



## REPOSITIONING ELECTRICAL/ELECTRONICS TECHNOLOGY EDUCATION PROGRAMME IN NIGERIAN UNIVERSITIES THROUGH UNIVERSITY-INDUSTRY PARTNERSHIP

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### Abstract

*One of the challenges confronting education is how to ensure that students are provided with opportunities and the capacity to transition into whichever field of vocation they have chosen. One way to address this challenge is through a functional university-industry partnership. University-industry partnership is a bi-directional relationship between university and industries with the sole aim of developing mutual benefits over time. This paper looks at the concept of university-industry partnership and how it could be harnessed to reposition electrical/electronics technology education programme in Nigerian universities. The paper also discusses several modes of university-industry partnership and how lecturers, students, and industry personnel in the field of electrical/electronic technology can benefit from such relationship. The paper concludes and recommends that the Heads of Department in collaboration with university management should come up with a blueprint/framework for university-industry partnership in Electrical/Electronics technology education programme in their various localities.*

**Keywords:** University-Industry Partnership, Collaboration, Electrical Technology Education, Electronics Technology Education

### Introduction

University-industry partnership is a bi-directional relationship between university and industry organizations, established to enable the diffusion of creativity, ideas, skills and people with the aim of creating mutual value over time (Chedid, 2021). Gento et al. (2022) view it as the relationship that exists between universities and industry to promote the exchange of knowledge and technology. It can take different forms, but the most important are collaboration and research agreements, talks and conferences and student internships. Additionally, Baporikar (2020) inferred that it refers to any type of cooperation between universities (i.e. their researchers) and companies in order to jointly either develop new goods/services or improve existing goods/services. Such forms cooperation include collaboration in determining training needs for programmes, funding training, curriculum development and review, involvement of experts from the industry in teaching, student internships and teacher exposure to the industry (Nkondola et al., 2019).

The essence of university-industry partnership is to enhance competence and skill acquisition in order to tackle social and economic problems such as creating more jobs and reducing unemployment. Guimon (2013) opines that successful university-industry partnership needs to support the missions and motivations of each partner. Jones (2021) outlined numerous benefits derived from university-industry relationships, including benefits to society, universities, and companies. The author stated that society benefits from university-industry research relationships through innovative products and technologies because industry-sponsored university research is often developed into practical applications that benefit society. The author also pointed out that interactions with industry are clearly thought out with attention paid to the benefits that will accrue to the university. The author asserted that some universities seek industrial partnerships because of the potential financial rewards of patents and licenses that result from the commercialization of academic research, as it provides a means by which the universities can decrease the governmental funding gap.

Partnership can take place in different forms such as in curriculum development and review, identification of skills demanded by the industry, funding training activities and donation of training facilities and equipment (Rufai, Abdulkadir, & Abdul, 2013). Partnership can also occur in terms of engaging industrial experts in teaching and assessing practical skills, academic staff attachment to industry to get exposure of the world of work (Obwoye, Mwangi, & Nyongesa, 2013) and students' internships (Raihan, 2014). For the purpose of this paper, the modes of partnership to be reviewed will be limited to curriculum formulation, human resource sharing, research and development, facilities provision, students' training, technology transfer, and knowledge transfer.

### **Partnership in Curriculum Formulation**

A curriculum is the combination of instructional practices, learning experiences, and students' performance assessment that are designed to bring out and evaluate the target learning outcomes of a particular course. It encompasses a variety of technical and non-technical courses that are required to complete a specific degree. Subharani, Bhuvaneshwari, Tamil, and Sujithra (2014) view curriculum as a blueprint of an educational programme and encompasses all the meaningful and desirable activities taking place in and around the environment.

Mulenga (2018) defines curriculum as all the selected, organized, integrative, innovative and evaluative educational experiences provided to learners consciously or unconsciously under the school authority in order to achieve the designated learning outcomes which are achieved as a result of growth, maturation and learning meant to be best utilized for life in a changing society. According to Dyjur and Kalu (2018), a curriculum becomes prescribed and described as the program of study, made up of a series of individual courses intentionally designed for learning and negotiated by faculty in the light of their specialized knowledge and in the context of social expectations and student's needs.

One fundamental role of the academic staff of any university is to design the curriculum of the degree programmes within the university. As enshrined in the National Policy on Education (Federal Republic of Nigeria, 2013), every institution determines the content of courses for its degree programmes in line with minimum standards stipulated by the National Universities Commission (NUC). This requirement of curriculum formulation by the academia may be seen as limiting the freedom of employers to influence the curriculum, while experience indicates that there is sufficient common ground between employer needs, quality assurance benchmarks and professional body requirements for there to be little reason why employer needs are not integrated within the process of degree programme design (Erkarlsan & Ayku, 2018). According to Erkarlsan and Ayku (2018), the level of engagement is clearly at the discretion of the university and occurs at variety of levels of prescription as many universities operate employers' advisory groups, often at departmental level. The authors opined that these groups may act as 'critical friends', monitoring the activities and development of the department; others act as industry advisors in research fields and in curriculum design. This is a mode of university-industry partnership that is often invisible outside a university's department and the existence of such a group is of legitimate interest to students in terms of future employment prospects.

University-industry partnership for curriculum formulation in Electrical/Electronics technology education programme is better and easier when both university/faculty and industry's expectations coincide together. Curriculum formulation is not a simple process which should be accomplished without collaboration of different stakeholders. A strong collaboration between Electrical/Electronics technology education programme and industry in curriculum formulation process is critical to the production of well-equipped graduates that could fit in the world of work. World Bank (2013) asserts the paramount importance of industry involvement in curriculum development process by outlining that collaboration between universities and industries is critical for skills development (education and training), the generation, acquisition, and adoption of knowledge (innovation and technology transfer), and the promotion of entrepreneurship (start-ups and spin-offs).

Matkovic et al. (2014) emphasized cooperation between universities and industry in curriculum development process, since it provides multiple benefits for universities and industries, as well as for the economy and society in general. The authors listed the benefits often gained in curriculum development partnership between universities and industries to include: improved relevance of learning outcomes, enhanced content of courses and subjects in relation to the needs of industry, intrinsic real life experiences through industrial attachment, immediate feedback on adequacy of the developed curriculum, development of new courses and adjustment of present ones, better trained graduates, eased selection and recruitment of graduates, etc. Banbul and Sintayehu (2017) emphasized that a strong collaboration between university and industry in curriculum development process has become critical to produce well equipped graduates that could fit in the world of work. The authors suggested that contemporary curriculum development processes should increasingly involve public discussion and consultation with a wide range of stakeholders like the industries.

### **Partnership in Human Resource Sharing**

Human resource refers to the persons employed in an organization. According to Betterteam (2022), the term human resources (HR) describes the people who make up the workforce of an industry or organization. Heathfield (2021) opines that a human resource is one person within an industry's overall workforce, with each person lending their skills and talents to the organization to help it succeed. Heathfield also opined that any person willing to trade their labour, knowledge, or time for compensation in an effort to improve the organization is a human resource, irrespective of if they're part-time, full-time, freelance, or contract employees.

Albats et al. (2020) asserts that human resources play a vital role in the successful implementation of university-industry partnerships, as there exists a strong dependence of the utility and quality of collaboration on the partners' available resources. Myoken (2013) insisted that, for a successful collaboration, highly qualified human

resources are paramount. Also, of significance are unrestricted access to libraries, lab space, similar infrastructure, and/or technical equipment (Boardman & Bozeman, 2015). Merritt (2015) argues that larger enterprises can harness university-driven and generated knowledge more efficiently than smaller enterprises due to a higher level of human capital in the larger enterprises. The smaller enterprises are less capable of absorbing the said knowledge since they generally lack qualified technicians and engineers who are invaluable for innovation endeavours.

Human resource sharing between Electrical/Electronics technology education programme and industry entails staff mobility and the joint participation of employees from both the programme and industry in the diffusion of creativity, ideas, and skills with the sole aim of creating mutual value over time. Human resource sharing and training can take the form of training of industry employees, internship programs, postgraduate training in industry, secondments to industry of university faculty and research staff, the participation of adjunct faculty from industry, and cooperation in curriculum development (Guimon, 2013; Bermejo, Eynian, Malmskold, & Scotti, 2022). According to Fagrell, Geschwind, and Jörnsten (2016), many universities have recognised staff mobility as a way to increase knowledge transfer between academia and the surrounding society, and they have developed strategies addressing how this kind of collaboration and cooperation could strengthen their universities. Furthermore, the authors opine that knowledge transfer and mobility of personnel are often discussed from the universities' point of view, with the assumption that all knowledge is 'produced' at the universities and has to be transferred to society. There is also technology interchange which represents an interactive process between various stakeholders such as universities, engineers in businesses, capitalists, patent attorneys and so on.

#### **Partnership in Research and Development**

Research and development is the process by which an industry works to generate new knowledge that is then used to create new technology, products, services, or systems that the industry will either use or sell (Staff, 2022). Similarly, Kenton (2022) view research and development (R&D) as a process that includes activities that industries undertake to innovate and introduce new products and services (often the first stage in the development process), with the goal of taking new products and services to market and adding to the industry's bottom line. Additionally, research and development (R&D) entails businesses gathering knowledge to create new products or discovering new ways to improve their existing products and services (Brunel University, 2022). According to the author, larger companies may have their own research and development team that will test and refine products or processes before commercial use, however, many companies outsource this work to universities due to a lack of in-house capacity and to access the expertise and advanced research equipment they possess.

Research and development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge (including knowledge of humankind, culture and society) and to devise new applications of available knowledge (OECD, 2015). According to OECD (2015), a set of common features identifies R&D activities, even if these are carried out by different performers. R&D activities may be aimed at achieving either specific or general objectives. R&D is always aimed at new findings, based on original concepts (and their interpretation) or hypotheses. It is largely uncertain about its final outcome (or at least about the quantity of time and resources needed to achieve it), it is planned for and budgeted (even when carried out by individuals), and it is aimed at producing results that could be either freely transferred or traded in a marketplace. For any activity to be a R&D activity, it must be novel, creative, uncertain, systematic, transferable and/or reproducible (OECD, 2015).

Research and development partnership between Electrical/Electronics technology education programme and industries can assume several modes. Matkovic et al. (2014) suggests it can be in form of consultancy work (commissioned by industry), contract research agreements (commissioned by industry and undertaken only by university researchers), industrial consulting by university staff and bilateral staff exchange, joint research agreements (involving research undertaken by both parties), joint research by funding joint research centres built by companies operating in the university campus or joint projects, technology transfer (patent sale or licensing, joint ventures for the commercialisation of joint research, creation of spin-of firms), and writing scientific publications (papers and books). Similarly, Guimon (2013) suggests inter-organizational arrangements for pursuing collaborative R&D including research consortia and joint projects, research-related activities commissioned to universities by industrial clients including contract research, consulting, quality control, testing, certification, and prototype development.

#### **Partnership in Students' Training**

Trainings entail any planned activity to transfer or modify the attitude, knowledge, skills and abilities of individuals through learning experiences in order to achieve effective performance (Kapur, 2019). Students' training as a mode of university-industry partnership is an avenue to provide students with current and relevant knowledge, hands-on activities, and real-world experiences, thereby augmenting competencies and skills acquired in the classroom. This mode of partnership helps in putting students' theoretical knowledge into practical experience as a result of learning that occurs through undertaking real work and through the production of goods and services, whether this work is paid or unpaid (Rajania, 2016). Additionally, students' training in university-industry partnerships come with numerous benefits such as development of technical and soft skills due to the learning-rich environment of industry,

career development particularly in terms of increased knowledge of available career paths, and social development through increased levels of job satisfaction, motivation and self-confidence (Rajania, 2016).

There are several modes of engaging students' training in order to aid successful university-to-industry transition in Electrical/Electronics technology education programme. Guimon (2013) suggested that such trainings could involve the training of industry employees, internship programs, and postgraduate training in industry. Students' training could also come in form of industry provision of on-the-job training opportunities and part-time work opportunities, postgraduate training in industry (e.g. joint supervision of PhDs), projects with the participation of students by writing theses or seminar papers, graduating students' internship in companies, and student volunteers' internship (Matkovic et al., 2014). Similarly, Ankrah and AL-Tabbaa (2015) opines that students' training activities in a university-industry partnership could include internships in industry for students, students' involvement in industrial projects, joint supervision of Masters degree dissertations and PhD Thesis by academic and industry personnel, and industrial fellowships for students. Furthermore, Walker and Boyer (2020) pointed out that internships and co-op programs are one option that provide industry exposure to trainees through full time, short term employment with an industry.

### Conclusion

Having reviewed several literatures, it can be seen that Electrical/Electronics technology education programme in Nigeria can be repositioned for better effectiveness and efficiency through a functional university-industry partnership model. A partnership in curriculum formulation will help bridge the gap between the skills acquired by graduates of the Electrical/Electronics technology education programme and skills required for performance in workplace. A partnership in human resource sharing will ensure diffusion of creativity, ideas, and skills, while a partnership in research and development will go a long way in providing lecturers and students of Electrical/Electronics technology education programme with expertise and facilities to conduct research projects while bringing innovative products to the market that gives the industry a competitive advantage. Finally, a partnership in students' training will ensure that training in Electrical/Electronics technology education programme is carried out in the same way with the same operations, the same tools and the same machines as in the occupation itself.

### Recommendations

Based on literature reviewed, the following recommendations are made:

1. Heads of Department in collaboration with university management should make it a policy of engaging industry experts in curriculum formulation and review process, as it will help bridge the gap between the skills acquired by graduates of the Electrical/Electronics technology education programme and skills required for performance in the industries.
2. Heads of Department in collaboration with university management should liaise with relevant industries in their localities in order to promote staff exchange through secondments or sabbaticals. This will allow industry experts to bring a wealth of industry knowledge and experience into the classroom which can aid in the preparation of undergraduates for the world of work.
3. There is need for Heads of Departments to collaborate with industries through joint research or writing of scientific publications. This will allow industry personnel access the expertise of the lecturers while the lecturers enjoy advanced research equipment the industry possess.
4. Electrical/Electronics technology education programmes need to develop a partnership framework with industries in their locality for students' training. This will augment the effort of SIWES already in existence. This will also address the issue of industries preferring engineering undergraduates over undergraduates of the programme.

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