



# Online Discussion Forum as a Tool for Interactive Learning and Communication

Edeh Michael Onyema, Edeh Chinecherem Deborah, Alhuseen Omar Alsayed, Quadri Noorulhasan Naveed, Sumaya Sanober

**ABSTRACT:** *The digital millennials are very interactive in nature. They love to learn and interact with their peers, teachers, relatives, and environment through digital platforms. These interactions are being facilitated by the increasing rate of internet penetration and emerging digital media across the globe. The nature of today's learners has increased the demand for use of student-centred learning approach such as Online Discussion Forum (ODF) across different levels of education. Online Discussion Forum (ODF) is being employed as a supportive tool to enhance interactive learning and student-teacher communication. The present study developed an Online Discussion Forum nicknamed "CSC forum" with a view to promote interactive learning, and communication among students, and teachers at the Department of Computer Science, Tai Solarin University of Education, Nigeria. The "CSC forum" facilitates exchange of ideas among students regarding course content and assignments, and also improved the quality of communications and relationship between students and teachers. The platform has a "Live Chat" module where members can engage in active conversations, and participate on group discussions on the go. It also provides a framework for improving the department's information literacy programme, and specifically students' participation in active learning as a way of improving their digital literacy skills. Given the relative importance of ODF, teachers are required to devote more time on the forum to provide feedbacks to pending student's queries/postings, and also to offer clarifications on trending topics being deliberated upon on the forum. The discussion forum presented in this study proved effective for student-teacher interactions, communication and information dissimulation to students on school/departmental activities. More so, the study affirms that teacher guidance is crucial to stimulate student's interest and participation in online forum. While factors such as poor power supply; low student/teacher commitment, poor quality of postings, Abusive posts, delayed feedbacks, poor internet connections and time constraints were found to limit the success of online forum.*

**Keywords:** *Online Discussion Forum, Interactive learning, e-learning, M-learning, Communication.*

## I. INTRODUCTION

Technology has become an important part of education in the 21<sup>st</sup> century. All modern educational settings are constantly embracing different technological tools and platforms to enhance effectiveness in the teaching and learning process.

The use of technology to support teaching and learning have become essential skills for the professional teachers and the learners in today's world [1]. Technology has strong influence on students reading habits, access to information, communication, collaboration and creativity. [2] stated that information and communication technology has a profound impact on student's access to information, and can either increase or decrease the degree of information among the students. The crop of learners in the current generation is tech savvy. They are very close to their technological gadgets particularly mobile technology devices such as smartphones and tablets. Also, the demand for technology in different aspect of labour market and professions has increased the need for all institutions of learning to adopt relevant technologies to improve the staff and student's digital literacy skills to be able to compete favourably in the world of work. Learning technologies have transformed education. Learners can learn on the go defeating the barriers of distance, time and physical presence. Distance learning has advanced through the assistance of technology using various types of delivery modes that include telephone conferencing, video conferencing, email correspondence, and web-based distance learning via the Internet [3], and online learning forums. There has been a significant increase in the availability of software to assist in the development of online teaching portals to facilitate the increasing use of Information and Communication Technologies (ICTs) in the teaching and learning process [4]. There is also an increasing quest for use of technology to facilitate effectiveness in education. This is because the digital natives can easily make use of various technological platforms and devices to support their learning. Learners enjoy freedom to practice independent and distance learning with the aid of emerging technologies. These technologies often come with interesting features that attract and inspire learner to engage constructively and productively. [4] reported that the University of South Australia (UniSA) introduced an online teaching environment (UniSAnet) to add a technologically mediated component to the teaching and learning strategies being used within the University. Efforts are also being made by many educational institutions in Nigeria, including Coal City University, and Tai Solarin University of Education to install effective technological facilities that encourage e-learning activities.

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\* Correspondence Author

**Edeh Michael Onyema\***, Lecturer, Dept. of Computer Science, Tai Solarin University of Education, Nigeria.

**Edeh Chinecherem Deborah**, Faculty of Law, Enugu State University of Science and Technology, Nigeria.

**Alhuseen Omar Alsayed**, Deanship of Scientific Research, King Abdulaziz University, Jeddah 21589, Saudi Arabia

**Quadri Noorulhasan Naveed**, College of Computer Science, King Khalid University, Abha 62529, Saudi Arabia

**Sumaya Sanober**, College of Arts and Science, Prince Sattam Bin Abdul Aziz University, Al Kharj 16278, Saudi Arabia

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The use of appropriate educational technologies increases accessibility to learning resources and multiple learning approaches to meet the need of diverse learners. One method of using technology in education is through Online Discussion forums that provide both synchronous and asynchronous interactions that make it easier for students who may be offline while discussions are being done on the forum to access previous threads of discussions, and possibly make contributions.

Online discussion forum takes teaching and learning beyond a confined learning environment like the classroom, bringing flexibility and convenience to teaching and learning. Students drive the learning process in online forums, and more emphasis is placed on knowledge sharing than lesson notes. [5] states that the popularity of using online forums as a tool for discussion cannot be undermined because of the flexibility of responding to messages and posts at preferred times and being able to view comments as often as one likes.

An online discussion forum plays an important role in tertiary education [6]. Apart from eliminating communication barriers that exist between students and their teachers, it also provides avenue for fruitful discussions among students and their peers. [7] stated that the use of online discussion forum has emerged as a effective tools for engaging students outside the classroom, and it allows students to post messages to the discussion threads, interact and receive feedback from other students and instructor, and foster deeper understanding towards the subject under study. An online forum creates a motivational environment for students to freely express their views and ideas with more confidence than they do in a traditional classroom. Introverted (Shy) learners can easily improve their involvement in the teaching and learning process via online discussion forum, because they can feel more comfortable to share their opinions from any location without much pressure.

With ODF, threads of discussions can be accessed by members at their convenient time, and ideas can be better shared on how to solve a given problem or provide answers to posed questions. Online interactive forum promotes active learning and student's participation in inquiry process, providing learners with the opportunity to contribute to group activities and discussions. The use of online instructional tools provides unique opportunities for the instructor to engage students in various activities and offer a new dimension for interaction – active and higher-order [7]. ODF often leads to better in-class discussions, and students have a chance to engage with each other virtually, often having their thoughts and opinions validated, and more willing to share out loud more thoughtfully in class afterwards [8]. [9, 5], opined that students involved in ongoing conversations in a community of practice makes the learners feel the supportive presences of participating peers, mentors and experts, and this level of comfort stimulates learning satisfaction that will further encourage students to think independently and reflect on what is said during online discuss. [5] suggested that in order to enhance students' learning experience via online forums, it is imperative that the instructors play a pivotal role in monitoring the online discussions, facilitating enquiries and providing feedback to students promptly. [6] stated that teachers play an essential role in facilitating discourse among students, and that such discourse can take place through the active participation of

students in online discussion forums or through collaboration with other students during the learning process. Teacher's participation in online forums increases the bond between them and their students, thereby helping the students to freely express themselves to the teacher. This can assist the teacher to understand the students better, and help them to overcome their learning constrains. Considering the potentials of online forums, the present study developed an online discussion forum nicknamed "CSC forum" to facilitate interactive learning and robust communication between students and their teachers at the department of Computer Science, Tai Solarin University of Education. The forum provided a platform for productive interactions, idea generation and knowledge exchange.

## II. METHODOLOGY

The "CSC forum" presented in this study was designed using web 2.0 technologies. A total of two hundred and twenty members registered for the forum but a pilot test was carried out using selected 30 final year students who were studying computer Science at Tai Solarin University of Education, Nigeria. The selected students were divided into two groups (15 students in each of the group). Both groups were taught the same topics using different approaches. While the first group were taught using the conventional approach only for three weeks, the second group were taught in conventional classroom but were also made to engage in the 'CSC' Forum to interact with themselves for three weeks under the guidance of a teacher. The teacher uploaded some topics to be discussed in the class to the "CSC forum" for pre-class and post class discussions among students, and also devoted some time to interact more with the students on the forum based on the same topics discussed in the class, and to provide feedbacks to student's postings on the forum. After the exercise was conducted for three weeks, a 20-items objective test was administered to both groups based on the same topics taught within the period. The results were collated and compared.

## III. RELATED WORK

Learning technologies have brought positive revolutions to the educational sector. There has been a groundswell of interest on how computers and the internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings [2]. The increasing prevalent use of internet in schools and homes has resulted in asynchronous online discussions becoming an increasingly common means to facilitate dialogue between students and instructors as well as students and students beyond the boundaries of their physical classrooms [10]. [6] reported that among all internet users in the U.S in 2015, 15% read or post comments in discussion forums. Learners seem to be enthusiastic in using technological platforms due to its flexibility and convenience. The use of online discussion forum has mitigated the communication barriers that often exist between teachers and students in the traditional classroom pattern. Online instructional tools can remove some of the communication impediments associated with the face-to-face lectures providing a forum to address issues through argumentative

and collaborative discourse [11]. The result of a study conducted by Cheng et al. [12] showed that students who participated in online discussion forum had a better performance than others who do not engage in the forum. [13] reveals that computer mediated Communication (CMC) has a positive potential to increase interaction among students and that asynchronous online environment is effective in supporting online learning community. [1] stated that the introduction and application of computer as a resource in teaching and learning process in education has contributed to the achievement of educational objectives. The findings of a study by [7] shows that the perceived richness of online discussion forum has significant positive effect on student participation, interaction, and learning, when used along with traditional classroom lecture. [14] opined that the practice of using online discussion forum to deepen students' knowledge of course is prominent in universities in Europe, America, Asia, and Southern Africa. The use of online resources expand the opportunities for students to reflect upon their thinking and experience the discourse with other students and instructor, and it individualizes their learning experience facilitating development of deep level learning and "new knowledge structures [15,7]. [5] revealed that learning experience and learning satisfaction gained from online forum influence both active learning and independent learning, and that the structure of online forums makes it an effective training ground for deep learning, cultivation of original thought and application of data acquired in the course. [16] investigates the impact of Discussion Boards on students' grades and satisfaction with the learning environment. They investigated two groups of similar students studying similar topic and compared the results after 6 weeks experiment and their results showed that use of discussion boards had a positive impact on students' grades and satisfaction. [17] opined that online discussion forum is made of the User Groups which are the different users that have access to the forum; the Posts which are the messages submitted to the forums, threads which are topics for which a user can submit a post, and an administrator who manage the rules, appearance, database and other technical details required for running the site. [3] stated that with the use of web-based interactions including online discussion forum, students can move or advance easily and efficiently from one segment to another and find relationships of ideas and concepts within the material that satisfy the purposes of their assigned inquiry. According to [18] cited in [19] the roles played by instructors and students in an online discussion forum can be categorized as follows:

**Student roles**

- Starters: questioning, raising issues, reflecting on teaching materials
- Responders: answering questions, posting new questions
- Facilitators: tutoring, introducing new learning sources, administrating

**Instructor roles**

- Host: creating and managing the discussion forum
- Connector: connecting different threads, sources, students for synthesizing purpose
- Mirror: reflecting students' thoughts and raising questions.
- Technical supporter: technically supporting students to use online tools and resources.
- Evaluator: assessing students' performance in discussion forum [18, 19].

A survey by [4] on student learning experience in use of online discussion boards shows that students acknowledged the contribution that can be made by the use of online discussion boards within their studies however they highlighted that the medium should be used in an integrated way with other teaching and learning strategies. Online discussion forum harbours a lot of potentials that can support the achievement of teaching-learning objectives if properly harnessed. Consequently, it is hoped that the present study would contribute to the growing knowledge of online discussion forum with a view to encourage interactivity and use of technology in education.

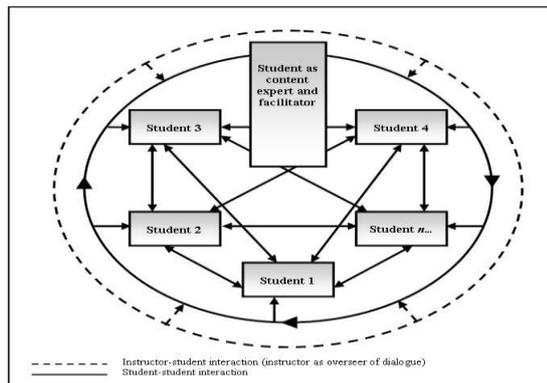
**IV. THE CONCEPT OF ONLINE DISCUSSION FORUM**

Online discussion forum is an electronic platform for online learning, discussion, knowledge sharing, and information dissemination. [17] states that Online discussion forum is a web-based application that brings people together with shared interest and mind-set, and members have the privilege to post messages to the discussion threads, interact and receive feedback from other students and instructors, and hence create a deeper understanding of the subject matter being discussed. Online Discussion Forum is a form of learning through networking which provide opportunities for students to seek, obtain, and share information, and it has beneficial impact on the teaching and learning process [20]. It can improve student's ability to lead a discussion or to think critically to contribute productively or respond to a given discussion. It can improve student problem solving skills and competitive spirit among their peers. Students can read threads of comments and contributions made by their peers, and then compare their knowledge and bring out meaning on the topic being discussed. Student participation in an online forum enables them to think deeply in order to contribute effectively on the platform or to be seen to be relevant during discussions. This can improve their critical thinking skills and understanding of concepts considering the fact that they have the opportunity to read through several comments of different views or approach to solving a particular problem. Having access to different views on a topic provided by other members of the forum in addition to that of the teacher (facilitator) can enhance student understanding of a given course content.

Students who participate in Online Discussion Forums can easily formulate answers to assignment and examination questions because the platform affords them the opportunity to have huge access to several threads of discussions and suggestions on a given course content which tend to build their confidence to attempt or respond more accurately to questions that arise in the course. Therefore, it promotes dialogue, deep learning and research mindset among students. Online discussion forums promote student-centred learning, making it possible for students to take charge and coordinate a discussion. [14] stated that increase in students' participation in online discussion forum increases their learning outcomes and achievement. They also identified four prominent pattern of participation in Online Discussion forum, ranging from Socratic questioning, sharing of personal opinion and experiences, brainstorming and reaction posting.

## Online Discussion Forum as a Tool for Interactive Learning and Communication

Neil and Maria [21] presents a model of online discussion forum as a student centred peer e-learning environment as represented in figure1. They stated that the model positions the student expert/facilitator at the centre of the learning event and the instructor, one step removed from the process, as overseer of the dialogue.



**Fig. 1: Online discussion forum as a student centred peer e-learning environment [21].**

Teacher role and control is reduced to that of a facilitator and mentor rather than a director of knowledge. Student ability to successfully act as a content or topic expert in an online discussion forum tends to boost his/her cognitive and leadership skills. It gives student the experience of thinking critically and deeply to provide accurate responses to questions both in the conventional class and on the online forum. Some of the popular online discussion tools include: BlackChannel Chat, Kialo, NowComment, Turnitin, YO Teach [8] and Blackboard. The proper use of online discussion forum would amount to better performance by students and effectiveness in student-teacher communication.

### V. BLENDED LEARNING

Blended learning refers to learning models that combine traditional classroom practice with e-learning solutions, in which a traditional class can be assigned both print-based and online materials, have online mentoring sessions with their teacher through chat, and are subscribed to a class email list [2]. It accommodates different categories of learners by ensuring that all students are exposed to electronic learning and traditional learning. Blended learning enhance students interface with their teachers both online and offline. It presents them with the opportunity to choose preferred medium of interaction with their teachers. The use of online discussion forum promotes blended learning. It supplements conventional classroom setting, and also give students more time to reflect on the course content, make evaluative comments and constructive contributions [20]. More recently, “flipped classrooms” are being promoted as an extension of blended learning initiatives, and this approach places “more of the responsibility for learning on the shoulders of students while giving them greater impetus to experiment” [22,19]. Students who are exposed to blended learning are more likely to blend easily with their peers and adapt to changing learning situations and environment. Unfortunately, due to the problem of digital divide, many students especially those at the rural areas where basic facilities that support e-learning activities are lacking, may be deprived of the interactive opportunities

associated with blended learning. Hence, the need for relevant authorities to ensure timely provision of learning technologies in all schools particularly in the areas to reduce the problem of digital divides.

### VI. THE NEED FOR ONLINE DISCUSSION FORUM

Online Discussion Forum is a platform for productive discussions on assignment topics or course contents. Information from many sources and contacts can be elicited and various opinions and information can be used for completing class assignments and as a way to generate ideas and brainstorming for writing activities [20]. Having access to several opinions and resources can inspire students to show more interest and commitment to class activities. [16] stated that a well-designed and executed online discussion board can encourage students’ activity, collaboration, motivation, and other social constructivist attributes of the learning process. According to the findings of an empirical study conducted by Tella and Isah [14], shows that the benefits of participating in online forum include; encouraging intellectual support in terms of sharing of ideas, introvert free expression of opinion, more participation of students than in a face to face class, promotion of social interaction, opportunity of asking colleagues what is not clear, and provision of motivation to be involved with the course content.

Online Discussion Forum for teachers encourage and facilitate the sharing and exchange of teaching experiences and expertise, and it serves as a repository for content in various media [23]. Students and teachers can upload tutorial videos for further learning after the normal classroom experience. This can improve student’s learning experiences and also afford teachers the opportunity to assess the quality of their teaching and the progression in learning. Online discussion forum complements the traditional approach to teaching. Sometimes, a teacher may not be able to conclude a given lesson or topic due to insufficient time allocated for such course, but he/she can maximize the opportunities provided by ODF to upload such lessons or materials for further discussions with the students. It increases the level and quality of interactions between teachers and students. Following a given course outline, students can pick a topic for the next class and discuss it extensively on the online forum before the class, and then formulate questions on it to be posed to the teacher during the class. This can increase student understanding of various subject concepts and then motivate them to contribute effectively in the classroom. One of the most appealing features of online discussion forum is that it provides opportunities for students to take ownership of their own learning, and this can spur them to easily create or construct knowledge. Learners can easily link up with other learners online leading to exchange of learning materials, ideas and skills in related areas. It has become a tool for implementation of technology usage in education. Many educational institutions have realized the growing benefits of online discussion forums as such that some are beginning to make it mandatory for students and teachers to participate in e-learning platforms in the school as a way to improve their digital literacy skills.

Online forum does not only promote learning interest but also accommodate different categories of learners including those with special needs who may find it difficult to be physically present at the traditional classroom all the time or to keep pace with other learners in the class. It enhances inclusive learning - enabling individuals to learn at their own pace and time, and to freely contribute to discussions on the platform. [8] states that “with online discussion forum, everyone has ample opportunities to be heard, and connect with other classmates, ensuring equity among all voices in classroom, and less intimidation for introverted students. ‘From the aforementioned benefits, it is obvious that online discussion forum has enormous potentials to motivate students learning interest, activate participation, and student-teacher communication. It also has the potential to increase student’s sophistication in use of digital learning platforms, and formulation of new topics or ideas for discussion and research.

## VII. CHALLENGES ASSOCIATED WITH ONLINE DISCUSSION FORUM

Online Discussion Forums has both benefits associated challenges. Reading through threaded discussions, can be time consuming, and students are often discouraged when there are too many posts to read, particularly when posts are lengthy [16]. Discussion forums are increasingly available and utilized in the delivery of university level courses but such modes of delivery can place significant time demands on academics [21]. [14] stated that participants in the online forum can be constrained by incessant power outage; time factor based on tight schedule, limited access to computers and internet, and cost of access to computers and the Internet. Also, online learners face challenges such as lack of contact with peers, limited sense of belonging to the learning community, and frustration about receiving delayed feedback to postings while teachers with existing heavy workloads face the added pressure of more actively engaging students through discussion forums [19]. The use of online discussion forums can be hindered by several factors among which are stated as follows:

- i. **Poor internet infrastructure:** The use of online discussion forums or any other e-learning platforms requires the availability of good internet connections. Since discussion forums are online-based, it can easily be hindered by network issues and poor internet services. Students who reside in rural areas are often disadvantaged than those who live in the urban areas where internet services seem to be better, and can easily be accessed.
- ii. **Lack of digital literacy skills:** The use of online discussion forums requires some basic digital literacy skills or knowledge of computer. This means that students and teachers who do not have knowledge of computer cannot participate fully in online forums. Students and teachers are often faced with the challenges of updating their skills to adapt to new teaching and learning approach.
- iii. **Low participation of students and teachers:** The motives of online discussion forums can be impeded by poor participation of students and teachers. Efforts have to be made to include features or policies that can attract users to the forum. Several institutions are adopting different

approaches including award of marks and assignment submissions as a way to increase student’s participation.

iv. **Delayed response:** Students can be frustrated if response to their questions in online discussion forum or feedbacks is not provided timely by instructors. Sometimes student postings submitted for approval in forums that requires administrator’s approval are often left pending for days thereby discouraging new postings by students. Despite the fact that some of the posts may require timely responses but the admin may not be available to approve it.

v. **Time demanding:** Many students find it difficult to read through long threads of discussions including those who find it hard to read long text on the screen. Also, the need to respond to several queries and postings increase the workload of teachers who may have many other teaching and administrative duties to carry out. Therefore, it is demanding for teachers to facilitate vibrant online discussion forums.

vi. **Student attitude to learning:** Lackadaisical attitude of some learners affect the effectiveness of online discussion forum. Similar, to the traditional classroom setting, the attitude of learners has a lot of influence on the learning outcome of Online Discussion forum. If students do not participate actively in the forum, and also follow the stipulated guidelines, it may be difficult to have positive effects on their learning outcomes.

vii. **Forum Abuse:** Posting of irrelevancies or frivolities that are not connected to the set objectives of an online discussion forum can discourage some members from participating in the forum or even force them to withdraw their membership. Also, the use of abusive language on postings or comments can dispirit members in online forums, hence the need for proper coordination and coaching.

viii. **Lack of update:** lack of frequent updates in an online discussion forum could result to lack of interest by members. Students would always want to visit online discussion forum if they know that they will find updated information relating to school activities or course content. However, the reverse is the case if the site is not frequently updated. There is need for online forum managers to be active and ensure posting of current updates on the online forum. An active online discussion forum can act as an electronic notice board for staff and students for posting timely, accurate and first hand information regarding a course or departmental activities. That would attract regular student participation.

## VIII. WAYS TO IMPROVE STUDENT’S PARTICIPATION IN ODF

Online discussion forum plays a critical role in improving the digital literacy of students and teachers. However, this can only be achieved if staff and students are encouraged to participate actively in the forum. [19] suggested that “educators need to scaffold student motivation by being explicit about expectations and ground rules for online discussion forums, for this sets the framework for interaction, peer collaboration and dialogue”.

## Online Discussion Forum as a Tool for Interactive Learning and Communication

The present study suggests the following ways to increase student' participation in online discussion forum:

- i. Provision of good internet infrastructures particularly at schools and student's accommodation areas.
- ii. Digital training for teachers and students on usage and benefits of online discussion forum
- iii. Prompt or timely Feedback by teachers and administrators of online discussion forums.
- iv. Formulation of policies regarding the usage of online discussion forum in schools.
- v. Grading of participation of students in online discussion forum
- vi. Regular forum updates by administrators and facilitators.
- vi. Provision of digital learning laboratories in schools.
- vii. Upload of course contents by teachers in online discussion forum
- viii. Administration of electronic test and examinations.

### IX. RESULTS ANALYSIS

The results of the test show that students in the second group were much better than the first group who never participated in the "CSC forum". The distribution of student's scores for the test is shown in figure 2 and 3.

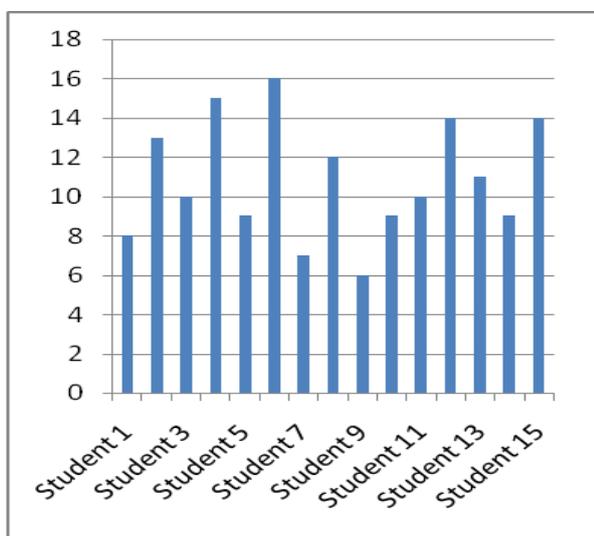


Fig. 2: Distributions of student's scores in the first Group (Non-participants in "CSC forum").

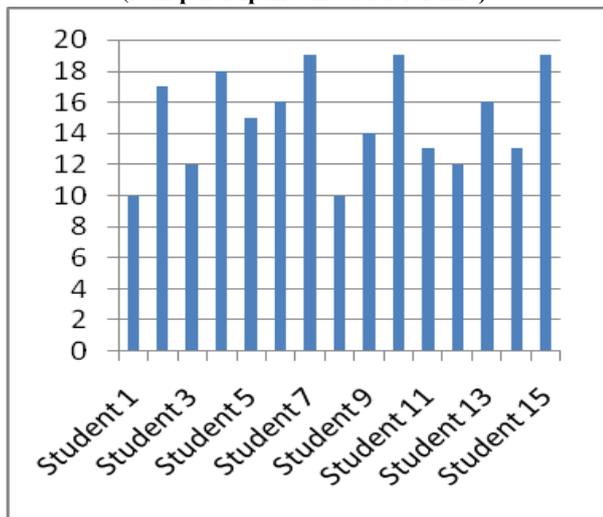


Fig. 3: Distributions of student's scores in the second group (participants in "CSC forum").

The student with the highest score for the first group had 16 marks and the lowest was 7 marks out of 20 marks assigned for the test. While the student with the highest score for the second group had 19 marks and the lowest had 10 marks. The scores show that student exposure to the "CSC Forum" had a positive influence on their performance in the test. Besides, students in the second group were enthusiastic to discuss on several topics posted to the platform. The "Live chat" module of the "CSC forum" provided them with the opportunity to engage in real-time interactions with their peers and the teacher whenever the teacher comes online in the forum. Students communicated freely with the teacher compared to the face-face traditional classroom where the teacher is often seen as a producer of knowledge. The screenshots of the "CSC forum" are attached in fig. 4-9.

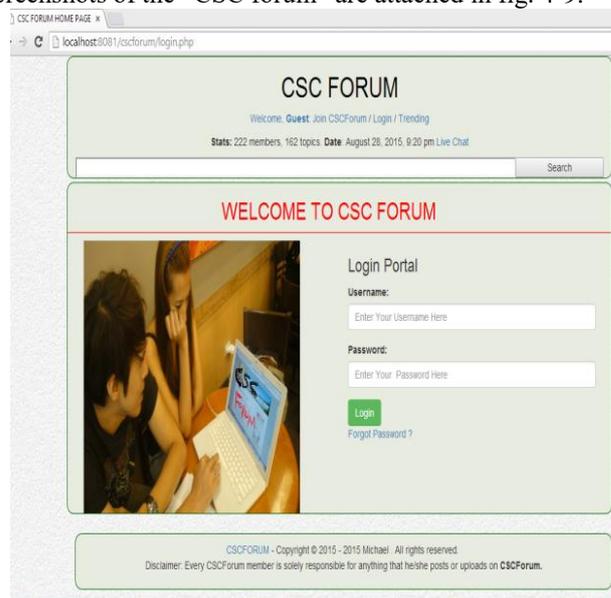


Fig. 4: Home Page

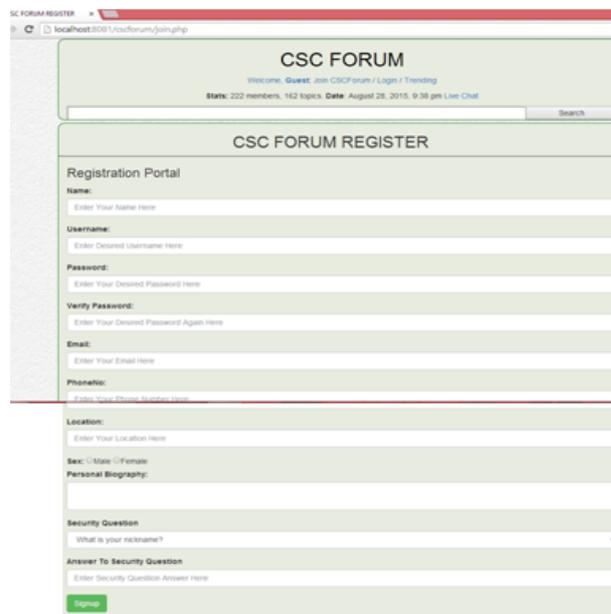


Fig. 5: Registration Page



Fig. 6: Members' profile Edit Page



Fig. 7: Post Approval page

Fig. 7 shows admin's options for approval of post. He can approve (feature) a post, ban, delete or close a post made by members on the forum. Unless a post is featured by the admin, it cannot appear publicly on the forum. This provides a kind of regulation for member posts to avoid forum abuse by members.



Fig. 8: Post creation Page

The post creation enables members to create a post to the forum. Members can also add pictures or upload materials

using this module. Post created requires admin (supervisor's ) approval before it can appear on the forum.

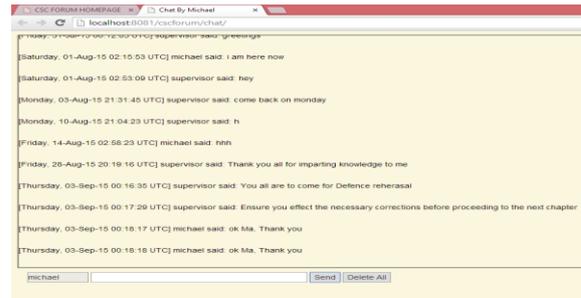


Fig. 9: The "Live Chat" Module

The "Live Chat" module provides opportunity for members to engage in direct conversations among themselves and with the teachers too. It can help teachers to reduce the stress they have to go through in attending to large number of students queuing up at their offices waiting for interactions. It can also save student's time that is often spent waiting to get teacher's attention in the office. It enhances faster feedbacks, and students can easily share their views on particular course content in a more relaxed atmosphere than the face-face classroom.

## X. CONCLUSION

Online discussion forum presents opportunities for interactive learning, inquiry-based learning, and student knowledge acquisition and creation. The Online discussion forum presented in this study proved very effective in interactive learning and communication among students and their teachers. However, for online discussion forum to be more impactful, there is need for increased student and teacher participation to enhance greater productivity. Given the relative impact of ODF, teachers have to devote more time to attend to student queries on the platform and also do more to facilitate or coach discussions and interactions on the forum.

Student participation in the forum can be increased if teachers can increase their presence and usage of the forum for class exercises such as assignment submissions, and attendance registering. Teacher's response should be timely and proactive to activate student interest in the forum. There is also need for proper coordination of the forum to ensure that only relevant posts are allowed to avoid abuses and frivolities that can bore or discourage member participation in the forum.

## XI. FUTURE WORK

The future work will focus on how Online Discussion Forum can be used as an instrument to enhance Inquiry-based learning, and inquiry-based teaching. We will also look at the influence of mobile technologies on E-learning.

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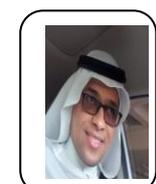
### AUTHORS PROFILE



**Edeh Michael Onyema** is currently a doctorate student at Ebonyi State University, Nigeria. He earned a masters degree in Computer Science Education at Tai Solarin University of Education (2017). He has taught Computer Science courses to students at different higher institutions in Nigeria, including, Southwestern University Nigeria; Coal City University, Nigeria, and Pogil College of Health Technology, Nigeria. He has facilitated multiple professional development programmes for students and youths including members of the National Youth Service Corps (NYSC) Nigeria. His research interest includes Learning technologies, Inquiry-based teaching, and IT Security.



**Edeh Chinecherem Deborah** is a Lawyer. She earned a degree in Law at Enugu State University of Science and Technology (2018), and a degree of Barrister at Law (BL) at the Nigerian Law School (2019). She is a legal practitioner and an educator. Her research interest includes Taxation Law, Criminal law and Legal Education.



**ALHUSEEN OMAR ALSAYED** obtained a master's degree in Information Technology from University of Technology Sydney, Australia. He currently work as a Scientific Researcher with the Deanship of Scientific Research, King Abdulaziz University, Jeddah, Saudi Arabia. He is also a certified Trainer and professional practitioner from KAU and Technical and Vocational Training Corporation, Saudi

Arabia. His research areas of interests include E-learning, cloud-based E-learning, collaborative learning, social networking sites, and other related topics. He has published many papers in indexed int. journals and conferences. He has been appointed as a Reviewer for IEOM GCC Conference.



**QUADRI NOORULHASAN NAVEED** obtained a Ph.D degree in Information Technology from International Islamic University Malaysia (IIUM), Kuala Lumpur. He has also worked as an IT Engineer with Saudi Aramco and Bank Riyad of Saudi Arabia. He is currently teaching with the College of Computer Science, King Khalid University, Saudi Arabia. His current research interests include E-learning, M-learning, cloud computing, cloud-based E-learning systems, and technology-enhanced learning. He is widely published in indexed Int. journals and the IEEE, ACM, and Scopus-Springer sponsored conferences. He is a Reviewer and also an international advisory board of several conferences and journals. He is also in the process to launch a special issue of Scopus Indexed journals.

**SUMAYA SANOBER** obtained a master's degrees (Hons.) from Osmania University, India. She is currently pursuing the Ph.D. degree with Sri Padmavati Mahila Vishvidalaya (SPMVV), Tirupati. She is also working as a Lecturer with the Computer Science Department, College of Arts and Science, Prince Sattam Bin Abdul Aziz University, Saudi Arabia, since 2012. Her research interests include AI, Neural Networks, Web Services, Cloud Computing, and Testing tools