn-how) specifies doing something, actions or manipulations. In general, it describes a method or behavior. 3. Strategic understood (learn-why, learn-when) is the category form which the decision process significance the most. (18). Learning map classification gives a general idea of the issues and helps to find the suitable problem solving method among the potential mapping techniques. Classification decreases the difficulty of determining the desired learning map design for the target context (6). Moreover, classification clarifies similarities and differences of the learning mapping techniques . Principles of classification adapted from are the following questions:

- What is our purpose of creating a learning map? (“why” questions)
- Who is going to use the map, in what condition and which phase? (“When” and “To Whom”)
- Which domain of learning is the in the focus? (”what” questions)
- Which graphical technique is preferred who is to construct it? (“how” questions)
- Where the institution’s learning is rooted and expected to produce? (“where” questions)
- Where the expert is use of map and what is effect on learning mapping?(‘where’ and ‘what’ question)

5. LEARNING OF MAPPING TECHNIQUES

There are several mapping techniques and methods useful for learners or open sense making communities. Through these techniques, they can create learning maps to explore learning materials, solve activities, systematize ideas, construct and represent their argumentation, and organize and share additional references. The major literature review led us to identification of fifteen types of learning mapping techniques. Table 2 depicts these learn mapping tools, methods and techniques. In this table, the techniques or methods were examined based on the dividing explained in the previous section.

TABLE2: **learning Maps Techniques**:

Learning Technique	Description	Learn what	Learn how	Learn why
1. Causal Maps	Causal maps (cause maps or cognitive maps) represent the cause-effect relations between experts' opinion in a directed graph.There are many diagrams known as causal maps like Ishikawa (fishbone) diagrams or cause and effect diagrams that are used to help teachers, experts, or students	Yes	Yes	Yes
2. Concept Maps	Developed by Prof. Joseph D. Novak around 1972, Concept map is a structured way to help groups to develop conceptual frameworks used in planning or evaluation. Concept mapping is different with mind mapping and not to be confused thus it is more formal and structured. Starting from a question or phrase, in a 'tree' structured hierarchy ideas lay in layers (primary, secondary and tertiary ideas)	Yes	Yes	Yes
3. Argument Maps	Invented by J.H. Wigmore around 2000, this map is considered relatively new to help in the analysis of legal arguments. This class of technique decomposes an argument into claims, reasons and objections. It is also used for preparing and presenting arguments and for developing critical thinking skills, both individually and collectively.	Yes	No	No
4. Mind Maps	Mind mapping (or ''idea'' mapping) is a representation of ideas and the relation between them in a nonlinear visual manner. Mind maps consist of a network of simple ideas in	Yes	Yes	Yes

	relation with each other. Its main help is in memory retention and organize ideas in relation together.			

5. Learn Asset Map	As it comes from the name, it consists of mechanisms enabling organizations to identify their knowledge assets, their inter relations and needed learn to fulfill development plans. Provides a framework that allows organizations to identify the critical knowledge areas of their company.	Yes	No	No
6. Cognitive map	This map tries to show how people see their environment and captures their comprehending, learning or keeping knowledge. This map facilitates mutual understanding by depicting several views in team members and helps to reach a solution based on an integrated understanding.	Yes	Yes	Yes
7. Topic Map	Topic maps (TM) organizes learn by describes the relations between knowledge domains and links to knowledge resource. Topic Maps (TM) help to visual information routing within institution.	Yes	Yes	Yes
8. Folksonomy	"A folksonomy is the collectively and/or collaboratively form of the tags that can emerge from user-generated metadata" which is used instead of formal taxonomies for organizing resources. The word is a combination of the worlds 'folk' and 'taxonomy' to refer to an informal collection of related vocabulary. A way of small content on the internet by social tagging; social classification generated by employees reflects the real situation of knowledge, learning.	Yes	No	No

9. Process Learning Mapping	Process knowledge mapping identifies current knowledge and needed knowledge in business process. Process knowledge mapping analyzes a business process or method to identify knowledge bottlenecks (where), knowledge requirements (what), and how to acquire them (or by who). Process mapping aids organizations in productivity, efficiency, error omitting, aim customer satisfaction and add to profit.	Yes	Yes	Yes
10.Functional knowledge mapping	It is sometimes mistaken with process knowledge mapping but functional knowledge map's main focus is on experts or people. This map illustrates each position in an organization, individual possessing that position, his skills, experiences and academic education, also depicts the social relation of all individuals and resources. Functional knowledge map provides an organizational directory of knowledge resources; inter relations of personal and their skills.	Yes	Yes	Yes
11. Petri nets	A Petri net is a graph with place or transitions as nodes. They are two parted graphs with directed edges and have formal semantics. It is a well known tool for information processing system study.	Yes	Yes	Yes
12. Information Flow Analysis	This type using complex programs, investigates formal and informal networks and processes in the enterprise and reports every knowledge resource is used by who, and how often.	Yes	Yes	Yes
13. Competency Mapping	Competency Mapping represents organizational structure, with jobs description and personnel requirements; it does not reveal the real expertise and Individual's knowledge.	Yes	No	No

14. Social Network Analysis	SNA studies, measures and maps any knowledge processing element in a network of connected nodes (people, groups, institutions, computers, and est.) and captures the flow of learning among them. SNA studies actors, how they blend or act in the overall network and relations, how the actions make a change in whole network.	Yes	No	No
15. Semantic Map	As it comes from the name, this map tries to represent relation of documents and explain the data economically with semantics. A semantic mapping technique objects to simplify implementation by building precise transforms from canonical message and document structures to 'flattened' formats where readily meaningful commercial names replace machine-orientated fixed attribute codes in deeply nested structures.	Yes	Yes	No
16. Capacity Map	Human capacity to access resources measurement and relation explain with human, nature, political and socio-cultural factors.	Yes	Yes	Yes

6. MODERN TECHNIQUES

In present time cartography stands on a foundation in a scientific age and it continues to develop and evolve with each passing year. With data colection from drones, satellites, and sensors, plus the robust capabilities of **GIS mapping** software. Cartography promises to be bright in future. Map making can employ a huge variety of methods,tools and techeniques. Here we'll cover a few of the most common tools aerial photography, sensors, GPS, satellites, computer hardware and software and **GIS** etc.

6.1 Aerial Photography

In ancient time human trying to get cameras into the sky for as long as those same cameras have existed. Early attempts at aerial photography included balloons, kites, birds and even rockets. Phantom 3 Drone Read more about the fascinating **history of aerial photography here**.

Modern aerial photography now relies on advanced technology like helicopters and unmanned aerial vehicles, more colloquially are called as drones. Able to reach impressive heights and controlled by hand-held remote, drones are are most tool for aerial photography. Specially for **GIS mapping**, large-scale, consistent visual records make surveying and change detection a land and sea breeze. Though drones are still fairly expensive, the barrier to entry is low enough that organizations and even most personals can participate.

6.2 Sensors

Sensors detect phenomenas, changes and physical characteristics of a given area by transforming (sound, light, heat, radiation or motion) into electrical signals. Those signals are collected and then transmitted to another device, usually a computer. Put simple sensors collect data about the Earth's surface. Seisometers measure ground motion.

6.3 LIDAR, SONAR:

In modern time 3D laser-based aerial mapping, Detecting objects under water through sound propagation. In terms of modern cartography, sensors contribute to the design and creation of detailed micro maps, Because sensors can detect and long huge quantities of accurate data regularly, they are often used in change study of futer projects. Essentially, creating one map of an area, waiting for a specified amount of time, creating another, and then comparing for discrepancies.

6.4 GPS

The Global Positioning System (GPS) is a series of over many satellites that orbit Earth regularly, each transmitting a unique signal. GPS receivers intercept those signals and perform distance based measurement between various points. Highly accurate system enable of navigation. Primarily used for navigation in aircrafts, motorcars, boats, mobile phones and others, GPS is also the primary tool for land surveying. Digital cartography has enabled the unique of GPS systems. Users can employ GPS to track everyday trends like control traffic, mark coordinates for landmarks, chart a path from one location to another, and find their own location in map.

6.5 Satellites

Satellites serve a variety of purposes on foreign adversaries, to tracking weather and improving cell service, or as mentioned above enabling the GPS network. In terms of map making, satellites enable consistent, large-scale updates of Earth’s surface. Think about modern applications like Google Earth or cloud GIS tools. These all really on satellites for accurate **geospatial data**. Satellites have increased the speed and range at which in map able information can be collected. Surveys that once took months can now be done in minutes. By continually capturing footage of the Earth’s surface, satellites have enabled the creation of thousands, if not millions, of maps - used in medical, agriculture, forestry, utilities, earth sciences, regional planning, and much more.

6.6 Geographic Information Systems (GIS)

Sensors, GPS, and satellites are methods through which to collect data. These devices are quite advanced. However, as a general rule they lack the ability to display, organize, and manage the data they collect. GIS provides the ideal solution. GIS is location-based software used to view, organize, visualizes, and analyzes geospatial data. GIS helps users wrangle their data, enabling a better understanding of positionally based patterns and relationships.

In present time GIS provide tools for high-level scientific analysis and data visualization. These programs are most often desktop based and require local installation. though some do offer mobile applications. In the last decade, **cloud GIS** systems have started to become more prevalent. Cloud GIS systems don’t offer the same level of deep scientific analysis; however, they are significantly more mobile friendly enabling users to take GIS with them wherever they go.

7. CONCLUSION

This paper is main aimed to analysis of various types of the current and modern learn mapping techniques and give a summary of them. The paper attempted to overview learning mapping techniques with regard to "what, why and how" aspects. however, this paper explained the differences among these techniques. According, it is suggested that understanding of learning mapping techniques is necessary and takes priority over the other activities in the knowledge management dimension.

In modern time various mapping techequenics and scientific method are developing. So increase in micro study in cartography. Today the importance of cartography is increasing. It comes that a geography have a deeply knowledge of these technique.

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