COLLABORATING FORMAL AND INFORMAL ELECTRICAL/ELECTRONIC EDUCATION FOR EFFECTIVE SKILL ACQUISITION

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Abstract

As times change, so the educational needs evolve and the ways to addressing issues change. The educational needs of the students and the society at large could only be attained through trending and evolving models. The conventional educational systems for years now have not helped matters in making the electrical/electronic education students acquire the requisite skills. These therefore, call for the change of the trajectories, through some educational reforms. The study took some descriptive investigations into the causes of the lack of proficient skills by the electrical/electronic education students, and ways out of these. The researcher is of the opinion that interfacing formal and informal learning/education systems will be the solutions to solving some of these nagging problems. In doing so, the study investigated the matter by surveying how curriculum adjustment, project based learning methods, hackathon ideals, flexible assessment learning methods, interdisciplinary engagement models, peer learning methods and continuous learning designs would enhance electrical/electronic education students attain proficiency in skill acquisition. Thereafter, conclusions were taken and recommendations for further investigations were proffered by the author.

Keywords: collaborating, formal, informal, electrical/electronic education, effective skill acquisition.

Introduction

The lack luster in the acquisition of requisite skills by the electrical/electronic education students, through our educational systems with which to address the myriads of socioeconomic problems, has made it compulsory for the educators, stakeholders, researchers to go into asking questions and seeking ways of coming out of the conundrums. Sequel to these, it calls for the interfacing of systems through rejigging and reforming of key educational systems, policies and infrastructure.

At this point, it is expedient to explain the concepts of formal and informal learning (education). Noy, James & Bedley (2016), stated that informal learning occurs on a continuum of formality with the following characteristics, the location where the learning is taking place, whether it is a professionally led or student led, the duration to which the content and context is organized with the curriculum, the purpose of seeking the knowledge. From the authors view point, formal education is characterized with issuance of certificates,

is professionally led, have an organized curriculum under the auspices of a school. Again, organized informal education (learning) occurs when there are different settings involving schools, work, the community and the home. This form of education is usually sought for by individuals, and curriculum is used by the instructor but lacks the award of certificates. In contrast to the foregoing, informal education does not necessarily require a professional, an organized curriculum, and is programmed in such a way that it is self-directed, incidental and actualized through socialization.

According to Innovation (2016), innovation and transformation in education, does not happen by chance and in a vacuum but takes the interfacing of systems and the environments, that should be supported through congruent or genuine policies, educators and all stakeholders of the industry.

There had been tremendous achievements in the educational classrooms, yet they have not aligned properly with technology in order to raise the standard of productivity, efficiency, quality and be able to foster equity in the ways things are done as compared with the public sectors of the economy. As a result, education must take its pride of place of developing critical thinkers, imaginative and creative personnel, through requisite skills acquisition.

The 21st century educational systems are completely different from the contemporary ways the public schools were structured. They have moved from classroom based to a conglomerate of team-based hands-on and minds-on systems that make them create and generate skills that can apply to all ranges of issues in addressing socioeconomic and political matters. Teachers are now realizing that teaching skills only are fantasies, unless they are backed up with result oriented provable applications to real world of work and problems (Interdisciplinary Education, 2013).

In order to strengthen innovation in education, Al-samarraie (2020) suggested the introduction of flipped classrooms in higher education (FCHE), a game initiative that is intended to attract the attention of the students towards creativity and teamwork development, something that cannot be achieved using the conventional systems and practices alone. Deploying the hackathon model as a form of educational innovation into marrying informal and formal education, Lyons, Brown, & Donlon (2021), observed that the model is experiential, active and involves multiple interactions with experts, facilitators and mentors, as was seen during the COVID-19 pandemic.

The use of emerging educational technology impacted positively on how the students did see the performance of their teachers with the educational resources that made the students to contribute online through discussions, which enhanced the acquisition of knowledge of the students, thereby boosting professional learning, was the observation of (Douglas, James, Earwaker and Mather, 2020). With the following backdrops, it becomes expedient that paradigm shifts be sought for in order to innovate our educational systems mostly the electrical/electronic education sector.

Curriculum adjustment

Curriculum has always been the yardstick by which the standard of the performances of schools, economies and the societal values can be measured. Therefore, the wellness, soundness and the proper implementation of any curriculum agenda, goes a long way to defining and determining the achievement and progress of such a community, organization or establishment. According to Gouëdard & Pont (2020), the purposes of curriculum designs

(CDs) are to map out what are to be learnt, how they are to be learnt, and why they should be learnt, and also how the successes and otherwise, should be evaluated, including the human, financial and material resources needed for the attainment.

The world is rapidly growing diverse, interwoven and needs technological dynamics that are not easy to come by. These therefore, pose challenges to the people and the society alike. Consequent upon these, the world is rebranding the ways of surmounting the challenges through knowledge and skills summersaults that should be incorporated in the education sector. For instance, in Asia, North America, their urban schools had evolved changes in their modes of policies and practices formulations as forms of modernization and innovation, by creating global cities education network (GCEN). The import of the creation of GCEN was hinged on benchmarking the performance practices of other countries as well as systematically equating and comparing such practices with their own performance practices (Cities, Net and Report, 2012).

Vista, Kim & Care (2018), observed that modern education is migrating to the acquisition of broader range of skills and getting critical thinkers, but the challenge globally now is how to harness and support students in developing, upskilling broader skills. Therefore, the components of modern education systems must incorporate the support for the development of broader 21st century skills. The qualitativeness on the different strata of these skills, depend solely on new approaches both in the measurement and evaluation, and the collation of assessment information. At this backdrop, it becomes imperative to look at the different curricula, with the view to finding out whether they are meeting up with the 21st century standard and the millennium development goals (MDGs).The absence of the knowledge of the 21st century skills' demands, and how they can be taught, and the lack of possible curricula alignments between traditional skills learning agenda and that of the emerging modi we are in, that are causing bottlenecks in the educational systems of the Third world countries (Vista, Kim and Care 2018).

Looking at the Asian Tigers and what made them what they are, it becomes expedient to review our curricula in different fronts of our national life. Kibga, Sentongo & Gakuba (2021) observed that hands-on and minds-on activities as parts of curriculum adjustment designs (CADs), give students the opportunity of developing feasible solutions to some problems of life. Through CADs, the deliverables of activities of skills' acquisition intentions are articulated and achieved. It gives the students the yearnings for lifelong learning intents, and motivates them into exploring and digging out the facts that would ignite their curiosity, guide and direct them toward facing challenges. Alismail & Mcguire (2015) stated that modern educational curriculum designs (MECDs) should be knowledge based, critical thinking oriented, skills' innovation and media focused, information and communication technology (ICT) centered, real life experience anchored, literacy and problem solving inclined, in contexts and contents of core academic subjects.

Project-based learning

Most of the courses requiring practical work have little time allocated to them unlike theoretical work in the classrooms where more time allocations are spent, that needs to be reversed. This gives the students ample opportunities to be acquainted with the realities on working the talk as far as skill acquisition (SA) is concerned. I have seen some electrical/electronic engineers with fascinating results, but in the field of work, they were

empty leading to joblessness. One of the domains of education is psychomotor/pragmatism which entails one doing the work with ones' hands. The electrical/electronic education students should be exposed to knowing the job, facing the challenges in the field of work. If their courses of learning are mainly project-based (PB), and they are given teachers and lecturers that know their onions in the field, they will be awesome performing exceptionally.

According to Perrotta & Houghton (2013), the integration of game-based learning (GBL), game design attainment (GDA) and good practice outcomes, as parts of project-based learning (PBL), helped the teaching learning processes of the UK. It provided some common fronts that through video games (VG), young people developed alluring interests and came together to operate across different divides in the execution of their projects and personal developments. PBL has exposed learners to some experiences that made some formal school subjects looked simpler through interaction and simulation, than the norms and rigorous methods of the conventional textbooks, lessons, assignments, 75% classroom attendance requirement and note-copying issue (Perrotta and Houghton, 2013).

School administrators and stakeholders in education are advised to look inward and integrate PBL, because it helps to build the frontiers of quality research and accessibility, facilitates school processes, cultures and leadership norms, builds the teachers' knowledge, motivates the policy environment of the teachers and students (Coldwell, Greany and Higgins, 2017).

Edition (2021) stated that PBL as part of e-learning was relevant in education due to some cultural and religious beliefs, that made it to be subject specific to the students in meeting their needs real time, and equally confronting their seeming difficulties headlong, as to professional communication and responsibilities.

Menzies, Hewitt, Kokotsaki, & Collyer (2016) stated that real projects (RPs) as the hallmarks of skill acquisition entailed that the teachers from different subject-areas, do come together to plan and design projects that would enable the students to produce public-oriented products (POPs), publications and presentations. Projects' building should involve the students' research topic writings (SRTWs) and redesigning of images (RIs), redrafting of texts (RTs), creating proofs (CPs), getting the publishing quotes, getting books published as well as getting them launched. It is a fact that constructivism is a learning strategy that draws students closer to knowledge and skill acquisition proficiency (SAP) corridors, and therefore be able to synergize and synthesize new understanding. Knowledge gotten on the basis of mere memorization hardly sustains and cannot adequately be transferred. Transfer of knowledge is achievable when the transferor readily knows and understands the concepts involved and apply them accordingly.

Hackathon ideals

There are many models that can be deployed in giving the students the future that sustains, and making them grasp the skills that endure, result oriented and be pragmatic. One of such models is the Hackathon philosophy of doing things by the engagement of the young minds in doing things through competition. Education of the 21st century, according to (Padua, 2020) is based on a lifelong and life-wide learning framework, where soft skills play key roles. In fact, education in the digital era, should not be constrained only in the area of technical abilities and competences, but should cover wider cultural perspectives, stemming from different philosophical views-of-thought, anchored on innovative learning (IL), open

space and adherence on ingenuity, love for platforms that support the students in developing lifelong skills that transverse competences, together with proactive roles in the global society. The Italian government, having seen the lack luster performance in her network connectivity (NC), human capital development (HCD), human development index (HDI), with regards to her soft skills acquisition (SSA), ranking her 26th on the table in the European Union survey in 2019. Discontented with that position, went into making specific efforts in building intrapersonal and interpersonal skills enhancement bridges, involving cognitive, emotional and social dimensions (Padua, 2020).

In Korea, one of the Asian Tigers, there were lacks of spaces for the population to get tertiary education. In the light of these, the government quickly set up a presidential education advisory council (PEAC) in 1989 that advised the government to relax the modus of degree acquisition (DA) through Self-Education. This led to the creation of academic credit bank system (ACBS) that snowballed into a sporadic education summersault for good, for their country, and has been in operation in that country, with wide acceptance for 30 years now. Mention must be made of Germany that has relaxation for some modalities for the conditions concomitant for gaining admission into tertiary institutions, recognizing informal and non-formal education and learning (Werquin, 2010).

Flexible assessment methods

The rigid dispositions for somebody becoming somebody through the statutory conditions from the four walls of the academic institutions, the rigorous channels one must pass through, is fast becoming a facade. There must be rooms for flexibility and some soft-landing for the students in their quests for skill acquisitions. The contemporary chalkboard, textbook and 75% classroom attendance before one is allowed to write examinations and possible graduation should be looked into. Johnson (2022), stated that non-formal education is any education that is organized and is a systematic activity that is carried outside the classroom, tailored to providing some selected types of learning to some targeted groups, including adults and children. From this position, it means that this education is structured around some set objectives, void of some formal education preconditions, that takes place anywhere but the formal classroom. Adopting theoretical norms always that are void of learner-experience are de-motivating to some students which may cause them to abandoning their pursuits, midstream.

Siew (2021), advocated that with the adaptation of engineering development process (EDP), flexible learning (FL) affords the students the opportunity of identifying problems, designing the roadmaps to creating, developing, testing and evaluating what they have designed, for tracking, tackling the problems of man, with less costly materials. Flexibility allows students to observe that there are many angles to finding solutions to problems of life, through brainstorming. The optimal ways of finding solutions to the problems of man within some given time frames, make them mandatory that those involved, should be critical thinkers, designers, collaborators, creative and communication skill builders as well as problem-skill solvers.

With FL, students have the opportunity to choose the time and location to study, without being compelled to attend a course at a mandatory time and place. Here, they have distributed and staggered learning processes and programs with the teachers/instructors, the learning materials available, from which they choose the most appropriate times and venues

convenient for them to attend (Basar, Mansor, Jamaludin and Alias, 2021). In a flexible learning environment (FLE), according to Onebunne (2022), guided by skilled and well experienced teachers, students use powerful devices and platforms. The school curriculum is expected to provide the students all that they need in a rapidly changing world, as there are needs of adapting to more flexible ways of personalizing teaching learning paradigms with technology.

Evaluation & Teaching, (2013), stated that standards ensured quality in teaching and learning. Standards are parts and parcels that provide consistencies in benchmarking the teachers in their pedagogical performances, pinpointing more areas of professional learning opportunities, as well as recognizing teachers who excel in their different areas. It is standard that ensures fluidity and flexibility, enabling for the movement of teachers and staff, horizontally and vertically across all the divides. It served as quality assurance mechanism (QAM} for measuring the effectiveness and competencies of the Australian teachers in the discharge of their pedagogical duties.

Interdisciplinary engagements

To attain optimum successes in skill acquisition, there is need for interdisciplinary engagements (IEs) between electrical/electronic education students with the students of other disciplines, in order to get different realities on ground, thereby getting enduring skills that will make them to come to terms with some of the happenings in other climes. This is because no course is wholly independent on its own. It is an established fact that the motor vehicle has different sections, manufactured by different sections in the engineering industry. The battery is made from the auto department, the prime-mover from the mechanical department while the alternator is from the electrical/electronic department and by synergy it stands out as a completed coupled system.

It could take the forms of collaborative learning (CL), and curriculum design (CD). According to Learning, Students, & Outside, (2012), CL is that structure that goes along with different stages that enable people to arrive at or produce some specific products in mind.

IE is another learning activity that is student-centered and teacher-guided, that engages the learners into investigating the real-world posers, within a chosen-subject time frame. It complements the informal and non-formal education by being a vehicle through which the students' learning outcomes are connected with their interests in broader topic-related outlook. The learners obtain and evaluate their data, develop and support proposals, supply answers, create technologies and products that conform to their thinking, the outcome of their learning being made manifest (Ronald, Styron and Ed. 2013). CL involved a wide range of methods that were different from the amount of classroom and outside the classroom programs that were targeted to group work. It involves all the classroom/workshop interactions the teachers have with their clients, as well as the use of ICT platforms like computers, smart-phones to engage in discussions in online forums.

Another aspect of achieving interdisciplinary learning (IL) result is through the re-designing of the curriculum. According to Education & Skills (2010), the re-jigging of the leading teacher programs (LTPs) in the areas of leadership, technology, diversity basically on learning theories, curricula designs, schools' philosophy, practical exhibitions and leadership instruction roadmaps, and the remodeling of the curriculum to capture the national council for accreditation of teachers of education (NCATE) and the interstate new teachers' assessment and support consortium (INTASC), helped in delivering IL objectives in America. The

import of curriculum design (CD) and its application in IL, was of great significance to teachers and administrators in the U.S., because it influenced their work. This was because it agreed with the Ontario's curriculum and assessment model (OCAM) as a benchmark. The collaborative design process (CDP) of planning and integrating all units, encouraged teachers and administrators clarify their understanding of standards and assessment (Drake and Reid, 2017).

Peer learning methods

Learning by mimicking or emulation is most rampant with children of the same age bracket(s). Tailoring this idea into education and mostly in electrical/electronic education, if well managed will boost the learning standard of the students. It is seen that most breakthroughs in scientific and other discoveries are by mimicking somebody or looking at what someone had done, zeroing your efforts towards that, with some modifications, one stumbles into his own discovery. If it is encouraged, it will enable the students grasp skills faster than the classroom model of reading, writing and copying long and burdensome notes, though the notes are for the records.

Peer learning method (PLM) is an active and constructive process of autonomous and scaffolded access to acquiring proficient enduring skill through proximal development. Here, the learners are given opportunities to be co-constructors of the learning exercises (Carvalho and Santos, 2021). It is the teachers' statutory obligations to assess students and the ways they do the assessments differ, either formatively or summatively. The import of these, are to underscore the assimilation of their teaching by their students. It is all about setting the students up, for the expected results to be attained through learning.

Shana & Abulibdeh (2020), stated that the conventional laboratory work, placed premium on scientific norms and terminologies making the students to see only what was happening during laboratory experiments. The students may judiciously follow the instructions in the workshops and laboratories to arriving to some solutions, but such cannot give them, the chances for creativity, soundness as well as developing their cognitive skills and be proficient.

Continuous learning designs

It is expedient to continue to experiment on some learning designs (LDs) repeatedly even when successes have not been attained. It is in the course of the experimentations, that one stumbles into success. The person may not recollect expeditiously the roads, he/she went through before achieving the feat, but if he/she continues to try out all the processes he/she went through, this time with caution, he/she will come to understanding the processes the better, and will be in the better frame of mind to documenting the processes, in a clean and informed way. He/she will be better disposed guiding, guarding those that will come his/her way for tutorials and the needed skills' proficiency.

According to Edition (2021), mentorship programs (MP) as parts of E-learning content (ELC) like mobile devices produced self-paced e-learning platforms, where learners were free to learn at their own paces and as such were able to define their individual learning paths based on their individual needs. For instance, it was in Canada, Switzerland and Korea that many students were certified with qualifications in the formal educational setting without contents. The problems of settling and retaining these students with their acquired educational qualifications (AEQs) posed challenges of disconnect as they worked with the

Alberta and Saskatchewan. Another problem was how to reverse, reskill or upskill these certificated qualifications and individuals, to meeting the demands of the changing days as observed in the Health, Transport, Agriculture, Oil and Gas sectors of the economy. These certified qualifications were not reversible because there were no contents in them. Had there been contents in them through the collaborations of formal, informal and non-formal education systems, there would have been easy ways of adapting and adjusting to any emerging demanding situations (Werquin, 2010).

The purpose of attending any course, schooling inclusive is to be pragmatic, and projects make students to be pragmatic when they participate actively in projects creation. All projects that are designed by teachers and meant to addressing the problems of the society are supposed to have students' creative inputs. When these are done, the feedbacks from what they get from such projects would be replicated in their individual problems. Projects that have and add values to the students must always involve professional and traditional inputs in them, in order to balance the mismatches that may arise in future, if they are one sided. These will translate to their being able to addressing some pertinent questions that may confront them and the society as they creatively live, as was witnessed in the UK. Open project learning (OPL) that involves traditional and professional mixes, make the students to be marketable since through it the students acquire the employers' required skills (ERSs) (Menzies et al., 2016).

In support of the CLD, Edition (2021) stated that online learning (OL) as a paradigm shift from the traditional face to face (TFF) teacher's interactions with students afforded the students the preparedness for their classes, having pre-information online before coming to their classes, acquainted with the topics to be discussed, having their own ideas relative to the issues to be discussed in the classes. Collaborating formal and informal education systems in general and electrical/electronic education in particular will engender effective classroom management (ECM), tailoring teaching to the individual needs of the students, enhancing the skill acquisition prospects (SAPs), limiting time wastages as well as cost.

Conclusion

The author is of the conclusion that if the observations outlined in this article are adhered to, the problems of getting proficient skills by the electrical/electronic education and other education students could be solved or reduced to the barest minimum.

Recommendation

The author recommends that the findings of the study be replicated in other educational fields, since there are similar problems in other academic fields.

The government, policymakers, curriculum formulators, stakeholders and other enabling bodies should fund education adequately because these ideals and methods are capital intensive.

The collaboration of formal and informal education methods should be improved through workshops, seminars and conferences.

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