

Towards an African Indigenous Model of Communication for Software Development in Digital Humanities

Akin-Otiko Akinmayowa
Augustine Akintunde Farinola

Abstract

Drawing insight from Toyin Falola's call for African scholars to Africanize knowledge, this paper argues for a review of the digital technological tools being used for research in African studies in order to adequately capture and properly process and present African data. To achieve this, the inadequacies of Digital Humanities for specific areas of African Studies will be highlighted, especially in the deployment of digital humanities tools. The major challenge being the distortion and constraint experienced in processing and presenting research through the use of Digital Humanities 'tools of translation and communication. The paper argues that such technological limitation has its root in the incompatibility of the epistemological frameworks within which those digital tools were developed. The paper discusses '*Ojú lórówà*' – a theory of communication in an African society as a model to highlight the importance of African context to African scholars in their exploration into African history, technology, culture, philosophy and tradition. Indigenous theory is an appropriate model for developing digital as well as virtual software for African scholars in human communication. The paper concludes by enjoining scholars in African Studies to ensure that the digital tools employed in African studies are not only able to collect data, but also able to process and present data adequately without losing the original meaning or sense.

Keywords: African Studies, data-presentation, data-processing, '*Ojú lórówà*', software development, digital humanities.

Introduction

In our increasingly digital world, it is expected that scholars in the humanities will embrace computer software and programs designed as tool for research. Meanwhile, experience has shown that scholars in African Studies have encountered difficulties in using those tools to capture a true representation of African heritage in the light of Africa's indigenous concepts, phenomena, beliefs and worldviews. Instead of discouraging the use of these digital tools, we are developing a conceptual and epistemological framework for developers, as well as identifying the appropriate tools for research in Africa.

To achieve this objective, we shall embark on a brief conceptual analysis and discussion on the humanities, digital technologies in the humanities, the idea of communication and digital communication, and technological tools used in research in the humanities. Then, we shall examine the inadequacies of some digital humanities tools for researchers in African Studies and argue that they were built on a theory of communication within the framework of Western and Oriental knowledge and belief system. This would necessitate the explication of the idea of *Ojú lòrówà*' as a theory of communication to address this epistemic imposition on the technologies of the digital humanities. We will then deploy this theory to address the identified limitations of digital technological tools developed to be used by scholars in humanities.

The Humanities: Definition, Disciplines, Goal, and Peculiarities

The term 'humanities' comes from the Latin word '*humanus*', meaning 'human' (Vito R. Giustiniani, 1985). So, the idea of the humanities is considered as a loosely defined group of academic subjects united by a commitment to studying aspects of the human condition. These subjects produce reflections and thoughts on human experiences and practices. The disciplines of humanities include history, anthropology, literature, art, philosophy, and law, political and cultural studies. The study of the humanities helps to understand human values and how these values translate to knowledge, attitudes, policies and inventions for the advancement of commodious living and common good. (Godwin Sogolo, 1981)

Digital Humanities and Its Technological Tools

The Digital Humanities (DH) currently incorporates both digitized and born-digital materials and combines the methodologies from traditional humanities disciplines (such as history, philosophy, linguistics, literature, art, archaeology, music, and cultural studies). It provides computing tools (like data visualization, information retrieval, data mining, statistics, text mining) and digital publishing tools (**Arjun Sabharwal, 2015**). Today, scholars in the humanities are using chat rooms, bulletin boards, and social networking websites for academic interactions. These digital technologies help in making digital information to travels over thousands of miles, thereby making research findings shareable within a global academic community. To be a member of these cyber communities, one simply needs a networked computer, or a computer that is connected to a larger system of other computers (**Albert Borgmann, 1999**). Furthermore, it is becoming easier than ever for scholars, through the use of technology, to validate, track, and cross-check information (**Anne Burdick et al., 2012**). The most interesting aspect is the easy access to primary source materials, understanding texts written in different languages, and in preserving digital resources for the future. Digital humanities technologies have enhanced perception, automated analysis, modelling and simulation, easy search for books, interactive music scores, dynamically generated maps, and other multimedia and digital resources or repositories.

Most scholars in the humanities currently make effort to digitalize their works. The first process in doing this is the digitalization of texts, images, and other data (e.g., survey data, videos, etc.), then the delivery of that data via the web (*Ibid.*). The digitalization of text has helped scholarship as many more people could access those virtual libraries, museums, and archives across the world (**Ian Foster, 2011**). This has enabled historians, folklorists, digital humanists, ethnologists, anthropologists, and archivists in the process of collecting, preserving, and understanding, interpreting, and retelling stories of humanity (**Douglas A. Boyd and Mary A. Larson, 2014**).

It does not require advanced computing or programming skills to benefit from the opportunities offered by digital humanities tools. Media outlets such as YouTube or SoundCloud offer near instant and free distribution of audio and video oral histories, while digital repository and content management systems like CONTENTdm, Omeka, or

even Drupal or Wordpress, provide powerful infrastructure for housing oral histories in a digital archive or library.

Systems such as OHMS (ORAL History Metadata Synchronizer) now provide free opportunities to enhance access to oral histories online, connecting a textual search of a transcript or an index to the correlating moment in the online audio or video interview. Mobile applications like Curatescape offer enormous opportunities for collecting, curating, and disseminating interviews and projects (*Ibid*). It must however be stated that as they offer benefits, these tools also posed potential threats such as increased vulnerability of narrators, infrastructure obsolescence, and hosts of other ethical issues (*Ibid*). Most of these technologies are built on the mandate that we have to be online and be connected to a source of power. This imperative creates a sense of significance dependence by that fact. For instance, with the advent of Apple iCloud, Amazon, Microsoft and other online storage systems, one no longer need the memory of one's computer because everything one writes, photographs and records will be saved in the 'cloud' or on a server somewhere which one can access anywhere in the world. In other words, cloud storage allows scholars to manage their data in an infinitely more convenient way so that they are synchronized across our growing collections of information appliances (**Domenico Fiormonte et al., 2015**).

Communication and Research In Humanities

Research is a process by which human beings investigate and obtain an understanding of the world. Today, the way in which research is carried out is changing either for better or for worse. We use our brain along with technological aids so as to enhance the limited biological capabilities (Ian Foster, 2011). In our present-day society, electronic communication plays a vital role within the academic community such that anyone ignorant of the use of digital tools would become near invisible in the global academy. This is not a surprise since the seeds of modern digital technologies were planted many centuries ago and develop with the research of renowned scholars in the humanities (**Albert Borgmann, 1999**).

Researchers in the humanities currently use tools such as such as telephones, cell phones, e-mail, and so on (**Ananda Mitra, 2010**) for interpersonal communication; while electronic bulletin boards, chat rooms, digital conferencing, and small private digital

networks tools are used for group communication (**Albert Borgmann, 1999**). These tools have enabled author(s) or researcher(s), editor(s), technician(s), publisher(s), librarian(s), reader(s) and audience(s) to interact without even meeting physically. But there have also been some observation as the limitations that researchers are facing in their engagement. Daniel O'Donnell's review of global participation of researchers in digital humanities suggests that digital activity may be correlated with the economic situation of a country, such that countries with high income, will most likely witness a high participation in digital activities while countries with average or low income [here Africa studies fit] have partial or low participation (O'Donnell, 2012).

Beyond the link the Digital Humanities has with economics, there is also the necessary link it has with culture and context, such that Digital humanities finds it easier to express data within the worldview of the coder and developer than the worldview of the user and learner where many African scholar belong.

Inadequacies of Tools in Digital Humanities

As scholarship moves from the libraries and the lecture halls to the digital communication networks, in order to deploy Digital Humanities, which is “an interdisciplinary academic field that is focussed on the development and use of applications that improve the quality of research and teaching in the humanities” (Babalola, 2014). Researchers are faced with new challenges, such as, collaborative authoring, multiple versioning, flexible attitudes toward intellectual property, peer contributions, access to multiple and multiplying communities, and overall pattern of distributed knowledge production, review, and use (*Ibid.*). Some of the real problems which the use of digital tools have engendered include: immersion in the virtual communities rather than the human communities, deception, misinformation or vulnerability of information, phishing, sudden loss of data, spamming and unwanted digital communication (*Ibid.*), open-source knowledge, lack of bridge between the academic and social life.

Digital humanities scholars like Anne Burdick, Johanna Drucker, Peter Lunenfeld, Todd Presner, Jeffrey Schnapp, and others have expressed their fear that “as humans and data machines become equal partners in cultural practice, social experience, and humanistic research, the humanities may no longer look like ‘The Humanities’” (**Anne Burdick et al., 2012**). They pointed out the negative contributions tools of digital humanities have had

on the tension between those in the humanities who now solely embrace quantitative methods and those who insists on qualitative analysis. This is a tension that has integrated the quantitative wing into the social sciences, while the other wing fights to defend its autonomy and critical stance (*Ibid.*). Thus, the digital humanities scholars enjoined us, as the next generation of digital experimenters, to contribute to humanities theory by forging digital tools that quite literally embody humanities-centered views regarding the world.

It is not helpful to classify Digital Humanities as unhelpful or dangerous to African Studies, researches show that technology is positively impacting on researchers and students, Babalola (2014) noted that in 2008, Lawal conducted a survey on the level of computer literacy and the use of the internet for research among the students and staff of computer science and engineering faculties in a Nigerian state university. The result revealed that ninety-four percent of the respondents are computer literate (Lawal et al. 2008).

Beyond the positive side is the limitation of Digital humanities to researchers in African Studies, because Digital Humanities does not fully represent the context and meanings that African ideas and worldviews carry when it tries to process and present data. It is the lack of adequacy in DH that this paper points out and attempts to engage. “The most cutting criticisms of digital humanities: that it constitutes a naively positivist refuge from cultural studies, critical race theory, postcolonial theory, and other scholarly methods designed to surface the concerns of marginalized communities” (Brier, 2012:390)

Researches have shown that Digital Humanities lack ‘for now’ the ‘know how’ of detailed data processing and presentation of data from African studies, “African writers are at times forced to relate their worldviews in Western colonial languages which do not often lend themselves easily to expressing African sociocultural reality” (Bandia, 1996:139). There are African ideas that cannot so far be completely and properly captured when translated or interpreted data into the language or programmes that the current Digital Humanities developer have and know. Global language and representatives many times shut out African context and particular views and ideas get missing (give examples)

For many Africans, words [signs representations] are never adequate to fully express salient ideas, and there are issues and ideas that are commonly hidden in words and signs

such that, only trained person can understand the hidden ideas. This epistemic framework is contained in sayings such as *àbò òrò làá so f'ómoluàbí tí ó bá dénú rẹ á di odindin* (half a word is spoken to the wise, once heard, it becomes complete). This sets the background for the Epistemological frameworks of '*Ojú lórówà*'. There is so much that is said when eyes meet in communication, that which is not said can also be understood, these unspoken and unrepresented ideas represent a percentage of data that so far do not have representations or equivalents in the Digital space; this makes it important to develop Digital Humanities in the context of Africans. The existing Digital tool cannot adequately process or present African ideas and now is the best time to begin to make changes since Digital Humanities, is still “a relative newcomer to the media scholar’s toolkit, is notoriously difficult to define” (Posner, 2018) and so gives room for the required addition and adjustments for a clearer processing and presentation of data in African Studies.

If “Most digital humanities practitioners would agree that the digital humanist works at the intersection of technology and the humanities (which is to say, the loose collection of disciplines comprising literature, art history, the study of music, media studies, languages, and philosophy)” (Posner, 2018) there will be the required effort to develop tools that can adequately and correctly process and present African ideas with correct interpretation. Raising the issue is not enough, it is important to engage the issue because of the fact that “digital humanities has very real problems with racial diversity and gender representation in its scholarly community” (Posner, 2018).

The concern of this paper is to engage the second and the third layers of GH engagements with particular reference to African studies, there seems to be little concern with ‘sourcing’ idea since this happens at all levels of research, from the fieldwork to uploading ideas into machines. It is important to engage these issues as Digital humanities does not constitute a new discipline in itself, but rather a new approach to humanities research that cuts across different existing humanities disciplines, but the effect is not yet adequate in African Studies because “Although many Nigerians have acquired skills that are useful in digital humanities, and though the internet and computers are widely used for research purposes across the country, the integration of digital tools into the educational system is very low” (Babalola, 2014).

Importation and Use of Computer and Digital Technologies in Africa

The use of Computer and Digital Technologies in Africa has led to what can be called ‘technological dependence’ – a situation in which almost all the technologies that we boast of in Africa has their root in America and Europe, and indications that we have no total control. This poses a huge difficulty in the presentation and processing of ideas especially where the context influences the meaning and representation of ideas. The technological globalization agenda has not achieved the desired result of global representation of ideas and views. There is a sort of theoretical framework which enables what most scholars would call ‘the politics of technology’, this basically reflects the knowledge interest of the major game players, the major scholars in the DH.

Attempts to Close the Gap

There are no doubts that “Technology has certainly made leaps and bounds over the past fifty years, yet it is evident that many conversations about Africa from external perspectives have remained somewhat stunted” (Falola and Sanchez 2016:2). The shortfall in Digital Humanities’ politics of ideas has raised notable African linguists and technologists who now have recognized the need to develop digital humanities technologies that are built on African indigenous knowledge system and ontology. Such individuals include Tunde Adegbola, Tunde Opeibi, Victor Odumuyiwa, Frank Ugiomo, and many others.

This shift is not limited to Africa as Microsoft and Google have been working to incorporate indigenous African languages into their software which are used by million of Scholars and Researchers in Africa. This quest leads to emergence of African linguists and information technology experts on the scene of localization of computer technology and the Africanization of the cyberspace.

While digital humanities extend well beyond language-based research, textual resources and spoken language materials play a central role in most humanities disciplines. In the digital humanities, scholars have begun to see an increase emphasis on anthologies, especially for the purposes of annotation and data integration. Adegbola's approach to Computer and Digital Technology satisfy to a great extent the requirement for ordering technology for the good of a society. First, he mastered the principle of technology and gained expertise in programming languages. He then contributed immensely to the

development of Human Language Technology (HLT) and this has led to the localization of computer and digital technological tools in Africa. His investigation of African languages from acoustic, information theoretic and linguistic perspective led to the development of theories and frameworks for designers or developers of African based Human Language Technology (HLT).

The concerns of these scholars raised the need to create technology within the ontology and epistemology of any indigenous society, and an avoidance of foreign ones that could destroy the local language and culture. This argument is built on the assumption that there is no account in history of people who became great after adopting the culture and language of other people. Such society won't be able to connect their act and activities with their behaviour nor allow technology to respond their culture. For instance, when most African societies first came in contact with mobile phone, it was a communal device.

It should be made clear that technology cannot consider the ontology of a society by itself; rather it is the designers that need to be motivated by question asked by the culture. It is in the course of technology transfer that one begins to ask which part of our culture it conforms into. This representation of the reality around us can be done either by creating analogy (between the known and the unknown) or digital (that in which values in the analogical sense is being represented by a number and compared with its equivalence in reality)

BRIDGING THE GAP: *OJÚ LÒRÓWÀ*, A THEORY OF COMMUNICATION

The contribution of Africans to Digital Humanities in order to process and present ideas in African Studies is an urgent task considering the low level of scientific and technological attitude within the continent. Writers have begun this attempt, through the use of “a characteristic feature of African creative writing [called] code-switching (CS) and code-mixing (CM) as a writing technique. CS and CM have a social, discursive and referential significance in a text” (Bandia, 1996:139). These reconstructed ideologies must then be incorporated into computer and digital technologies that characterize this milieu. This is in line with what an African Scholar Kofi Awoonor opines that science and technology must be grafted upon African social and cultural realities, without losing sight of the original humanistic impulse of their communal existence (Awoonor, 2006).

This is reflected in CS, “In code-switched discourse, the items in question form part of the same speech act. They are tied together prosodically as well as by semantic and syntactic relations equivalent to those that join passages in a single speech act” (Romaine 1989:111). What then is the possibility for the localization of digital humanities technologies on African Studies for better processing and presentation.

A typical African setup or research field has Folklores, proverbs and parables are folkmedia and means of information dissemination in Nigerian towns and villages (Nwuneli, 1983; Akpan, 1977; and Otasowie, 1981). Folkmedia are intangible artefact of a culture, made up of customs, traditions, stories, songs, religion, performance arts and superstition and these can pose difficulty to tools used in Digital Humanities.

The concept of ‘*Ojú lòrówà*’, as a theory of communication, addresses some of the limitation in the existing Digital Humanities tools which serves as bedrock for the processing and presentation of research ideas in African Studies. ‘*Ojú lòrówà*’ is a Yoruba statement which could be literally translated as ‘discussion is in *the eye*’; that is, ‘communication takes place when we see physically’. The eyes have always been a formidable means of initiating, sustaining and emphasizing details of conversation among the Africans and not just among the Yoruba. According to Nwuneli “In some cultures it is considered sincere and trustworthy when a person looks straight in the face or,...looks [at] you right in the eyes. In other cultures it is rude and impertinent to “catch somebody’s eye” during conversation. In some cultures, people express themselves non-verbally by the mimicry of the face” (1983:148). As a communication framework, ‘*Ojú lòrówà*’ has five major components:

1. **Coding:** In this theory, like every communication, there has to be an operative coding system understood by the parties involved. *Ojú lòrówà* demands eye contact, or even contact through any of the other senses, for there to be communication using known and agreed on code. Holding one’s ear while talking with a child or another person, for the Yoruba, is a sign of warning. This may pass an entirely different communicative meaning in some other cultural contexts across the world.

The reality of Digital Humanities can at best capture a sense of warning, but it will find it difficult to process how the holding of ears translates to warning. Beyond the

processing, the limitation of the existing tools become visible in its inability to communicate to the listener or reader why the warning is being issued. The general popular warning sign learnt by road users or public space users will not work here in the context of the African. The same sign can mean different things, the face (*ojú*) adds the context; if a mother holds her ears while looking at a child in a friend's house, it simply will mean 'I am warning you about what we had discussed earlier', here the facial expression provides the context. But if the same mother does the same thing at home and the mood is happy, the facial express this time also provides the context, they mother may hold the ears and still be smiling, the child understands that the context is milder and may not require to total halt in whatever is being done. There are not Digital Humanities tools that can fill this expression gap. The fixed tools and too mechanical for many African expressions.

2. **Privacy in communication:** This theory ensures and protects privacy in communication on the ground that only the child or any other person in the know of the code can decipher what is being communicated. Persons outside the code will not understand the code. And this applies to codes that are specially developed by a group of people for particular communication either to exclude others from their communication for the sake of privacy or to password their communication.

Developed codes serve as gate ways meanings and contents to be processed and presented, but these passwords and learnt and accessed by people who are trained across the globe, which is part of the aims of Digital Humanity, but Africa is replete with information that are coded and limited to specific groups and contexts. This are excluded from the tools of Digital Humanities either because the data is not made available because of the nature of Digital humanities or because the data is for coded group that do not find representation in the present sphere of Digital Humanities. A good example will the content of different cults in the African contexts.

3. **Participation:** This theory ensures effective communication by ensuring that the subject and object of communication are totally immersed in the process through participation. For instance, the eye contact leaves out doubt as to whether the message was delivered or received. Communication is usually straight to the point;

message is usually clear, and brief. Every sign is done only when there is an eye/sound/touch contact between the parties engaged in the communication.

Studies have shown that Africans are expressive, and messages are passed swiftly just as they can be changed using same code. This has no equivalent in Digital Humanities and codes are representative of particular messages. The swiftness and flexibility of messages requires participation. Communication is like a game where every player is expected to be focus for success and team play.

4. **Concentration:** This theory sustains concentration by ensuring that messages are brief and straight to the point, for effective communication there is always the need to concentrate, that is why messages are given only when there is an eye contact, whenever there is no eye contact, a form of a sign (cough, tapping of finger, etc.) is given to draw the attention of the person to receive communication, and once attention is gained, attempt is made to sustain the concentration of the other party.

Data in African Studies are continuous in their nature, it is not a once and for all encounter. When information is being passed, relationship is built as well. Persons involved in data sourcing are expected to maintain regular contact with the information for relevance. A password only makes information available, but the effectiveness of the information is achieved through proper use of context. For example, the tradition of greeting the king when one is passing by his palace will hold true, but there are certain times that the information will not be.

5. **Feedback:** This theory ensures feedbacks – which are usually in the form of reaction to communication. What is communicated is either understood or not, once understood; a sign is given to indicate that communication had taken place. If code is not understood, a sign is given to indicate that message is not understood. It is never presumed; an affirmation or denial of message is always given.

As the world becomes a global village, and “moves into this increasingly transnational and global age, it is more and more evident that homelands and identities are profound spaces for social, political, cultural, and academic engagement in Africa and beyond.” (Falola and Sanchez 2016:1). This creates the need for an effective theory of communication, that can source for data and beyond that adequately process and present data from African Studies. Lessons can be learnt

from writers such that “When African writers cannot adequately express African sociocultural reality in a European language, they resort to the use of indigenous words and expressions” (Bandia, 1996:141). Digital Humanities experts must also realize that there are ideas that cannot be captured unless the African context and tools are deployed to facilitate communication among functionaries in humanities. **In the development of those tools (software), it would be necessary for the developers to put those five components into consideration in the course of their brainstorming.**

**Emoticons based on ‘OJÚ LÒRÓWÀ’:
A theory of Communication**



8.0 Conclusion

Digital Humanities is still, but the reality of African Studies is beyond material representation, there is *òrò* which represents the material data that has been sourced but beyond the material data there is also, *ojú* which give the contest and more details to the material substance that has been gathered. This for now is beyond the developed programs and tools of Digital Humanities.

In this article, we have been able to illustrate how digital technological tools can be Africanized using ‘*Ojú lòrówà*’ as an indigenous theory suitable for developing digital as well as virtual software for African scholars. We have addressed the cause of those challenges confronting scholars in African Studies in their deployment of digital humanities tools. We have also identified beneficial digital tool that could genuinely promote research in African Studies, as well as discourage the usage of digital technological tools such AntConc, Nvivo, E-translators, and likes, on the basis that they distort or imposes a certain framework on literatures in African history, techne, culture, philosophy and tradition.

Furthermore, we enjoin scholars in African Studies to provide contents and frameworks for appropriate digital technological tools for Research in Africa. Effort must be made to develop multimedia documentaries, archives of cultural movies, digital translators for African languages, virtual galleries that would display African sculptures, arts, artifacts and antiques. In this age of technology, there is need for scholars in African studies to extract, from our indigenous practices, theories and framework that would help software developers to create tools appropriate for our knowledge system. On a final note, we advocate for minimum digital literacy for African researchers and scholars in humanities. This will ensure the availability of their works online, through academic social media and community such as academia or research gate, thereby bringing the research efforts made in Africa available to the global academic community. “Digital Humanities work has been criticized as empiricist, secular, and reductive of the creativity of human expression to a mathematical elegance that perhaps no longer carries the evocative mysteries of the original object or experience of it” (Hall, 2017). If the existing Digital humanities tools are not improved upon, by including and using African contextual digital representations: Meanings will be lost, details will be sacrificed and fundamentally, ideas will be misrepresented.

About the Authors

Akinmayowa Akin-Otiko currently works at the Institute of African and Diaspora Studies, University of Lagos. Akinmayowa does research in African Traditional medicine, Religion and Culture. Their current project is on: i) the use of Traditional Medicine for primary health care; ii) Religion and Culture of the Yoruba in Nigeria.

Augustine Farinola is currently a researcher at the Department of English Literature, University of Birmingham, United Kingdom. His research focuses on post phenomenological analysis of Digital Humanities (DH) Technological tools used for Scholarly Communication and Linguistic Analysis.

REFERENCES

- Babalola, T. L. (2014). The Digital Humanities and Digital Literacy: Understanding the Digital Culture in Nigeria. *Digital Studies/le Champ Numérique*, 5(1).
- Bartscherer, Thomas and Coover, Roderick .(Ed.). (2011). *Switching Codes: Thinking Through Digital Technology in the Humanities and the Arts*. `University of Chicago Press.
- Borgmann, Albert (1999). *Holding on to Reality: The Nature of Information at the Turn of the Millelium*. Chicago: The University of Chicago Press, Ltd.
- Borgmann, Albert. (2005). Technology. In Dreyfus and Wrathall (Ed.) *A Companion to Heidegger* (pp. 420 -432).Washington: Blackwell Publishing.
- Burdick, Anne. Schnapp, Jeffrey. Drucker, Johanna. And Lunenfeld, Peter. (2012). *Digital Humanities*. Cambridge MA, United States of America: MIT Press.
- C.N, Davidson (2012). Humanities 2.0: promise, perils, predictions. In M. K. Gold (Ed.) *Debates in the digital humanities* (pp.). Minneapolis, MN :University of Minnesota Press.
- Das, Apurba. (2010) *Digital Communication: Principles and System Modelling* (India: Springer.
- Das, Apurba. (2010). *Digital Communication: Principles and System Modelling*. India: Springer.
- Davidson C.N. (2012). Humanities 2.0: promise, perils, predictions. In M. K. Gold (Ed.) *Debates in the digital humanities* Minneapolis, MN: University of Minnesota Press.
- Domenico Fiormonte et al. (2015). *The Digital Humanist: A Critical Inquiry* (Brooklyn, New York: Punctum Books.
- Douglas A. Boyd and Larson, Mary A. (2014) *Oral History and Digital Humanities: Voice, Access and Engagement* USA: Palgrave Macmillan.

Fiormonte, Domenico. (2015). *The Digital Humanist: A Critical Inquiry*. Brooklyn, New York: Punctum Books.

Gill, Jim and Geoff, Vincent. (1981) *Software Development Handbook* Texas: Texas Instruments.

Meinel, Christoph and Sack, Harald. (2014). *Digital Communication: Communication, Multimedia, Security* Berlin, Germany: Springer.

Mitra, Ananda. (2010). *Digital Communication: From Email to the Cyber Community*. New York: Infobase Publishing.

Rydberg-Cox, Jeffery A. (2006). *Digital Libraries and the Challenges of Digital Humanities* Oxford: Chandos Publishing Limited.

Sabharwal, Arjun. (2015). *Digital Curation in the Digital Humanities: Preserving and Promoting Archival and Special Collections*. USA: Elsevier.

Skolnikoff, B. Eugene. (1993) *The Elusive Transformation: Science, Technology, and the Evolution of International Politics* Princeton. NJ: Princeton University Press.

JOURNALS

Borgmann, Albert. (2000). Semiartificial Intelligence. In Mark Wrathall & Jeff Malpas (Ed.) *Heidegger, Coping, and Cognitive Science: Essays in Honour of Hubert L. Dreyfus Vol.2* (pp. 197 -206) Cambridge, Massachusetts: The MIT Press

F. Reynolds, Dwight. (2016) 'From Basmati Rice to the Bani Hilal: Digital Archives and Public Humanities' in Elias Muhanna (Ed.), *The Digital Humanities and Islamic & Middle East Studies* Germany: De Gruyter.

Sogolo, Godwin. (1981). Literary Values and the Academic Mind: A Portrait of the Humanistic Studies. *Ibadan Journal of Humanistic Studies*, No. 2.

The Journal of Epsilon Pi Tau, Vol. 4, No. 1 (Spring 1978), pp. 46-51

Weidong, Xia and Lee, Gwanhoo. (March 2010) "Toward Agile: An Integrated Analysis of Quantitative and Qualitative Field Data on Software Development Agility" in : *MIS Quarterly*, Vol. 34, No. 1 pp. 87-114 Published by: Management Information Systems Research Center, University of Minnesota.