

# Optimising Learning Outcome via Project-Based Learning in the Production of Technicians

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**Abstract — the Department of Electrical Engineering runs a multi-exit level programs where student can obtain a National Diploma or the Bachelor of Technology. One of the requirements of the program is for graduates to be industry-ready and globally marketable. Project-based learning was adopted in the Department to produce graduates that are nationally relevant, industry compliant and globally marketable. Design Project 3 is one such course that gives the graduates an apex outcome and a cutting edge advantage in the market place. This was designed to improve employability of the graduates.**

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It has been realized that many factors are involved in graduates being employable, retainable and self-employable. These factors include graduates good understanding of the world of work and awareness of business ethics. Others are his ability to innovate in a rapidly changing economic landscape by integrating knowledge, work experience, technical and interactive skills. One of the strategies employed here in the department is to tackle the problem of employability from the “grass root” through curriculum transformation which saw the injection of Design Project at eh National Diploma level. Design Project is seen as an anchor for producing self-empowered nationally relevant, industry-ready, and globally marketable technicians [5].

## DESIGN PROJECT AT ELECTRICAL ENGINEERING DEPARTMENT

### INTRODUCTION

There is an increasing need to make products of out university and polytechnic employable [1], [2], [3]. The need arose because of the volatile economic landscape where jobs rather than the seekers are on ever increasing queue. Getting a job is now critical, but keeping the job is assuming an important role in the labour market. Namibia as an emerging economy needs workforce that can get and keep job. The jobs are fewer than the number of job seekers. It is therefore imperative that products of our programs are employable and retainable. In many countries it has become it necessary to benchmark universities against a graduate employability performance indicator (EPI) [6], [7], [8]. The Department is therefore proactive in ensuring that it has a high EPI without government directive. The Government has been appealing for job-creation capacity building and increasing our EPI will go along way to ensure that graduates are employable, retainable and self-employable.

Employability has been aptly defined by the Learning and Teaching Support Network (LTSN) [4],

*“a set of achievements -skills, understandings and personal attributes - that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy.” (Yorke, Knight et al, 2003)*

It is appropriate to consider retainability of job and self-employment as components part of employability.

Polytechnic of Namibia is a young institution of higher learning in a young nation both being 15 years and 10 years old respectively. The Polytechnic of Namibia, committed to producing technical manpower for that is needed for economic development, started an engineering school with Electrical Engineering as one of its departments. The department runs two programs leading to Bachelor of Technology in Power Engineering and Electronic Engineering with exits point at National Diploma level. The National Diploma is a 3-year sandwich program where a student spends 1 year in industry to acquire work experience and two on the campus. This sandwich arrangement which involves employers in the training is aimed at producing “work-ready” products, that is, ‘graduates should be capable of hitting the ground running’ [4], [10]. Graduates of these programs must be employable in the traditional and emerging industries. Employability here also includes self-employment.

One of the courses introduced that assisted in producing the much needed apex outcome that gives the product a cutting edge in the competitive market is Design Project [9], [10], [10]. It is an outcome focused curriculum where graduate should have acquired “kick-and-go” industry-ready skills and knowledge. The main focus of the course is two folds. Firstly the students are taught the mechanics of project management and are required to demonstrate their understanding of the integrity by managing their own project. Secondly, since it is an accepted nom that knowledge is

created through the transformation of experience, the students are given the latitude to identify an engineering problem, proffer solution and implement such solution within time and budget constraints. The students then bring on board all the theoretical knowledge and practical skills acquired to arrive at an elegant solution to an engineering problem. Due to the diversity of problems in an industrial setting, the student may pursue a project with a physical product output or a pure research into cause and effect, analysis or projections.

The core requirement of the curriculum is hinged on four axes.

- As a young nation, there is a dearth of manpower particularly in the previously disadvantage group. Graduates of the Polytechnic therefore must be able to fit into the fabric of national aspirations.
- Graduates must be able to fit into the national industrial landscape. Most of the industries in the nation are appendages of the parent company from beyond national borders with traditional production line which requires defined skills and know-how. It was felt important that the curriculum must be able to produce emerging workforce that can fit into the traditional shop floor.
- Graduates of the program must also be globally marketable. While it may be true that initial graduates of may not find job placement difficult, it is a known fact the economy may not expand quickly enough to absorb the products. The curriculum must therefore look beyond producing manpower for national market alone. It must produce graduates that are mobile in the global village.
- The forth consideration in fine-tuning the curriculum and giving it an apex outcome, is the need to produce graduates that may be empowered to employment creator- products that can venture into the market by establishing his/her own business.

The curriculum was therefore designed to allow the students to be aware of their strength, weakness, opportunities and challenges. It trains them to develop interpersonal as well as technical skills. It gives them the opportunity to make choices in a competing situation. It teaches them how to do research and market the products of their knowledge and skill. It attempts to “integrate knowledge, work experience and technical and interactive skills development, together with reflection on the needs of a flexible organization”.

### PREREQUISITE KNOW-HOW

Since this is expected to be an apex outcome, the curriculum was designed in such a way that the students have necessary pre-requisite knowledge and practical skills. This is done in three ways.

- Many of other courses are practical intensive.
- Two projects are introduced where the students are guided in art of engineering skills, computer-aided design and production before this final one.
- The students spend a year in industry that gave them a real-time environment for engineering practice.

### COURSE ADMINISTRATION

#### *Choice of Project*

The course is made up of the theoretical and practical components. In the theoretical phase, the students are taught the basics of project management with its triple constraints, i.e.” high quality, cheap product delivered in a short time.” Other components include standards, estimation and report writing. The student is required to submit reports on project identification and proposal at the end of this phase as a practical outcome of the theoretical lessons.

A student is given a free hand in the choice of a project. The choice could make from a technical problem he came across during the mandatory experiential learning period. Many students have gone this way. The student also could decide to work with a Lecturer on an on going research work. Other areas of choice are problem of national or student interest. In each case the topic is assessed for technical viability, credit worthiness and financial feasibility by the allocated Mentor.

#### *Technical Reporting*

Each student has to write the following reports. Emphasis is placed on grammar, structure, layout all of which are graded out of 40%. The balance 60% is awarded for technical accuracy.

- Initial Specification
- Literature Search
- Proposal
- First Progress Report
- Second Progress Report
- Final Documentation
- Advertisement flyer

#### *Technical Presentation*

The Proposal as well as Progress Reports is presented before a small committee for two reasons. Firstly, the student is given the opportunity to demonstrate the skill of presentation using audiovisual skills acquired during the program. Secondly lecturers have opportunity to inject direction into the whole process. The final Report is equally presented and the product demonstrated to a wider technical audience mad up of lectures from the department. This four-time presentation of reports is a confidence building and quality assurance strategy that has led to the production of good projects and skilled “industry-ready” graduates.

*Technical Mentoring*

A Mentor is allocated to the student for guidance. If the project is a specific industrial one, usually a co-mentor is required from that industry. This practice adds value to the quality of the product developed and service to the industry. It provides a good link between industry and academic.

**CONCLUSION**

The course has given ample confidence to the graduates and has made many of them employable in the industry. It formed a solid background for those who opted to proceed to Bachelor of Technology level.

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