Adaptability and Balancing Patterns in Geographic Information Services: A Review of Recent Trends

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Abstract

The paper aims to identify the areas for libraries' attention towards developing understanding to keep pace with geographic information services with the subject progress and factors behind the gap. The paper has been built on narrative literature review on few selective segments related to GIS and library approaches. Authors collected articles from Web of Science and Google Scholar platform to scan evidence-based practices. The SANRA scale has been applied in the article and the approach was to find a framework for sharing academic libraries practices. All reviewed articles were rated based on 6 SANRA criteria and aspects as performed descriptive statistics analysis. The recent times have witnessed close collaboration between library service providers and geographic information users; both as information consumers and information developers. This aspect of library and information services requires attention in academic libraries to serve in the geographical disciplines users in many fold ways as this study impetrates speculations and notions of convolutions to both geographic subject information services outlook and milieu. Observations through SANRA scale analysis and thorough interpretations based on reviewed literature in this study are significant contributions to the relation of geography information tools and library services.

Keywords: Academic libraries; Geographic information systems; GIS; SANRA scale; Geography faculty; Geographic information (GI); Library services; Library tools.

Introduction

The discovery of various multidisciplinary research environment leads to library and Geographic Information Systems (GIS) training and access. The libraries serve the users by providing access to various GIS software, tools for scanning and printing, and technical support. Libraries have an age-old relationship (more than 2000 years) with Geography. It was Eratosthenes, the chief librarian in Alexandria who first time used the word "Geography" and attempted to measure the earth's circumference, hence duly regarded as the father of Geography.[1] The contemporary design of methods to present research data is challenging yet successful for providing services to geography information seekers. For example, the manipulation of numeric and geospatial data is required to create various tools of GIS support to geography users has access expansion with GIS access promotion, instruction options, remote use, and assistance to GIS clients. The collaboration between geography faculty and libraries bridges the GIS gap through expanding GIS access which includes obtaining data, learning assistance for courseware, and creating maps questions to be catered library due to multiple disciplinary scopes. To understand sustainability and interconnecting local issues in a larger context, the occurrence of information seeking skills, using

software, resources are explored. The governments and policymakers are relying on GIS data; the common people are not left behind. Geoliteracy can help in avoiding poor decision-making and furnish the starting point for a quantum leap. Libraryconnects pupils to the information they're seeking; here geoliteracy is an appropriate tool, which makes search fast and easy.

Insight of the paper

The efforts are needed to offer and illustrate the designing of geographic user-driven services to enhance GIS users, interactions with academic libraries. Irrespective of discipline, the GIS penetration has been observed in a context that future holds an augmented potential for advanced library and information services with the comprehensive and cohesive association of geography information users. Authors have identified the following segments for review; geographical literacy i.e., geoliteracy, and collaboration between geographic Community and library. The relation between libraries' resources, services and geographic academics have been observed and reviewed in context with teacher-student interactions, redefining responsibilities and roles of librarians. The major developments have taken place during the last couple of years (though last four decades literature has been observed) reflecting the inclusion apart from popular tools yet there is an immense need to update library staff in context with GIS knowledge and services. There are requisites to address and enable the discipline devoted library service decision-making in accordance with designing, better comprehending of the geography clients' needs and corroboration to the stakeholders.

Methodology

Search strategy: The narrative and systematic literature review processes have been taken in the paper. Few selective segments that are related to GIS and library approaches were considered which are as following: geoliteracy and academic libraries, geoliteracy tools, geography related information services, "geographic-library aspects". Authors collected articles from Web of science and Google Scholar platform to scan evidence-based geographic supporting library services and teaching practices involving library resources and tools. There were other articles related to common

library services or purely geographic aspects which were excluded; only those articles provided close insight and recent practices related to geography-oriented library services and their inclusion in geographical pedagogy and instruction.

Eligibility criteria: The synthesis of various components of the article has emerged as outcome of interrelated developments taken place gradually. The methodology in the paper emphasized to include those articles that were supporting the aim of the paper and related point of view. The review in this study has been conducted in a manner to support a reader entering the subject-field in a systematic and chronological development. The searched, selected and reviewed articles reflected that there has been a gradual development yet a lot in major academic libraries is to be implemented as this area has expressed the knowledge gaps.

Using SANRA scale: To conduct narrative review method, the SANRA scale was used. The SANRA (Scale for the Assessment of Narrative Review Articles) tool helps in rating the quality of the narrative review articles taken in the study. This rating scale provides categories 0–2 on the scale for different aspects of quality[2] as discussed by Baethge, et. al., (2019). The quality of included articles is examined and rated in the contexts such as article's importance for the readership, formulation of research questions, related literature search, evident referencing, and inclusion of reasoning and appropriate evidence and in the last, appropriate data presentation. As an approximation of SANRA's criterion validity, descriptive statistics was used for the data collected from reviews of articles on GIS and library information's. Mean, median, minimum, maximum and standard deviation was calculated using the SPSS software.

Result

Various sections, topics and concepts: The table (1) shows various themes and topics on which the literature was searched and reviewed. Each section reflects number of articles associated and reviewed. Since the data was collected from Web of science and Google Scholar platforms in different contexts such as geoliteracy tools; geography pedagogy and libraries services, geographic scholarly community and librarians collaboration, geographic information digital platforms, and library resources with GIS Services.

Table 1: Frequency of Various Sections and Topics of Reviews

Section	N	Percent
Introduction	1	2.3
Method	1	2.3
Visuals from Geoliteracy, Pedagogy & Libraries	11	25.6
Geographic Scholarly Community & Library Collaboration	6	14.0
Teacher-Student Interactions in Geoliteracy	7	16.3
Redefining Roles of Librarians	8	18.6
Early Geographic Information Digital Platforms	6	14.0
Integrating Library Resources with GIS Services	3	7.0
Total	43	100.0

The table (1) shows the percentage of various reviews taken in the article. It reflects that majority of the articles are associated with visuals from geoliteracy, pedagogy and libraries aspects (25%), followed by redefining roles of librarians (18.6%). Whereas the aspects related with teacher-student interactions in geoliteracy (16.3%) are reflecting the significance of faculty roles, the Geographic scholarly community and library collaboration and various Geographic information digital platforms are showing (14%) importance in the literature. Thus various components have been inter-related to provide an intricate relationship and direction in geography related library and information services (figure 1) with the inclusion of instructions.
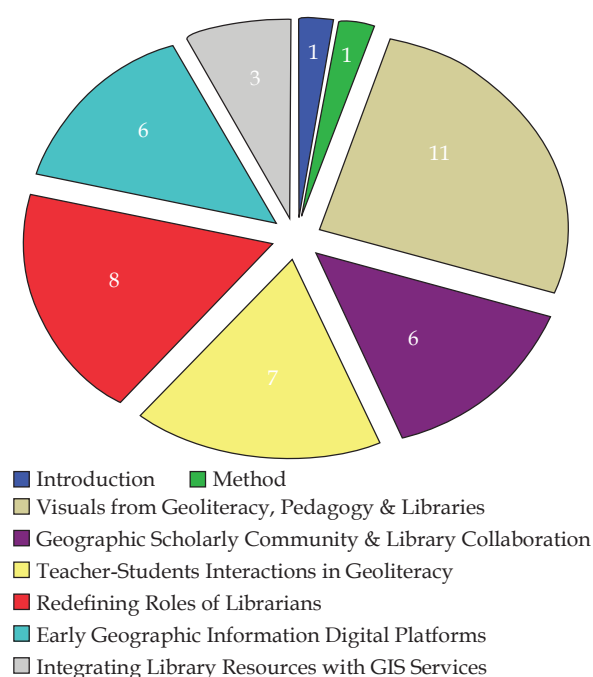

Fig. 1: Concepts and Topics of reviews.

Table 2: Descriptive Statistics of Sum Score of the Concepts and Topics of Reviews.

Section (Concepts and Topics of Reviews)	N	Mean	Median	SD	Min-Max
Introduction	1	6.0	6	-	6, 6
Method	1	9.0	9	-	9,9
Visuals from Geoliteracy, Pedagogy & Libraries	11	7.7	7	0.91	7, 9
Geographic Scholarly Community & Library Collaboration	6	7.8	7.5	1.17	7,10
Teacher-Student Interactions in Geoliteracy	7	8.3	8	0.49	8,9
Redefining Roles of Librarians	8	9.1	9	0.64	8,10
Early Geographic Information Digital Platforms	6	10.7	11	1.37	8,12
Integrating Library Resources with GIS Services	3	9.3	9	1.53	8,11
Total	43	8.6	8	1.40	6,12

The table (2) applied on the sum score as per SANRA scale, shows the statistical analysis of various sections, related number of articles reviewed and their comparative analysis. The aspects related withGeographic Information Digital Platforms (mean score 10.6); Integrating Library Resources with GIS Services (mean score 9.3), Redefining Roles of Librarians (9.1) and Teacher-Student Interactions in Geoliteracy (8.2) have emerged as defining factors in setting the directions of literature research. The minimum sum score start with 6 and maximum score reaching to 12. The overall mean score is 8.6 and which is showing the significant review of articles.

Application of SANRA Scale

With the help of SANRA tool, forty three (43) articles were reviewed and this tool has been scientifically supportive in rating and assessing the quality of reviewed articles. The quality of the narrative review article is rated by using categories 0–2 on the SANRA scale. For each quality aspect, best suitable option was chosen to estimate the evaluation in the present article. The categories 0 and 2 are related to reflect the general low and high quality according to review of each article. All 43 articles were rated based on six SANRA criteria and performed descriptive statistics (Table 3). It was found that the total mean score is 8.60 out of 12 total score points along with (median 8, minimum 6, maximum 12 and standard deviation (SD) is 1.40).

Table 3: Descriptive Statistics of SANRA Scaling for Quality Aspects of Reviewed Articles.

S. No.	Items Based on SANRA Scale	N	Mean	Median	SD	Min-Max
1.	Justification of the article's importance for the readership	43	1.74	2	0.44	1,2
2.	Statement of the aims or formulation of questions	43	1.40	1	0.49	1,2
3.	The review, description of the literature search	43	1.37	1	0.49	1,2
4.	Referencing	43	1.33	1	0.47	1,2
5.	Scientific reasoning	43	1.40	1	0.49	1,2
6.	Presentation of relevant and appropriate endpoint data	43	1.37	1	0.54	0,2
	Total sum score	43	8.60	8	1.40	6,12

The data support that Explanation of the review's importance, mean response is 1.74, therefore significant for review in the article. Mean score of statements of aims in various articles reviewed is 1.4, thus reflecting the purpose of literary efforts.In context with, review and description of the literature search in articles has been observed in different manner, in some articles, extensive review of literature and few of them have background studies; yet unevenly distributed showing, 1.37 mean score. Well the referencing part in the reviewed articles is average as mean score is 1.33, while the scientific reasoning and evidences are supporting extensively as mean score is 1.40 which is significant aspect. The presentation of relevant data in the reviewed articles shows the mean score 1.37 to strengthen the study. The mean score of each items based on SANRA scale shown a mean values from 1.33 to 1.74 (for quality of each article categories as 0, 1, 2). The mean values and SD shows the good quality of articles.

Visuals from Geoliteracy, Pedagogy and Libraries

Geoliteracy as explained by National Geographic, "is an ability of people to use geographic knowledge and geographic reasoning to make far-reaching decisions"[3] and upon "considerable extent on an educated public that realizes the value of earth science information" and[4] "ability to convince bright students to enter our profession" by focusing upon "Geoliteracy". Edelson (2011) indicated

that it comprises three elements- "interactions, interconnections and implications".[3] Hence, Geoliteracy is not merely a general study of maps, charts and demography; instead it's refined data of how everything is connected. The geoliteracy is the area that has empowered geography scholars. Geoliteracy involves many more attributes. It provides a conceptual link among students, their home places and rest of the world. Various tools of geographic science help the students in understanding places. The commonly identified tools are maps, but the geography faculty also employs photographs, images and statistical data as an alternative method apart from their personal observations. This geoliteracy method helps student to read, understand and interpret the data at geographical scale from regional to global.

Geography information and pedagogical mechanisms

The enhancement of GIS knowledge is done through various workshops and instructions at different levels such as individual, classroom, and virtual ways with the support libraries. The approaches based on the needs of users are significant to geography scholars. Geography Information Management Workshops can be provided for introductory and intermediate nature with hands-on Practice. Combining the teaching of geography and mathematics skills that were examined on "Arizona's state mandated-testing" and resulted into that "GeoMath lessons" augmented the understanding of geography standards by implementing the GeoLiteracy program[5] (Dorn, 2005) the students increased the level of comfort in understanding the subject.

Classroom instruction involves various facets such as library resources, geography research, and extending to GIS is taught to scholars by a hands-on portion of the session, scenarios developments. While relating to "Virtual Campus instruction", the virtual learning environment provides online module-based methods for extended GIS instruction as a supplement to the conventional academic scenario. Almost more than a decade ago, Saarinen and MacCabe discussed (1995, 2010) "world patterns of geographic literacy and illiteracy based on the quality of sketch maps of the world drawn by university students"[6] and in their words "geographic literacy is equated with the number of nations and continents included on the sketch maps". The study of geography and evaluation of stereotypes among the students leads to becoming geo-literate with the increased roles of digital resources and software. The level and direction

of students' perception are crucial components to cater to those learning resources and experiences.

Geo literacy and students' perception

In the field of geography, visual literacy plays a great role in skill development. The significance in geographic pedagogical practices, media literacy is paving the way to be efficient in incorporates visual literacy, IT literacy, and information literacy. This skill is supportive in developing the abilities identifying and evaluating the geographic information to generate more information. Significance of media and information literacy for undergraduate GIS courses is comprised of data acquisition for students bringing collaboration among students, librarians and faculty to improve the learning connection level, and satisfaction. With the help of a model, to "train instructors to include information literacy components" while providing the learning through intended courses, thereby increasing students' ability to work independently.[7] Embedding the information literacy in the Geography curriculum and mechanizing through online methods has been a common path. The use and application of online or web-based instruments are necessary to evaluate the information literacy skill.[8]

This paves way for improvement in gathering the skills and assessment, later on, including the instruction process to promote geographic literacy in a global perspective.[9] Hindeet. al., (2007) investigated[10] the impacts on "reading comprehension of Geoliteracy" in context with the "quasi-experimental assessment". The experiences of an afterschool Geography Club[11] reflect the perception of geographic and literacy and augment students' exposure to geographical content. The finding from the study shows student's increased learning about geographic content in the context of place recognition, understanding and application of geographic theory and facts, and interconnection of cultures. Turner and Leydon (2012) argued[12] that "geographic literacy exercises should test an understanding of location and employ techniques to correct deficiencies" based on effective online quizzes etc. The application of various geographic tools concentrates on mapping tasks to comprehend geographic relevance.

Geographic Scholarly Community and Library Collaboration

The earlier attempts have been visible through the published literature. A significant publication in this area has been by Gordon (1978), which provided insights into the geography resources, use in the context of library services.[13] It is significant to understand the information-seeking behavior of geography students; their levels may be different such as undergraduate, post-graduate students, and research scholars. With the beginning of a new academic session, organizing a bibliographic instruction program can be supportive for the new entrants in the academic system. Using a variety of resources in digital and print formats[14] has been an indicator of their interest in the significance of resources. The resources for teachers include their continuous interaction with the available library resources[15] while "ADEPT", a digital library project focused upon learning capabilities geography by qualitative interactions with geography faculty members[16] and encouraging experiences of geography faculty members to interact with significant "teaching resources while seeking research resources than vice versa, although the influence goes in both directions," related to geographic research data, and maps, etc.

Retrieval of Geographic Information

These practices support informed and updated teaching in geography discipline. The everyday inclusion of the latest development in the subject as well as tools is helpful for informative instructions in geography. The availability of various tools and software through open source and commercial avenues has made Geographic Information access and distribution, possible. Geographic information (GI) usage has created sparks in various routines of daily life and various professions. To understand the scholars' needs and support them by regular interactions, feedbacks by crafting feedback mechanisms and tools are necessary including the knowledge of GIS software and license management.[17] Butlin (2017) mentioned about the development and spread of geographical thought in Europe with the increased curiosity for geographical information and discovery are supported by the information resources[18] at intricate levels. Library using their GIS experience and working in association with faculties can bridge the gap between social and natural sciences; hence can create an objective milieu for the scholarly community to carry on interdisciplinary investigation and develop geoliteracy. The libraries continue to meet the challenges of geoliteracy in many ways,[19] but changing the character of traditional association between faculties and librarians from a facilitator to associate partner is required.

Teacher-Student Interactions in Geoliteracy

The interactions and creation of various interfaces are platforms for improved communicative exchanges. The segmentation of students according to their level and approaches is beneficial before initiating the specific interactions among students groups. March (2011) assessed the need for GIS and global positioning system (GPS) services[20] while[21] students' attention and argumentation in data interpretation. During designing the common platforms for library and GIS services, there are few aspects to be considered which include roles of libraries, participation of scholars and faculty members, areas of virtual training, and provisions of additional resources.

Scheming geographic information services

The designing of geographic information services for teachers may take a different route by having prior focus group discussions and questionnaire-based feedbacks. Such tools provide a systematic collection of information about their information preferences, demands, and media. The collaborative approach for geographic information service can involve various stakeholders such as library and information specialists, geography subject specialists, and instructors. Approaches for information services are meant to serve geography teachers[22] and "the information service model can be adapted as a prototype for other teachers across the curriculum as well as in other developing countries" in context with "utilitarian geological products, such as survey maps and mining records" in context of consistency and quality.[23] Hunter (2016) discussed "the multifaceted benefits that accrue from learning within an international, experiential context" and provided evidence[24] to augment the professional knowledge, and improve the instructional practices to achieve higher a level of students learning results.

Systemic skills development

GI Science revolves around the knowledge of geospatial concepts, geo- literacy, Web GIS and participatory mapping, etc. The example of outcomes from the bi-national projects is related to the sustainable geographical knowledge by "incorporating physical and human geography" from Chilean and North American geography teachers.[25] The development of "standards-based lesson plans and associated curricular materials" could be possible due to understanding the practices in geography education. Another example of teacher-student interaction in geoliteracy for

school children in Chile during 2018 provides an insight into the qualitative approach taken[26] that "communicative exchanges are not related to the literacy of the discipline, in terms of the development of content, skills and attitudes specific to each area of knowledge". Hence, the teacher should develop their professional skills by evaluating the future of geoliteracy development opportunities and institutional infrastructural demands to cater the changing needs of the prospective students.

Redefining Roles of Librarians

The libraries are developing geospatial collections and, concentrating upon framing the geospatial collection development policies (GCDPs). The specific roles are being played in Map/GIS libraries by the library and faculty interactions in context with the contemporary research needs and potential areas for exploration in the field of geography and related other sciences. Whereas the geography of public libraries can be explored by spatial statistics and spatial patterns, geographic information systems can also be used "to study variations in library accessibility by state and by socio-economic group" and determine "a library's geographic service area".[27] Here, GIS acts as a powerful tool to help librarians in identifying future scope in collections based on users' behavior over time.

Inclusion of interactive GIS tools

The usage of GIS tools naturally enhances collection development. Such mechanisms play a great role in value-added services for the users in current times where geographic research is on a great level contributing to various areas of life. To explore "the geography of virtual questioning by using geographic information systems" in Florida Electronic Library[28] and suggested for further applications of geographic analysis in virtual digital reference areas along with the limitations on the part of librarians knowledge in context with geospatial information.[29] The inclusion of "spatial cognition, spatial reasoning, and knowledge discovery" in Geospatial thinking has been instrumental to serve the geography users better. The emphasis upon the development of specialized competencies among the academic librarians in geographic information systems (GIS) would be supportive in sophisticated geographic information services.

Expansive GIS roles of Libraries

The role of librarians in geographic information services has been expanding; the factors may be understood as the increased usage of geospatial technology in various components of society,

including government, academic scenario, and industrial sectors. These areas involve spatial analysis, map creation, data collection. The K-12 educators have been using technologies in Colorado and understanding the period while instructing through GIS. Kerski (2015) explored[30] about five major "converging global trends - geo-awareness, geo-enablement, geotechnologies, citizen science, and storytelling, in context with relating the subject geography to wider size of population. Another study suggested[31] that librarians, "as educational collaborators, can become equal partners in educational ventures". GIS trained academic librarians can enhance the use and exploration of various resources e.g. digital maps by users. The collaboration among geographers, instructors and academic librarians can bring new approaches to enhance the skills and knowledge status of teachers at various levels. The integration of these resources into GIS courses is an avenue to enhance students' geoliteracy skills. Romund (2019) discussed "geographic literacy and spatial thinking, and the questions that derive from geographic inquiry"[32] where the roles of librarians have to deal with the "specialized geographic information" and related evolved digital technologies.

Imbibing collaborations with faculty

The collaboration between librarians and instructors[33] and embedding data literacy techniques can address the divide in the form of lack of skills to utilize the GIS information resources. In the context of relating the roles and skills of librarians and instructors, in various areas such as developing skill-sets among students by a project design process. These skills are related to primary source research, geocoding, geoliteracy, and spatial data interpretation. Vardakosta and Kapidakis (2018) have discussed[34] geospatial collection policies by evaluating "research on libraries' websites and content analysis". The study contributed in understanding needs and the collection development policies in context with MAP/GIS libraries. Now it's high time for librarians to make joint efforts with teachers to educate the students and develop the required skills to face the challenges of the digital era.

Early Geographic Information Digital Platforms

Technological developments have paved the way for a highly connected digital world to think about information storage and retrieval in context with "Central facilities location theory." The trends in users' behavior in the digital scenario are helpful to predict various patterns of locating the information

based on the "degree of geographical variation in levels of interest"[35] as reflecting the growth of the future libraries are suggested that "a geographic data set is most likely to be served from locations within its geographic footprint". Another digital library of geographical resources for Singapore students,[36] has been intended to support them in preparation for grand level national examination in the discipline. The development of "digital library of geographical resources (Geog DL)" has been built on top of G-Portal. This platform has been instrumental for provisions of geospatial and "georeferenced Web content" based on "Scenario-based design and claims analysis".[37] A Java-based system, with metadata of geography-related resources has been based on XML and XML Schemas, metadata organization layers, synchronized classification (user-specified classification schemas), map-based interfaces.[38] The "usability" and "usefulness" aspects of design in Geog DL are significant from users' point of view.[39] The digital libraries for geo-specific information are influential for learning and research purposes. Hall et.al., (2019) shared an example of "Developing Research Excellence and Methods (DREaM) project" as learning component and development of information services,[40] with increased opportunities emerged from collaborations to identify library research-practice gap and collaborative interactions.

Integrating Library Resources with GIS Services

To induce geoliteracy and instill reference instruction skills is possible by identifying, locating, accessing, and using the maps and geospatial resources. The focus on map librarianship has been an intriguing aspect related with Geoliteracy and geospatial revolution[41] in the libraries. The instructions to students include the evaluation of conventional and digital resources, assessing the credibility of maps with hands-on exercises. With the provisions of workshops and other small training programs, libraries can promote geoliteracy, supplied with background information with approaches at introductory, middle or intermediary, and advanced levels. The growing responsibility in academic libraries has emerged due to the demand for increased GIS support services. During an investigation conducted to understand GIS services provisions made by academic libraries, it was found[42] that there is a relation among the "extent and nature of GIS services offered and librarians' perceptions" and library GIS services in New Zealand and Australia. GIS services in the form of geospatial data management and geoliteracy are provided. Godfrey (2019) identified the preferred

methods of access by users,[43] which may be useful for GIS librarians in order "to guide their digital georeferenced" and provide discovery, exploration, and access services for these data".

Discussion

It is observed that advanced level geo-education adopts an active approach for people and individual instructions. The creation and modification of data sets are taught with a deep knowledge of GIS software. The balance between classroom learning and GIS skills development is necessary when using GIS software packages. Interdependent components such as geoliteracy and pedagogy are highly significant in context of academic libraries aspects. The other analysis reflects that provisions for these services require specific planning, extensive administration, library collection development, and a network-based multi-station GIS laboratory. Greater accessibility to GIS may be possible due to technological development in all geographic disciplines. Multi-level learning is possible with the collaboration of libraries to serve GIS clients on campus. Further it is discovered and perceived that potential areas of library GIS services have not yet been revealed in the form of opportunities. Libraries' responsiveness is required to meet the information needs of GIS users with regular monitoring of the demand for GIS services and the provision of personalized tailored GIS services in many academic libraries in developing countries.

Practicing GIS tools and Academic Librarians

The literature shows that library professionals are experts in social science tools and research tools related to the use of techniques and methodologies, but this type of bias is necessary for geographic information tools and services. Various web platforms, GIS tools and information service techniques have been designed to understand the value in the area of geographic information services by drawing and acquiring different experiences. The geographic information requirement and library environment focus on cooperative learning with an emphasis on collaborative approaches. Attention to staff at geo-expert libraries supports faculty members by enhancing inquiry-driven learning. Geographical literacy skills are also necessary for library staff to support and stimulate research and information services geared toward geographic disciplines. However, it is also reflected that academic librarians who focus and improve

on geographic information tools and pedagogy could address and explain the factors in which this segment within library services research has emerged in the past two decades. The challenge facing university librarians is highly advanced geographic information tools and resources, requiring in-depth understanding and continuous updating through GIS skills sessions. In business, there is plenty of room to polish and advance the library and geo-centric information services.

Conclusion

Geographic information systems and services are driven by the implementation of ICT and data services. Facets such as geoliteracy and computer literacy have created their niche in regular library training programs to keep pace with development in this area of research. Since the integration of spatial data and other components into decision support systems is important to improve planning, that is crucial in many areas of the technological and social aspects of human life. The information services provided by libraries in the context of GIS and geospatial data management demonstrate their contemporary role with users and researchers of geographic information. These resources and services are essential and instrumental for developers of modern geospatial technologies. Libraries should create tailored and sustainable GIS services, which may include specific information on topics such as "Citizen-Responsive" geographic facilities or urban spatial analysis. In this context, the skill and knowledge levels of library staff require various types of awareness and training to maximize teacher-researcher-librarian collaborations in geography and potential areas of current common practices. However, university library decision makers may not be aware of the current skills of library staff in terms of geography tools and may choose to eliminate attrition and develop the experience through GIS advocacy. The "connect" is a must for the wide-ranging and cross-disciplinary geographical research and libraries which are evident in policy-making for the multifarious benefits for each stratum of society and research.

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Investigating the Factors Affecting Utilization of Health Information: In the Case of Jimma University Specialized Hospital

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Abstract

Background: Health information is a system that entails collecting, reporting and using in order to assist the health professionals for better decision making. In case the health records are not maintained properly it affects the patient's healthcare. Therefore, this study was to investigate the factors affecting the utilization of health information in case of Jimma University specialized hospital.

Materials and Methods: A cross sectional study design was employed with both the quantitative and qualitative data collection methodology. The sample size was selected using simple random sampling technique. Quantitative data were entered and analyzed using SPSS version 20.0, while qualitative data was transcribed, categorized into themes for easy interpretation and analysis.

Results: A total of 167 health professionals were participated with the response rate of 87%. The experience ranged between 6-10 years (50%) and the JU hospital has engaged only 40% of health professionals as fulltime employees and hence there were lack of records / reports about the health information. Most of them are not satisfied on the current status of health information and also they are not motivated properly.

Conclusions: The research found that most of the respondents are not happy with the existing health information. Utilization of health information is low and it is attributed to the system quality by the health professionals. The factors that are to be reinforced like lack of confidence, motivational factors, health professionals engagement levels, lack of resources and consensus between seniors and user departments. It is recommended to have more resources with more openings and periodic training.

Keywords: Health information; Jimma University; WHO; Health care professionals.

Introduction

Health information refers to demographic information, medical history, test and laboratory results, insurance information and other data that is collected by a health care professional to identify an individual and determine what type of care that individual should receive or to determine appropriate care. Health information is likely to allow health facility managers and service providers to document, analyze and use information to improve coverage, continuity and quality of health care services at all levels by better planning, monitoring and evaluating of health facility services.[1] Health information refers to information that is related to health and it is highly required in the processes of improving the quality of health care services. As healthcare is a field of