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Perceptions of Electrical and Electronic Engineering Career Paths: A Study Among Form Five Students in Dungun District, Malaysia

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A B S T R A C T

The discipline of Electrical and Electronic Engineering has been recounted as one of the main Technical and Vocational Education and Training (TVET) fields. However, students' know-how and exposure within the discipline of electrical and electronic engineering stay at a low stage. This is due to the lack of college students selecting engineering fields of their in addition observe, mainly electrical and digital engineering publications. Therefore, this take a look at turned into conducted. This examine targets to evaluate Form Five students' perceptions of careers in Electrical and Electronic Engineering on 3 extraordinary degrees: the profession attributes which might be taken into consideration "massive" in profession selection, the volume of understanding approximately careers in the area, and the propensity to select Electrical Engineering as a profession direction. One hundred forty college students from twenty-three national secondary faculties in the Dungun location participated within the move-sectional survey. From this studies, it reveals that scholars possess inadequate know-how of electrical and electronic engineering disciplines, coupled with limited exposure to potential careers inside the subject. This lack of expertise hampers their preparedness for destiny expert roles within the electrical and electronic engineering area, highlighting a sizable gap in their educational reviews and profession readiness.

Keywords: Electrical and electronic engineering, career, exposure.

Introduction

Electrical and Electronic Engineering has plays a important position in shaping the current global, including the whole thing from offering electricity to our houses to enabling verbal exchange networks and using technological innovation. Despite its exceptional significance, many college students today appear to lack knowledge and consciousness of this area. This lack is especially concerning, given the vital role Electrical and Electronic Engineering performs within the advancement of society (Elena, 2023).

The needs for electric and digital engineering expertise has elevated recently because of fast technology advancements and a rising dependence on electric powered and digital gadgets across a lot of industries. Nonetheless, there's a sizeable discrepancy among the variety of college students deciding on to pursue careers in electrical and electronic engineering and the actual want for qualified people in this area.

This tendency is caused by a number of factors. First and foremost, college students might not have been exposed to the standards and career opportunities of electrical and electronic engineering throughout their early years. Electrical and Electronic Engineering courses may not be sufficiently covered in the college curriculum, which would result in students knowing little about them. Furthermore, students may be discouraged from considering engineering professions as potential career choices if they encounter misconceptions or preconceptions about them, including electrical engineering (Elena, 2023).

Moreover, the swiftly evolving nature and complexity of era inside Electrical and Electronic Engineering may also pose challenges for college students in comprehending the sphere absolutely. Without proper steerage and publicity to actual-world packages, students may also warfare to comprehend the relevance and importance of Electrical Engineering in their day by day lives and destiny careers.

To deal with these issues, it is important to discover students' perceptions and understanding gaps concerning Electrical Engineering careers. By information the motives behind the lack of awareness and hobby on this subject, educators and policymakers can devise targeted interventions to sell extra engagement and participation in Electrical and Electronic Engineering schooling and careers.

Therefore, the purpose of this study is to assess Form Five students' perception regarding careers in the field of electrical and electronic engineering, with a particular emphasis on their understanding of the field, the variables affecting career decisions, and their preparedness to pursue an electrical engineering career. By means of thorough investigation and evaluation, these conclusions will assist educational institutions and decision-makers in enhancing students' enthusiasm in studying Electrical and Electronic Engineering.

Methodology

The study area is in Dungun District, Terengganu. Dungun District is situated in the eastern part of Terengganu state at coordinates 4°44'N 103°25'E. Generally, Dungun District covers an area of 273,503.1 hectares. Overall, there are 152 secondary schools in Terengganu state, and among them, 23 secondary schools are located in Dungun District. However, this study only focuses on national secondary schools located in Dungun District, consisting of only 21 schools.

This study employs a cross-sectional design, which means data is collected at a single point in time from a specific population. In this case, the population under investigation consists of all Form Five students from National Secondary Schools (SMK) in the Dungun District, totaling approximately 2290 students. Using The Raosoft sample size calculator (Raosoft, 2010), it was determined that a sample size of 140 students is sufficient for the study. This means that out of the total population of 2290 students, gathering data from a sample of 140 students is considered adequate for the purposes of this study.

The questionnaire used in this study was adapted from the English version questionnaire used in a previous study (Greenwood et al., 2006 Tang Hoe Ching, 2018). A pilot study was also conducted on 10 subjects who met the study criteria to improve the questionnaire to make it easier and clearer for use by Form Five students. For this study, instrument validity refers to the accuracy of the questionnaire used. Questionnaire validity aims to measure the extent to which the questionnaire accurately measures the data it is supposed to measure. If the questionnaire does not measure the intended data accurately, then the findings of the study are not meaningful (Mohd. Majid, 2005).

According to Mohd. Najib (2003), a sample size of 15-20 respondents is sufficient for analyzing external validity. However, according to Mohamad Najib (1999), the sample size for a pilot study does not need to be large but adequate to fulfill the purpose of effective initial discussions about the test, which is between 6 to 9 individuals. Based on these two statements, the researcher decided that a sample size of 10 individuals is appropriate for the pilot study. Feedback was collected to rectify any errors in meaning, spelling, and grammar found in the questions. The Cronbach alpha reliability coefficient obtained for the questionnaire was 0.9, indicating a high level of consistency in the questions. The researcher then distributed the study information sheet to the respondents.

We used descriptive analysis to understand two things: what the students in Form Five think is important in health science careers, and their overall perceptions about these careers. We looked at three main factors: (1) the career characteristics evaluated as 'important' in career selection among form five students, (2) the level of knowledge regarding careers in the field of electrical and electronic engineering, and (3) the potential fields in electrical and electronic engineering for further study consideration. We handed out 140 forms for students to fill in, and 140 were returned. Overall, we got a high response rate of 100%.

Result and Discussion

A total of 140 students responded, including 63 males and 77 females. All respondents were fifth-grade students at a Malaysian secondary school in the Dungun area, and they were of Malay and Chinese descent, with Malays accounting for 98.6% of the sample and Chinese for 1.4%. Table 1 shows that out of 140 responders, 63 (45%) were male and 77 (55%) were female. Table 2 shows the number of responses and their percentages by school in the Dungun area.

Table 1 - Distribution of Respondents Based on Gender

	Frequency	**Percent (%)**
Male	63	45
Female	77	55
Total	**140**	**100**

Table 2 - Distribution of Respondents based on school

School	N	Percent	Valid Percent
SMK PAKA	10	7.1	7.1
SMK DURIAN MAS	3	2.1	2.1
SMK KETENGAH JAYA	11	7.9	7.9
SMK SERI PAKA	10	7.1	7.1
SMK JERANGAU	6	4.3	4.3
SMK TEJA PUTRA	4	2.9	2.9
SMK PADANG PULUT	10	7.1	7.1

SMK KUALA JENGAL	4	2.9	2.9
SMK BUKIT BESI	5	3.6	3.6
SMK SERI RASAU	3	2.1	2.1
SMK PULAU SERAI	7	5.0	5.0
SMK ENGKU BIJAYA	5	3.6	3.6
SMK TENGKU INTAN ZAHARAH	12	8.6	8.6
SMK KOMPLEKS PADANG JAMBU	8	5.7	5.7
SMK BALAI BESAR	6	4.3	4.3
SMK SULTAN OMAR	9	6.4	6.4
SMK(A) KUALA ABANG	5	3.6	3.6
SMK SURA	7	5.0	5.0
SMK SERI DUNGUN	7	5.0	5.0
SMK KOMPLEKS RANTAU ABANG	6	4.3	4.3
SMASID	2	1.4	1.4
	140	100.0	100.0

The career characteristics evaluated as 'Important' in career selection among form five students by gender (%)

Table 3 lists the career attributes that respondents by gender deemed "Important" when choosing a career. The study's conclusions show that respondents, irrespective of gender, give preference to occupations with traits like:

Table 3 - Career characteristics assessed as "Important" in career selection among respondents by gender

Career characteristics	**Male**	**Female**
	Mean value	
Job satisfaction	3.37	3.25
Job security	3.44	3.32
Interesting	3.97	3.88
Helping others *Doing something for the benefit of society	3.38	3.54
High salary	3.38	3.44
Opportunities for travel	3.37	3.36
Opportunities to meet many people	3.48	3.29
Challenging	3.14	3.97
Opportunities to live abroad	3.16	3.22
Career status from a societal perspective **Being one's own boss / making own decisions	3.19	3.18
Mostly female coworkers	2.89	3.03
Mostly male coworkers	3.38	2.95

The study findings indicate that respondents, regardless of gender, prefer careers that have characteristics such as "Interesting" as their favourite choice. On the other hand, respondents are less concerned about career characteristics such as "coworkers are male" or "coworkers are female".

Table 4 - Interpretation of Mean Score for 4-point Likert Scale

Mean score	**Level**
1.00 – 2.00	Low
2.01 – 3.00	Moderate
3.01 – 4.00	High

(source : Talib, 1996)

In table 5, there's sizeable difference in the variable "Mostly male coworkers" (the sig fee < zero.05) shows that there is a statistically big relationship among the gender composition of the administrative center and the elements influencing profession preference a few of the respondents. One possible interpretation of this finding is that the presence of generally male coworkers might also have an effect on or impact the career choices of individuals. For example, it is feasible that respondents who perceive their destiny administrative center as predominantly male may be influenced by means of this thing when making their career decisions. This could be due to numerous reasons, along with perceptions of inclusivity, workplace tradition, or the character of the paintings environment. This could also be because respondents, in particular women, see engineering as typically for male and that they do not need it. In fact, consistent with Diana (2016), this is due to circle of relatives factors and shortage of sufficient exposure to the engineering area. Women may not recognize plenty approximately engineering because stereotypes are deeply rooted in families, beliefs, lifestyle, media, and society.

Table 5 - The characteristics rated as "Important" in career choice among respondents by gender.

Independent Samples Test				
		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Job safisfaction	Equal variances assumed	1.221	138	0.224
	Equal variances not assumed	1.241	137.811	0.217
Job security	Equal variances assumed	1.271	138	0.206
	Equal variances not assumed	1.281	135.712	0.203
Interesting	Equal variances assumed	1.320	138	0.189
	Equal variances not assumed	1.199	64.314	0.235
Helping others - Doing something for the benefit of society	Equal variances assumed	0.080	138	0.936
	Equal variances not assumed	0.080	131.992	0.936
High salary	Equal variances assumed	-0.648	138	0.518
	Equal variances not assumed	-0.654	136.428	0.514
Opportunities for travel	Equal variances assumed	0.015	138	0.988
	Equal variances not assumed	0.015	136.553	0.988
Opportunities to meet many people	Equal variances assumed	1.738	138	0.084
	Equal variances not assumed	1.764	137.582	0.080
Challenging	Equal variances assumed	-1.369	138	0.173
	Equal variances not assumed	-1.509	79.414	0.135
Opportunities to live abroad	Equal variances assumed	-0.556	138	0.579
	Equal variances not assumed	-0.552	129.503	0.582
Career status from a societal perspective -**Being one's own boss / making own decisions	Equal variances assumed	0.096	138	0.924
	Equal variances not assumed	0.099	136.066	0.921
Mostly female coworkers	Equal variances assumed	-1.148	138	0.253

	Equal variances not assumed	-1.143	129.937	0.255
Mostly male coworkers	Equal variances assumed	3.782	138	<0.001
	Equal variances not assumed	3.849	137.902	<0.001

The level of knowledge regarding careers in the field of electrical and electronic engineering

The respondents' level of familiarity with ten distinct electrical and electronic engineering occupations is displayed in Table 6. Electronic engineering, microelectronics, signal processing, telecommunications, instrumentation, computer, electro-optical, power, control, and medical electronic engineering. The most popular professional career among responders is telecommunications engineering (3.12), followed by computer engineering (3.06), and finally, electronic engineering (3.04). Instrumentation engineering is the area in which respondents know the least (2.51).

The data indicates that Telecommunications Engineering emerges as the most recognized career path among respondents, with an acknowledgment rate of (3.12). This high level of recognition can be attributed to several factors. Firstly, telecommunications technologies have become integral to modern life, with widespread use of smartphones, internet connectivity, and wireless networks. The ubiquity of these technologies likely contributes to greater public awareness of Telecommunications Engineering. Additionally, prominent telecommunications companies and brands, along with extensive media coverage of telecommunications advancements, further enhance public familiarity with the field.

With 3.06 percent of respondents recognizing it, computer engineering is the second most recognized job choice behind telecommunications engineering. This could be because computer-related courses and programs are common in educational institutions, and computer technology is becoming more and more important in a variety of businesses and daily activities. Even though it isn't as well-known as computer engineering and telecommunications, respondents nevertheless give electronic engineering a high rating (3.04), showing that they are familiar with the area. Respondents recognized electronic engineering because of its broad range of applications, which include anything from industrial automation to consumer electronics. On the other hand, the data shows that respondents know the least about Instrumentation Engineering. Compared to other engineering specialties, instrumentation engineering which deals with the design and implementation of measurement and control systems—may not be as well-known to the general public, which could explain why respondents were less familiar with it.

However, Laila (2018) asserts that students are greatly captivated by the topic of electrical engineering, which encourages them to pursue further education in this area. Many students are drawn to seek higher education in electrical engineering because of the field's dynamic and ever-evolving nature, as well as its potential employment options.

Table 6 - Knowledge regarding careers in the field of electrical and electronic engineering

Descriptive Statistics			
	N	Mean	Std. Deviation
Kejuruteraan instrumentasi - Instrumentation engineering	140	2.51	.725
Kejuruteraan elektro-optik - Electro-Optical Engineering	140	2.52	.714
Kejuruteraan kuasa - Power engineering	140	2.63	.672
Mikroelektronik - Microelectronics	140	2.68	.702
Pemprosessan isyarat - Signal processing	140	2.72	.669
Kejuruteraan elektronik perubatan – Medical Electronic engineering	140	2.74	.753
Kejuruteraan kawalan - Control engineering	140	2.76	.645
Kejuruteraan elektronik - Electronic engineering	140	3.04	.586
Kejuruteraan komputer - Computer engineering	140	3.06	.614
Kejuruteraan telekomunikasi - Telecommunications engineering	140	3.12	.569
Valid N (listwise)	140		

There was a significant difference found in the level of knowledge between men and women in the field of Power Engineering ($\chi 2 = 9.29$, df = 3, p = 0.026). This statement indicates that there is a statistically significant difference in the level of knowledge about Power Engineering between males and females, as evidenced by the chi-square test ($\chi 2 = 9.29$) with 3 degrees of freedom (df) and a p-value of 0.026.

As for why this difference may exist, it could be attributed to various factors such as differences in educational background, exposure to the field through work or study, societal norms and expectations influencing career choices, or even inherent biases in how engineering fields are perceived by different genders. Further investigation or analysis would be needed to determine the exact reasons behind this observed difference.

However, it's notable that respondents have the least knowledge about the field of instrumentation engineering. The mean = 2.51. This could suggest several things: either instrumentation engineering is not well-understood or it's not commonly offered as a specialization in electrical engineering programs, or it's simply not as popular among students compared to other fields. According to Andrew (2022), students should be given more opportunities and exposure to the fields of technology and engineering so that they are more likely to choose these fields.

The potential fields in electrical and electronic engineering for further study consideration

The study examined the selection of Form 5 students to pursue studies in the fields of electrical and electronic engineering. Based on Table 7, the field of telecommunications engineering receives the highest consideration for entry into further their study programs, 3.06 is the mean value. Followed by electronic engineering and computer engineering. The mean value is 2.96.

Telecommunication engineering is often the top preference for students due to several factors. Firstly, it provides ample job opportunities across various sectors, including telecommunications companies, networking firms, IT firms, government agencies, and research institutions. The increasing global demand for telecommunications infrastructure and services ensures a consistent need for skilled professionals in this domain. Secondly, the field of telecommunications is characterized by continuous technological advancements, including developments in 5G, Internet of Things (IoT), artificial intelligence (AI), and cloud computing. This dynamic nature appeals to students who are drawn to working with cutting-edge technologies and contributing to innovative solutions.

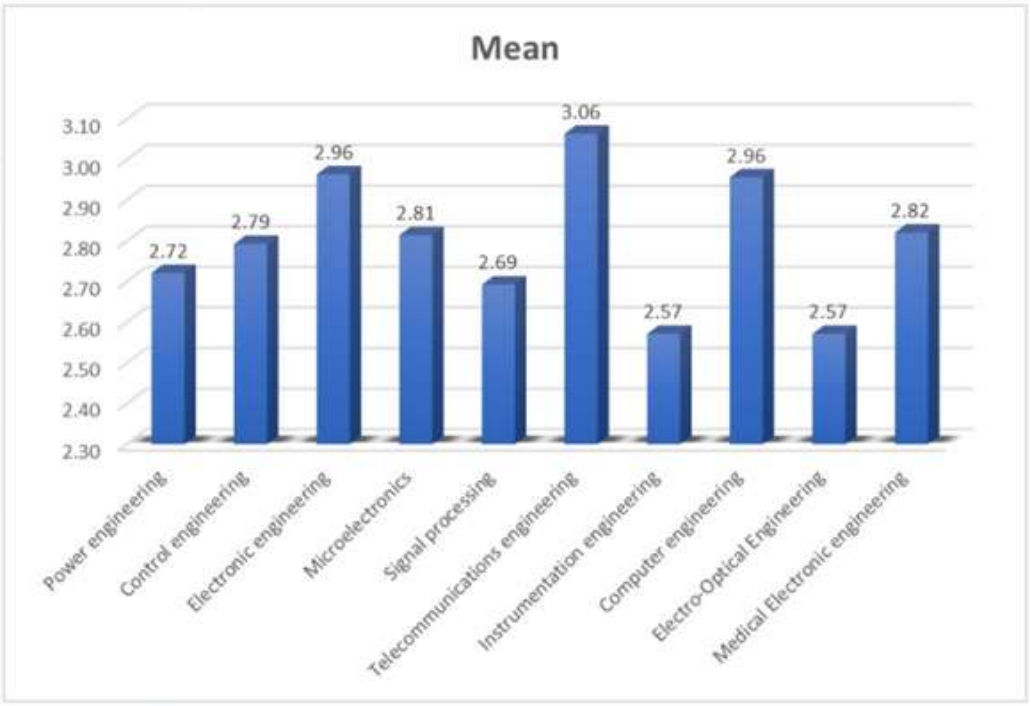

Fig. 1 - Mean

Table 7 - Potential fields in electrical engineering for further study consideration

	N	Mean	Std. Deviation
Kejuruteraan kuasa - Power engineering	140	2.72	.805
Kejuruteraan kawalan - Control engineering	140	2.79	.754
Kejuruteraan elektronik - Electronic engineering	140	2.96	.734
Mikroelektronik - Microelectronics	140	2.81	2.591
Pemprosessan isyarat - Signal processing	140	2.69	.758
Kejuruteraan telekomunikasi - Telecommunications engineering	140	3.06	.681
Kejuruteraan instrumentasi - Instrumentation engineering	140	2.57	.741
Kejuruteraan komputer - Computer engineering	140	2.96	.666

Kejuruteraan elektro-optik - Electro-Optical Engineering	140	2.57	.779
Kejuruteraan elektronik perubatan – Medical Electronic engineering	140	2.82	.780
Valid N (listwise)	140		

Overall, this study offers intriguing new perspectives on the preferences and attitudes of electrical engineering students toward their course of study. As shown in Table 4, the results indicate a moderate level of comprehension among respondents, with mean values ranging from 2.57 to 3.06. This suggests a big chance to raise knowledge of the variety of electrical and electronic engineering job options. The study highlights both potential knowledge gaps and areas of interest in the field, encouraging more research and instructional efforts.

Conclusion

The results of this survey have allowed us to determine the factors that form five students should consider when selecting a career in electrical and electronic engineering. Students favor careers that they find interesting and fascinating. They are drawn to professions that provide chances for personal development, excitement, and creativity. Despite the alluring features of the electrical and electronic industry, such as state-of-the-art technology, a strong need for qualified workers, and attractive pay, their interest in these underappreciated careers is restricted by a substantial knowledge gap and pervasive misunderstandings.

This misconception demonstrates that students' knowledge of electrical and electronic engineering is rather lacking. They are mostly ignorant of the wide range of employment options and career pathways in this industry, which include advanced manufacturing, robotics and automation, renewable energy, and electricity generation and distribution. This informational gap is alarming because it shows that students lack a thorough understanding of the possibilities and range of careers in electrical and electronic engineering.

The study underscores a significant gap in their educational experiences and career readiness. This gap indicates a pressing need for better information, guidance, and educational resources to help students understand the vast opportunities within electrical and electronic engineering. Schools, educators, and career counsellors must work together to provide students with comprehensive information about these fields, including the various specializations, required skills, and potential career trajectories.

Moreover, practical projects, industry collaborations, and internships are among initiatives that might be rather crucial in bridging this divide. Practical experience and exposure to the real world help students to deepen their knowledge and enjoyment of electrical and electronic engineering, hence fostering their interest in and preparation for work in these dynamic and crucial sectors.

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