Impact of HCI in Learning Processes of Students and Staff in Some Selected Institutions of Kebbi State

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Abstract:- This research was conducted to find the impact of HCI in learning and working processes of students and staff in some selected institution of Kebbi State. Structured questionnaire was design and administered to 30 respondents per each of the four selected institutions. The study find out school portal was the most common information system (IS) in all the institution, and these portals are not meant for e-learning but rather registration. Therefore, interaction between it and respondent has less impact on learning and administrative functionalities. Also projector is discovered to be the second prevalent device respondents interact with during learning and working activities in all the (4) institutions. However, this work observed that all the institutions are aware of how importance HCI, and Computer information System (CIS) is and, how better it simplify work. Also, basic modern ICT tools, devices and CIS for institutions of learning were highlighted and recommended to be deployed for improving learning efficiency and productivity. The work also stress the need to train both the staff and students on devices and systems usability.

Keywords:- Dakingari, Alero, Usability, Interaction, HCI.

I. INTRODUCTION

Human computer interaction, or shortly HCI, can be defined as "a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them"[1]. HCI is the most important aspect of computing that guide users and interaction designers on how communication could be done efficiently and smoothly by translating user language into machine language. This was made possible due to technology evolvement which led to development of high level language that sprung new technology of desktop, laptop, note book, smart phones, cloud, 3D printing and innovative devices with identifiable and adaptable interface. The Human computer interaction (HCI) is a multidisciplinary, interdisciplinary and cross-disciplinary---though debatable [2] that focuses on different perspectives and, is an important consideration for any organization, businesses and individuals that uses computers in their everyday operations. Well-designed usable systems ensure that staff are not frustrated during their work and as a result are more content and productive[3].

Many scholars has different perception in defining HCI like In academic view HCI can be defined as an experience an individual acquires when that individual comes in contact with a computer system. It is an independent discipline which strives to improve the quality of interactions humans has with computers[4]. In investigating the relationships between computer technology, human activity and society, a strategy was put in place such as designed, created, and evaluated technologies and tools to support humans and their social activities[5]. Also user perceptions differ in interaction with computer, those that interacted with computer ten years back are lacking some technological revolution compared to those interacting with it today. This research intends to find user experience, perceptions and measure the role of human computer interaction in their learning/working environment. The research will be conducted on Kebbi State Polytechnic Dakin-gari and some selected tertiary institutions within the state such as (Federal Polytechnic Birnin Kebbi, State University and Federal University Birnin Kebbi). Furthermore, their bottlenecks associated with interactions and measures to be employed to overcome challenges will be address.

II. RELATED WORK

As multidisciplinary as it is, HCI has disparate research areas from ranging interface design, implementation and evaluation of interactive system and some surrounding phenomena. Other areas are usability issues and their preferred solutions. Furthermore, an impact of HCI in medical domain has also been studied as another researchable area by [6] and others. All these encourage best user experience which in turn achieved productivity and acceptability that always motivate users[4]. On the other hand, [4]presented their work as surveyed paper where university students were interviewed regarding the use of HCI technology in their learning process. Eventually, results show that those using HCI willingly have better and greater experience than those compelled to use it. Additionally, the work came up with two concepts: HCI had significant impact in learning efficiency and the degree of this efficiency lies on oneself, HCI-reliant system based on functions it served. Also [7]reviewed some HCI related literatures the support academic tasks. Though pros and cons of these devices were identified by the researchers and suggested users involved must be studied and the kind of interaction involve. In the end, proposal of parallel input, voice recognition, devices

interoperability and writing recognitions devices should be introduced to students for biter interactions.

In another work by [1] two sets of student's background were formed to ascertain their level of HCI design understanding. The work confirmed diverse design practices from the students and also formed systematic way of achieving different design practice. HCI design investigation of a studio-based HCI course was made among 42 undergraduate students. According to their findings, suggestions were made for course revision for complex user study context under best and worst case scenarios. Also, pedagogical characteristics that motivate and militate student's reflective practices were stated out. Research work carried out by [8] highlighted existing HCI frameworks of 13 years research work in the subfield of MIS. Issues with them were mapped out and new framework was proposed for solving the lingering problems. However, research topics, methods and publication patterns in HCI were outlined as contributions. Conceptual framework for effective learning engagement via interface design of teaching aids was proposed in[9]. Suggestions were made by the authors that if student's needs, requirements and involvement were all thoroughly understood, then; the design of teaching aids will not be a problematic to students in learning process. Stressed in, priority should be on top in relation to principle and elements of interface design for effective teaching and learning experience.

In a Similar work by[10] guidelines for a suitable interface design for e-learning solutions in tertiary school was presented.

Finally, it is evident that all the aforesaid works contributed in one way or the other but, none of them focused on the impact HCI has on students, academic and non-academic staff in tertiary schools for discharging their daily routines/studies. Hence, main goal of this work.

III. CONTRIBUTIONS

This work presents contributions as follows: 1. User experience and perception during interaction with the modern equipment in learning environment. 2. Bottlenecks users experiences associated with interactions with modern equipment. 3. Role of human computer interaction in learning environment.. And finally, we suggest measures to be employed to overcome challenges associated with the interactions for these institutions.

IV. METHODOLOGY

The work used survey method as methodology where structured questionnaire was designed and administered to 30 target respondents per institution in order to test the following research objectives as below:/work

- Determine the level of experience users acquired when interacting with computer system.
- Ascertain how, where and what perception of improvement observed by users during the interactions.
- Explore how users perceive the role of human computer interaction in their learning/working environment.
- Identify bottlenecks associated with interactions as highlighted by users
- Suggest measures to be employed to overcome challenges associated with the interactions

V. SURVEY RESULTS

This work was designed to ascertain the Impact of HCI in learning/work processes of students and staff of Kebbi State Polytechnic Dakingari (KSPD) and some selected tertiary institutions within the state such as Waziri Umaru Federal Polytechnic Birnin Kebbi (WUFPB), State University, Aleiro (SUA) and Federal University Birnin Kebbi (FUB). Questionnaire was administered to all four ;(4) institutions as mentioned above, and table 1 below provide samples of questionnaires administered and the associated responses per institution.

(1st *Question:* Do you consider HCI as important during interaction with devices/information System in your Institution?*)*

Table 1: Responses from question 1

WUFPB	KSPD	FUB	SUA
Yes (100%)	Yes (100%)	Yes (100%)	Yes (100%)

The results above provide a detailed score for each higher institution of learning in the state. The most interesting thing to note from the table is that 100% of users considered HCI/Computer Information System (CIS) as important in their Institution, this also corroborate with the importance of Information and Communication Technology (ICT in education sector stated in[11].

(2nd *Question:* If yes, why do you think it is important?*)*

Table 2: Responses from question 2.

WUFPB	KSPD	FUB	SUA
Eases work (43%)	Eases work (100%)	Eases work (76%)	Eases work (60%)
Use in every institution (43%)	Use in every institution (0%)	Use in every institution (20%)	Use in every institution (40%)
It keeps record (14%)	It keeps record (0%)	It keeps record (4%)	It keeps record (0%)
I don't know (10%)	I don't know (0%)	I don't know (0%)	I don't know (0%)

From the scores recorded in table 2 above, it was observed that all the respondents from the institutions confirmed that computer/information systems use in their respective school simplify their tasks. This is in conformity with interface design guideline "*understand user skill*" in[9]. This attest to the fact that users of the systems were well understood and their skills were considered. Also confirmed the users' perception that CIS eases work highlighted in [12] with better interaction eases work. On the other hand, we can see two scores 43% and 40% respectively that thought CIS is important due to their abundance in tertiary institutions. Though individually significant but, averagely insignificant.

(3rd *Question:* How simple your institution's computer/information systems is?*)*

Table 3: Responses from question 3.

WUFPB	KSPD	FUB	SUA
Very simple (33.3%)	Very simple (43%)	Very simple (24%)	Very simple (0%)
Not simple (10%)	Not simple (0%)	Not simple (6%)	Not simple (0%)
Simple (36.7%)	Simple (57%)	Simple (70%)	Simple (86%)
Difficult (20%)	Difficult (0%)	Difficult (0%)	Difficult (14%)

It is indicated in table 3 above that interactions between users and school CIS is simple. This no doubt supports responses from table 2.

(4th *Question:* Which of these interactive device/system do you use in your institutions?*)*

Table 4: Responses from question 4.

WUFPB	KSPD	FUB	SUA
Institution portal (54%)	Institution portal (100%)	Institution portal (86%)	Institution portal (70%)
Database (34%)	Database (0%)	Database (14%)	Database (30%)
Cloud (6%)	Cloud (0%)	Cloud (0%)	Cloud (0%)
I don't know (6%)	I don't know (0%)	I don't know (0%)	I don't know (0%)

Table 4 above presents interesting scores. The commonplace device/CIS of interaction amongst the respondents happens to be school portal with an average score of 77.5%, followed by database with 19.5%. This highlighted the most popular vehicle of interaction institutions deployed and, students and staff are familiar with. Additionally, responses show good interface that provides better interaction. On the other hand, respondents indirectly indicates the most available devices/CIS (school portal & database) in their schools in this modern age of information technology.

(5th *Question:* Does the devices/computer & information systems in your institutions need upgrade?*)*

Table 5: Responses from question 5.

WUFPB	KSPD	FUB	SUA
Yes (70%)	Yes (100%)	Yes (83%)	Yes (100%)
No (30%)	No (0%)	No (17%)	No (0%)

From table 5 above, we can see highest number of scores recorded where respondents perceived an upgrade of CIS for best interaction.

(6th *Question:* if yes, which among the upgrade?*)*

Table 6: Responses from question 6.

WUFPB	KSPD	FUB	SUA
Contents upgrade (53%)	Contents upgrade (83%)	Contents upgrade (54%)	Contents upgrade (17%)
Accessibility (30%)	Accessibility (0%)	Accessibility (23%)	Accessibility (56%)
Usability (0%)	Usability (0%)	Usability (0%)	Usability (27%)
Not sure (17%)	Not sure (17%)	Not sure (23%)	Not sure (0%)

As indicated in table 6 above, it is evident that respondents often access school portal with ease and simplicity but, the contents needs to be upgraded for better and smoother navigation within the system. This does not deny the fact of simplicity but, prove difficulty in navigation.

(7th *Question:* Does your institution use modern ICT devices and systems in learning?*)*

Table 7: Responses from question 7.

WUFPB	KSPD	FUB	SUA
Yes (66%)	Yes (83%)	Yes (47%)	Yes (30%)
No (20%)	No (17%)	No (30%)	No (43%)
Not sure (14%)	Not sure (0%)	Not sure (23%)	Not sure (27%)

Table 7 show the response where majority of respondents attest to fact that their individual institution of learning is using modern ICT tools and systems in learning process. Only SUA respondents took exception to that as score against "*NO"* is higher than yes.

(8th *Question:* if yes, list the modern ICT devices and systems use your institution for learning?*)*

Table 8: Responses from question 8.

WUFPB	KSPD	FUB	SUA
Projector (53%)	Projector (30%)	Projector (70%)	Projector (86%)
Online learning software (27%)	Online learning software (0%)	Online learning software (0%)	Online learning software (14%)
Smart board (14%)	Smart board (56%)	Smart board (0%)	Smart board (0%)
All of the above (6%)	All of the above (14%)	All of the above (30%)	All of the above (0%)

Table 8 above provide an insight that the second prevalent ICT device for which users are familiar and interact with in their respective school is projector. Its average score is 59.75% which no doubt is used majorly in learning environment such as class rooms, labs and lecture theaters. But we can see that KSPD respondents are conversant with smart board as it score outweigh projector.

(9th *Question:* which experience do you acquire during interaction with the devices and systems?*)*

Table 9: Responses from question 9.

WUFPB	KSPD	FUB	SUA
Public speaking (56%)	Public speaking (70%)	Public speaking (30%)	Public speaking (73%)
Improve communication (40%)	Improve communication (14%)	Improve communication (30%)	Improve communication (0%)
It makes us to be smarter (4%)	It makes us to be smarter (0%)	It makes us to be smarter (40%)	It makes us to be smarter (27%)
Not sure (0%)	Not sure (16%)	Not sure (0%)	Not sure (0%)

From table 9, results indicate that on average 57.25% of the total respondents improve confidence in interaction and also improve the ability to address audience. However, 17.75% believed that interaction with these devices and other systems made them to gain more knowledge of interaction by improving their level of confidence.

(10th *Question:* Do you have challenges during your interaction with these ICT devices/systems?*)*

Table 10: Responses from question 10.

WUFPB	KSPD	FUB	SUA
Yes (30%)	Yes (54%)	Yes (30%)	Yes (56%)
No (66%)	No (13%)	No (66%)	No (44%)
Not sure (4%)	Not sure (33%)	Not sure (6%)	Not sure (0%)

As observe, table 10 results validate results of table 2 and 3 where total average of 47.25% is in favor of lack of challenges. Though, 42.75% indicates some challenges during interaction but, is lesser compared with absence of it. On individual level, KSPD and SUA show highest percentages of interaction challenges which coincided with their high score of "*simple*" status of interaction in table 2 as opposed to "*very simple*".

(11th *Question:* if yes, what are the challenges?*)*

Table 11: Responses from question 11.

WUFPB	KSPD	FUB	SUA
Lack of training (40%)	Lack of training (70%)	Lack of training (34%)	Lack of training (56%)
Lack of accessibility (16%)	Lack of accessibility (30%)	Lack of accessibility (13%)	Lack of accessibility (27%)
Lack of availability (16%)	Lack of availability (0%)	Lack of availability (13%)	Lack of availability (17%)
Shyness (20%)	Shyness (0%)	Shyness (0%)	Shyness (0%)
No challenges at all (8%)	No challenges at all (0%)	No challenges at all (40%)	No challenges at all (0%)

As observe also in table 11 above, the average percentage score of "*lack of training*" is 50% which corresponds to response provided in table 2 where highest percentage goes to "*simple*". This indicate that the interface and entire interaction are not very simple; that's why training is of utmost important to them. Also, 11.5% indicate inaccessibility of all other ICT tools/devices/CIS for interaction (except school portal) during learning/working process. This has direct link with the scores in item 1 of table 4 where, institution portal get the highest score. This happens because it's most common to all staff and students. And it requires no training for the interaction.

With these, we can attest to the fact that the whole four (4) institutions of Kebbi State is faced with one or more interaction and usability issues as table 1 through 11 show. Furthermore, all are in need of more additional modern computer and ICT tools in school premises for smooth interaction and usability to enhancing learning events and capability.

VI. MODERN COMPUTER AND ICT TOOLS IN LEARNING ENVIRONMENT

Computer and ICT tools help students and staff to effectively discharge their academic and non-academic routines with higher productivity. This could be achieved only if the interactions are smooth and effective. In this section, authors aimed at providing state-of the-art computer and ICT tools use in learning environment as presented from different literatures and submitted in sum-total here. As technological advancement increases, needs for such technology in tertiary schools also increases. Table 2 below is the list of contemporary ICT tools supposed to be deployed in tertiary institutions of learning for progress and development.

Table 12. List of contemporary ICT tools for learning environment

S. No	Tool	Purpose	Source
1.	Video Projector	Projecting lessons on the board	
2	Digital Camera	Recording microteaching	[13]
3	Computer systems	Writing learning materials, storing records, vehicle of assignment	[14] [15]
4	Photocopying machine	To make more copies of documents	[14]
	Scanning machine	For conversion of hardcopy documents to softcopy	
	Printer	To produce hardcopy format from softcopy	[16]
	Interactive whiteboard	To write, save and send lecture notes from the board	
5	Internet network	For searching learning materials	[14]
6	Smart phones	For browsing learning resources and assignment submission	
	Electronic curriculum	For easy access everywhere	[17]
7	Computer-based testing (CBT)	To simplify testing process for lecturers and students	[14]
	E-portfolio	Integrated electronic collections of student's academic work	

Table 12 above, contains basic modern ICT tools that students and staff of the institutions are expected to use and interact with.

VII. CONCLUSION

In this research, it could be concluded that all the institutions are aware of the importance of HCI, and Computer information System (CIS), and how better it simplify work. As such maximum utilization and interaction is expected for efficiency and productivity in learning and office work. From the analysis above it was evident that school portal was the most common information system (IS) in all schools under study. The notion it gives is alarming because these portals are not meant for e-learning but rather registration, has no direct link with learning. Even though its usability is good due to good interface design. From the score provided against projector, it is observed that the device is second as the most popular tool but, its known fact that majority of students in tertiary institutions of Nigeria has less interaction with some of the devices. So we assumed the respondents graded the tool based on the most seen ICT tool as it's mostly suspended on the wall or ceiling for projection—less interaction from students. As seen in the authors' analysis, each school is faced with one or more challenges that ought to be address for better learning environment. Also, as table 12 present modern basic ICT devices/tools/systems for learning process, all the four institutions under study are struggling in that direction.

VIII. RECOMMENDATIONS

Based on the responses collected, the authors strongly believed that ICT devices/tools/systems for learning interactions are too scarce. Additionally, the available ones need to be accessible and used by staff and students to leverage their sophistication. Sufficient training on these tools and devices is paramount important for better usability. Also, new and modern interactive system with learning materials akin to institution portal be provided to gain interactive advantages. Eventually, all the basic and modern interactive ICT tools be provided in school vicinity for more interaction and more knowledge.

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