COLLABORATIVE TEACHING AND LEARNING USING INDUSTRY 5.0: A STRATEGY FOR ENHANCING ACADEMIC ACHIEVEMENT IN POST COVID-19 ERA

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Abstract

This paper focused on collaborative teaching and learning using Industry 5.0 as a strategy for enhancing academic achievement in post COVID-19 era. The COVID-19 pandemic that ravaged the world caused large-scale institutional and behavioural 'shock effects' in various areas of human activity, education inclusive. The impact on teaching and learning is unprecedented. This is due to massive and unexpected closures of schools. Affected countries, including Nigeria, have been forced to seek quick fixes in different digital learning platforms. These rapid moves from classroom to online teaching have, to some extent, set aside the more profound questions related to national educational policies. This paper therefore employs a critical lens to reflect on the concept of collaborative teaching and learning using Industry 5.0, procedures for using collaborative teaching methods with Industry 5.0 tools, challenges and strategies for improving the use of collaborative teaching and learning as an approach towards enhancing educational achievement in post COVID-19 era. The paper recommends among others that School managers and administrators need to develop and offer professional development opportunities in the area of Industry 5.0 technology on a regular basis centered on the implementation of collaborative teaching towards enhancing teachers' performance to meet future needs.

Keywords: Collaborative Teaching; Learning; Industry 5.0; COVID-19; Educational Achievement.

1.0 Introduction

Industry 5.0 refers to the collaboration of advanced technologies, such as Information and communication Technology, robotics and artificial intelligence solutions, with humans to improve efficiency and performance in various spheres of life. The enabling technologies related to industry 5.0 include cloud computing, Blockchain, analytics of big data, IoT and 6G networks. (Amr Adel, 2022). In education, Industry 5.0 refers to the cooperation between these technologies and educators and students to enhance the efficiency and effectiveness of teaching and learning. Industry 5.0 technologies have the potential to revolutionize the way students learn, and how teachers teach (Al-Emran and Al-Sharafi, 2023). The application of Industry 5.0 becomes very essential as coronavirus disease (COVID-19) pandemic has caused an unprecedented crisis in all areas and especially in the field of education. This, according to United Nations Educational, Scientific and Cultural Organization (UNESCO, 2020), has led to the massive closure of face-to-face activities of educational institutions in more than 190 countries in order to prevent the spread of the virus and mitigate its impact. According to UNESCO, (2020), by mid-May 2020, more than 1.2 billion students at all levels of education

worldwide had stopped having face-to-face classes and the educational system of the world was halted because of social distancing and the lockdown.

The conventional paradigm of teaching according to Aina and Langenhoven (2015) failed and teaching/learning suffered a severe setback all over the world including Nigeria. During this period, as a measure of social distancing, students and teachers were not allowed to interact physically. Teaching and learning, as stated by Akhtar, Hussain, Afzal and Gilani, (2019), require interactions between students and the teachers which may not only be physical. Therefore, students staying away from schools for a long period may adversely impact on their academic performance. It is, therefore, important that during post COVID-19 era, more effort should be made to encourage collaborative teaching and learning considering Industry 5.0 among teachers and students respectively for an improved educational achievement.

However, Industry 4.0 has prioritized automating processes and reducing the need for human intervention, resulting in machines taking over many tasks previously performed by humans. Industry 5.0 seeks to create a balance between human and machine involvement in order to maximize the benefits of their interaction (Andres et al., 2022). Industry 5.0 therefore, provide opportunities as well as limitations as it is changing paradigm and brings the resolution since it will decrease emphasis on the technology and assume that the potential for progress is based on collaboration among the humans and machines. The use of collaborative teaching, sometimes called cooperative teaching or team teaching, involves educators and machines such as google classrooms, robotic and artificial intelligence working in tandem to lead, instruct and mentor groups of students towards achieving the stated objectives of education. Collaborative teaching, according to Abu (2016), is also described as any academic experience in which two teachers work together in designing and teaching a course that itself uses group learning techniques towards enhancing the students' academic attainment and achievement. Friend, (2008) also viewed collaborative teaching as a practice that is rooted in the philosophy of inclusive education and it involves two teachers collaborating in delivering instruction to a group of students with diverse learning needs, including those with disabilities, in a single classroom. Collaboration can be implemented across all instructional levels and subject areas. Rick and Becky, DuFour and Robert in Oliver (2007) stated that collaborative teaching is a systematic process in which educators work together, interdependently, to analyze and impact professional practice in order to improve individual and collective results. Collaborative skills are highly required by both teachers and students to provide themselves with the ability to work effectively and respectfully with diverse teams in the future. Collaborative Learning (CL), then, is very crucial and is said to be able to facilitate the students to attain higher level thinking and preserve information for longer times than individual learning. The collaboration should be active as it requires a shift from managing the learning of a single group of learners to taking collective responsibility for the success and well-being of all learners. Educational technologies as a product of Industry 5.0 play a vital role in education by providing students with access to a wide range of learning resources, making it easier for educators to personalize the learning experience, and providing students with access to advanced 6 tools (Al-Tahitah et al. in Al-Emran and Al-Sharafi, 2023).

These technologies can revolutionize students' learning and lead to a more efficient and effective education system (Al-Emran & Mezhuyev, 2019). Industry 5.0 also brought a variety of educational applications. One of such applications in education is the use of smart classrooms and learning environments. These classrooms utilize technologies, such as smart boards, interactive displays, and virtual reality, to enhance the learning experience. For example, students can use virtual reality simulations to learn hands-on skills, such as step involves in the preparation of other teaching aids. Another application of Industry 5.0 in education is the use of artificial intelligence and machine learning to personalize the learning experience for each student. This can be made through the use of adaptive learning software, which adjusts the curriculum and difficulty level based on a student's performance and needs Al-Emran and Al-Sharafi (2023). Innovative learning environments (ILEs) are changing the

ways that teachers teach, plan, and inquire into teaching together, but regardless of the teaching environment, effective collaboration requires a shift of thinking from "me" to "we" and from "my learners" to "our learners. Collaboration among teachers for delivering learning content could be beneficial in the following ways:

- Learners benefit from collaborative teaching as teachers take collective responsibility for the progress of all learners. Teachers who know how to collaborate effectively model skills of collaboration to their learners.
- Collaborative teaching environments provide opportunities for teachers to learn from each other on an ongoing basis. They can observe other teachers in action, engage in professional conversations about the impact of different approaches, and get feedback on their own teaching.
- Collaborative teaching teams are based on each other's strengths, support each other's professional growth, discuss ideas, and solves problem together. This creates synergy and allows teams to achieve more than they would if teachers work independently.

Procedure for Collaborative teaching

The procedure for collaborative teaching, according to Abu (2016), involves three main stages as follows:

i. Planning: At the planning stage, members of the team meet together to; discuss the objectives of teaching, identify topics to be taught; identify and select appropriate instructional aids, assign duties to teachers like lead-teacher etc.; select appropriate audio-visual aids, other equipment's and decide about the class work, assignment, evaluation techniques whether oral or written questions or practical work are to be used for evaluation.

ii. Organization: At this stage, members of the team, as planned, arrange to teach the students and note down the different points specifically those that are difficult for the students to understand. The other teachers in the team also assist in the utilization of instructional materials, delivery of lectures and clarification of various aspects of the lessons. During the lectures, the pupils too perform some activities in the class.

iii. Evaluation: At this stage, different tools and techniques are used to evaluate the performance of the students and achievement of the lesson objectives. The shortcomings and problems of the students are diagnosed and remedied.

There are also five elements that facilitate collaborative processes according to Rabeeh (2012) which include: face-to-face interactions, positive interdependence, interpersonal skills, monitoring progress and individual accountability. Each of the five elements is highlighted as follows:

Face-to-face Interaction: This is an important element for collaborating teachers as they make several important decisions. Collaborating teachers need to decide when and how often they will meet as well as how much time meetings will take during school hours. They need to decide when others (e.g., parents, specialists, paraprofessionals, psychologists) should be involved.

Positive Interdependence: This is the heart of collaborative teaching. It involves the recognition that no one person can effectively respond to the diverse psychological and educational needs of the heterogeneous groups of students found in typical 21st-century classrooms. Collaborating teachers create the feeling that they are equally responsible for the learning of all students to whom they are now assigned and that they can best carry out their responsibilities by pooling their diverse knowledge, skills, and material resources together towards enhancing the students' academic performance.

Interpersonal Skills: These include the verbal and nonverbal components of trust and trust-building as well as conflict management and creative problem solving. Such social interaction skills are needed for achieving the distribution of leadership functions and for ensuring that no child is ignored. Individual collaborating teachers will find that they are functioning at

different interpersonal skill levels, depending on their previous training, personality styles, and communication preferences.

Monitoring Collaborating Teacher Progress: - Monitoring refers to the process of frequently debriefing the successes and challenges of collaborating teachers' lessons. Collaborating teachers check each other to determine whether (1) the students are achieving the lesson's learning goals, (2) the collaborating teachers are using good communication skills with each other, and (3) the learning activities need to be adjusted. Methods of monitoring can vary from very simple to more complex approach.

Individual Accountability: This is the engine of collaborative teaching. It is clear that collaborative teaching is effective based on the actual delivery of skills and knowledge by each collaborating teachers. It is a form of acknowledging the importance of the actions from each other. It also involves taking time to assess the individual performance of each partner for one or more purposes. One is to increase partners' perceptions of their contributions to the collaborative teaching endeavor and so on. These procedures when fully adopted and utilized as components of collaborative teaching in our various institutions of learning will help in enhancing teaching and learning in post COVID-19 era.

Collaborative learning on the other hand is a situation in which two or more people learn or attempt to learn something together. Unlike individual learning, people who engage in collaborative learning capitalize on one another's resources and skills, asking one another for information, evaluating one another's ideas, monitoring one another's work, etc. It is a form of learning that is based on the model that knowledge can be created within a population where members actively interact by sharing experiences and take on asymmetric roles.

According to Vygotsky's idea of "Zone of Proximal Development (ZPD)" in Lin (2015) and the concepts of Collaborative Learning view learning basically as a social process which is activated through the Zone of Proximal Development famously known as sociocultural theory. This theory explains how learning is negotiated in relation to the context and experience with peers coming from any possible social relationship. In sociocultural theory, learning is viewed as social term which results from the informal relationship between social interaction and cognitive development of an individual. It is therefore; crucial to consider the interactive processes among people, but the most critical point is the construction of new knowledge brought about through collaboration. Collaborative Learning provides students with opportunities to get new ideas from their peers and thereby establish mutual interaction in the learning process. The more beneficial interactions take place, the more the development the students are able to attain. Dyson and Grineski in Ervin, (2011) stated that classroom content taught using collaborative learning method with heterogeneous team in an inclusive environment encourages positive students' interaction, competition among team members and individual contribution towards collective goals.

Challenges of Implementing Collaborative Teaching and Learning

Teachers collaboration to ensure effective teaching and learning is faced with challenges. Some of these challenges with respect to Industry 5.0 application are discussed below:

While Industry 5.0 brings many potential benefits, it also presents challenges for the education sector One of the challenges as identified by Al-Emran and Al-Sharafi (2023) is the need to prepare students for jobs that do not yet exist. Also, Industry 5.0 technologies are rapidly evolving, and it is difficult to predict exactly which skills and knowledge will be required in the future by students. This makes it difficult for educators to prepare students for the job market and ensure they can compete in a rapidly changing economy.

Another challenge is the need to provide students with the necessary digital skills to thrive in an Industry 5.0 world. As more and more jobs become reliant on advanced technologies, it is crucial that students are proficient in areas such as coding, data analysis, and machine learning. This requires a significant investment in both teacher training and the development of relevant curricula.

Additionally, not all students have the same level of access to technology and digital resources and this can create a divide between those who are able to take advantage of Industry 5.0 opportunities and those who are left behind. Other challenges include:

- **Lack of True Professional Commitment:** Teachers' commitment to collaborative teaching must be absolute and they must be able to exhibit good professional conduct. Professional commitment **is** a powerful tool in education and its achievement. Without commitment, teachers' collaboration can be challenging and it may be difficult to achieve any good results.
- **Poor Planning, Collaboration and Reflection on Time**; Many teachers feel like there are not enough hours in the school day to plan and reflect on their activities. The most common challenge of effective collaboration is lack of time to focus on working together. While this reason may occasionally be used to suppress other issues like personality conflicts or fear of judgment, it is still worth noting that planning time is a valuable resource for educators that should be embedded in their teaching responsibilities.
- **Personality Conflicts and Territoriality**: Collaborative groups comprised of multiple personalities and unique belief systems which can lead to unproductive experiences.
- **Lack of Sufficient ICT Training:** Technology plays a major role in modern teachers' collaboration. It gives teachers direct access to the knowledge, experience, and resources of countless educators who they may never have connected with in their immediate professional circles. Most of the teachers lack requisite and sufficient skills to use ICT resources as required while collaborating in teaching-learning process. This is because most of the teachers are reluctant to use new technology during teaching and learning. New technologies need to be integrated in the classroom and teachers have to be trained in the use of ICT devices in particular towards enhancing collaborative teaching. In this regard, some initial training is needed for teachers to develop appropriate skills, knowledge, and attitudes regarding the effective use of computers to support learning. Label and Hime (2006) noted that the success of teaching with digital information technology would be difficult to achieve due to lack of deep knowledge of ICT by teachers.
- **Inadequate Provision of ICT Infrastructures**: Infrastructures are the primary factors that can enhance the use of ICT by teachers while collaborating in teaching and learning. For instance, many tertiary institutions are having weak internet connectivity and those who have strong internet connectivity may not have enough computers and other devices that could be utilized for teaching and learning especially in the rural areas where internet access is not readily available. Naidu (2003) stated that the greatest obstacle to the growth of e-learning is lack of access to the necessary technological infrastructure for without it there can be no e-learning. Poor or insufficient technological infrastructure is just bad as it can lead to unsavory experience that can cause more damage than good to teachers, students and their learning experiences.
- **Teacher's attitude: -** Some teachers consider their classrooms as their own and having an additional teacher might be considered as an invasion of their professional space. Murawski and Swanson in Ervin, (2011) found that some teachers were opposed to using collaborative teaching because they were not willing to share instructional responsibilities. These differences might also stem from philosophical standpoints. For example, some teachers might not support the use of collaborative teaching because they are opposed to the philosophy of inclusion (i.e., including students with special needs in regular education classrooms). Students with special needs may present characteristics that place them outside of teacher's tolerance and they may al-

so need extra attention from the teacher thereby slowing instructional pace. It is demands such as these that make the use of collaborative teaching complicated.

- Other challenges according to a collaborative learning study conducted by Lee and Bonk cited in Lin (2015) include: member isolation in virtual teams, generation gaps and age differences in the acceptance of collaboration tools; lack of technology support for learners, lack of learners' awareness about effective collaboration processes and strategies; and lack of learners' technological skills and knowledge about collaboration tools.

Strategies for enhancing collaborative teaching and learning

Collaboration, just like any other skill, can be improved upon with practices. Here are some strategies to set the stage for successful, high-quality teacher collaboration in Post-COVID - 19 era.

Develop and Agree upon a Shared Vision and Mutual Goals: The level of ownership teachers feel about the process determines how much time and energy they really put into collaborating. Having a shared vision and mutual goals can lead to the buy-in required for teachers to have a genuine sense of ownership. For example, if your team identifies that it is committed to building relationships with students and students' learning, it will set goals related to that vision, discuss how to reach the goals, and assess progress regularly.

Provide honest and open communication. Good team collaboration relies on open and truthful communication. The more people feel they can contribute and the more ideas can be shared, the more productive the team will become.

Encourage creativity: A collaborative team should be innovative and capable of creating space for creativity where both teachers and students can demonstrate their level of commitment towards attaining the stated learning objectives. For instance, brainstorming sessions can be a great way of opening up your team to creative thinking.

Use of Technology: Technology has provided enough tools and equipment for teaching and learning. Collaborating teachers should adequately adopt suitable technologies for enhancing teaching and learning. Students' learning can be significantly enhanced through the use of technology. Students are frequently ahead of their teachers with their knowledge of technology. It is important for teachers to be as current as possible in the use of instructional technology and team should have time spent talking about technology integration while collaborating during teaching and learning.

Share Knowledge, Insights, and Resources. Knowledge, as they say, is power. And if knowledge is shared among the team, they will feel more empowered to contribute on an even playing field. For instance, file-sharing software can help the team access the resources they need to do their jobs more effectively.

Developing Collaborative Capabilities: To collaborate effectively, teachers need to be deliberate about developing their collaborative capabilities. This includes: actively contributing to a safe and supportive teaching environment**,** being skilled at managing teaching/ learning situations including learning facilities, having growth mindset**,** taking collective responsibility for the well-being and success of all learners.

Additional Task/activities*:* Some teachers usually develop task or activities that can reinforce, enrich, or extend learning. When students complete a particular learning activity early, they are expected to "go to" and complete an anchoring activity. Activities may include readings, cumulative review sheets, computer work or other ideas teachers develop. Team members can discuss the different types of anchoring activities that work or might work in their individual classrooms.

Examining student work: - This can be a valuable use of time. There is often a discrepancy from teacher to teacher in determining what constitutes rigorous work. Team members can bring work samples to team meetings and discuss how they go about assessing students' work.

Post COVID-19 Era

Post Covid-19 era is very significant in the restoration of normal academic activities in the various institutions of learning. The pandemic and the social distancing that followed has affected education. In order to keep education running, educational institutions had to quickly adapt to the situation. This has resulted in an unprecedented push to online learning. This situation had almost led to the negligence and to some extent abandonment of the conventional teaching strategies. Post COVID-19 era should usher in some of the best conventional approaches such as demonstration, collaboration, discussion, field trip among others in collaboration with Information and Communication Technology (ICT) to enhance teaching and learning towards accomplishing the set goals of the education systems at all levels.

Presently, many institutions of higher learning are relying heavily on information technology for teaching and learning with little emphasis on conventional instructional delivery system. According to Selwyn (2019), educational institutions are increasingly quantifying their operations, which create a temptation of using data for surveillance rather than support for education. Technology and datafication of education according to Birch et al. in Teräs, Suoranta,, Teräs,. *et al.*(2020) are typically synonymized with progress and economic growth. The proponents of data mining argue that education generates growing volumes of data, so this data should be processed and applied to improve students' education achievement in post COVID-19 era.

Educational Achievement

The overall educational performance of students can be enhanced at post-COVID-19 Era when collaborative teaching and learning approach is adopted and practised. As a result of COVID-19 pandemic, many countries of the world adopted social distancing as one of the measures for mitigating its spread. Collaborative teaching and learning approach has equally been extended to classroom learning situation. Students are being taught in groups. Therefore, adopting collaborative teaching technique with utmost commitment in the utilization of industry 5.0 technologies in practice will enhance students' academic performance. Students' performances, according to Leonard and Leonard in Oliver (2007), will be enhanced only when the instructional staff function as a team and abandon the traditional norms of isolation and individualism. The shared responsibility of teamwork and mutual support requires time, hard work, and skill development. Educators must have a commitment to assist all students in their learning. Cefai (2008) believed that classroom teachers who promote collaboration among their peers while also participating in collaborative groups assist in creating a successful learning environment where students thrive, grow and achieve educationally, behaviorally, and socially. Blanchard (2007) believed that collaborative teams accomplish work, make better decisions, solve problems that are more complex, enhance creativity, and build skills more than working in isolation. For people to work collaboratively in the school setting, they must have skills, tools, and information. Also, they must trust each other and be actively involved and included in all of the collaborative processes for educational growth and development.

2.0 Recommendations

The following recommendations are made to further enhance the use of collaborative approach in teaching and learning:

i. There should be adequate provision of learning facilities such as robotic, artificial intelligence, 6G network among others that will enhance the preparation of teachers and adoption of Industry 5.0 technology for training and retraining of teachers. This will on the long run enhance students preparation and academic performance.
ii. Teacher education programmes need to develop and offer mandatory courses to prospective teachers focused on collaborative teaching and the involvement of Industry 5.0 technology. This is to ensure that they have conceptual knowledge needed for the future and the use of the technologies for collaborative teaching before they are employed.

iii. Placement for student teachers should be made in classrooms where collaborative teaching approach is the instructional delivery model. This will allow the prospective teachers to see collaborative teaching in practice, thereby giving them the much needed practical experience. Research demonstrates that teachers benefit immensely from professional and academic preparation in school-based practices
iv. There is also a great need for teachers who are already on the job to be adequately trained in the use of Industry 5.0 technology for practices stipulated in the philosophy of inclusive education such as collaborative teaching.
v. School managers and administrators need to develop and offer professional development opportunities in the area of Industry 5.0 technology on a regular basis centered on the implementation of collaborative teaching to their teachers. Professional development is a critical factor for the implementation and sustainability of collaborative teaching practices for educational growth and development.

3.0 Conclusion:

COVID-19 had come and the entire world including Nigeria felt its impact, and gradually, it has been contained to a great extent. Therefore, educational sector must live above board by coming up with more robust approaches in addition to the virtual teaching and learning strategies already given priority. Collaborative teaching and learning approach becomes very handy and an option that should be embraced. COVID-19 has increased consciousness in the education sector with regards to social distancing which has invariably lead to regrouping of students for instructions, involving more teachers in teaching few students and deployment of industry 5.0 technologies and other ICTs for teaching and learning. These attributes should be galvanized and re-modelled into approaches for sustained collaborative teaching and learning. This paper identified challenges of using collaborative approach to teaching and learning as well as strategies for its improvement. Other suggestions for continuous improvement were also identified. Their uses, therefore, will on the long run help in the realisation of Nigeria's educational objectives and goals in post COVID-19 era.

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