Organisation of Islamic Cooperation

COMPARATIVE STUDY OF UNDERGRADUATE LEVEL ELECTRICAL AND ELECTRONIC ENGINEERING CURRICULA OF SELECTED UNIVERSITY IN OIC COUNTRIES.

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RECOMMENDATION OF THE BOARD OF EXAMINERS

It is recommended that this thesis prepared by **Nadoukou Idris Adamou**, titled **COMPARATIVE STUDY OF UNDERGRADUATE LEVEL ELECTRICAL AND ELECTRONIC ENGINEERING CURRICULA OF SELECTED UNIVERSITY IN OIC COUNTRIES** has been accepted as fulfilling part of the requirements for the degree of Master of Science in Technical Education (M.Sc.T.E.) with specialization in Electrical and Electronic Engineering (EEE).

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This is to certify that the work presented in this thesis is an original work of me, Nadoukou Idris Adamou, a student of the Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT), The Organization of Islamic Cooperation (OIC), Dhaka, Bangladesh. This work has not been submitted to any other institutions for any other degree.

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ABSTRACT

Curriculum in education, is the outline of concepts to be taught to students to help them meet the content standards. Curriculum is what is taught in a given course or subject and it refers to an interactive system of instruction with specific goals, contents, strategies, measurement, and resources. On the other hand, Assessment in education ascertains the extent of achievement of a program learning objectives by the students and the effectiveness of the delivery approaches and processes used by teachers in educational institutions. The assurances of quality assessment in engineering universities can result in the production of highly competent graduates for the labor market. The OIC member countries are facing major challenges in Engineering professional registration standardization as a whole and in the field of Electrical & Electronic Engineering as a whole due to the significant differences in the undergraduate curricula in these countries.

This paper compared undergraduate Electrical & Electronic Engineering curricula in five countries members of the OIC i.e. Osun States University of Nigeria, King Fahd University of Egypt, Kocaeli University of Turkey, University Teknikal Malaysia Melaka of Malaysia and Qatar University of Qatar. A review of the course requirements, course credits and course hours of these universities were presented and eventually compared. The research grouped the courses into three different categories: general courses, core courses and electives courses. Some similarities were noted among all five universities. The main similarity is the teaching of modern language such as English. Secondly, five core course subjects are taught in the five universities. These subjects are electrical, electronic, Control Eng. (System), Electromagnetics and the end of year project of study.

Regarding the assessment systems of the universities, although each university has its own specificity, some similarities between King Fahd University and Qatar University which both have the same system for evaluating students was observed.

Therefore, based on these outcomes, engineering universities are recommended to improve the existing programs of the OIC member states universities in order to better promote and reinforce cooperation and exchange programs in between different universities. OIC Engineering universities

are equally recommended to consider the perceptions of their students and teachers and put more emphasis on the practice of quality and authentic evaluation practices and better train teachers in the use of appropriate teaching and assessment techniques.

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LIST OF ACRONYMS

Acronyms	Meaning
TVE	Technical and Vocational Education
IUT	Islamic University of Technology
OIC	Organization of Islamic Cooperation
M.Sc. TE.	Master of Science in Technical Education
EEE	Electrical and Electronic Engineering
WES	World Education Services
ECTS	European Credit Transfer and Accumulation System
GER	General Education Requirement
BER	Basic Engineering Requirement
EMR	Engineering Major Requirement
UTMe	Unified Tertiary Matriculation Exam
KFU	King Fahad University
UTeM	University Teknikal Malaysia Melaka
QU	Qatar University
KU	Kocaeli University
OSU	Osun State University

CHAPTER I

1. INTRODUCTION

Background and present state of the problem

The curriculum of a subject or a study program is described as a throbbing pulse of a nation(Malik et al, 2019). By viewing curriculum one can judge the stage of development of a nation. Every day, new technologies are being created and discovered. In regards to the numerous researches taking place worldwide, there is a need in updating and revamping the existing curricula after regular intervals in order to introduce the latest development and innovation possible in the relevant field of knowledge.

The role of science and engineering in the economic development of a nation is quite important. This is so, because these students are going to become the countries' workforce in future. In order to keep at pace with the world involvement, it is primordial to follow the international standards.

The hallmark of curriculum is to infuse original thinking, resourcefulness and entrepreneurial spirits among students(In, 2013). It is essential that the contents of each constituent courses of the curriculum have been updated to absorb recent technological developments to meet the nation's need. Efforts are equally made in order to have an effective relationship between curricular content and practice in the field of specialization.

This thesis is about carrying out a comparative study of the existing undergraduate Electrical & Electronic Engineering (EEE) curricula of selected universities in OIC countries. The following sections presents the related literature review, research objectives, methodology, and the tentative time table for completing the study.

Electrical and Electronic Engineering is a field whose demands have considerably changed with the years and it is changing every day. All different areas of specialization in EEE are rapidly growing as new fascination disciplines are also being created(Brüsow & Wilkinson, 2007). No curriculum is standardized internationally i.e. it varies from one country to another. Hence, the EEE curriculum of one university may vary from that of another university to meet up with the demands and needs of a country or region.

Many studies have focused on curricula within a specific area having the same culture, recent studies have extended the scope to cover countries in different continents (Brookfield, 2007). In the United States, Russell and Stouffer conducted a survey of about 40% of electrical engineering programs in the US. In their studies, they considered three major courses sets i.e. mathematics & Science, general education and engineering courses. As a result of their survey, they examined the satisfaction of the curriculum to the accreditation requirements of the Accreditation Board for Engineering and Technology (ABET) under Washington Accord. In conclusion, they found out that EEE curriculum is technical but lacked other important areas like professional skills, system thinking and liberal arts. With regards to research on engineering education in Muslim countries, the literature search has revealed few studies on the subject. Some research focused on accreditation issues in electrical and civil engineering in Saudi Arabia(Kanter et al., 2009).

Other researches also treated issues such as the quality and sustainability of engineering education in Africa(Zubizarreta & Development, 2006). There has equally been a number of researches on problems and challenges such as curricula and quality of lecturers faced in the educational systems.

It is true, an international curriculum exists but some countries in Africa faces challenges in implementing it they believe that the curricula were designed for Western rather than African realities.

In Bangladesh, the main focus of the EEE department curriculum is on four major areas- power and energy, electronics, computer and communication. A student becomes specialized in one of these branches of engineering without compromising the basic and fundamental knowledge of EEE field. In addition to that, courses such as basic mathematics, social sciences, ethical principles,

management and practical work and experiment in laboratory are part of the curricula. In African countries such as Cameroon, the current EEE undergraduate curricula lags mainly in research and development(In, 2013).

The European Credit Transfer and Accumulation System (ECTS) is a tool of the European Higher Education Area for making studies and courses more transparent. It helps students to move between countries and to have their academic qualifications and study periods abroad recognized.

ECTS allows credits taken at one higher education institution to be counted towards a qualification studied for at another. ECTS credits represent learning based on defined learning outcomes and their associated workload. ECTS enhances the flexibility of study programs for students. It also supports the planning, delivery and evaluation of higher education programs. It is a central tool in the Bologna Process, which aims to make national education systems more comparable internationally. ECTS also helps make other documents, such as the Diploma Supplement, clearer and easier to use in different countries.

ECTS has been adopted by most of the countries in the European Higher Education Area as the national credit system and is increasingly used elsewhere.

Objectives of the Study

This study mainly focuses on the EEE curricula at undergraduate level of universities in selected OIC countries. As stated in the background of this study proposal the curriculum varied among the countries and even among the universities in a single country. Therefore, this study was be carried out with the following specific objective:

To compare the curriculum content in terms of subject/ course category, credit hours and implementation mode among selected universities in selected OIC member countries;

To compare the students learning assessment systems of the selected universities;

The significance of the Study

The OIC member's countries are facing major challenges in Electrical and Electronic Engineering and the whole of the Engineering field at large. Professional registration standardization is an issue due to the major differences in the undergraduate curricula in these countries. Throughout the world, regulations have been established in the engineering job in order to protect the wellbeing of the people. With a wide non- uniformity in curricula, some graduates in the engineering field may not be qualified for a professional registration in their home countries

Delimitations of the Study

The research considers some OIC countries based on semester basis system. It compares some undergraduate electrical and electronic curricula in some countries of the OIC. The universities which follows the European Credit Transfer and Accumulation System is not going to be considered i.e. only the universities following the American Accreditation system is considered. The research would take in consideration degree requirements related to mathematics, science, statistics and probability, calculus, free electives courses, English language, Islamic studies, engineering fundamentals, computer proficiency, required electrical and electronic courses and technical electives courses.

Definition of terms

- Credit hour: The Federal definition of credit hour states that "A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than;

One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks;

Or at least an equivalent amount of work as required in point (1) of this definition for other activities as established by an institution, including laboratory work, internships, practical's, studio work and other academic work leading toward the awarding of credit hours

CHAPTER II

2. REVIEW OF RELATED LITERATURE

Developing an electrical and electronic engineering undergraduate curriculum is a difficult task that involves many challenges, such as continuous advances in technologies, accreditation, professional standards, local and international market requirements, student intake background, and institutional objectives and resources.

Electrical engineering is one of the most dynamic, challenging and rapidly changing disciplines in modern engineering and technology. The challenges faced by today's graduating electrical engineers are very diverse and stimulating. Such advancements and changes, ultimately, form a challenging task for educators. If countries have to maintain edge on world economics and sustain in providing jobs to its nationals, it must prepare for this wave of change(*Educating the Engineer of 2020*, 2005). The curriculum design seeks to address two major objectives in undergraduate education: firstly, to enable students to experience in-depth learning; and secondly, to facilitate the development of transferable skills. It has long been recognized that traditional teaching techniques often fail to encourage in-depth learning of subject content, which goes beyond short-term memorization to enable the assimilation of new knowledge in a way which allows reapplication to novel situations (Zallaq, 2019). Some of the studies have involved the exploitation of appropriate technology to support open and distance learning, and the design of curriculum based upon constructivist and experiential learning principles(Savery & Duffy, 1995).

Other examples can be found in (Al-Hazimi et al., 2004), where authors have used an innovative educational methodology adapted to the requirements of a new era with new societal and industrial challenges for electronic engineers (Memon, 2007).

2.1 Definition of Curriculum

Historically, the notion of curriculum is not a scholarly concept. In French speaking countries, curriculum designates a study plan, a program or a course, depending on whether an emphasis is placed on progression in knowledge, successive contents or structuring of the school career. Meanwhile in English speaking countries, we speak of curriculum to designate the educational path offered to learners (Mulenga, 1993.).

Curriculum is often one of the main concerns in the educational field. What kind of curricula should be offered to learners? Educators and teachers are concerned about what choices are to make about teaching content and methods. As for the parents, they would like to know what their children are going to learn. Learners are also concerned about what kinds of content they are going to have in class. “Curriculum” seems to be considered greatly as what teachers are going to teach and, in other words, what learners are going to learn. In fact, “curriculum” is also closely related to how well the learners learn—the outcomes. Thus, as an umbrella term, “curriculum” includes a lot of issues, for example, teaching curriculum, learning curriculum, testing curriculum, administrative curriculum and the hidden curriculum (Chandrasekaran et al., 2013.).

In a common sense, curriculum is a journey, the one summed up in curriculum vitae. The definition in the educational field is different, it rather represents a training course. And there begins the complexity: is it a real journey? or a dreamed, thought out, organized, “programmed” course to generate certain learning? When Rousseau writes Émile, he hardly needs to distinguish his project and its realization, because the educational path he dreams of is designed for a single person, tailor-made. Undoubtedly there is always a possible and even inevitable distance between the intention to instruct and its effects, and even between the dreamed educational path and the actual experience of the “teachable” or “learners”(Mulenga, 1993.). But this distance appears trivial, since it is found in all human action. In education, it is both hollowed out by the complexity of the mind and the autonomy of educators, and limited by the continuous possibility of adapting educational action, of reorganizing the course according to the resistance of the subject or of the reality.

However, with the expansion of formal education in almost all societies around the world an appropriate and suitable definition of the term ‘curriculum’ has become increasingly essential and

necessary. Instead of achieving a consensus and thereby enhancing a clear educational focus, literature reveals continued differentiation and disputation as to an acceptable definition of the term. Apparently, despite its recent common usage and development of study areas in the curriculum field, the term has a long history which dates as far back as the ages of education writers such as (Mulenga, 1987.).

Till date, there continues to be a high interest in curriculum matters both locally and internationally and a range of different theoretical discussions continue to be widely discussed in relation to international standards set by the global players through platforms such as the Sustainable Development Goals (SDGs), International Student Assessment (PISA), academic conferences and others. For this reason, some kind of a common understanding of an appropriate curriculum needs to be reflected upon since the measure of educational achievements, which in essence is brought about by the implemented curriculum, are compared between and among countries and continents. Curriculum, has also become quite frequently used in the media and the community in general. Such a development cannot be overlooked by curriculum scholars whose duty is to give guidance and direction on curriculum issues. As the study of curriculum has also grown in sophistication so it's very nature has become more challenging and sometimes problematic especially to novice and sometimes Journal of Lexicography and Terminology, Volume 2, Issue 23 even seasoned scholars of other disciplines that are learning about it for the first time in a systematic manner.

Curriculum as a Program of Education Over the past decades, the study of curriculum has become an established component of almost all education programs. Why has that been the case? It is obvious that education is the basic function that a curriculum saves in any education system and learning institutions. A curriculum embodies the intentions of education; it is the program of education (Mulenga, n.d.). A curriculum carries the beliefs, values, attitudes, skills, knowledge and all that education is about. One would wonder how especially formal education can take place without a curriculum. It is for this reason that curriculum scholars refer to the curriculum as the 'raison d'etre' of education, i.e. the very substance of schooling(Mulenga, 1993.).

Curriculum could also be defined as mentioned by (Stage, 2009), as follows;

Curriculum is:

That which is taught in schools

A set of subjects.

Content

A program of studies.

A set of materials

A sequence of courses.

A set of performance objectives

A course of study

Is everything that goes on within the school, including extra-class activities, guidance, and interpersonal relationships.

Everything that is planned by school personnel.

A series of experiences undergone by learners in a school.

That which an individual learner experiences as a result of schooling.

2.2 Types of Curriculum

The typology of curriculum is subject to interpretation. Since, curriculum reflects the models of instructional delivery chosen and used, some people, might indicate that curriculum could be categorized according to the common psychological classifications of the four families of learning theories i.e. “Social, Information Processing, Personalist, and Behavioral.” Longstreet and Shane have dubbed divisions in curricular orientations as: child-centered, society-centered, knowledge-centered, or eclectic (*MARGARET MAHUPELA*, W.S and Shane, H.G, 1993.). Common philosophical orientations of curriculum parallel those beliefs espoused by different philosophical orientations – Idealism, Realism, Perennialism, Essentialism, Experimentalism, Existentialism, Constructivism, Re-Constructivism and the like. With all of these sources it should be obvious that there are lots of types of curriculum.

Whatever classification one gravitates toward, the fact remains that at one time or another curriculum in the world has, at some level, been impacted by all of the above. In essence, curriculum is hard to pin down because it is multi-layered and highly eclectic.

The most important point to note is that no serious research has been done by the curriculum scholars in order to classify the "types of the curriculum", but some efforts have taken place in attending to the classification of "curriculum definitions". In this regard,(Mulenga, 1987.) had gathered a large number of various curriculum definitions, from which he drew the conclusion that the definitions could be classified into three different groups based on the curriculum (Pierson, 2008.) preferred to classify curriculum definition based on metaphors. He proposes three different metaphors namely the curriculum "as a production", "as a growth", and "as a journey". Of course, there are other metaphors that can be used such as "play", "surfing" and "emergentness" metaphors, and so on, which are not considered by him. In addition, various types of curriculum were mentioned by scholars such as explicit, implicit, null (Marzooghi, 2016), explicit, hidden and null , ideal and actual (Marzooghi, 2016), unwritten (Sari & Doğanay, 2009) , society-centered, student-centered, knowledge-centered, eclectic curricula, hidden curriculum with universalistic and particularistic aspects (Sari & Doğanay, 2009), planned, taught, learned and assessed curricula (Normore & Doscher, 2007), disciplinary, inter-disciplinary, multidisciplinary (Mccaw, 2007.), transmission, transactional and transformational (Mccaw, 2007.) global-spaced, localized, localized, electronic (Marzooghi, 2016) clandestine, big, embodied, mandatory, exiled, home school, ecological (Marzooghi, 2016), community-service, inclusive, fused, multidisciplinary, mindless, project-based, problem-based, postsecondary, unschooling, emancipatory curriculum (Marzooghi, 2016), systematic, existentialist, radical, pragmatic and deliberative (Mccaw, n.d.) intended hidden, omitted hidden, distorted hidden, sterilized hidden, real implicit, distorted, neglected, sterilized, correspondence implicit, resistance implicit, resistive curricula (Marzooghi, 2016). Each of the curriculum scholars had their own opinion on curriculum classification based on his/ her point of view, need, and his/ her theoretical platform.

However, the definition and meaning of curricula which had similar titles are not the same. From this perspective, it could be said that moreover to the "definition controversy", "theories controversy", "curriculum commonplaces controversy" and "typology controversy", "classification controversy" equally is existent. As mentioned before, the curriculum is not a "type", but has various "types" itself. In order to further clarify the curriculum definitions and determine boundaries and differences between them, it is required to "categorize" curriculum types, although based on scholars' notions, several methods of classification could be applied. Therefore, in this regard, fist the categories must be determined and then each classification should be defined based on the general and shared characteristics between the curricula located in that category. Secondly, each of the curricula embedded within each classification should be defined separately. But the important point is that in many occasions despite the shared meaning, there are only terminological and verbal differences in using the tittles. In other words, several terms were used for the same type of curriculum, which are placed in each of the categories during the explanation on all curricula or curriculum typology process.

Category	Types
Theoretical-oriented	Behavioristic, cognitivist, humanistic, constructivist, democratic, community-service, descriptive, eclectic, inclusive, inert, spiritual, modernistic, post-modernistic, post-formal, monoculture, multicultural, normative, mono-realistic, pluralistic, progressive, scientific, society-centered, student-centered, subject-centered, transformative, trans active, transmission, transpersonal, transcendental, developmental, deliberative, service-learning, positivistic, emancipatory
Racial-oriented & gender-oriented	Feministic-based, male-oriented, sex-based, differentiated, segregated, race-based, ethnocentric
Subject-centered and learning levels	Scientific broad-field, knowledge-based, disciplinary, inter-disciplinary, interdisciplinary, trans-disciplinary, integrated, fused, enabled, mufti-vocational, professional, separate subject-matter, skill-based, technical, core, vocational, linear, helix, spiral, spider web, hierarchical, staircase, sequenced, balanced, parallel

Social-oriented and curriculum-development system	Place-based, school-based, space-based, in content, site-based, centralized, semi-centralized, decentralized, institutional, adapted, contact, cross-cultural, localized, globalized, localized, internationalized, national, local, societal, traditional, big, in- between, state-mandated
Methodic and process-based	Activity-based, action-based, inquiry-based, problem-based, innovative, collaborative
Schooling level	Pre-school, elementary, secondary, post secondary, higher education, early childhood, further, complementary
Formal/Intended	Approved, common, explicit, generic, ideal, phantom, overt, planned, prescriptive, public, visible, exiled, written, internal
Implemented and based on teacher contribution	Operational, actual, applied, adopted, delivered, instructional, thought, experiential, live, teacher-based, teacher-proof, adapted, enacted
Learned and learner-based	Achieved, experienced, narrative, personalized, student-oriented, student-proof, individualized
Evaluation-oriented	Assessed, evaluated, tested, measured, appraised, outcome-based, unmeasured
Implicit	Tacit, concomitant, correspondence, embodied, ignored, invisible, real implicit, unintended, unintended-implicit, adjusted, adaptive, thematic, overuse, mindless, informal
Hidden	Unwritten, unspoken, unstudied, covert, neglected-hidden, sterilized-hidden, resistance, clandestine, universalistic, particularistic, pre-planned hidden
Non-formal	Un- schooling, home school, extra, extracurricular, media, outside
Emergent	Incidental, expressive, exposed, bouncy, UN-preplanned
Null	Absent, empty, in-absentia, distorted, intended-distorted, intended-null, intended-omitted, intended-sterilized, lost, missed, neglected, omitted, omitted-hidden, intended sterilized, unintended distorted, unintended omitted, unintended null, unintended sterilized, intended neglected
Digital	Electronic, web-based, online, offline, internet-based, intranet-based, computer-based, digital implicit, digital hidden, digital omitted, digital sterilized, digital neglected, digital distorted

Table 1: Types of curriculum

According to (Wilson, 1990.), Curricula is defined as;

“Anything and everything that teaches a lesson, planned or otherwise. Humans are born learning, thus the learned curriculum actually encompasses a combination of all of the following — the hidden, null, written, political and societal etc. Since students learn all the time through exposure and modeled behaviors, this means that they learn important social and emotional lessons from everyone who inhabits a school — from the janitorial staff, the secretary, the cafeteria workers, their peers, as well as from the deportment, conduct and attitudes expressed and modeled by their teachers. Many educators are unaware of the strong lessons imparted to youth by these everyday contacts.”

The following represents the many different types of curriculum used in schools today.

Type of Curriculum	Definition
1. Overt, explicit, or written curriculum	Is simply that which is written as part of formal instruction of schooling experiences. It may refer to a curriculum document, texts, films, and supportive teaching materials that are overtly chosen to support the intentional instructional agenda of a school. Thus, the overt curriculum is usually confined to those written understandings and directions formally designated and reviewed by administrators, curriculum directors and teachers, often collectively.
2. Societal curriculum (or social curricula)	As defined by (Zubizarreta & Development, 2006).this curriculum as: the massive, ongoing, informal curriculum of family, peer groups, neighborhoods, churches, organizations, occupations, mass media, and other socializing forces that “educate” all of us throughout our lives. This type of curricula can now be expanded to include the powerful effects of social media (YouTube; Facebook; Twitter; Pinterest) and how it actively helps create new perspectives, and can help shape both individual and public opinion.
3. The hidden or covert curriculum	That which is implied by the very structure and nature of schools, much of what revolves around daily or established routines. (MARGARET MAHUPE., Longstreet and Shane, 1993) offer a commonly accepted definition for this term – the “hidden curriculum,” which refers to the kinds of learning children derive from the very nature and organizational design of the public school, as well as from the behaviors and attitudes of teachers and administrators”.

	Examples of the hidden curriculum might include the messages and lessons derived from the mere organization of schools — the emphasis on: sequential room arrangements; the cellular, timed segments of formal instruction; an annual schedule that is still arranged to accommodate an agrarian age; disciplined messages where concentration equates to student behaviors were they are sitting up straight and are continually quiet; students getting in and standing in line silently; students quietly raising their hands to be called on; the endless competition for grades, and so on. The hidden curriculum may include both positive or negative messages, depending on the models provided and the perspectives of the learner or the observer. In what I term floating quotes, popularized quotes that have no direct, cited sources, David P. Gardner is reported to have said: We learn simply by the exposure of living. Much that passes for education is not education at all but ritual. The fact is that we are being educated when we know it least.
4. The null curriculum	That which we do not teach, thus giving students the message that these elements are not important in their educational experiences or in our society. Eisner offers some major points as he concludes his discussion of the null curriculum. The major point I have been trying to make thus far is that schools have consequences not only by virtue of what they do teach, but also by virtue of what they neglect to teach. What students cannot consider, what they don't processes they are unable to use, have consequences for the kinds of lives they lead. (Marzooghi, 2016) first described and defined aspects of this curriculum. He states: There is something of a paradox involved in writing about a curriculum that does not exist. Yet, if we are concerned with the consequences of school programs and the role of curriculum in shaping those consequences, then it seems to me that we are well advised to consider not only the explicit and implicit curricula of schools but also what schools do not teach. It is my thesis that what schools do not teach may be as important as what they do teach. I argue this position because ignorance is not simply a neutral void; it has important effects on the kinds of options one is able to consider, the alternatives that one can examine, and the perspectives from which one can view a situation or problems. From Eisner's perspective the null curriculum is simply that which is not taught in schools. Somehow, somewhere, some people are empowered to make conscious decisions as to what is to be included and what is to be excluded from the overt (written) curriculum. Since it is physically impossible to teach everything in schools, many topics and subject areas must be intentionally excluded from the written curriculum. But Eisner's position on the "null curriculum" is that when certain subjects or topics are left out of the overt curriculum, school personnel are sending messages to students that certain content and processes are not important enough to study. Unfortunately, without some level of awareness that there is also a well-defined implicit agenda in schools, school personnel send this same type of message via the hidden curriculum. These are important to consider when making choices. We teach about wars but not peace, we teach about certain select cultures and

	histories but not about others. Both our choices and our omissions send messages to students.
5. Phantom curriculum	The messages prevalent in and through exposure to any type of media. These components and messages play a major part in the enculturation of students into the predominant meta-culture, or in acculturating students into narrower or generational subcultures.
6. Concomitant curriculum	What is taught, or emphasized at home, or those experiences that are part of a family's experiences, or related experiences sanctioned by the family. (This type of curriculum may be received at church, in the context of religious expression, lessons on values, ethics or morals, molded behaviors, or social experiences based on the family's preferences.)
7. Rhetorical curriculum	Elements from the rhetorical curriculum are comprised from ideas offered by policymakers, school officials, administrators, or politicians. This curriculum may also come from those professionals involved in concept formation and content changes; or from those educational initiatives resulting from decisions based on national and state reports, public speeches, or from texts critiquing outdated educational practices. The rhetorical curriculum may also come from the publicized works offering updates in pedagogical knowledge.
8. Curriculum-in-use	The formal curriculum (written or overt) comprises those things in textbooks, and content and concepts in the district curriculum guides. However, those "formal" elements are frequently not taught. The curriculum-in-use is the actual curriculum that is delivered and presented by each teacher.
9. Received curriculum	Those things that students actually take out of classrooms; those concepts and content that are truly learned and remembered.
10. The internal curriculum	Processes, content, knowledge combined with the experiences and realities of the learner to create new knowledge. While educators should be aware of this curriculum, they have little control over the internal curriculum since it is unique to each student. Educators can explore these curricula by using instructional assessments like "exit slips," reflective exercises, or debriefing discussions to see what students really remember from a lesson. It is often very enlightening and surprising to find out what has meaning for learners and what does not.
11. The electronic curriculum	Those lessons learned through searching the Internet for information, or through using e-forms of communication. (Wilson, 2004.) These types of curriculum may be either formal or informal, and inherent lessons may be overt or covert, good or bad, correct or incorrect depending on ones'

views. Students who use the Internet and electronic media on a regular basis, both for recreational and informational purposes, are bombarded with all types of media and messages. What types of messages are they being exposed to through varied social media and online interactions?
When they are researching subjects and topics online and gathering information they are often bombarded with all types of ads, images and messages. Much of this information may be factually correct, informative, or even entertaining or inspirational. But there is also a great deal of other e-information that may be very incorrect, dated, passé, biased, perverse, or even manipulative.

The implications of the electronic curriculum for educational practices are that part of the overt curriculum needs to include lessons on how to be wise consumers of information, how to critically appraise the accuracy and correctness of e-information, as well as how to determine the reliability of electronic sources. Also, students need to learn how to be artfully discerning about the usefulness and appropriateness of certain types of information.

As well, when it comes to social media and interactions just like other forms of social interaction, students need to know that there are inherent lessons to be learned about appropriate and acceptable "netiquette" and online behaviors, to include the differences between "fair and legal usage," vs. plagiarism and information piracy.

In today's world, of all the types of curriculum listed on this page, the electronic curriculum needs to be actively appraised, discussed, and considered by today's educators.

Table 2: Types of curriculum used in schools today

2.3 Assessment

Assessment has become an important topic of debate and discussion, especially in Western countries. It is also important in other regions of the world and no more so than in the countries in the Asia-Pacific region. Yet the discussions across cultural boundaries are not always the same.

The term “assessment for learning” was first used by Mary James in a conference in 1992. Then Gipps (1994) used this term to explain a shift from traditional assessment model that included “checking whether the information had been received” to a more holistic assessment of “the structure and quality of students‟ learning and understanding”.

According to Ioannou-Georgiou, the process of evaluation means “gathering information in order to determine the extent to which a language program meets its goals. Relevant information can be teachers,, and parents,, opinions, textbook quality, exam results, and children’s attitudes. Some of the tools of the evaluation process are tests, questionnaires, textbook analysis, and observation”.

According to (Brown, 2019) assessment refers to a related series of measures used to determine a complex attribute of an individual or group of individuals. This involves gathering and interpreting information about student level of attainment of learning goals. Assessments also are used to identify individual student weaknesses and strengths so that educators can provide specialized academic support educational programming, or social services. In addition, assessments are developed by a wide array of groups and individuals, including teachers, district administrators, universities, private companies, state departments of education, and groups that include a combination of these individuals and institutions. In classroom assessment, since teachers themselves develop, administer and analyze the questions, they are more likely to apply the results of the assessment to their own teaching. Therefore, it provides feedback on the effectiveness of instruction and gives students a measure of their progress. As (Brown, 2019) maintains, two major functions can be pointed out for classroom assessment: One is to show whether or not the learning has been successful, and the other one is to clarify the expectations of the teachers from the students (Brown, 2019).

Assessment is a process that includes four basic components:

- Measuring improvement over time.
- Motivating students to study.
- Evaluating the teaching methods.
- Ranking the students' capabilities in relation to the whole group evaluation. ABET (2009, p. 3) defines the term “assessment” as “one or more that processes that identify, collect and prepare date to evaluate the attainment of student’s outcomes. Effective assessment use relevant direct, indirect, quantitative and qualitative measure as appropriate to the outcomes being measured”

2.4 Types of Assessment

Numerous terms are used to describe different types to learner assessment.

Formative <----------> Summative

Informal <----------> Formal

Continuous <----------> Final

Process <----------> Product

Divergent <----------> Convergent

2.5 Formative vs Summative Assessment

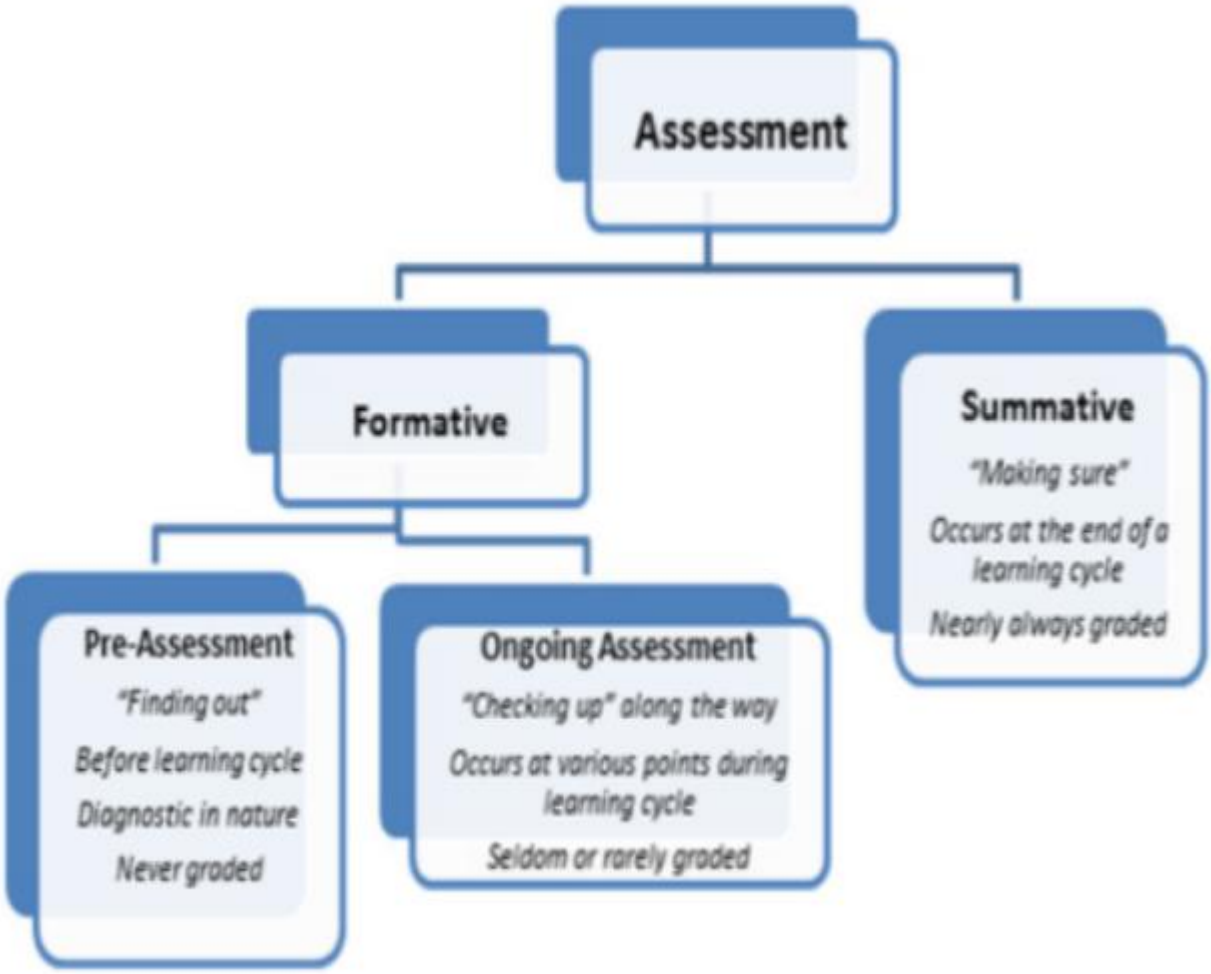

Figure 1: Formative vs Summative Assessment

Formative assessment is designed to assist the learning process by providing feedback to the learner, which can be used to identify strengths and weakness and hence improve future performance. Formative assessment is most appropriate where the results are to be used internally by those involved in the learning process (students, teachers, curriculum developers).

Summative assessment is used primarily to make decisions for grading or determine readiness for progression. Typically, summative assessment occurs at the end of an educational activity and is designed to judge the learner's overall performance. In addition to providing the basis for grade assignment, summative assessment is used to communicate students' abilities to external stakeholders, e.g., administrators and employers (Darling-Hammond, 2006.).

2.6 Informal vs Formal Assessment

With informal assessment, the judgments are integrated with other tasks, e.g. Lecturer feedback on the answer to a question or preceptor feedback provided while performing a bedside procedure. Informal assessment is most often used to provide formative feedback. As such, it tends to be less threatening and thus less stressful to the student. However, informal feedback is prone to high subjectivity or bias.

Formal assessment occurs when students are aware that the task that they are doing is for assessment purposes, e.g., a written examination. Most formal assessments also are summative in nature and thus tend to have greater motivation impact and are associated with increased stress. Given their role in decision-making, formal assessments should be held to higher standards of reliability and validity than informal assessments (*LYNN MCALPINE AND CYNTHIA WESTON*, 2002).

2.7 Continuous vs Final Assessment

Continuous assessment occurs throughout a learning experience (intermittent is probably a more realistic term). Continuous assessment is most appropriate when student and/or instructor knowledge of progress or achievement is needed to determine the subsequent progression or sequence of activities (*LYNN MCALPINE AND CYNTHIA WESTON*, 2002). Continuous assessment provides both students and teachers with the information needed to improve teaching and learning in process. Obviously, continuous assessment involves increased effort for both teacher and student.

On the other hand, Final (or terminal) assessment is that which takes place only at the end of a learning activity. It is most appropriate when learning can only be assessed as a complete whole rather than as constituent parts. Typically, final assessment is used for summative decision-making. Obviously, due to its timing, final assessment cannot be used for formative purposes (*LYNN MCALPINE AND CYNTHIA WESTON*, 2002).

2.8 Process vs. Product Assessment

Process assessment focuses on the steps or procedures underlying a particular ability or task, i.e., the cognitive steps in performing a mathematical operation or the procedure involved in analyzing a blood sample. Because it provides more detailed information, process assessment is most useful when a student is learning a new skill and for providing formative feedback to assist in improving performance (*LYNN MCALPINE AND CYNTHIA WESTON*, 2002).

Product assessment focuses on evaluating the result or outcome of a process. Using the above examples, we would focus on the answer to the math computation or the accuracy of the blood test results. Product assessment is most appropriate for documenting proficiency or competency in a given skill, i.e., for nominative purposes. In general, product assessments are easier to create than product assessments, requiring only a specification of the attributes of the final product (*LYNN MCALPINE AND CYNTHIA WESTON*, 2002).

2.9 Divergent vs. Convergent Assessment

Divergent assessments are those for which a range of answers or solutions might be considered correct. Examples include essay tests. Divergent assessments tend to be more authentic and most appropriate in evaluating higher cognitive skills. However, these types of assessment are often time consuming to evaluate and the resulting judgments often exhibit poor reliability.

A convergent assessment has only one correct response (per item). Objective test items are the best example and demonstrate the value of this approach in assessing knowledge. Obviously, convergent assessments are easier to evaluate or score than divergent assessments. Unfortunately, this “ease of use” often leads to their widespread application of this approach even when contrary to good assessment practices. Specifically, the familiarity and ease with which convergent assessment tools can be applied leads to two common evaluation fallacies: the Fallacy of False Quantification (the tendency to focus on what’s easiest to measure) and the Law of the Instrument

Fallacy (molding the evaluation problem to fit the tool) (*LYNN MCALPINE AND CYNTHIA WESTON*, 2002).

CHAPTER III

3 METHODOLOGY

Design of the Study

This is a descriptive type of study which uses both the qualitative and quantitative approach. In the quantitative approach, we compare, the number of credit hours offered, the number of contact-hours per course and the number of exams during a semester. On the other hand, with the qualitative approach, students' learning assessment systems among the selected universities was compared.

Population

The population of this research is based uniquely on public universities of some selected OIC countries based on their geographical distribution. Private are not going to be considered.

The population of this study include the universities in the following selected OIC countries as shown below;

Continent / Region	Selected Country	Number of (public) university
Africa	Nigeria	8
Asia (south / south East)	Malaysia	32
Middle East	Saudi Arabia, Qatar	25, 29
Europe	Turkey	41

Table 3: Population of some OIC countries

Sampling

Getting an access to all the undergraduate electrical and electronic engineering curricula for the entire public universities of the selected OIC countries is possible. This study has taken data from five (5) universities. Only one university per country with the assumption that the curriculum content and the assessment system of all the public universities in a particular country are roughly the same and thus these universities may be treated as one cluster. Thus the sampling technique used in this research was cluster sampling. Therefore, five (5) universities in five (5) countries from different regions are the sample of this study. This serve as the representation of the population. This research takes into count, five (5) universities of the OIC, i.e. Saudi Arabia, Malaysia, Nigeria, Qatar and Turkey. The Universities are; King Fahd University, University TekniKal Malaysia Melaka, Osun State University, Qatar University and Kocaeli University.

King Fahd University is a public university in Dhahran, Saudi Arabia. Among Saudi universities, its science, engineering and business/ management programs are the most highly regarded in the country as well as in the whole region.

The University of Kocaeli is a state university in Kocaeli, Turkey. It was founded as the Academy of Engineering and Architecture of Kocaeli in 1976. It is a huge educational institution serving with 19 faculties and 21 vocational schools. It has an important position in the research and development (R&D) activities in Turkey.

University TekniKal Malaysia Melaka, is a public university in Melaka, Malaysia. It is the pioneer in the use of the "Practice and Application Oriented" teaching and learning method for tertiary level technical education in Malaysia.

Osun State University is a multi-campus university established by the Osun state government. The university currently operates six (6) campuses in Oshogbo.

Qatar University is the leading public institution of academic and research excellence in the Qatari region. Its vibrant portfolio advances national goals towards regional research particularly in the areas of environment and energy.

Continent / Region	Selected Country	Number of (public) university
Africa	Nigeria	1
Asia (south / south East)	Malaysia	1
Middle East	Saudi Arabia	1, 1
Europe	Turkey	1

Table 4: Selected universities in some OIC countries

The Instrument of Collecting Data

This study is a comparative research. A mimeograph form designed where all the relevant information is organized. In order to make the mimeograph, the amount of credit hours, courses, class period for different semesters of the universities are considered. A comparative study of the number of semesters and the duration of the program are equally carried out and the assessment system as well.

Data collecting Procedure

The data collection steps take place on the website of the selected universities. In case of non-availability of certain information from their website, a letter was sent to the registrar's office of the concerned university in order to obtain the required information, particularly the curriculum document and the assessment system document. In addition, in case the data was not obtained from the university's staff, student from the concerned university was asked for help.

Data Analysis Techniques

All obtained information is categorized, as per ABET framework in different groups such as: general educational requirement (GER), basic engineering requirement(BER) and engineering major requirement(EMR).

The result obtained help us to figure out what each university offers in their respective curriculum. Finally, from these result, a comparative study is made among all the selected universities.

Ethics and safety in the study

In this study, ethical issues and measures were taken to make sure that all the participants involved in the study were safe by all means. The university authorities were informed about the objectives, importance and significance of the outcomes of this study prior to data collection in their universities.

CHAPTER IV

4 DATA ANALYSIS AND INTERPRETATION

This chapter presents the interpretations of the data collected from the various selected universities. A brief introduction of each university were given. A descriptive analysis was made from the different resources in order to set up graphs, tables, curves and histograms which highlights and compares the data from different universities.

4.1 Brief Introduction of Study Programs of Sampled Universities

A descriptive analysis is very important because if we simply presented our raw data it would be hard to visualize what the data is really showing, especially since there is a lot of it.
This would enable us to present the data in a more meaningful way, which allows simpler interpretation of the data.

4.1.1 University of King Fahd

King Fahad University is one of the most prestigious and famous technological university in the Islamic world. The university has several departments including the one that interests us, that of electrical and electronics. The Department of Electrical and Electronics is one of the oldest in the university. It covers Bachelor's, Master's and Doctorate programs. With six specializations:

Energy Systems, Communications, Electronics, Control Systems, Electromagnetic, and Digital Signal Processing.

The department has established a training program in order to achieve the following objectives from the university graduates;

- Graduates will have a successful career in Electrical Engineering
- Graduates will advance to the position of leadership in their profession
- Graduates may pursue their professional development through self-learning and advanced degrees.

The department offers a 4-year study program with a first preparatory year in order to strengthen the basic knowledge of learners in scientific subjects: mathematics, physics and science and equally on the level of language of study and religious values: Arabic language and Islamic study(*King Fahd University,* 2019.).

4.1.2 University Teknikal Malaysia Melaka

The Faculty of Electrical Engineering (FKE) was established in early 2001 and officially began its operation from the 22nd of June 2001. The Electrical Engineering Faculty consist of 4 Bachelor's Degree programs and 1 Diploma program under these respective departments(Vitae, 2013):

- Industrial Power Engineering
- Control, Instrumentation and Automation Engineering
- Power Electronic & Drives Engineering
- Mechatronics Engineering
- Diploma Studies

During the first year of a Bachelor degree, students are introduced to fundamental subjects that would provide the basis of studying electrical engineering. This include, among others, subjects such as Algebra and Calculus, Engineering Mathematics, Electrical Circuit I and Computer

Programming. In the second year, the student will continue learning subjects that will further strengthen their basic electrical engineering knowledge. Student are required to undergo an internal industrial training during semester break after Semester 4 completed. Beginning with the third year(Vitae, 2013), the students will start to learn basic engineering requirement courses such Control, Instrumentation & Automation Engineering, Industrial Power Engineering, Power Electronics & Drive Engineering or Mechatronics Engineering which include the areas of specialization. After Semester 6 has been completed student are required to undergo industrial training during the long semester break. During the fourth year, almost all the courses in this year are engineering major requirement. In addition to this, the students are also required to undertake the Final Year Project for two semesters which should relate to the student's field of study. Students are encouraged to do a project based on industrial problems that have been identified during their industrial training(Vitae, 2013).

Apart from basic engineering requirement (BER) operated in the form of practice and application, students are also provided with engineering management skills, entrepreneurship, communication skills, co-curricular activities and personality development to produce engineers who are competent and able to work independently with a positive attitude.

4.1.3 Qatar University

Since its inception in 1973, Qatar University (QU) has served as Qatar's prominent national institution of higher education and is positioned as a beacon of academic and research excellence in the region. Serving over 20000 students, the organization provides a teaching and learning environment enhanced by top-rate faculty, facilities, resources and student-driven services that enhance academic performance and produce quality outcomes. The university is comprised of 10 colleges, the College of Arts and Sciences (CAS), College of Business and Economics (CBE), College of Education (CED), College of Engineering (CENG), College of Health Sciences (CHS), College of Law (LAWC), College of Medicine (CMED) College of Pharmacy (CPH), College of Sharia and Islamic Studies (CSIS) and the latest College of Dental Medicine. The 10 Colleges offer

over 45 specializations at the undergraduate level – the widest range of academic programs in the State of Qatar. QU has committed considerable resources to upgrading its classroom and campus infrastructure with modern technology such as Lecture Capture, Blackboard, Cisco Web-ex, special needs assistive technology, advanced research labs, environmentally friendly buildings and well-equipped library facilities(Court & Henderson, 2014).

The College of Engineering, established in 1980, serves the State of Qatar by preparing graduates in a wide range of engineering disciplines, as well as in computing and architecture. The College aims to be recognized in the region for its outstanding education, research and community engagement, and for the quality of its socially responsible graduates. The main mission of the college is to prepare globally competent and socially responsible graduates, who can compete in an international working environment while taking into consideration our Islamic and Arabic heritage, as well as the local societal needs.

4.1.4 Kocaeli University

Established in 1992 with 6 faculties, 1 vocational school and 3 institutes, Kocaeli University is one of the leading science and education centers of Turkey. The Department of Electrical Engineering was established in the year 1976 as a part of Kocaeli State Architecture and Engineering Academy. Later in 1982, the academy was renamed as Kocaeli Engineering Faculty of Yıldız Technical University.

The Department of Electrical Engineering continues its activities with Kocaeli University. There are two area departments, Electrical Machinery and Power systems. Circuit and control system design, analysis, practice and interpretation, design of electrical machines and their control, generation, transmission and distribution of electricity, power quality, power electronics, photo-voltaic and wind energy as renewable energy systems are the main subjects of these areas. The goal of the department is to give a modern and effective electrical engineering education with theoretical and practical studies(Faculty, 2016).

4.1.5 Osun State University

Osun State University is set up as a conventional, multi-campus University charged with the production of high quality, well–rounded, globally competitive and entrepreneurial graduates who are catalysts for rapid and sustainable socioeconomic development of Osun State and Nigeria.

Following the approval by the National University commission on December 21, 2006, Osun State University (UNIOSUN) became the 30th State University and 80th in the Nigerian University system. Osun State University is a conventional University envisioned to be a center of excellence through the provision of highly qualitative teaching and learning experiences which will engender the production of well-rounded entrepreneurial graduate capable of impacting positively on their environments while also being globally competitive(*Curriculum for B . Tech in Electrical Engineering*, 2019.).

There are seven colleges in six campuses located in six geographical zones of the state.

- Oshogbo Main Campus - College of Health Sciences, College of Science, Engineering and Technology
- Okuku - College of Management and Social Sciences;
- Ikire - College of Humanities and culture
- Ejigbo - College of Agriculture; Centre for Pre-degree Studies(Science)
- Ifetedo - College of Law; Centre for Entrepreneurial Studies; Centre for Pre-Degree(Science)
- Ipetu-Ijesa - College of Education

4.2 Summary of Curriculum Content of the Selected Universities

There is a wide spread agreement that the academy and the undergraduate curriculum have evolved in significant ways. Nonetheless, it is also true that curriculum changes and varies from one university to another.so our guide to categorize the different course is according to ABET. ABET categorizes the engineering curriculum content under following three categories: general educational requirement(GER), basic engineering requirement(BER) and engineering measure requirement(EMR).

Below is a brief a comparison on the various universities undergraduate curriculum content

4.2.1 King Fahd University

The university's Bachelor's program comprises eight (8) semesters spread over four (4) years. The first four semesters each have 6 subjects and the last four semester have five (5) subjects each. Forty- six (46) subjects are taught during the four (4) years so some subjects are a continuation. The subjects to be covered are divided into three groups: general courses, basic courses and selective or specialization courses. The student in electrical and electronic engineering must at the end of his program have validated 134 units (*King Fahd University*, 2019.).

The table below gives us the details of the materials and unit of value of each material as well as the names of the materials.

(a) General Educational Requirement(GER)

English	ENGL 101, 102, 214	9
Islamic and Arabic Studies	IAS 101, 111, 201, 212, 301, 322	12
		21

(b) Basic engineering Requirements (BER)

Computer programming	ICS 103	3
Mathematics	MATH 101, 102, 201, 202, 302	17
Physical Education	PE 101, 102	2
Natural Sciences	CHEM 101, PHYS 101, 102	12

Engineering Economic Analysis	ISE 307	3
		37

(c) Engineering Major Requirements (EMR)

Digital Logic Circuit Design	EE 200	4
Electrical Circuits I, II	EE 202, 213	6
Intro to Electrical Eng.	EE 206	2
Electronics I, II	EE 203, 303	8
Signals and Systems	EE 207	3
Elctric Energy Eng.	EE 360	4
Control Eng. I	EE 380	4
Electromagnetics	EE 340	4
Communications Eng. I	EE 370	4
Digital Sytems Eng.	EE 390	4
Probalistics Methods in Electrical Eng.	EE 315	3
Fundamentals of EE Design	EE 311	2
Electrical Engineering Electives	Four EE 4xx Courses	13
Science or Engineering. Elective	XXX 2xx	3
Technical Elective	XE xxx	3
General Studies	Two GS xxx Courses	6
		73

(d)Capstone course

Senior Design Project	EE 411	3
		3

Total : 134

Table 6: King Fahd University curriculum

4.2.2 University Teknikal Malaysia Melaka

(a) General educational requirement (GER)

BLHW 1013 OR BLHL 1XXX	Foundation English or Third language	3
BKKX	Co-Curriculum I	1
BHLW 2403	Technical English	3
BKKX	Co-Curriculum II	1
BLHW 3403	English for professional communication	3
BLHC 3012	Organization Skill	2
BLHW 1702	Co- Curriculum	2
BACA 4132	Project Management	2
BLHW 2712	Ethnics Relationship	2
BLHW 1722	Science & Technology Philosophy Or Malaysia's Socioeconomic	2
BLHC 4042	Entrepreneurship & New Business Skills	2
		23

(b) Basic engineering requirements (BER)

BEKA 1123	Algebra & Calculus	2
BITG 1233	Computer Programming	3
BEKA 2333	Differential Equations	3
BEKA 2453	Statistics & Numerical Methods	3
BEKU 4883	Algorithm	3
		15

(c) Engineering Major Requirements (EMR)

BEKE 1123	Electronic Devices	2
BEKC 1123	Instrumentation & Measurement	3
BEKU 1123	Electrical circuits	3
BEKU 1121	Basic Electrical & Electronics Laboratory	3
BEKA 1233	Engineering Mathematics	3

BEKU 1243	Electronics Digital & Systems	3
BEKE 1243	Analogue electronics	3
BEKU 1221	Analogue & Digital Electronics Laboratory	1
BEKU 2333	Electrical circuit	3
BEKP 2323	Electrical Technology	3
BMCG 2343	Introduction To Mechanical Engineering	3
BEKU 2321	Electrical Technology Laboratory	1
BEKP 2453	Electromagnetic theory Signal & Systems I	3
BEKC 2433	Introduction To Power	3
BEKP 2443	Engineering Electrical	3
BEKU 2431	Engineering Laboratory I	1
BEKU 2432	Engineering Practice	2
BEKU 2422	Report Engineering Practice	2
BEKE 3543	Power Electronics	3
BEKC 3543	Microprocessor	3
BEKE 3533	Electrical Machines	3
BEKC 3533	Introduction To Control Systems	3
BEKC3563	Instrumentation	3
BEKU 3531	Electrical Engineering Laboratory II	1
BEKC 3633	Communications Systems	3
BEKC 3643	Control Systems Engineering E	3
BEKE 3653	Electrical drives & Actuator Power	3
BEKE 3663	Electronics Systems Power	1
BEKE 3631	Electronics & Drives Laboratory I	2
BEKP 4743	Power Systems Analysis & High Voltage	3
BEKE 4763	Modern Electrical Drives	3
BEKE 4731	Electronics Power & Drives Laboratory II	1
BEKE 4883	Electronics Power In Industry	3
BEKP 4863	Electrical System Design	3
BEKC 4753 or BEKM 4763	Plc & Automation or Robotics	3
BEKU 2432	Engineering Practice Report	2
BEKU 2422	Engineering Practice	2
		94

(d) Capstone courses

BEKU 4792	Final Year Project I	2
BEKU 4894	Final Year Project II	4
		6

Total: 138

Table 7: University Teknikal Malaysia Melaka Curriculum

4.2.3 Qatar University

Graduates of the college have significantly contributed to the huge industrial expansion that the State of Qatar has witnessed. They are currently playing a key role in the transformation of the economy of Qatar to a knowledge-based economy. All the engineering programs in the College are accredited by the Engineering Accreditation Commission of ABET(Court & Henderson, 2014).

Graduates of the Electrical Engineering Program will:

- Apply effectively their technical, communication, and teamwork skills in modern work environment as well as graduate studies.
- Act professionally and ethically.
- Adapt to emerging technologies, social development, and contemporary issues.

(a) General educational requirement (GER)

Course code	Course Title	Course credit
ARAB 101	Arabic Language I	3
GENG 107	Engineering Skills and Ethics	3
ENGL 202	English Language I Post Foundation	3
ENGL 203	English Language II Post Foundation	3
DAWA 111	Islamic Culture	3
	Core Curriculum Elective *	3
	Core Curriculum Elective *	3

(b) Basic engineering requirements (BER)

MATH 102	Calculus II	3
PHYS 191	General Physics for Engineering I	3
PHYS 192	Experimental General Physics for Engineering	1
GENG 106	Computer Programming	3
MATH 231	Linear Algebra	3
MATH 211	Calculus III	3
PHYS 193	General Physics for Engineering II	3
PHYS 194	Experimental General Physics for Engineering	1
MATH 285	Mathematics for Electrical Engineering	3
GENG 200	Probability and Statistics for Engineers	3
GENG 300	Numerical methods	3
MATH 101	Calculus I	3
CHEM 101	General Chemistry I	3
CHEM 103	Experimental General Chemistry I	1
		36

(c) Engineering Major Requirement (EMR)

ELEC 201	Electric Circuits	3
ELEC 202	Electric Circuits II	3

ELEC 203	Electric circuits II Lab	1
ELEC 231	Fundamentals of Electronics	3
ELEC 261	Digital Systems Design	3
ELEC 262	Digital Systems Design lab	1
ELEC 311	Electromagnetic	3
ELEC 312	Electric Machines	3
ELEC 313	Electric Machines Lab	1
ELEC 371	Sensors and instrumentation	3
ELEC 351	Signals and Systems	3
ELEC 366	Embedded Systems	3
ELEC 367	Embedded Systems Lab	1
ELEC 341	Communication Engineering	3
ELEC 342	Communication Engineering Lab	1
ELEC 352	Control Systems	3
ELEC 321	Power Systems Analysis	3
ELEC 325	Power Electronics	3
ELEC 353	Signal Analysis & Filtering	3
ELEC 4XX	Major Elective I	3
ELEC 4XX	Major Elective II	3
GENG 360	Engineering Economics	3
ELEC 498 or GENG 498	Senior Design Project I or Multidisciplinary Senior Design I	3
ELEC 428	Electrical Engineering Design	3
ELEC 4XX	Major Elective III	3

ELEC 4XX	Major Elective IV	3
ELEC 499 or GENG 499	Senior Design Project II or Multidisciplinary Senior Design II	3
		71
(d)Summer Training		
ELEC 399	Practical Training	3
		3
		Total: 131

Table 8: Qatar University Curriculum

4.2.4 Kocaeli University

The course structure with the number of credits is as shown in the table below;

(a) General educational requirement (GER)

Course code	Course Title	Course Credit
AIT101	Ataturk Principles and History of Turkish Revolution I (DE)	2
YDB101	English I	4
TDB101	Turkish Language I (DE)	2
AIT102	Ataturk's Principles and History of Turkish Revolutions II	2
YDB102	English II (DE)	4
TDB102	Turkish Language II (DE)	2
MEL314	Health and safety at work	2
MEL406	Engineering Profession and Work Health-Safety	2
MEL458	Energy Management	4

MEL490	Total Quality Management	3
		16

(b) Basic engineering requirements (BER)

FEF105	Physics I	5
FEF103	Linear Algebra	3
MEL103	Introduction to Computer Programming	3
FEF101	Mathematics I	6
FEF201	Differential Equations	5
FEF104	Physics II	5
FEF102	Mathematics II	6
MEL120	C Programming	4
MUH307	Computer Aided Drawing	5
MUH404	Business Law	3
MEL421	İntroduction to Microcomputers	5
		32

(c) Engineering Major Requirement (EMR)

MEL101	Introduction to Electrical Engineering	6
MEL102	Electric Circuits I	2
MEL104	Materials	3
MEL203	Electric Circuit Lab	4
MEL201	Electric Circuits II	6
MEL213	Fundamentals of Electrical Machinery	2
MEL205	Electrical Measurement	3
MEL207	Electronics	4
MEL209	Engineering Drawing	2
MEL299	Internship I	5
MEL202	Circuit Analysis	5
MEL206	Introduction to Electromagnetic Fields	4
MEL204	Electronics Lab	3
MEL208	Power Transmission Lines	3
MEL210	Logic Circuits	4
MEL212	Numerical Analysis Methods	4
MEL298	Internship II	7

MEL303	Illumination Techniques and Laboratory	4
MEL305	Electric Machinery I	5
MEL301	Power Electronics	4
MEL307	Automatic Control Systems	4
MEL345	Alternative Energy Resources	4
MEL343	Electric Electronic Design and application	4
MEL306	Electric Machinery II	5
MEL304	Power Transmission	4
MEL302	Power Electronics Lab	3
MEL308	Automation Systems.	4
MEL310	High Voltage Technique and Lab	4
MEL344	Relays and Sensors in Smart grids	4
MEL330	Energy Storage	4
MEL401	Power Distribution	6
MEL402	Electrical Installation Laboratory	3
MEL403	Power System Analysis	5
MEL405	Electric Machinery Lab	3
MEL407	Electrical Engineering Project	2
MEL425	Electrical Power Generation	5
MEL426	Power Distribution Design	5
MEL444	Electric Motor Drives	4
MEL447	Power System Control	4
		94

(d) Capstone course

MEL404	Graduation Project	3
		3

Total : 145

According to (Commission & European Commission, 2015), 1 credit hour is equal approximately 1.7 ECTS the credit hour of Kocaeli University is 141 course credit.

Table 9: Kocaeli University Curriculum

4.2.5 Osun State University

The Department of Electrical and Electronic Engineering of the Osun State University is one of the two pioneering engineering departments under the College of Science, Engineering and Technology established in 2007/2008 academic session as part of the first phase of development of the University. The department runs a 5-year programs, operating 2-semester course units system in its curriculum that leads to the award of Bachelor of Engineering (B.Eng.) degree in Electrical and Electronic Engineering. The 5-year duration is expected to progress from year-one (100 level) through year-five (500 level). Each year is divided into two semesters (Harmattan and Rain), each of 17-18 weeks duration which comprises 2 weeks of registration, 13 weeks of lecture and 2-3 weeks of examination(*Curriculum for B . Tech in Electrical Engineering*, 2019).

(a) General educational requirement (GER)

Course code	Course title	Course credit
GNS 101	Use of English 1	2
GNS 102	Use of English 2	2
CVE 201	Engineer in Society	1
FRN 222	French for Specific Purposes	2
GNS 201	Nigerian Peoples and Culture	2
GNS 202	Osun Peoples and Culture	2
GNS 301	Entrepreneurship Skills Development and Practice	2
GNS 302	Introduction to Logic and Philosophy	2
CVE 401	Technical Report Writing	2
CVE 513	Industrial Law & Management	2
		19

(b) Basic engineering Requirements (BER)

MEE 101	Engineering Drawing I	2
MEE 102	Workshop Technology	2
CHM 102	General Chemistry II	3
CHM 108	Experimental Chemistry II	1
MTH 102	General Mathematics II (Calculus)	3
MTH 104	General Mathematics III (Vectors, Geometry & Dynamics)	3
PHY 102	General Physics II	3
PHY 108	Experimental Physics II	1

MEE 201	Engineering Materials	2
MEE 203	Engineering Mechanics I (Statics)	2
MEE 205	Basic Thermodynamics	2
MTH 201	Mathematical Methods I	2
STA 201	Statistics for Physical Science & Engineering	4
CIT 201	Structured Programming	3
CIT 111	Introduction to Information & Communication Technology	2
CVE 202	Strength of Materials	2
MEE 208	Workshop Technology II	2
MTH 202	Elementary Differential Equation I	2
MTH 206	Introduction to Numerical Analysis	3
CIT 202	Low Level Language	2
MTH 303	Elementary Differential Equation II	3
MTH 302	Mathematical Methods II	2
CVE 511	Industrial Economics	2
MEE 206	Basic Fluid Mechanics	2
MEE 204	Engineering Mechanics II (Dynamics)	2
		57

(c) Engineering Major Requirement (EMR)

EEE 201	Applied Electricity I	2
EEE 291	Applied Electricity Laboratory	1
EEE 202	Applied Electricity II	2
EEE 292	Applied Electricity Laboratory II	1
EEE 301	Microelectronic Devices & Circuits I	3
EEE 302	Microelectronic Devices & Circuits II	3
EEE 303	Electromechanical Devices	3
EEE 304	Electrical Machines	3
EEE 305	Computational Structures I	3
EEE 306	Computational Structures II	3
EEE 307	Group Design I	1
EEE 308	Digital Circuit Analysis & Design	3
EEE 309	Signals & Systems	3
EEE 310	Measurement & Instrumentation	3
EEE 311	Electromagnetic Theory	3
EEE 391	Electrotechnic Laboratory	1
EEE 392	Electrical Machine Laboratory	2
EEE 400	SIWES	6
EEE 401	Electric Power Principles	3
EEE 403	Group Design II	1
EEE 405	Analog Circuit Design	3

EEE 407	Introduction to Control Engineering	3
EEE 409	Communication Principles	3
EEE 411	Semiconductor Devices	3
EEE 491	Telecommunication & Control Laboratory	4
EEE 503	Control System Engineering	3
EEE 504	Digital Signal Processing	3
EEE 505	Probability & Stochastic Processes	3
EEE 506	Electrical Services & Energy Utilization	3
EEE 507	Advanced Circuit Techniques	3
EEE 508	Application of Electromagnetic Principles	3
EEE 510	Reliability Engineering	2
EEE 512	Advanced Computer Programming & Statistics	3
EEE 513	Wireless Communication	3
EEE 514	Telecommunications Engineering	3
		95

(d) Capstone courses

EEE 501	Students Project	3
EEE 502	Students Project	3
Total		6

Total: 177

Table 10: Osun State University Curriculum

4.3 Curricula Comparison of Selected Universities

In section 4.2, the distribution and classification of the courses was done in three categories according to ABET i.e. General Educational Requirement (GER), Basic Engineering Requirement (BER), Engineering Major Requirement (EMR) and Capstone. This distribution allows us to note

that despite a great similarity in the courses that are offered by the departments of electrical and electronics of the selected universities, there are existing differences.

The course structure of King Fahad University

The Electrical and Electronics Department of King Fahad University in Saudi Arabia offers in total 39 courses (131 Credit hours) and a graduation project (Senior design project, 3 credit hours) for the Bachelor of Science in Electrical and Electronics Engineering. These 39 courses are spread over 8 semesters for a period of 4 years of training without counting the first year of acquisition of the basic skills. The 39 courses offered can be categorized as shown in Table 11.

Course category	Number of course
General Education Requirement(GER)	9
Basic Engineering Requirement(BER)	12
Engineering Major Requirement(EMR)	18
Total	39

Table 11: Number of courses of King Fahd University

Considering the General Educational Requirement (GER), the department of electrical and electronic engineering offers among other English, Arabic and Islamic studies. These three subjects are distributed in different semesters. The Basic Engineering Requirement (BER) includes Mathematics, Physics and Chemistry which are essential for the study of engineering. In addition to these three courses, Engineering Economic Analysis and Computer programming are included.

The Engineering Major Requirement (EMR), on the other hand, groups all the necessary and essential courses for achieving the learning outcomes of a good Electrical and Electronic Engineer. It includes courses such as; Electrical Circuit, Electronic, Electromagnetic Theory, Signals and Systems, etc.

The teaching of Engineering Economic Analysis and Islamic study portrays how much effort the university puts in, in not just training an engineer, but above all, in training a citizen with strong leadership skills and good Islamic values.

In order to obtain the engineering degree, a student is to earn 134 credits. The credit hours can be categorized as shown Table 12

Course category	Credit hours
GER	21
BER	37
EMR	73
capstone	3
Total	134

Table 12: King Fahd University's Course credits

The course structure Teknikal Malaysia Melaka University

At Teknikal Malaysia Melaka University, the Department of Electrical and Electronics offers in total 53 courses spread over 8 semesters in 4 years.

The Table 13 shows the distribution of the courses.

Course category	Course number
General Education Requirement(GER)	11
Basic Engineering Requirement(BER)	5
Engineering Major Requirement(EMR)	37
Total	53

Table 13: courses number in University Teknikal Malaysia Melaka

Considering the General Educational Requirement courses, in addition to the teaching of English Language, we have courses such as: Curriculum, Organization Skill, Project Management, Ethnics Relationship, Science & Technology Philosophy/ Malaysia's Socio-Economy and Entrepreneurship & New Business Skills.

It is noted that with these courses, the student learns to know not only the environment and society in which he lives in, but equally, the lifestyles of the populations and how to interact with them.

Considering the Basic Engineering Requirement Courses, the emphasis is much more on Mathematics.

From the Table14, it could be noted that more than half of the courses are Engineering Major Requirement courses.

In the Electrical and Electronics Department of University Teknikal Malaysia Melaka greater importance is given to the engineering course. The student must complete in total 138 credit courses during these four (4) years.

The Table 14 shows the distribution of credit hours.

Course category	Credit hours
GER	23
BER	15
EMR	94
capstone	6
Total	138

Table 14: Course Credits of University Teknikal Malaysia Melaka

The course structure Qatar University

Qatar university in its Electrical and Electronics department offers 7 General Educational Requirement (GER) courses which include English and Arabic language courses, curriculum, Engineering Skills and Ethics, and Islamic Culture.

In total, the department offers in total 48 courses spread over 8 semesters and 4 years.

At the basic engineering requirement level, in addition to Mathematics, Physics and Chemistry, we have courses such as Computer Programming and Probability and Statistics for Engineers. Regarding the Major Requirement Engineering courses all the basic courses for the training of an engineer in electrical engineering are included.

The Table 15 shows the distribution the courses

Course category	Courses numbers
General Education Requirement(GER)	7
Basic Engineering Requirement(BER)	14
Engineering Major Requirement(EMR)	27
Total	48

Table 15: courses Number of Qatar University

A student at Qatar University, is required to earn in total 131 course credits to be expected to graduate.

The Table 16 shows the distribution credit hour

Course category	Credit hours

GER	21
BER	36
EMR	71
capstone	3
Total	131

Table 16: Course Credit of Qatar University

The course structure Kocaeli University

Kocaeli university offers in total 60 courses spread over 8 semesters and 4 years. In terms of the General Educational Requirement, the university offers in total 10 courses spread over 8 semesters. Atypical courses such as: Ataturk's Principles and History of Turkish Revolution which tells the story of the founder of the Turkish nation, Health and safety at work, Engineering Profession and Work Health-Safety which are courses specific to this university.

In addition to the language courses: Turkish and English Language, the University offers Energy Management, Total Quality Management which are management economics courses. We find 11 basic engineering requirement level courses. Apart from the fundamentals courses such as: Mathematics, Physics, we have such as: Introduction to Computer Programming and especially courses specific to this university like C Programming, Computer Aided Drawing, Introduction to Microcomputers and especially Business Law.

We can notice the high number (39) of Basic Engineering Requirement courses. This shows the importance that the Electrical and Electronic department of Kocaeli University gives the mastery of the knowledge of the field that the students have chosen.

The Table 17 shows the distribution the courses.

Course category	Course number
General Education Requirement(GER)	10
Basic Engineering Requirement(BER)	11
Engineering Major Requirement(EMR)	39
Total	60

Table 17: courses Number of Kocaeli University

Kocaeli University follow ECTS system and has 240 ECTS credit hour. When we convert 240 ECTS credit to ABET system we found 145 credit hours.

Below we have the credit and credit hour distribution.

Course Credit	Kocaeli University
GER	16
BER	32
EMR	94
capstone	3
Total	145

Table 18: Course Credit of Kocaeli University

The course structure Osun state University.

Osun State University's department of Electrical and Electronics Engineering has the highest number of courses with 71 courses and also the highest number of semesters i.e. 10 semesters and the longest training period of 5-years among the selected universities.

We can equally notice that the number of Basic Engineering Requirement courses (25) is very high compared to other selected universities. In terms of General Educational Requirement, the university offers Entrepreneurship Skills Development and Practice, Introduction to Logic and Philosophy, Industrial Law & Management which are courses specific to this university not present in the other selected universities.

The university equally have sociocultural courses such as: Nigerian Peoples and Culture, Osun Peoples and Culture.

The high number of Basic Engineering Requirement courses is explained by the presence of several mechanics courses such as: Engineering Drawing, Workshop Technology, Engineering Materials, Engineering Mechanic, Basic Thermodynamics, Basic Fluid Mechanics, which are courses not present in the other selected universities engineering departments.

The University equally possesses courses such as: Low Level Language, Technical Report Writing, Strength of Materials which are courses specific to the department of this university.

In addition to courses in Mathematics, Physics, Chemistry, Introduction to Computer Programming, Structured Programming, Introduction to Information & Communication Technology, Industrial Economics, which are courses present in all the selected universities.

Course category	Course number
General Education Requirement(GER)	11
Basic Engineering Requirement(BER)	25
Engineering Major Requirement(EMR)	35
Total	61

Table 19: courses Number of Osun State University

Course Credit	Osun State University
GER	19
BER	57
EMR	95
capstone	6
Total	177

Table20: Credit hours of Osun State University

Category	Credit hours of King Fahd University	Credit hours Kocaeli University	Credit hours University Teknikal Malaysia Melaka	Unit	Credit hours Qatar University
GER	21	16	23	19	21
BER	37	32	15	57	36
EMR	73	94	94	95	71
Capstone	3	3	6	6	3
Total	134	145	138	177*	131

Table 21: Credit hours of five Selected Universities

*Learning units

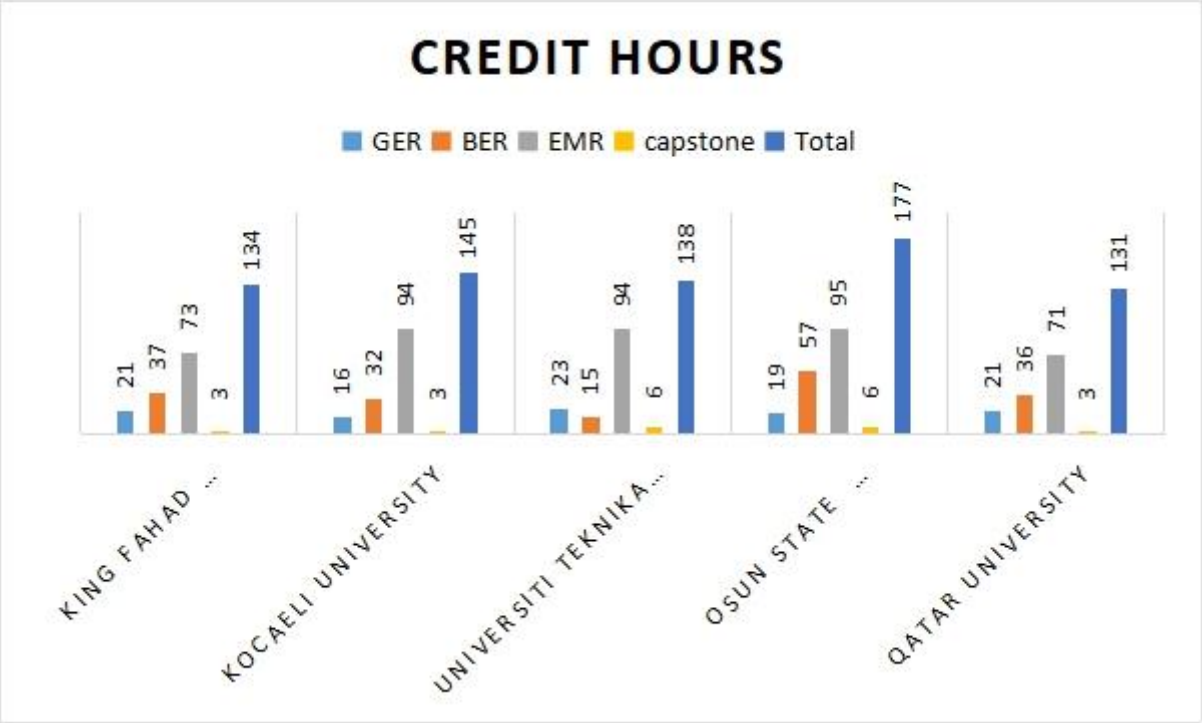

Figure 2: Credit Hours comparative histogram

It is noticed that, in terms of the distribution of study programs, of the five selected universities, four universities offer a 4- years program spread over 8 semesters.

Osun State University offers a 5-year program spread over 10 semesters.

In terms of the number of courses, apart from the Engineering Major Requirements, the engineering courses i.e. Electric Circuits, Electronics, Signal and System are almost the same in all the selected universities.

The Basic Engineering Requirement courses such as: Mathematics, Physics and Chemistry, English language courses and courses in Computer Programming Economics are present in all the selected universities.

Universities such as Qatar university and Teknikal University Malaysia Melaka offer joint curriculum and ethics courses whereas King Fahad University and Qatar University jointly offer Arabic and Islamic study courses.

Osun State and Teknikal University Malaysia Melaka offer Entrepreneurship.

In terms of differences, we can notice that Osun State University is the only university to have a 5 years of program over 10 semesters. The numbers of courses are not the same in all the

selected universities. Sunday State university is the one that offers the most courses with 71 courses spread over 10 semesters, then followed by Kocaeli University which offer 60 courses spread over 8 semesters, then Teknikal University Malaysia Melaka which offer 53 courses spread over 8 semesters. Qatar University offers 48 courses spread over 8 semesters and lastly King Fahad University which offers 39 courses spread over 8 semesters.

The five selected universities do not have the same credit courses. One universities has course credit more than 150 credits Osun State University. Kocaeli University has 145 course credit, Teknikal University Malaysia Melaka has 138 course credit, King Fahd University has 134 and finally, Qatar University has 131 course credit.

Some universities offer courses that are absent in other universities. For example, Osun State university offers mechanics courses like: Engineering Materials, Engineering Mechanics or Low Level Language, Technical Report Writing, Strength of Materials. Introduction to Logic and Philosophy that are found only in that university.

Osun State University is the only university to offer the most unique courses.

Kocaeli University also offers singular courses such as: Health and Safety at Work, Engineering Profession and Work Health-Safety.

Unique courses are equally found in Teknikal University Malaysia Melaka such as Organization Skill courses.

Each university has its strengths and weaknesses. If the variety of courses is a great asset for Osun State University, it should be noted that the plethora of courses and the long duration of its training are a real handicap. As for Kocaeli University and also Osun State University, the very high number of course credit are real obstacles for students who find themselves facing a real challenge in obtaining their diploma. On the other hand, King Fahd University does not offer enough diversity in its General Educational Requirement courses. But in terms of the number of courses and course credit it remains in the international average. University Teknikal Malaysia Melaka and Qatar University seem to be the ones that offer a good mix of course diversity and a

reasonable number of courses i.e. in terms of the number of course credit despite Qatar University being the one with the lowest course credit.

4.4 Student Assessment Systems

Assessment has become an important topic of debate and discussion, especially in Western countries. It is also important in other regions of the world and no more so than in the countries in the Asia-Pacific region. We can say that teachers need to undergo prior service or in-service training on assessment where they will be trained on different assessment approaches and systems.

Students assessment system is known to be a qualitative analysis. The students' learning assessment systems among the selected universities will be compared. This research takes in count, five (5) universities of the OIC, i.e. Saudi Arabia, Malaysia, Nigeria, Qatar and Turkey. The Universities are; King Fahd University, University TekniKal Malaysia Melaka, Osun State University, Qatar University and Kocaeli University.

4.4.1 King Fahd University

According to (KE, 2016) the evaluation system applied by the university in general and the department in particular consists of three exams, two major ones of 20% each, a final exam which counts 30%, 4 to 5 quizzes of 15%, projects, class exercises and portfolio 10%.

For a total of 100%, the following table gives an appreciation of the points distribution. The University have 8 rating levels. Attendance is not included the elevation system. A student is required to get 94% to get the highest average A + and a minimum of 59% is required to pass. An average of less than 59% means failure in the subject.

Requirements	Weight
Major I	20%
Major II	20%

Final Exam (Semi Comprehensive)	30%
Quizzes and Participation	15%
Projects and Assignments: Portfolio Construction Assignment Bloomberg Market Concepts (BMC) Certificate	10% 5%
Total	100%

Table 22: Student Assessment methods with weight of KFU

Letter Grade	%
A+	94-100
A	89-93
B+	84-88
B	79-83
C+	74-78
C	69-73
D+	64-68
D	59-63
F	<59

Table 23: Student evaluation grading scale

4.4.2 University Teknikal Malaysia Melaka

Student's performance in every subject according to (Vitae, 2013) is evaluated based on the grade obtained. Grading system is shown in Table 1. Generally, minimum passing grade for a subject is Grade D. However, grade D up to C- are categorized as conditional pass and the students are allowed to improve their grade by repeating the subject only once. The University has 10 level of evaluation which goes from A to E. It is necessary to obtain 80% of the total mark to obtain the highest average and an average less than or equal to 39% to fail.

Grade	Marks Percentages	Grade Point

(Achievement)		
A (Excellent)	94-100	4.0
(Excellent)	89-93	3.7
B+ (Honours)	84-88	3.3
B (Honours)	79-83	3.0
(Pass)	74-78	2.7
C+ (Pass)	69-73	2.3
C (Pass)	64-68	2.0
(Conditional Pass)	59-63	1.7
D+ (Conditional Pass)	<59	1.3
D (Conditional Pass)	94-100	1.0
E (Fail)	89-93	0.0

Table 24: Grading System and Point

4.4.3 Qatar University

A final examination is organized at the end of each semester according to (Court & Henderson, 2014). But Student assessment and grading is,(Court & Henderson, 2014) a continuous process starting on the first day of class and continuing until the end of the semester. Instructors evaluate student performance using a variety of techniques, methods and tools. Instructors assess each student's performance and progress in the class while recognizing areas of strengths and weaknesses. Grading is a cumulative notion that is based on the student's performance during the semester. The student's final grade is not based on less than three different assessment tools. These may include, but are not limited to, exams, projects, presentations, reports, quizzes, reading assignments, research papers, writing essays, classroom feedback and discussions etc. In all cases,

every student has the right to see, review and discuss with the instructor all marked materials used in grading them.

Instructors shall determine the grade for each undergraduate student registered in their courses according to the following table:

Letter Grade	Description	Percentage	Grade Points
A	Excellent	90 to 100	4.00
B+	Very Good	85 to <90	3.50
B	Very Good	80 to <85	3.00
C+	Good	75 to < 80	2.50
C	Good	70 to < 75	2.00
D+	Pass	65 to <70	1.50
D	Pass	60 to < 65	1.00
F	Fail	Less than 60	0.00
P	Pass		
NP	Not Pass		

Table 25: Letter Grades and corresponding Grade Points

CC	Continuing Course
I	Incomplete
TC	Transfer Credit
W	Withdrawal
WF	Forced Withdrawal
Au	Audit
FA	The student could not attend the final exam and could not provide an acceptable excuse for his absence.
FB	The student exceeded the allowed absence limit (25%)

Table 26: Grade Acronyms meaning

Every letter grade has grade points corresponding to it. These constitute the basis for calculating the Grade Point Average (GPA). The total number of grade points earned for each course is calculated by multiplying the number of credit hours assigned to the course by the number of grade points corresponding to the letter grade received as shown above. The semester and cumulative GPA are determined by dividing the total number of grade points accumulated for all courses by the number of credit hours attempted. The GPA is an indicator of the student's overall academic performance at Qatar University.

4.4.4 Kocaeli University

Examination, assessment and grading procedure is mainly based on Kocaeli University Education and Training Regulations for Associate and Undergraduate Degrees Depending on the nature of the course various instruments such as midterms, final exams, short exams, presentations, assignments, projects, portfolios and applications may be involved in the assessment process of a semester on condition that students are informed about their weights upon registry. Contribution of these activities to final grading range between 30% -70% and so as to be eligible to take the final exam, a student has to fulfill the attendance requirement of 70% for theoretical and 80 % for practical courses. Once this requirement is fulfilled, attendance is not required again in case of a failure and retaking that course. Final grading of a course is determined on the basis of semester studies and final exam (Say et al., 2011). Those with certified and officially approved excuses are also given a makeup exam.

The course structure with the number of credits is as shown in the table below;

Letter Grade	Description	Percentage	Grade Points
AA	Successful	90 to 100	4.00
BA	Successful	80 to 89	3.50
BB	Successful	75 to 79	3.00
CB	Successful	70 to 74	2.50
CC	Successful	60 to 69	2.00
DC	Successful/Unsuccessful	50 to 59	1.50
DD	Unsuccessful	40 to 49	1.00
FD	Unsuccessful	30 to 39	0.50
FF	Unsuccessful	0 to 29	0.00

Table 27: Letter Grades and corresponding Grade Points

4.4.5 Osun State University

The evaluation system applied by the Osun State university in general and the department in particular consists of two exams, continuous examination (test) of 30%, final examination 60% and attendance 10%.

Requirement	Weight
Continuous assessment	30%
Final examination	60%
Attendance	10%

Table 28: Student Assessment methods with weight of Osun State University

Degree Classification	Percentage	Letter Grades	Grade Points	Cumulative GPA	WES
First Class	70 – 100	A	5	4.40 – 5.00	A
2nd Class Upper	60 – 69	B	4	3.50 – 2.29	B+
2nd Class Lower	50 – 59	C	3	2.40 – 3.49	B
Third Class	45 – 49	D	2	1.50 – 2.39	C
Fail	40 - 44	E/F	1	1.49- 0	F

Table 29: Letter Grades and corresponding Grade Points

Requirement	KFU	UTeM	QU	KU	OSU
Major I	√				
Major II	√				
Mid semester				√	
Final Exam (Semi Comprehensive)	√	√	√	√	√
Quizzes and Participation	√				
Projects and Assignments: Portfolio Construction Assignment	√				
Bloomberg Market Concepts (BMC) Certificate	√				
Continuous assessment		√	√		√
Attendance					√

Table 30:Comparison of student Assessment methods amount the selected universities

KFU				UTeM				QU				KU				OSU			
%	LG	GPA	Class	%	LG	GPA	Class	%	LG	GPA	Class	%	LG	GPA	Class	%	LG	GPA	Class
94-100	A+	-	-	94-100	A (Excellent)			90 to 100	A			90 to 100	AA			70-100	A	4.40-5.00	1st class

89-93	A	-	-	89-93	(Excellent)			85 to <90	B+			80 to 89	BA			60-69	B	3.50 – 2.29	
84-88	B+			84-88	B+ (Honours)			80 to <85	B			75 to 79	BB			50-59	C	2.40 – 3.49	
79-83	B			79-83	B (Honours)			75 to < 80	C+			70 to 74	CB			45-49	D	1.50 – 2.39	
74-78	C+			74-78	(Pass)			70 to < 75	C			60 to 69	CC			< 45	E/F	1.49-0	
69-73	C			69-73	C+ (Pass)			65 to <70	D+			50 to 59	DC						
64-68	D+			64-68	C (Pass)			60 to < 65	D			40 to 49	DD						
59-63	D			59-63	(Conditional Pass)			Less than 60	F			30 to 39	FD						
<59	F			<59	D+ (Conditional Pass)							0 to 29	FF						
				94-100	D (Conditional Pass)														
				89-93	E (Fail)														

Table 31:Comparison of student Assessment evaluation amount the selected universities

LG: letter grade, GP: grade point, %: percentage of marks

4.5 Comparison of Universities Assessment Systems

Considering the universities evaluation and assessment system of the five selected universities, the CGPA is 4 for all universities except Osun State University where the CGPA is 5. Each university has its own evaluation system with great flexibility given to teachers to assess students through class projects, exercises, homework and oral quizzes in addition to the official exams organized by universities. A minimum of two exams are organized by the universities each

semester. These subjects are assessed out of 100 points for the entire semester. Some universities like King Fahd or Qatar Universities grant a percentage for each evaluation. The sum of all these evaluations made by the teacher gives the student's average in a semester.

The minimum required to pass a subject also depends on each university. For example, at University Teknikal Malaysia Melaka, at least 40 points out of a hundred is required to pass a subject while at King Fahd University, 59 points is needed.

King Fahd University and Qatar University have the same student evaluation system and point award scale. In order to pass a subject in these universities, a student needs 59-60 points while to get an A + grade, any score from 90 to 100 is required.

University Teknikal Malaysia Melaka and Kocaeli University equally have the same evaluation system i.e. a minimum of a ‘D’ grade is the minimum grade required to pass (40-45%) and the maximum is an A + (80-100%).

It is noticed that in all five selected universities that attendance is not considered in the evaluation system. The percentage of the highest average, the minimum grade to pass and the average of a student that constitutes failure vary from one university to another. Certainly some universities have the same level of evaluation such as; University Teknikal Malaysia Melaka and King Fahd university but they do not have the same distribution of points and grading.

CHAPTER V

5 DISCUSSION, CONCLUSION & RECOMMENDATION

5.1 Discussion

This study based is based on the department's electricity and electronics courses from 5 chosen universities of the OIC countries. It allows us to examine the number of courses that these universities provide, the course credits that students are required to accomplish in order to obtain their diplomas and course credits in relation to the courses dispensed as well as the evaluation system

used by the five universities to assess their students.

The study equally permitted us to all the subjects taught and comparisons between each university was obtained. It emerges from our study that Osun State University is the university which offers the most courses in terms of total number of courses in the whole program with 71 courses, then comes, the University of Kocaeli with 60 courses, University Teknikal Malaysia Melaka has 54 courses, Qatar university with 48 courses and finally, King Fahd University is by far the one with the fewest number of courses with 39 courses.

The research, equally grouped the courses into three different categories: general educational requirement (GER), basic engineering requirement and engineering major requirement. According to each category, we have noticed that regarding general educational requirement (GER), all the selected universities offers almost same number of general educational requirement (GER) between 9 to 11 courses. Except Qatar University with 7 general educational requirement (GER).

Considering the basis engineering requirement (BER) category, Osun State University occupies the first position with 25 courses, followed by Qatar University with 14 courses, King Fahd University offers 12 courses, Kocaeli University offers 11 courses and lastly University Teknikal Malaysia Melaka offers 5 courses.

Considering engineering major requirement (EMR) category, Kocaeli University is the first with 39 courses. University Teknikal Malaysia Melaka offers 37 courses, Osun State University offers 35 courses, Qatar University which offers 27 courses and finally, King Fahd University which offers 18 courses.

The credits hours for each of the five universities was also reviewed. It has been found that, Osun State University has in total 177 credits hours i.e. 19 credits hours for the general educational requirement, 57 credits hours for the basic engineering requirement (BER), 95 credits hours for engineering major requirement (EMR) and 6 credit hours for capstone. Kocaeli University has 145 credits courses i.e. 16 credits hours for general educational requirement (GER), 32 credits hours for basic engineering requirement (BER), 94 credits hours for engineering major requirement (EMR) and 3 credits hours for capstone. University Teknikal Malaysia Melaka offers 138 credits hours, with 23 credits hours for the general educational requirement (GER), 15 credits hours for basic engineering requirement (BER), 94 credits hours for engineering major requirement (EMR) and 6 credits hours for capstone. King Fahd University, on the other hand, offers 134 credits hours i.e. 21 credits hours for general educational requirement (GER), 37 credits hours for basic engineering requirement (BER) and 73 credits hours for engineering major requirement (EMR) and 3 credit hours for capstone. At last, comes Qatar University which offers 131 credits hours i.e. 21 credits hours for general educational requirement (GER), 36 credits hours for basic engineering requirement (BER) and 71 credits hours for engineering major requirement (EMR) and 3 credits hours' capstone.

Some similarities were equally noted among all five universities. The main similarity is the teaching of modern language such as English.

Regarding the assessment systems of the universities, although each university has its own specificity, we note some similarities between King Fahd University and Qatar University which both have the same system for evaluating students. They both equally have the same point award scale. In order to pass a subject in these two universities, a minimum of 59-60 points range is

required by the student. Meanwhile to have the best passing grade, an A + is needed ranging between 90-100 points. On the other hand, University Teknikal Malaysia Melaka University and Kocaeli equally have the same assessment system with a minimum passing point ‘D’ i.e. a point in between 40 to 45 points and a maximum ‘A +’ between 80-100 points is needed.

5.2 Conclusion

This study allowed us to make a comparison between five universities of the OIC member countries for the undergraduate program in the department electricity and electronics. This research explored the number of courses, course credits, credit hours as well as the evaluation system of the various selected universities.

From the various analysis of the universities curriculum, carried out in this research, we have noted some similarities as well as some differences. From the results of this study, it appears that the programs of universities in the OIC member countries differ.

5.3 Recommendations

From the results obtained in this study, the following recommendations may improve the existing programs of OIC member states universities as well as promoting and reinforcing cooperation and exchange programs in between different universities.
different universities.

The recommendations are as follows;

- the establishment of a summit of ministers of education of the various OIC member states in order to discuss issues and challenges of the Muslim Ummah in the field of education;
- the creation of a body responsible for developing programs or courses and then offer them to the OIC member states based on the needs of the Muslim Ummah;

- granting research funding in order to identify the shortcomings and needs in the field of education of the OIC member states;
- the creation of a platform responsible for ensuring cooperation and exchanges between universities in the OIC member countries;
- the establishment of specialties in the field of renewable energy in the departments of electricity and electronics;
- the creation of a research center of excellence bringing all together the OIC member countries;
- harmonization of programs in the various fields in general and in the field of electricity and electronics in particular.

CHAPTER VI

6 REFERENCES

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APPENDIX -A

Comparative table of general courses in selected universities

Course Name	King Fahad University	Qatar university	Kocaeli University	Universiti Teknikal Malaysia Melaka	Osun State University
Computer programming	Yes	Yes	No	No	Yes
Language	Yes	Yes	Yes	Yes	Yes
Islamic and Arabic studies	Yes	Yes	No	No	No
Mathematics	Yes	Yes	Yes	No	No
Physical Education	Yes	No	No	No	No
Natural science(physics and chemistry)	Yes	Yes	Yes	No	No
Engineering economic analysis	Yes	Yes	No	No	No
Humanities	No	Yes	Yes	Yes	Yes
History and socio-economic of the country	No	No	Yes	Yes	Yes
Introduction to information and communication technology	No	No	No	No	Yes

APPENDIX -B

Comparative table of core courses in selected universities

Course Name	King Fahad University	Qatar university	Kocaeli University	Universiti Teknikal Malaysia Melaka	Osun State University
Digital Logic Circuit Design	Yes	No	Yes	No	Yes
Electrical Circuits	Yes	Yes	Yes	Yes	Yes
Intro. to Electrical Eng	Yes	No	Yes	No	No
Electronics	Yes	Yes	Yes	Yes	Yes
Signals and Systems	Yes	Yes	No	Yes	Yes
Electric Energy Eng.	Yes	No	No	No	Yes
Control Eng.(system)	Yes	Yes	Yes	Yes	Yes
Electromagnetics	Yes	Yes	Yes	Yes	Yes
Communications Eng.	Yes	Yes	No	Yes	Yes
Digital Systems Eng.	Yes	Yes	No	Yes	No
Probabilistic Methods in Electrical Eng.	Yes	No	No	No	No
Fundamentals of EE Design	Yes	Yes	No	No	Yes
Project	Yes	Yes	Yes	Yes	Yes
Electric Machines	No	Yes	Yes	Yes	Yes
Power Systems Analysis	No	Yes	Yes	Yes	No
Power Electronics	No	Yes	Yes	Yes	No
Signal Analysis & Filtering	No	Yes	No	No	No
Embedded Systems	No	Yes	No	No	No
Sensors and Instrumentation	No	Yes	No	No	No
Computer programming	No	No	Yes	Yes	Yes
Materials	No	No	Yes	No	Yes
Electrical Measurement	No	No	Yes	No	No
Engineering Drawing	No	No	Yes	No	No
Circuit Analysis	No	No	Yes	No	No
Power Transmission	No	No	Yes	No	No
Numerical Analysis Methods	No	No	Yes	No	No
Health and safety at work	No	No	Yes	No	No
Automation Systems.	No	No	Yes	Yes	No
Power Distribution	No	No	Yes	No	No
Mathematics	No	No	No	Yes	Yes
Instrumentation & Measurement	No	No	No	Yes	Yes
Digital Electronics & System	No	No	No	Yes	No

Electrical Technology	No	No	No	Yes	No
Introduction to Mechanical Engineering	No	No	No	Yes	Yes
Introduction to Power Engineering	No	No	No	Yes	No
Microprocessor	No	No	No	Yes	No
Electrical Drive & Actuators	No	No	No	Yes	No
High Voltage Engineering	No	No	No	Yes	No
Natural science(physics and chemistry)	No	No	No	No	Yes
Engineer in Society	No	No	No	No	Yes
Basic Thermodynamics	No	No	No	No	Yes
Basic Fluid Mechanics	No	No	No	No	Yes
Computational Structures	No	No	No	No	Yes
Electric Power Principles	No	No	No	No	Yes
Semiconductor Devices	No	No	No	No	Yes
Industrial Economics	No	No	No	No	Yes
Industrial Law & Management	No	No	No	No	Yes
Digital Signal Processing	No	No	No	No	Yes
Reliability Engineering	No	No	No	No	Yes