Perception and Use of E-Collaboration by Postgraduate Students in Nigeria Universities

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Abstract:

Collaboration in the Nigerian context has focused majorly on traditional collaboration and not even among postgraduate (PG) students. Advancement in technology has ushered many changes, particularly the introduction of numerous e-tools for collaboration. It is based on this that the study examined the perception and use of e-collaboration by postgraduate students in Nigeria Universities. The study adopted a survey design using a questionnaire to collect data from 631 postgraduate students selected across ten universities in South-West Nigeria. Six objectives were developed to guide the study. The results revealed that e-collaboration is perceived by postgraduate students as a collaboration among individuals engaged in a common task using electronic technologies. E-collaboration is used mostly for projects and research and it is impactful in providing opportunities to interact better than face-to-face collaborative activities. The study revealed electronic mail, social media including (Facebook, Twitter, and WhatsApp), discussion forums and Google documents as the tools most significantly used for e-collaboration. The reasons why respondents use e-collaboration include flexibility, availability, and compatibility with cell phones. The level of awareness about the ethics of e-collaboration is reported to be too low. However, a small percentage were aware that participation in decision-making and the sharing of blame and credit for outcomes is the responsibility of all members. Challenges faced by PG students in their e-collaboration efforts are power failure, lack of trust, and poor internet connection and speed. It is recommended that more awareness of e-collaboration should be promoted and coupled with improved internet connectivity.

Introduction

It is noted in education that no one student knows it all. Through the sharing of knowledge with friends and colleagues either between individuals or groups, students learn more and gain more. Hence, at a higher level of education, collaboration is indispensable. Through collaboration, individual student cooperates, collaborate, brainstorm, and contribute their ideas from which others benefit and learn.

As pointed out by Lai (2011), collaboration is the mutual engagement of participants in coordinated efforts to solve a problem together. The author explained that collaborative interactions are characterized by shared goals, the symmetry of the structure, and a high degree of negotiation, interactivity, and interdependence. Interactions that produce elaborative explanations are particularly valuable for promoting students learning. As such, it has been noted that nothing is inherently instructive about working with more than one person on tasks rather, interaction triggers learning processes. Nonresponsive feedback otherwise can be detrimental to students learning in collaborative situations. Collaboration can have powerful effects on student learning, particularly for low-achieving students. However, several

factors may moderate the impact of collaboration on students such as students' characteristics, group composition, and task characteristics.

Collaborative learning situations require instructions, a physical setting, and other kinds of performance constraints. These elements do not guarantee collaboration; they only make it more likely. Collaboration is a process by which people work together on an intellectual, academic, or practical endeavour (Morison, 2017). Collaboration in the workplace, school, church, and business is nothing new. However, it is becoming increasingly important in the modern world as we become more connected around the globe. Particularly in higher education, when working on a project, an individual often needs the input of other members. By collaborating with other, different members, skills can be pooled to make the project more successful than it might otherwise be.

Collaboration not only equals a happier moment for members, but it also represents an educated one. A collaborative education naturally cultivates a sense of community within an organization, with members feeling almost like they are part of a family (Elcom, 2018). This forces them beyond the expectation of their role, absorbing as much educational knowledge as possible, and driving the group forward with informed and sound decisions.

In terms of benefits to the members, electronic collaboration brings participants out of isolation and allows members to connect to a new set of colleagues. Participants can communicate with people who share the same interests and experience the same challenges. Since it allows for the inclusion of many people, electronic collaboration promotes the exchange of a larger range of opinions and resources (Stanoevska-Slabeva, & Mirijamdotter, (2010). It provides many more opportunities for interaction than face-to-face collaborative activities. For instance, while traditional workshops and courses typically use lecturers or presentations to impart information, online courses allow for an extended on-topic dialogue through electronic discussion groups long after the course has ended.

In Nigeria, at the higher educational levels, master's and doctoral, students collaborate on research projects, research proposals for international grants, class work, group assignments, and the like. The e-collaboration is now being employed due to its popularity and as a result, e-collaboration has become an important research topic, with a great number of researchers contributing to many aspects. The increased importance of e-collaboration has driven much research from a different perspective regarding the development of various kinds of collaboration tools (Mohammadjafar, Shahadat, Shamsuddin, Dawal, & Zayandehroodi, 2011). However, limited studies are available regarding the perception, use, and impact of e-collaboration in Nigeria especially among research students who have in recent times become heavy users. Available studies on collaboration from the Nigerian context have focused majorly on traditional collaboration and not e-collaboration. The focus has been on collaboration among established researchers, university lecturers, and captains in the industries and not among postgraduate students. Now that we are in the fourth industrial revolution era, advancement in technology has ushered so many changes, particularly the introduction of numerous e-tools for collaboration. Therefore, examining how these tools are being used for collaboration by postgraduate students from Nigerian universities will be an addition to the literature in this area. Against this background, therefore, the study examined the perception and use of e-collaboration by postgraduate students in Nigerian universities.

Objectives of the Study

The broad objective of the study was to examine the perception and use of e-collaboration by postgraduate students in Nigerian universities. The specific objectives are to: determine the perception of postgraduate students on e-collaboration; investigate the use and impact of e-collaboration on postgraduate students; identify the tools being used by postgraduate students to engage in e-collaboration and the forms/format of e-collaboration by postgraduate students; determine postgraduate students' awareness of the ethics of e-collaboration; and identify the challenges perceived by postgraduate students associated with e-collaboration.

Literature Review

E-collaboration facilitates the formation of strategic partnerships (Thatcher, Brown & Jenkins, 2012). The authors explained further that people use e-collaboration to coordinate work and exchange information. It includes a variety of technologies such as computer-mediated communication including group support systems and email, video conferencing suites, and teleconferencing suites (Kock, 2005). According to Cai and Kock (2009), e-collaboration is defined as a collaboration among different individuals to accomplish a joint task using electronic technologies (Cai & Kock, 2009). The use of e-collaboration media can enhance interaction among group members thereby minimizing the perception of temporal and spatial dispersion.

No doubt, as changes are taking place at all levels of education and collaboration continues to gain pace, especially in the era of change and advancement in technologies. The landscape of collaboration has now changed. Most collaboration now takes place through electronic tools. What we now have is e-collaboration. E-collaboration or electronic collaboration connects individuals electronically via the internet using tools such as email or through access to sites on the World Wide Web. Kock and Nosek (2006:15) define e-collaboration as "collaboration among individuals engaged in a common task using electronic technologies." It, therefore, refers to any kind of collaboration situation, where collaboration is partly or fully enabled or supported by specific information and communication technologies. Also, IGI Global (2020) provides a list of thirty-five definitions of e-collaboration. This study just referenced five out of these definitions. These are i. Working together in an electronic environment, ii., a collaboration, which is conducted without face-to-face interaction among individuals or members of virtual teams engaged in a common task using information and communication technologies," iii., the process in which a set of individuals communicate through an intranet or Internet to coordinate their efforts towards the solution of a problem, iv., the use of information technology to establish, facilitate and sustain cooperation between two geographically dispersed parties, who have common goals, to enable them to work together for mutual benefit; and, v., the use of information technology to establish, facilitate and sustain cooperation between two geographically dispersed parties, who have common goals, to enable them to work together for mutual benefit' (IGI Global, 2020).

From these various definitions, it can be deduced that internet-based work allows collaborators to communicate anytime, from anywhere to any place. People from different parts of a building, state, country, or continent can exchange information, collaborate on shared documents and ideas, study together, or reflect on their practices. Collaborating electronically can take many forms. Some of the more common activities include discussion groups, data collection, and organization, sharing the document, synchronous communication, online courses, or workshop among others (Brown University, 1999; Thompson, 2014).

Online collaboration or e-collaboration is a computer-mediated form of collaborative learning, including multilevel interaction, resource sharing, and developing competencies for real-world situations (Oliveira, Tinoca, & Pereira, 2011). McConnell (2006) identified three aspects of online group collaboration: the process of group work (measured by the ability to develop in-depth discussions, questioning and contributing to group work), social presence (openness between group participants), outcomes, and products of group work. Tseng et al. (2009) found that trust among team members and organizational practices are factors that can explain satisfaction with online collaboration.

Academics constantly need to find ways of improving themselves either by way of learning individually or through a group. This was why it has been firstly emphasized that the best way of pursuing the goal is through assessments that emphasized individual comprehension, making students choose an approach (Siqueire et al, 2003). Secondly, there emerged a school of thought that supports a method of teaching based on constructivist principles, where there is a high degree of interactivity between the participants (Siqueira et al, 2003). This became the basis for distributed collaborative work in the academic world (Lowry et al., 2004). The academic environment not only cultivates knowledge but also prepares students for the industry. While most work is still individual in academia, professional work is much more collaborative (Lowry, 2004). It has been observed that teams contributed to their success by allowing the sharing of knowledge across boundaries and helping to develop new products and services (Nidiffer & Dolan, 2005). However, working within teams or groups is not only a reality for educators but it is also an added value to the society at large since the outcomes are usually something that benefits all and sundry. Considering this, therefore, and as we approach the fourth industrial era (4IR), working in a team or group should be a priority to train students in the use of collaboration tools (Tella, 2020); in analyzing their collaborative needs (Brown et al., 2007); management of work; as well as adapting to cultural and time zone differences (Swigger et al, 2006). Yet, so far, there has been a lack of widespread acceptance of collaborative technologies by instructors and professors (University of Wisconsin-Madison, 2005).

E-collaboration can be categorized into three elements. These are tools, organizations, and humans (KappaeMme, 2012). The tools aspect assumed that implementing and providing a technical infrastructure ensures e-collaboration. However, technical tools have turned out to be not enough to make e-collaboration successfully work. Working with others in a team means following a common goal where sharing becomes a social core competency of collaborating with the group. Tools can support the processes of sharing by providing the users with infrastructures and platforms to participate in the experiences, ideas, etc of one another. Therefore, tools that answer the question of sharing can be technically organized.

The second element of e-collaboration is the organization structure which has an impact on what is shared and what is not with the organizational culture. Norms and values implicit as well as explicit ones create a kind of framework, cultivating those behaviours which are located within its borders.

Following the organizational structure, the human element, collaboration no doubt requires a human being. This means that individual players have the competencies to be active in e-collaboration. Sharing is the core of e-collaboration. A group or team can achieve a goal only by sharing knowledge, experience, ideas, expectations, wishes, and fears among others. The team or group members must be ready, willing, and motivated to participate in what others have to offer and they must be interested to let others participate based on their knowledge.

It should be noted that in e-collaboration, there are ethics that guide the operation of team members. On this note, Blunden (2015:1) highlighted three issues, These are; i., that every theory of society is implicitly a theory of ethics, and every ethics is implicitly a theory of society, ii., general ethics must have recourse to the idea of collaboration between projects and elaborate the relevant ethical principles., and iii., ethical principles entailed by several individuals participating together in a collaborative project. Blunden explains what it means to take an individual as a project, and then the ethics of relations between projects in terms of four paradigmatic cases, viz., exchange, solidarity, colonization, and collaboration. These are explained as:

Exchange: each treats the other as an autonomous agent and bargains in good faith and honestly fulfils their obligations without exploiting the other

Colonization: members do not treat the other as autonomous and equal but do take on responsibility for the other's welfare as for their own, and according to their rights.

Solidarity: members subordinate themselves to the other and act under their direction, to assist themselves in regaining normality and autonomy because trust is a precondition for solidarity and solidarity builds trust.

Collaboration: members move towards full consultation and participation in decision-making and the sharing of blame and credit for outcomes.

Some related studies have been conducted on e-collaboration. For instance, literature has revealed the impact of e-collaboration in several areas. Olaisen and Revang (2017) explored how to facilitate the exchange of high-quality knowledge and found that the sharing of knowledge among virtual team members makes performance smarter and leads to increased confidence and knowledge collaboration to deliver solutions and innovations, thereby improving innovation and collective individual growth; also knowledge sharing, through different technological platforms, makes work greener (i.e., less frequent mobility and travel at a lower rate) and creates less stress and more professionality. The study recommended increasing reliance on different technological platforms that would increase participation among members in different geographic regions. Al-Ammary (2013) examined the effect of online collaborative learning OCL on students' achievement in the Kingdom of Bahrain. The findings showed that most of the students prefer to use face-to-face collaborative learning FTFCL and that OCL is already been adopted in some universities, especially at the University of Bahrain. Moreover, factors that mostly affect the adoption of OCL are perceived readiness, guidance, and support. Razmerita and Kachner (2015) investigated how students perceive collaboration and how they use new technologies in collaborative group work. Furthermore, the study measured the impact of technology on students' satisfaction with collaboration outcomes. Questions such as which demographic information (e.g. gender and place of origin) is significant for collaboration and collaboration and which perceived factors influence the students' group performance were answered by the study. The findings emphasized that there were gender and cultural differences concerning the perception of e-collaboration.

Thatcher, Brown, and Jenkins (2012) described the role diversity plays during different organizational evolutionary approaches, and how e-collaboration media characteristics interact with diversity and organizational evolution to influence outcomes. The authors leverage media synchronicity theory to discuss how the characteristics of different e-collaboration media can reduce or enhance perceived diversity. The role that perceived diversity has in determining outcomes is a function of whether a virtual organization is evolving according to the life-cycle, teleological, or dialectic evolutionary approaches. Guided by organizational evolution, diversity, attribution, and media theories, the authors propose a theoretical framework with a set of propositions. The authors also illustrate how the framework may be implemented by managers of virtual organizations.

Bratistit (2012) examined the utilization of Computer-Mediated Communication tools within collaborative learning activities. The participants" attitudes and behaviour, and issues related to performance improvement were discussed. Through a comparative study using a Blog, Wiki, and a Discussion Forum, students "'perception of collaboration aspects and the tools" effect were examined. Common misconceptions were discussed, along with the difficulties that students face and the ways they invent to overcome them. The paper concluded by raising issues to be considered when designing similar collaborative activities, involving novice computer users with mediocre and developed information literacy.

Stretton 1994) reported that social loafing within teams can diminish team potency assessments, perception of technology usefulness, and thus behavioural usage intentions and team performance. Social loafing is defined as a reduction of motivation and effort when individuals work in groups as opposed to when they work individually. Team members loaf when they feel that their contributions are not essential for the result of the group or if their work is not assessed. Another study of online learning collaboration identified several critical challenges, among which are a lack of instructor support and encouragement, unambiguous instructions, team commitment, and clear and frequent communication (Ku, Tseng, &Akarasriworn, 2013).

Zaščerinska and Ahrens (2009) identified and analyzed key factors in the use of e-collaboration technologies in teaching/learning activities. The meaning of the key concepts of e-collaboration technologies, collaboration, and factors was studied in the search for factors affecting the use of e-collaboration technologies. The results revealed the factors forming a successful use of e-collaboration technologies in teaching/learning activities to become more mobile, learn from the experiences of others, and work qualitatively.

Al-Ma'aitah (2008) explored the effect of using electronic collaborative media on knowledge-sharing phases. This study investigated a sample formed of (180) individuals operating in several hospitals within the Jordanian health sector; using the electronic collaborative system, to perform its different duties. The study proposed that using electronic collaborative media would positively influence the knowledge-sharing phases. The study revealed that among the most important electronic collaborative media used in knowledge sharing in the hospitals subject to research are e-mail and video conferencing, and the existence of a significant effect between using the electronic collaborative media and the knowledge sharing process in the researched hospitals.

From the synopsis of related studies above, it is evident that the few available studies were conducted over a decade ago with the most recent being the one conducted by Razmerita and Kachner (2015) and Olaisen and Revang (2017). These two studies and most of the others were conducted outside the sore of Africa. Before now, Nigerian postgraduate students and counterparts in other African countries have been collaborating; however, empirical evidence of this is currently lacking. This confirms that there seems to be no study that particularly focuses on e-collaboration among postgraduate students from the Nigerian university context. An understanding of how postgraduate students engage in e-collaboration in Africa and for what purpose, and what e-tools are used will be in addition to the literature.

Methodology

Design

The study adopted a survey method. A survey is commonly used in LIS/information system research to collect self-report data from study participants (Togia & Malliari, 2017). A survey may focus on information about individuals, or it might aim to collect the opinions of the survey takers. A survey design was considered appropriate in this study because it gives room for the researcher to cover a substantial percentage of respondents (postgraduate students) in the universities that were covered in the study and to enable the generalization of the outcomes from the study.

Table 1. Sample Selection

Universities	Sample	Percentage %
A	155	20.3
B	136	17.9
C	127	16.7
D	85	11.2
E	74	9.7
F	21	2.7
G	51	6.7
H	55	7.2
I	35	4.6
J	23	3.0
Total	**762**	**100.0**

Population and Sample

The target population for the study comprises postgraduate students in Nigeria Universities. The study focused on South-west universities that run the postgraduate program. From these universities, a total of ten universities (five

federal and five states) were purposively selected. From each of these universities, a sample of all the postgraduate students that were available each day the researcher visited the Postgraduate school of their university and hall of residence were involved in the study. The breakdown of the sample is presented in Table 1. In all, a total of 762 postgraduate students that were selected represent the sample for the study.

The Instrument for Data Collection

A researcher-developed questionnaire was used for the collection of data in the study. The development of the questionnaire was informed by the literature review and variables in the objectives of the study. The questionnaire was divided\ into two. Section A required respondents' demographic characteristics such as age, gender, school, and program of study while section B comprised the items. The section is sub-divided into five sub-sections. Each of the sub-section featured items on each of the objectives of the study. Thus, there are:

Sub-section A: Sub-section A featured items on the perception of e-collaboration. Here a set of five different statements that describe e-collaboration were provided and respondents were asked to indicate the statement that best describes e-collaboration based on their perception. The section adopts tick as an applicable format. Only five items were featured in the section.

Sub-section B: This section featured items on the benefits of being part of e-collaboration. There are five items in this section and the respondents were required to tick the option as applicable.

Sub-section C: Tools: This section contained items on tools for e-collaboration. Respondents were requested to tick the tools that were applicable and available for the collaborative activities.

Sub-section D: Awareness of ethics of e-collaboration: This section featured items on the awareness of ethics on e-collaboration. The respondents were to indicate their level of awareness of each item.

Sub-section E: Challenges of collaboration: This last section of the questionnaire featured items on the challenges of e-collaboration. The respondents were required to tick as applicable to them.

There is various response format adopted depending on the nature of items featured in each of the sections.

Validity and Reliability

The developed questionnaire was tested for validity. It was given to colleagues who research collaborative learning and related areas. Based on the outcomes of the validation, some items in the questionnaire were modified and reworded while others were removed and replaced. To achieve reliability, the instrument was administered to 30 postgraduate students in a private university that did not form part of the study. A split-half reliability method was adopted to determine the reliability of the questionnaire. The overall reliability co-efficient through Cronbach Alpha yielded r = 0.78 while the reliability co-efficient of each of the sub-scale is as reflected in Table 2.

Table 2. Realibility

S/N	Variables	No of Items	Co-efficient
1	Perception on e-collaboration	5	0.89
2	Benefits of being a member of e-collaboration	5	0.78
3	Tools for collaboration	5	0.71
4	Postgraduate students' awareness of the ethics of collaboration	5	0.74
5	Challenges of e-collaboration	5	0.77
	Overall	20	0.78

Procedure for Data Collection

The researcher with the four research assistants covered two universities each. With this exercise, a visit was made to the postgraduate school in each of the participating universities. For two days each, any postgraduate students found at the postgraduate school or college and the respective postgraduate students' hall of residence in each university were administered the questionnaire. However, none were forced to take part in the filling of the questionnaire but were intimated with the purpose and what the study set to achieve. Based on the sample of the study, a total of 762 copies of the questionnaire were administered while 631 representing 82.8% were returned properly filled and good for data analysis.

Data Analysis

Collected data were analyzed through percentage, Mean, Standard deviation, and frequency count. The results are presented in the following section.

Results

Collected data were analyzed through percentage, Mean, Standard deviation, and frequency count. The results are presented in the following section.

Table 3. Respondents' Demographic Information

Demographics	Frequency	Percent (%)
Gender		
Male	438	69.4
Female	193	30.6
Total	631	100
Age		
25-30 years	221	35.0
31-35 years	197	31.2
36-40 years	175	27.7
41 years +	38	6.0
Total	631	100.0
Postgraduate Levels		
Master	415	65.7
Doctoral	216	34.3
Total	631	100.0

Table 3 revealed the respondents' demographic information. It is shown that there was more male than a female that took part in the study. Similarly, respondents ages 20-30, (35%) constituted the majority while those ages 41 years and above were the least represented with just (6%). Respondents in the master's program (65.7%) were more than the respondents pursuing a doctoral degree (34.3%).

Table 4. Perception of Postgraduate Students on E-collaboration

S/N	Perception	Freq	Mean $\bar{x}$	SD
1.	Connects individuals electronically via the Internet using tools such as email, or through access to sites on the World Wide Web.	46	9.2	1.5
2.	Collaboration among individuals engaged in a common task using electronic technologies.	183	36.6	5.9
3.	Any kind of collaboration situation, where collaboration is partly or fully enabled or supported by specific information and communication technologies	166	33.2	5.3
4.	Collaborations that involve gathering and sharing information and/or resources or producing large amounts of data via technology.	135	27.0	4.3
5.	A process where participants express discuss and develop ideas through electronic platforms.	101	20.2	3.2
	Others,………………	0	0.0	0.0
	Total	631	100.0	

Table 4 reveals the perception of postgraduate students on e-collaboration. The table shows that the most significant perception of the respondents on e-collaboration is a collaboration among individuals engaged in a common task using electronic technologies and that collaborations involve gathering and sharing information and/or resources or producing large amounts of data via technology. The least perception of the respondents on e-collaboration is that it

connects individuals electronically via the Internet using tools such as email, or through access to sites on the World Wide Web. This implies that e-collaboration is perceived by postgraduate students as a collaboration among individuals engaged in a common task using electronic technologies.

Table 5. Use of E-collaboration by Postgraduate Students

S/N	Use of E-collaboration	Freq.	Mean $\bar{x}$	SD
1.	E-collaboration tools are very useful to support group work.	69	13.8	2.2
2.	Carrying out a project and conducting research	267	53.4	8.5
3.	Brainstorming and problem-solving	133	26.6	4.2
4.	Cooperative learning and group discussion	162	32.4	5.2
5.	Others	0	0.0	0.0
	Total	631	100.0	

Table 5 reveals the use of e-collaboration by postgraduate students in Nigerian universities. The results show the most prominent use of e-collaboration for carrying out a project and conducting research. This is followed by the use of cooperative learning and group discussion. The last, however, is for support group work. No other uses of e-collaboration were identified by the postgraduate students aside from the four reflected in Table 5. This implies that Nigerian postgraduate students use e-collaboration mostly for projects and research.

Table 6. Impact of E-collaboration on Postgraduate Students

S/N	Impact	Freq.	Mean $\bar{x}$	SD
1.	Electronic collaboration tool provides many more opportunities for interaction than face-to-face collaborative activities.	203	33.8	7.8
2.	E-Collaboration tools play a role in strengthening group vision.	171	34.2	5.5
3.	E-Collaboration tools assist in speeding the process of making group decisions.	139	23.2	4.6
4.	E-Collaboration tools facilitate creating a flexible collaborative environment.	77	12.8	2.6
5.	E-Collaboration tools help members fulfil the evolving needs to complete tasks	36	6.0	1.2
6.	Others	6	1.0	0.2
	Total	631	100.0	

Table 6 reveals results on the impact of e-collaboration as perceived by Nigerian postgraduate students. The results show that the most significant impact is its provision of more opportunities for interaction than face-to-face collaborative activities. This is followed by strengthening the group vision and assisting in speeding the process of group decisions. However, the least significant of e-collaboration indicated by the postgraduate students is helping the group members to fulfil their evolving needs. The results here imply that the Nigerian postgraduate students perceived e-collaboration as most impactful in the provision of opportunities for interaction better than face-to-face collaborative activities.

Asides from these impacts indicated in the table, other impacts of e-collaboration identified by the postgraduate students are-collaboration tools help achieve task performance transparency; e-collaboration tools help in utilizing internal environment factors (strengths and weaknesses); e-collaboration tools help utilize external environment factors (opportunities and threats); e-collaboration tools help apply procedures to goal achievements, and that e-collaboration tools help eliminate bureaucracy in performing tasks.

Table 7. Available Tools of E-collaboration by Postgraduate Students

S/N	Tools	Freq.	Mean $\bar{x}$	SD
1.	Electronic mail	156	13.0	5.7

2.	Mailing list/Listserv	35	2.9	1.3
3.	Groupware	47	3.9	1.7
4.	Shared whiteboard	0	0.0	0.0
5.	Social Media (Facebook, Twitter, Linkdle, Whatsap)	122	10.2	4.5
6.	Web document	49	4.1	1.8
7.	Google Document	99	8.3	3.6
8.	Audio Conference	10	0.8	0.4
9.	Video conference	11	0.9	0.5
10.	Discussion forum (yahoo groups)	53	4.4	1.9
11.	Skype	20	1.7	0.7
12.	Short Message Service	29	2.4	1.1
	Total	631	100.0	

Table 7 reveals the tools Nigerian postgraduate students use for e-collaboration. The most prominent tool identified is electronic mail. This is followed by social media (including Facebook, Twitter, Linkdle, and Whatsapp) and Google documents. Tools like audio and video conferences were hardly used perhaps because they are too expensive than what postgraduate students can afford. However, the shared whiteboard was not used at all by the postgraduate students as a tool for e-collaboration. The results here imply that electronic mail, social media like (Facebook, Twitter, and WhatsApp) and Google document are the tools mostly used for e-collaboration by Nigerian postgraduate students.

Table 8. Forms and Formats of E-collaboration by Postgraduate Students

S/N	Forms and Formats	Freq.	Mean x̃	SD
1.	Disucussion group	379	63.2	12.6
2.	Data collection and organization	22	3.7	0.7
3.	Documents sharing	213	35.5	2.8
4.	Synchronous communication	14	2.3	0.4
5.	Online course delivery and workshops	3	0.5	0.1
6.	Others	0	0.0	0.0
	Total	**631**	**100.0**	

On the forms/formats of e-collaboration platforms used by the postgraduate students, the results in Table 8 reveal that the discussion group is the most common format adopted, this is followed by document sharing. Other platforms identified but which are not significant are data collection and organization, synchronous communication, and online course delivery and workshops. The results here imply that the most significant platforms use for e-collaboration by the postgraduate students are the discussion group and document sharing.

The postgraduate students were asked to indicate whether or not they were aware of the ethics of e-collaboration. They were meant to respond to the four different ethics of e-collaboration identified from the literature. The results reveal that postgraduate students' level of awareness about the ethics of e-collaboration is too low. However, a little percentage of postgraduate students were aware that participation in decision-making and the sharing of blame and credit for outcomes is the responsibility of all members.

Table 9. Awareness of Ethics of E-collaboration

S/N	Ethics of E-collaboration	Highly Aware	Aware	Not Aware

1.	Exchange: each treats the other as an autonomous agent and bargains in good faith and honestly fulfils their obligations without exploiting the other	51 (8.1%)	11 (1.7%)	569 (90.2%)
2.	Colonization: Members do not treat the other as autonomous and equal but do take on responsibility for the other's welfare as for their own, and according to their lights.	91 (14.4%)	65 (10.3%)	475 (75.3%)
3.	Solidarity: Members subordinate themselves to the other and act under their direction, to assist themselves in regaining normality and autonomy because trust is a precondition for solidarity and solidarity builds trust.	167 (26.5%)	19 (3.1%)	445 (70.5%)
4.	Collaboration: Members move towards full consultation and participation in decision-making and the sharing of blame and credit for outcomes.	201 (31.9%)	10 (0.2%)	420 (66.6%)

Table 10. Challenges Associated with E-collaboration

S/N	Challenges	Freq.	Mean $\bar{x}$	SD
1.	Focus on success alone	97	9.7	3.4
2.	Limited intervention	10	1.0	0.3
3.	Lack of Trust	105	10.5	3.8
4.	Risks perception	41	4.1	1.5
5.	Lack of coordination	18	1.8	0.7
6.	Power failure	115	1.2	4.5
7.	Poor internet connection and speed	103	10.3	3.7
8.	Different educational background	62	6.2	2.2
9.	Different levels of knowledge	65	6.5	2.3
10.	Lack of commitment	45	4.5	1.6
	Total	**631**	**100.0**	

Table 10 reveals the challenges associated with e-collaboration as perceived by postgraduate students. Power failure was identified as the most significant challenge, followed by a lack of trust and poor internet connection and speed, and members' focusing on success alone at the detriment of other issues. However, limited intervention perhaps from the members was identified as the least challenge. This implies that the most significant challenges faced by postgraduate students in their e-collaboration efforts are power failure, lack of trust, and poor internet connection and speed.

Discussion

This study examined the perception and use of e-collaboration by postgraduate students in Nigerian universities. The study reveals that e-collaboration is perceived by postgraduate students as a collaboration among individuals engaged in a common task using electronic technologies; postgraduate students use e-collaboration mostly for projects and research; Nigerian postgraduate students perceived e-collaboration as most impactful in the provision of opportunities for interaction better than face-to-face collaborative activities; electronic mail, social media like (Facebook, Twitter, and WhatsApp) and Google document are the tools mostly used for e-collaboration by the Nigerian postgraduate students; the most significant platforms use for e-collaboration by the postgraduate students are the discussion group and document sharing; postgraduate students level of awareness about the ethics of e-collaboration is too low. However, a little percentage of them were aware that participation in decision-making and the sharing of blame and credit for outcomes is the responsibility of all members. The most significant challenges faced by postgraduate students in their e-collaboration efforts are power failure, lack of trust, and poor internet connection and speed.

The postgraduate students perceived e-collaboration as a collaboration among individuals engaged in a common task using electronic technologies. This is in line with the report by Cai and Kock (2009) that e-collaboration is a collaboration among different individuals to accomplish a joint task using electronic technologies. Looking at the

literature most of the definitions also confirms the same thing claiming that it is a collaboration between individual through one communication technology or another.

Postgraduate students use e-collaboration mostly for projects and research. It can be deduced from this that collaboration usually has a target; and, the target is always toward the achievement of a goal. When there is a group project at stake in academics, collaboration is bound to take place without which the project may not be done or completed. People collaborate in research for the objectives and purpose of the research to be achieved. E-collaboration has made it possible for academics from far and near to collaborate either in projects or research, not surprising the results revealed in this study.

Nigerian postgraduate students perceived e-collaboration as most impactful in the provision of opportunities for interaction better than face-to-face collaborative activities. Postgraduate students engaged in e-collaboration for the achievement of a purpose and the results of this study have proved that the exercise greatly impacts interaction. Siqueira et al. (2003) earlier reported a finding similar to this that there was a high degree of interactivity between the participants when they engaged in collaboration No doubt, the interaction became the basis for distributed collaborative work in the academic world (Lowry et al., 2004). E-collaboration facilitates the formation of strategic partnerships (Thatcher, Brown & Jenkins, 2012). When two or more individuals are in partnership, an interaction that leads to cooperation is bound to take place.

Olaisen and Revang (2017) and Razmerita, Kirchner, Hockerts, and Chee-Wee (2018)explored how to facilitate the exchange of high-quality knowledge and found that the sharing of knowledge among virtual team members makes performance smarter and leads to increased confidence and knowledge of collaboration to deliver solutions and innovations, thereby improving innovation and collective individual growth; also, knowledge sharing, through different technological platforms, makes work greener. There is usually a positive result in a collaboration where there is effective interaction among the participants.

The current study revealed electronic mail, and social media like (Facebook, Twitter, WhatsApp) and Google documents as the tools mostly used for e-collaboration by Nigerian postgraduate students. This finding is in agreement with Almauita (2008) and Albreama and Maraqa (2019) who revealed that among the most important electronic collaborative media used in knowledge sharing in research are e-mail and video conferencing, and the existence of a significant effect between using electronic collaborative media and the knowledge sharing process in the researched hospitals. This result confirms that sharing becomes the social core competency of collaborating with the group. Similarly, the tool for communication and collaboration has been confirmed to be important here. Tools can support the processes of sharing by providing the users with infrastructures and platforms to participate in the experiences, ideas, etc of one another. Therefore, tools answer the question of sharing and collaboration (KappaeMme, 2012).

The study revealed the most significant platforms used for e-collaboration by postgraduate students as a discussion groups and document sharing. Bratistit's (2012) identification of discussion forums as one of the platforms for e-collaboration lend support to the finding in this study. Postgraduate students' level of awareness about the ethics of e-collaboration is too low. However, a little percentage of the respondents were aware that participation in decision-making and the sharing of blame and credit for outcomes is the responsibility of all members. Literature has made us understand that there are ethics that guide the operation of team members in collaboration. Therefore, the revelation by Blunden (2015:1) on the three issues, i., that every theory of society is implicitly a theory of ethics, and every ethics is implicitly a theory of society, ii., general ethics must have recourse to the idea of collaboration between projects and elaborate the relevant ethical principles., and iii., ethical principles entailed by several individuals participating together in a collaborative project; all confirm that ethics in collaboration are important but unfortunately, the respondents in this study have a low perception about it.

The most significant challenges faced by postgraduate students in their e-collaboration efforts are power failure, lack of trust, and poor internet connection and speed. There is never anything associated with technologies that do not have an attendant's shortcomings. No wonder why Tseng et al. (2009) found that trust among team members and organizational practices are factors that can explain satisfaction with online collaboration. This confirms that the absence of trust in a collaborative team usually constitutes a challenge. Ku, Tseng, and Akarasriworn, (2013) also confirm that there are challenges usually associated with e-collaboration among which according to them are lack of instructor support and encouragement, unambiguous instructions, team commitment, and clear and frequent communication.

Conclusion

This research on e-collaboration among postgraduate students in Nigerian universities seems to be the first of its kind in Nigeria and has revealed some significant findings that can generate further research. The study has revealed that e-collaboration is perceived by postgraduate students as a collaboration among individuals engaged in a common task using electronic technologies. Also, it has been revealed that postgraduate students use e-collaboration mostly for projects and research and that postgraduate students perceived e-collaboration as most impactful in the provision of opportunities for interaction better than face-to-face collaborative activities. In terms of tools, the study revealed electronic mail, social media like (Facebook, Twitter, WhatsApp) and Google document as the tools mostly used for e-collaboration by Nigerian postgraduate students; while the most significant platforms use for e-collaboration by the postgraduate students are discussion group and document sharing. Also, postgraduate students' level of awareness about the ethics of e-collaboration is reported to be too low. However, a minute percentage of postgraduate students were aware that participation in decision-making and the sharing of blame and credit for outcomes is the responsibility of all members. The most significant challenges faced by postgraduate students in their e-collaboration efforts are power failure, lack of trust, and poor internet connection and speed.

Recommendations

This study has reported low awareness of e-collaboration ethics by postgraduate students in Nigeria. In light of this, it is recommended that postgraduate students should learn more about ethics that guide collaboration. The knowledge of this is expected to enable the collaborative group to achieve their desired goals because right from the onset, each participant will know what is expected and what they need to contribute towards the achievement of the goals of the team.

The study reported power failure, low internet connectivity, and speed as challenges to e-collaboration. It is recommended that there is a need to improve internet facilities and broadband on Nigerian university campuses. This should be considered important and highly necessary because they are indispensable in e-collaboration and their absence makes e-collaboration a mirage.

The study has reported that e-collaboration results to improve interaction among the members. Considering this, it is recommended that postgraduate students should engage more in e-collaboration. This is indispensable in this fourth industrial revolution where collaboration is one of the keys that drive everything. Research has also confirmed that students learn better through a group (Brame, & Biel,2015; Dallimore, Hertenstein, & Platt, 2016). Therefore, Nigerian postgraduate students should take e-collaboration or any form of collaboration very seriously as the outcomes have been demonstrated to always result in positive impacts like improved learning, the achievement of research goals, and improve interactions among members.

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