Universe International Journal of Interdisciplinary Research
(Peer Reviewed Refereed Journal)

© UIJIR | ISSN (O) – 2582-6417
JUNE 2021 | Vol. 2 Issue 1
www.uijir.com

ANALYSING THE IMPACT OF INFORMATION TECHNOLOGY ON THE STUDY OF GEOGRAPHY

Author's Name: *Sonia*[1]

Affiliation: [1]*Ph.D. Scholar, Department of Geography, MDU, Rohtak, Haryana, India.*

E-Mail: *soniamalik3500@gmail.com*

DOI No. – 08.2020-25662434

Abstract

This study aims to guide future scholars in the field of geography education by identifying trends in the use of technology in this domain. A thorough search of the Web of Science database was done in this regard to find the papers that were published. Following the search, 621 scholarly articles in the Education Educational Research Category that examine the application of technology in geography education research were found. Academic study metadata was extracted from the Web of Science database and examined using MS Excel. In the last several years, technological advancements have taken centre stage in the subject of geography education, as they have in many other domains. To compare and assess teachers' views on integrating technology education into geography classes, we have focused on their attitudes in this study. Initially, it was determined that there were no appropriate measurement tools for our purposes, therefore we made an effort to address this by creating the Modern Technology Attitude Index (MTAI). Three distinct dimensions that represent regions of intimidation (INT), loss of control (LOC), and benefits and easement (BAE), with or via contemporary technology, were found with the use of exploratory factor analysis. Their choice of study, geography, has decreased, as has their degree of success in the subject. It seems that a lack of interest in studying geography is one factor. The effect of geographic information system (GIS) integrated instruction on the intrinsic motivation of underachieving geography students has, however, not received much attention in studies. A new subfield of human geography known as "information, technology and communication geography" emerged in the 1960s as a result of geographers becoming more interested in the telegraph and telephone. The Association of American Geographers established a speciality group devoted to "communication geography," which overlapped with the interests of the International Geographical Union's commission on the geography of the global information society. Since then, one of the frontiers in the field of geographical study has been the new sub-discipline. The main barrier to the growth of the new sub-discipline is now disagreements amongst local and international academics over the study objects and the nomenclature of the research field. Numerous terms, including communication geography, information geography, and geography, are used both domestically and internationally.This study examined how geography is taught at postsecondary institutions about information and communication technology (ICT). It is advised that information and communication technology (ICT) be used in our postsecondary institutions and that instructors be trained to use it effectively when teaching and studying geography. A mixed-method model was used in the current study to look at this problem. While student interviews were used to get qualitative data, a quasi-experimental method was used to gain quantitative data. Out of all the scientific, physical, and social science subjects, geography is arguably the most advantageous. The near-surface spheres of the lithosphere, hydrosphere, atmosphere, biosphere, and geosphere are the focus of geography (Gregory, 1985). Through the quantitative revolution and the systems approach, the discipline has gradually changed to meet the demands of the times since the age of discovery and its era of descriptive geography. Because understanding the world as an integrated system necessitates tackling problems with a complex web of interconnectivity, the systems approach fits in especially well.

Keywords*: Information Technology, Geographical Paradigm shift, Geographical Information Technology and Communication.*

INTRODUCTION

As a subject that examines how people interact with the natural world, geography is important to every society's educational system since it covers topics including local and global migration, urbanisation, natural catastrophes, and climate change. geographic education raises people's consciousness of their civic duty, enabling them to understand their community better and derive more benefits from it. With geography education, it is possible to prepare for a sustainable future, solve human and ecological issues, and comprehend the links between the complex events of the modern world. According to Gönülaçar and Öztürk, the goal of the social studies course is for the students to learn about their local area via the scientific study of geography. Human geography focuses largely on the built environment how space is created, viewed and managed and the influence humans have on space (ESRI, 2008). It focuses on patterns and processes created by human activities in the environment. It thus encompasses the interaction of human, political, cultural, social and economic aspects and the concomitant structure and pattern they create including migration, religious diversity, transportation systems, urbanization, tourism, poverty, slums, disadvantaged places, and other socioeconomic conditions. Gregory (1985) noted that at a time, the soil nexus held the promise of unifying physical and human geography, but that did not happen. He further held that the union might conceivably come through a common technique of analysis. This prediction may be coming to pass with the enormous growth in technology which has had considerable influence on the ways both physical and human geographers now collect, analyze and present geographic data. The birth of remote sensing (RS), geographic information systems (GIS) and the advancement in spatial modelling techniques have provided the geographer with toolsets for integrating physical and human geography. The main field that uses numerous cutting-edge technologies to capture, store, and display data connected to geographical systems is called geographic information technology. Any data that contains a location can be used by a GIS. Numerous parameters can be used to describe the location, including latitude and longitude, address, and ZIP code. The use of GIS technology greatly simplifies map updates. The current GIS application may easily be updated by adding new data. Remote sensing, land surveys, and satellite-based mapping systems are the three primary categories of Geographic Information Systems (GIS) and associated geospatial technologies.

Evidence is a crucial component of geographical initiatives involving data gathering, analysis, and distribution as science is an evidence-based field. It seeks systematic solutions to planning and development issues at the geographical and temporal levels through the use of predetermined methods for gathering evidence, processing data, and disseminating conclusions. Oral tradition,

rumours, superstitions, opinion polls, interviews, and surveys were just a few of the long-standing, largely reliant methodologies and instruments used in human geography. Data collection, particularly in the fields of physical measurements, social surveys, archival sources, reports, and computer models, has been a major feature of advancement in geographic methodology (Montello & Sutton, 2013). Physical evaluation of the earth's characteristics, components, and elements, including in-situ mapping. Two specific phenomena are having a growing impact on life as we know it, and they will have long-term repercussions for both society and the environment: In addition to the ecological and social problems brought on by climate change, environmental degradation, biodiversity loss, and other factors [1-4], mankind is now dealing with an ever-accelerating pace of technology advancement and the corresponding digital shift in society [5-7]. While the latter may inherently carry social and ecological hazards, it also offers significant promise for addressing some of the most pressing issues of our day [8–11]. In addition, this is a central focus of geography and geography education about the principal issues confronting mankind in light of globalisation. Modern technology (MT) has long been valued in scientific methods for geographic study.

LITERATURE REVIEW

Alaa Jawad Kadhim,(2019), in their paper, entitled 'Effective Use of ICT for Learning and Teaching Geography' The use of information and communication technology (ICT) in geography education, whether in universities or public schools, is reviewed and examined in this paper. The purpose of the study is to respond to the research issue about the efficient use of ICT in geography education. It also demonstrated that to teach geography efficiently—for example, by using the GIS application in the classroom—teachers of geography must comprehend the link between the Technological Pedagogical Content Knowledge (TPCK) and geography subjects.

Antwi Samuel, Teresa Franklin & et al.(2018)'The Information Technology Challenge in Teaching Senior High School Geography in Ghana' The application of information technology in geography, a crucial social science subject, helps to give real form to abstract ideas and phenomena, which piques the interest of high school students in geographic education. By concentrating on the use of information technologies by geography instructors in the classroom, this study assessed the degree to which technology has permeated high school geography classes in a Ghanaian metropolitan region. The study also showed that instructors lacked the necessary abilities and were unwilling to utilize technology since they had not received enough training in its usage in teacher preparation programs.

Patil Ananda Sardar, (2020) "Use of Computer Technologies in Geographical Research: An

Integrated Focus on Google Services, SPSS and Microsoft Word" Computer technology is becoming an essential component of geography study. Google offers several free services to its customers that may be utilized as a tool to quickly get accurate data for high-quality geographic research. Simultaneously, statistical software such as SPSS may be employed for data processing and analysis, hypothesis testing, and the creation of laws, theories, and models. It is difficult to express the outcomes of a systematic analysis with the appropriate citation, footnote, reference, and bibliography. The employment of Microsoft Word is a suitable and effective instrument in that situation.

R.V Tatipamul,(2018) "Role ICT in teaching, learning and research with special reference to geography" Internet has made the world a global village. People may simply and quickly get information because of the widespread internet connectivity. The Internet is a network that offers rapid information access. Due to ICT, teaching, learning, and research all underwent pattern, format, and technique changes. Teaching is made much more engaging with the use of PowerPoint and videos. With the use of contemporary tools like ICT, students may also master new subjects. This article addresses the use of ICT in research, teaching, and learning, with a particular emphasis on geography. The number of geography branches is growing daily. ICT aids in the study of new subjects. The technological revolution benefits geography as a topic for educators, learners, and scholars alike.

Kurniawan E, Eva B, Dafip M et al.(2020), 'A teaching-based technology in geography learning' The purpose of this study is to determine instructors' technological proficiency and their attitudes toward technology-based learning procedures. The respondents' compilation of technology-based geography learning places more emphasis on classroom management and student learning than it does on the creation of instructional technologies. In light of the findings, we advise stakeholders to support educators by offering socialization, technology-based training, and tools before implementing technology-based instruction. Keywords: technical skill, teaching technology, and pedagogical competency.

OBJECTIVE OF THE STUDY

The objectives of the study shall be:

1. To analyse the Role of Information technology in geographical study
2. Discuss about paradigm shift in Geography with Technological context.
3. To Analyse the Relationship between Geographical study and ICT Tools.

DATA SOURCES AND METHODOLOGY

This study analyses the trends in academic studies on the use of technology in geography education and offers researchers. Findings obtained with contribute to scientific progress in a particular field. In addition, identifying the roles of authors, institutions and similar stakeholders that contribute to the scientific progress process in the field allows the determination of areas of interest in research and the evaluation of new developments. The data included in the study was accessed via the Web of Science database (https://www.webofknowledge.com). Through the Web of Science advanced search section, a query was made primarily with the search string TI= (technology AND geography education OR geography teaching OR geography curriculum OR geography teaching programs OR geography education programs OR geography learning OR geography lesson OR geography course) and a total of 1540 academic studies were accessed that presented a match with the keywords on technology and geography education. These 1540 academic studies feature in the "SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI" indexes. The aforementioned objectives of the study would be achieved using secondary data. The secondary data will be obtained from varied government agencies such as the National Centre of Geo-Informatics, Ministry of Statistics & Programme Implementation, Besides this, the relevant data will be collected from published as well as unpublished materials such as theses, dissertations journals, various significant government reports, etc. The presentation of data will be done by using various basic and advanced statistical methods such as tables, line graphs, bar diagrams, histograms, pie charts, etc. Advanced technology of the Geographical Information System (GIS) will be used to represent the study area and other relevant information on different maps.

Information Technology and Geography

covered the new millennials in one of my previous presidential essays. They are a new generation of students who are interested in Internet geography and cyber geography and who are leveraging data from many media and sources to create new geographies. found that these three areas of GIT are quite interesting since they deal with the applications of GIT for assessing issues related to rural regions. The scientific discipline of astronomy is wide and provides a variety of facts. How fortunate we are to know the world. Location, distribution, distance, movement, region, scale, and spatial interaction are all covered in this geography lesson, along with how they change over time to information is a crucial tool for development, and ICT can facilitate information sharing. The foundation of contemporary learning theory is the idea that instruction is the process by which this knowledge construction is sustained rather than a process of knowledge transmission Learning is

thus seen as an active process of constructing knowledge rather than acquiring knowledge. Research in geography and 0or5 methods are developed. At the moment, ICT is related to the realization of geographical studies and research as well as the geographical teaching and learning process. Even though ICT has a significant influence on geography science, ICT utilization in secondary and upper-level education is still quite low. This is associated or linked to the lac5 of hard and soft materials. ICT use is becoming more prevalent in the curriculum.

ICT is an engineering and scientific technology discipline and management approach utilized in three managing data in a way that takes social, economic, and cultural influences into account. Though there are certain limitations, the integration of information and communication technologies can assist educators and students in their practice when utilizing ICTs. Geographic educators can benefit from this as well. Lehtinen, cited, examined the significance of the impact of modern ICT on teaching and learning in geography. Through the use of meta-analyses, eA came to the conclusion that students in classes where ICT was used as a teaching aid learned more than students in other classes, performed better on cognitive tests on average, enjoyed the lessons more, and were generally higher in their academic performance. Geography in the Era of Technology The limitations of traditional methods in geography are identified explicitly and summarized by Adeniyi (1987) as being resource-consuming, subdued by insincerity and restriction of access, sampling and inaccessibility factors as well as being time and energy-sapping. Changes in technological development in allied fields have impacted positively aspects of human geography, albeit the focus of this Chapter, is on GIS and Spatial/Regional Analysis, Remote Sensing, Geographic Modeling, Cartography and GPS. ICTs, according to Daniels (2002), have quickly emerged as one of the fundamental pillars of contemporary society. These days, comprehension of ICT and mastery of its fundamental ideas and abilities are considered, along with reading, writing, and arithmetic, to be essential components of education in many nations. It seems, nonetheless, that there is a misperception that ICTs are exclusively computers and computing-related activities. Thankfully, this is untrue. While computers and their applications are important to contemporary information management, other technologies and systems also contribute to the phenomena that are generally recognized as information and communication technologies (ICTs). According to Pelgrum and Law (2003), there was a change in emphasis towards the end of the 1980s when the term "computers" was substituted with "IT" (Information Technology).

The Use of Technology in Geography Education Research: A Bibliometric Analysis

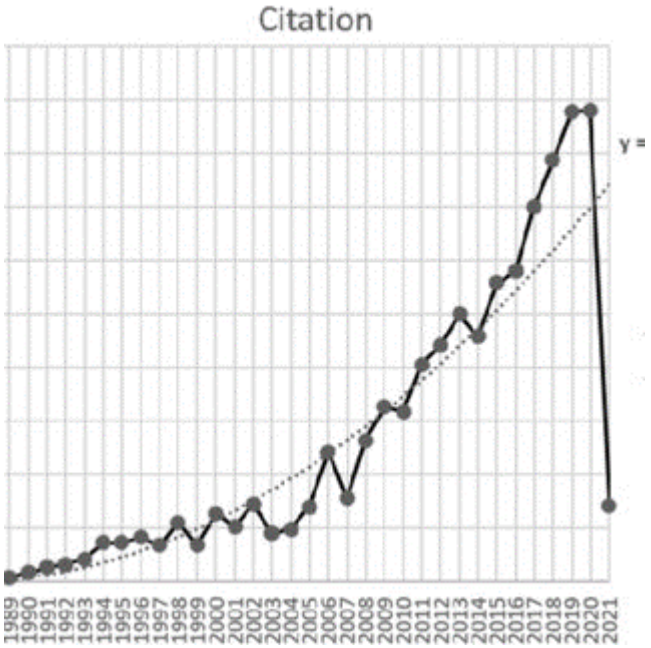


Fig. 1. Number of publications by year

Source: Web of Science; Figure created by the author using Excel.

Geographical Study and ICT Tools

Summarizes the drawbacks of conventional geographic approaches, which include resource consumption, lack of sincerity and access restrictions, sampling and inaccessibility issues, as well as time and energy wastage.

Aspects of human geography have benefited from changes in related areas' technical growth, even though this chapter focuses on GIS and spatial/regional analysis, remote sensing, geographic modelling, cartography, and GPS.

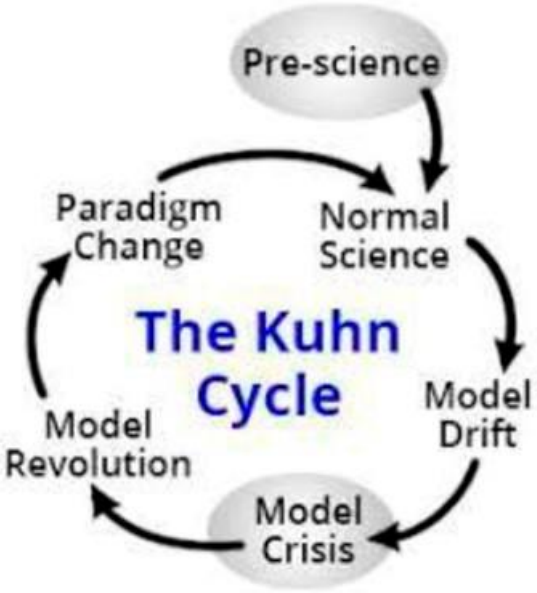
GIS and Spatial Analysis Making decisions based on geography and spatial organization is basic to human thinking. Spatial organization refers to the arrangement of physical and human objects (i.e. the natural and built environment) on the earth. Points, lines, and areas are the three geometric features with which spatial organization can be easily described. Geographic information refers to information which can be related to specific locations on the earth (DOE, 1987). This means information about a place or an area or the locations of phenomena and their characteristics on which much human activity depends. Geographic information is handled by GIS which has been

described as the biggest step forward in handling geographic data since the invention of the map (ibid). Tomlinson (2009) noted that fifty years ago, it was not possible to handle any large set of hard-copy maps and data that were being gathered, much less efficiently analyze them. The resulting inability—indeed the failure—to ask questions, let alone consider in depth the role of various interacting influences shaping the individual and societal factors, left us with a deep and generally unrecognized ignorance of space and time behaviour. A geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions. Were it not for our ability to manipulate this ever-advancing technology, and our constant use of computers, the chances of developing our spatial tendencies would be limited. But when the entire package is put together, we find a level of congeniality that brings a high amount of enthusiasm and dedication (ESRI, 2008). The innovations in the field of geospatial technology and mapping have contributed immensely to decision-making and knowledge-based economy (Kufoniyi, 2009).

Discuss Paradigm Shift in Geography with Technological Context

A paradigm shift in geography is a significant change in thinking that results in a completely changed view or outlook. It can be a radical replacement for a way of thinking or organizing. One example of a paradigm shift in geography is the quantitative revolution (QR). The QR was a response to the inadequacy of regional geography to explain general spatial dynamics. It sought to develop a more rigorous and systematic methodology for the discipline of geography.

The **Kuhn Cycle is a simple cycle of progress described by Thomas Kuhn in 1962** in his seminal work The Structure of Scientific Revolutions. In Structure Kuhn challenged the world's current conception of science, which was a steady progression of the accumulation of new ideas. In a brilliant series of reviews of past major scientific advances, Kuhn showed this viewpoint was wrong. Science advanced the most by occasional revolutionary explosions of new knowledge, each revolution triggered by the introduction of new ways of thought so large they must be called new paradigms. From Kuhn's work came the popular use of terms like "paradigm," "paradigm shift," and "paradigm change." The Kuhn Cycle is preceded by the Pre-science step. After that, the cycle consists of the five steps as shown. The Model Drift step was added to clarify the cycle and allow reuse of the Model Drift concept in the System Improvement Process. In the present-day context, this needs modification keeping in mind the magnitude of the paradigm shifts in geographical research, need and application



Technological paradigm shifts can also disrupt existing social norms and values. For example, lithium is a material input to technologies that are part of ongoing technological paradigm shifts. However, its extraction, refining, and processing have been associated with negative social, economic, and environmental externalities in various supplying regions.

Changing paradigms in Geography with spatial analysis and desirable technology

Beginning in the middle of the 1960s, GIS development was combined with spatially referenced data, spatial data models, and data visualization. Computerized mapping, automatic map drafting, and the use of data formats followed in 1970. Computer mapping also included the ability to generate spatial database management systems in 1980, 1990, and 2001. With the introduction of the web in 2000, GIS and GAS the linked data were integrated. Geographical paradigms are connected to all of these occurrences.

In geography, an integrated method has emerged as a new paradigm recently. The sense of place, environment, and geographical space is the primary focus of the current geographical study. A key component of the social epistemology of geography (the science of space) is the spatial dimension. Understanding the idea of integration and the study of space is necessary.

Role of New Paradigms in the Recent Decade

As part of the 2030 Agenda for Sustainable Development, geographical research may be useful in producing inputs desired for national and international targets, such as the Sustainable Development Goals. Zero Hunger, No Poverty, well-being and good health, Gender equality, high-quality education, inexpensive and clean electricity, hygienic water and sanitation, Reducing inequality,

ethical consumption and production, industry innovation and infrastructure, decent labour and economic growth, Climate Action, Underwater and Onshore Life, Peace, Justice, Robust Institution, and Goal-Oriented Partnership.

The subject of geography has several aspects from the outset. Every aspect of society and the educational system prospered independently, each with its endeavours, as they developed. However, a significant connection is always made, demonstrating its interdisciplinary tendencies. Later, as specialities developed within its divisions, geography began doing research in tandem with other disciplines to introduce transdisciplinary initiatives. With the development of technology and philosophy, we are now at the cusp of a transdisciplinary paradigm that transcends the boundaries of a particular subject. Because of this, this paradigm shift also promotes data-intensive spatial analysis that is enhanced by a significant amount of geo-coded data, innovative methods for quantitative geography, and evolving geospatial technological paradigms.

Role of ICT with special reference to geography

ICT is the soul of the education system. The education system has changed due to the use of ICT in all aspects. Without the support of ICT to acquire knowledge is very difficult. There are many tools in ICT which is useful for teaching, learning and research in geography. It includes Google, Yahoo, Bing, Map, YouTube, Play Store, Apps, Google Translate, Google Earth etc.

Search engine: A search engine is a piece of software used to look up information on the Internet. On the internet, there are several search engines available. Bing, Yahoo, and Google are among them. Google is accessible to everyone and provides sharp information along with all relevant connections. Wikipedia provides reliable information. Geographical material is presented using maps, graphs, photos, and videos. Google gives educators and students instant access to current data, as well as topical and geographical information. From a research perspective, Google gives us access to both historical and current geography research topics. Researchers can benefit from it. Researchers can use websites to get references, theses, and titles. It is beneficial to both teachers and students. Additionally, they study online courses and diplomas.

Google Earth: - Google Planet is a computer software that uses satellite images to create a three-dimensional depiction of the planet. Users of the application may view cities and landscapes from different perspectives by superimposing satellite pictures, aerial photographs, and GIS data onto the 3D globe. 4 Google Earth offers satellite imagery of every location on the planet. From home, one can study in far-off areas. Maps and images may be created with Google Earth to prepare PowerPoint presentations. For studying tours, village surveys, and geographical point observations,

Google Earth and Google Image are particularly useful.

Geographical Apps: - Android-based smartphones are quite popular these days. Through the applications, all software programs are accessible on mobile devices. Many applications are available, such as the geography learning quiz, Bonza National Geographic, World Citizen Geographic, Maps Master, Google Earth, and the World Map Atlas 2015: Countries of the World. These apps offer up-to-date knowledge and information, and students will find them to be engaging learning tools.

GIS software: - GIS software is a modern tool for geographic study. There are many GIS and image processing software available. It includes ArcGIS, Erdas, Global Mapper, PGstreamer, Quantum GIS etc. ArcGIS provide contextual tools for mapping and spatial reasoning. It explores data and shares location-based insights. This GIS software is very useful for researchers to study geographical problems with the help of satellite imagery. To study the regional and particular geography of any area or city. Land use and land transformation study is very easy through the GIS software. Nowadays traditional research in geography has changed. Modern research acquires the place of traditional research due to the technological revolution and use of GIS and Remote Sensing.5 ArcGIS creates deeper understanding, allowing us to quickly observe where things are happening and how information is connected. Presently most of the geographical research is based on satellite imagery. Maps created by GIS are very accurate. It gives quick and rational maps. Micro-level to regional-level study is possible with the help of GIS and RS. GIS is a very useful tool in human geography research. Nowadays research in Urban and settlement geography is mainly studied by GIS. It includes urban sprawl, fringe, settlement patterns etc. Teachers also use GIS and RS for students to teach contour generation, image processing, digital elevation models etc. It is beneficial to learners for future study.

The mother of all sciences is geography, and new fields within it are developing as well, such as geoinformatics, RS, and GIS. ICT utilization is required for these completely new disciplines. ICT is a representation of traditional geographical branches as well. ICT plays a crucial role in research, education, and learning.

Geography and GIS

Raster and Vector formats are the two major data models model commonly used in GIS. Each data model tends to fit certain types of data and applications better than others. The data models model chosen for a particular application is also influenced by our perception of space, the task at hand and expected results, the software available, the training of the key individuals and historical precedent. An array of areas and disciplines are connected to geospatial data production and

application areas emanating from them. These include areas that are highly critical to human geography and national development including agriculture, environment, economic activities, health, disaster management, settlement, land-use planning, land management, cadastration and land consolidation, etc. GIS helps to put geographical data together within a common frame to facilitate their integrated analysis for different application areas for national development. GIS are the perfect tool to allow ease of access to vast quantities of distributed data in an integrated environment. It promotes collaboration between units, departments, and agencies and with the outside world. Commercial-off-the-shelf software (COTS) is becoming more widely available and relatively inexpensive. GIS also provides the perfect tool for getting the right information to the public through developments in web applications and online platforms, internet GIS, wireless GIS, GPS and location-based services. Although large-scale networks of sensors have been in existence for several decades connecting the earth with the atmosphere and ocean, the new breed of wireless sensor networks which works on micro devices have demonstrated the potential to revolutionize the way we acquire geospatial data. They have extended the way we perceive reality by equipping us with virtual reality and augmented reality capabilities (Longley et al., 2005). One of the most compelling benefits of satellite images, maps, and virtual globes lies in their ability to provide context, by displaying information in its correct geographic position. This has advanced the appeal of remote sensing data and generated interest in public remote sensing such as Google Earth and Google Maps.

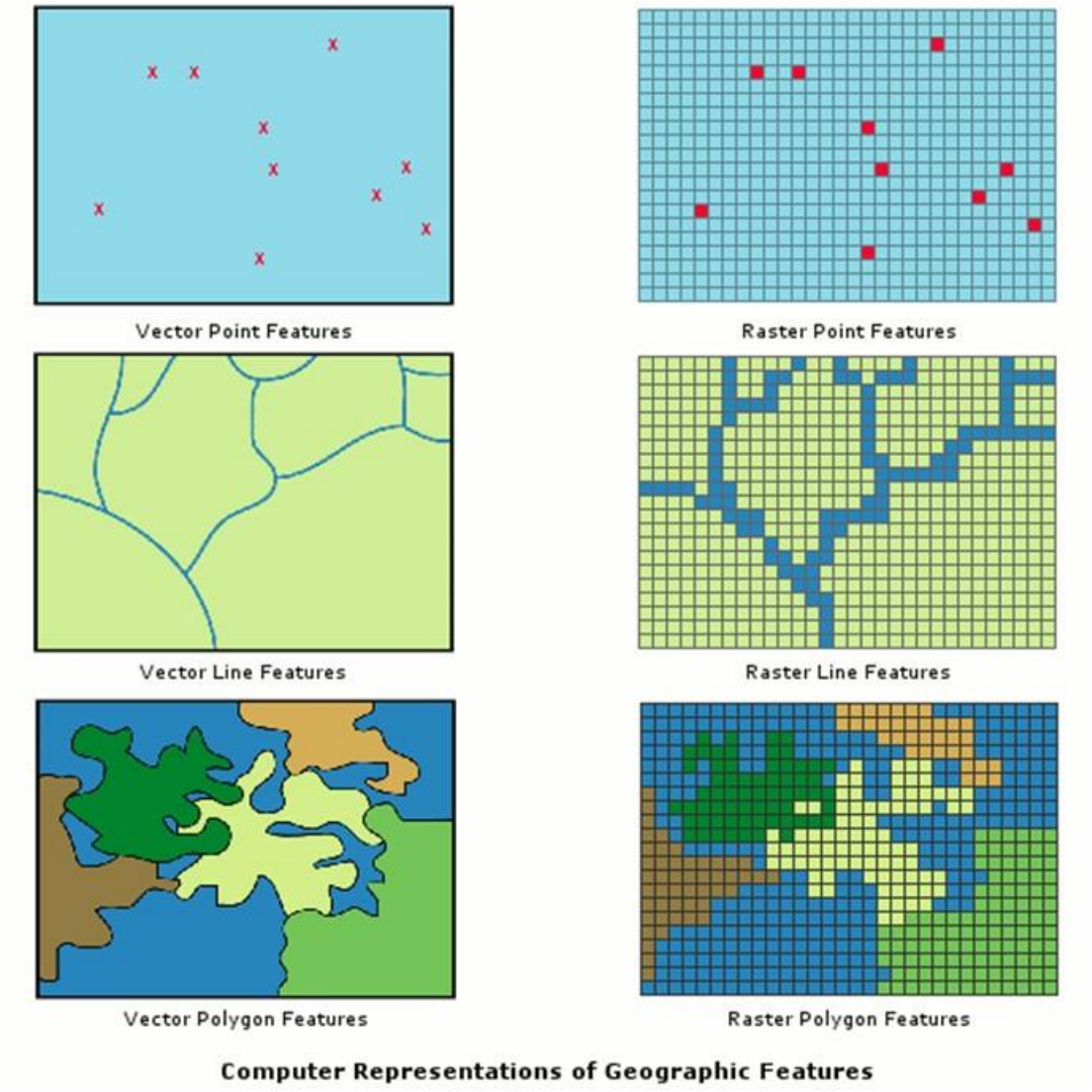


Fig: Raster and Vector representation model of geographical features.

Source: https://gisinfo.hertfordshire.gov.uk/GISdata/vectorraster.htm

Geographic Modelling Geographic information is particularly complex as it requires the descriptor of where and what. It also requires answering questions about location, patterns, trends and conditions. This does not only require moving from the real world to a simulation world but also moving from the traditional descriptive domain to a predictive domain to be able to predict, project or forecast what the pattern and trend in a particular location will look like at a time in the future. This is done through spatial-statistical modelling in geography. The core of any science is the ability to predict. Technology presents geographers with the chance to develop our spatial tendencies. When good spatial data meets good hardware and software technology, a level of congeniality and an atmosphere of enthusiasm and conviviality is created. A model, according to

Hagget & Chorley (1967) is a simplified structure of reality which presents supposedly significant features or relationships in a generalised or abstract form. It is like trying to extract the essential frame of a system to see how it works. Thus, all models are subjective approximations which obscure incidental details and allow fundamental aspects of reality to appear (Mazerolle, 2004). The value of a model is, therefore, often directly related to its level of abstraction which is constantly in need of improvement as new information about reality appears. The inability of geographers to handle successfully the simultaneous operations of several causes contributing to a given effect (and thus predicting the future) was once described as one of the greatest impediments to the advancement of the discipline (Gregory, 1985).

Conclusion

Recent years have seen a rapid growth of spatial technology, opening up new tools and possibilities for services and clients in human geography. The development of GIS, GPS, and remote sensing technologies in particular has made it possible to gather and analyze data and evidence in previously unheard-of ways. As a result, technological applications, either alone or in combination, have improved complicated analytical tasks utilizing a variety of software package categories and covered a wide range of applications. Technology has helped to better integrate geography's human and physical components.

The human and physical elements of physical processes are being studied by geographers far more now. This has strengthened the case for studying the earth as a cohesive system. Technology has opened up new possibilities.

REFERENCES

- Harvey, M.E.; Holly, B.P. Themes in Geographical Thought. New York: Routledge, 1981
- Abiodun, A. A. (2017). Nigeria's space journey: Understanding its past, reshaping its future. Africa Space Foundation. 404 pages.
- Adeniyi, P. O. (1979). Some Fundamental Issues in Land and Land Use Planning in Nigeria. Nigeria Geographical Journal. 22, 59-79.
- Kurniawan E, Eva B, Dafip M, and Sriyanto S. (2020). A Teaching Based Technology in Geography Learning. Cypriot Journal of Educational Science. 15(4), 766-776. DOI: 10.18844/cjes.v%vi%i.5058
- Kuhn, T. The structure of scientific revolutions. 2 ed. Chicago: The University of Chicago Press, 1970.
- Adeniyi, P. O. (1987). Using remotely sensed data for census surveys and population estimation in developing countries: Examples from Nigeria. Geocarto International. 2(4), 11-31.
- Masterman, M. The Nature of a Paradigm. In LAKATOS, I.; Musgrave, A. (Eds.). Criticism and the Growth of Knowledge: Proceedings of the International Colloquium in the Philosophy of Science. Cambridge: Cambridge University Press, 1965. pp. 59-90. https://doi.org/10.1017/CBO9781139171434.008
- Al Gore (1998). The digital earth: Understanding our planet in the 21st Century. Lecture Given at the California Science Center, Los Angeles, California, on January 31, 1998.
- Arvanitis, L., Ramachandran, B., Brackett, D., Rasoul, H., & Du, X. (2000). Multiresource inventories incorporating GIS, GPS and database management systems: A conceptual model. Computers and Electronics in Agriculture, 28, 89-100.
- Baker, J. R. & Rummond, J. E. (1984). Environmental monitoring and map revision using integrated Landsat and digital cartographic data. ITC Journal. 1,10-18.
- Brimicombe, A & Li, C. (2009). Location-based services and geoinformation engineering. Wiley Blackwell. 378pages
- Bruce, Mitchell, (1979), Geography and resource analysis. Longman Scientific and Technical. John and Sons Inc. New York.
- Gregory, K. J. (1985). The nature of physical geography. Edward Arnold (Pub) Ltd, 262p.
- Hogget, P. (eds), Models in geography. London: Methuen & Co Ltd.
- Hogget, P. & R. J. Chorley (eds.) (1967). Models, paradigms and the new geography.

- Barcellos, C., and P. C. Sabroza. "Socio-environmental Determinants of the Leptospirosis Outbreak of 1996 in Western Rio de Janeiro: A Geographical Approach." International Journal of Environmental Health Research 10 (2000): 301–313.11. Ibid., p. 302.12.
- Luther, S. L., J. Studnicki, J. Kromery, and K. Lomando-Frakes. "A Method to Measure the Impact of Primary Care Programs Targeted to Reduce Racial and Ethnic Disparities in Health Outcomes." Journal of Public Health Management and Practice 9 (2003): 243–248

- *(PDF) Integrative literature review: A review of literature related to geographical information systems, healthcare access, and health outcomes*. Available from: https://www.researchgate.net/publication/23166246_Integrative_literature_review_A_review_of_literature_related_to_geographical_information_systems_healthcare_access_and_health_outcomes [accessed Mar 16 2024].