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Research Article

The Profiling of Aspiration and Interest towards STEM and TVET Careers among Malaysian School Students

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Abstract

Education system in Malaysia continues to develop and expands to meet the demands of 21st century that strongly advocates the use of technology in teaching and learning. As such, basic education gives greater emphasis on two fields; STEM (*Science, Technology, Engineering & Mathematics*) and TVET (*Technology & Vocational Education Training*) in order to encourage school students to pursue higher education in STEM and TVET fields; however, the aspiration and interest to pursuit higher education in both fields are still low among school students. The purpose of this quantitative study was to identify profiling of career aspiration and interest of Malaysian school students in both fields. Using Career Exploration Test adapted from *Self Directed Search (SDS)* with 90 items to evaluate six types of career interests: Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E) and Conventional (C), 138 students, aged 13 years old, from a particular secondary school in Selangor state were sampled as respondents. Data was descriptively and inferentially analysed. Findings showed that the pattern of dominant traits of interest were Social (S), Investigative (I), and Realistic (R). In general, there was no difference between female and male students. However, for Realistic (R) dimension, majority of male students were dominant as compared to female students. Further findings also showed the existence of high congruency between aspiration and interest for career dimensions of Social (S), Investigative (I) and Realistic (R). This study has implications for schools and related stakeholders to conduct career development programs especially to nurture the interests among students in STEM and TVET from the early stage of secondary schooling years.

Keywords

career aspiration, career interest, STEM, TVET

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Introduction

The Malaysian government had set a 60:40 ratio target in the national education policy in 1967. Implementing the targeted policy in 1970, the government was committed to produce 60% of science and technical graduates as compared to 40% of Art graduates in higher education and secondary education. Such policy is a long term planning to prepare human capital for development of the country as advanced and high capital country as envisioned in Vision 2020 and National Transformation 2050 (TN50). To move the policy of 60:40 at the right time, the Ministry of Education (MOE) has created internal policy which underpins the need to promote the dimensions of Science, Technology, Engineering & Mathematics (STEM) and Technical & Vocational Education Training (TVET) education among secondary school students (Ministry of Education 2013).

Both of these education dimensions are given heavy emphasis from time to time in effort to ensure that Malaysia has sufficient professional human resource in science and technical field that caters the needs of local industry. In general, STEM education dimension gives great emphasis on the initiative to produce knowledgeable and skillful experts in science while TVET education dimension focusses to produce experts in technical field and workforce through systematic training approach.

Nevertheless, after five centuries of 60:40 policy implementations, the policy objective failed to impact the Malaysian education system. The reported statistics showed that Malaysia Education Development Plan 2013-2025 (Ministry of Education 2013) shows that only 45% students in secondary schools chose technical science during their lower secondary education to upper secondary education (Bakar, Amat & Mahmud 2017; Jelas et al. 2013). Additionally, it was reported that 12% of science stream students in secondary schools migrated to non-STEM programs at the tertiary level. On the other hand, rapid development of TVET education is not able to attract the younger generation especially the school leavers to choose the skill training institutions as their main choice. Despite the incentives and huge investments made by the government to encourage the interests of young generation to pursue their study in science/technical education, the response was not good enough. Therefore, the government initiative falls short of its' goal.

The identified reasons behind these failing efforts were saturated and stereotyped to elements with material attributes such as learning techniques, curriculum, infrastructure and many more (Ministry of Education 2013). In other words, this area is under-researched especially in identifying the human and psychosocial factors such as aspiration, students' career interest, tendencies in making career choices, environment support and others. Thus, this study is an initial initiative to profile the aspiration and interests of lower secondary students in STEM and TVET careers. This study aims to produce baseline data that is useful to plan a module or plan to enhance the students' potential in choosing STEM and TVET careers.

Research Background

This study hypothesizes that career tendencies are able to be identified through career interest constructs (Isaacson & Brown 2000; Holland 1994) and career aspiration (Crites 1981). Both constructs are psychology factors that explain the tendencies of career interest among students. This study also assumes that the choices of study and training, as well as job aspiration are the results of a career decision made during schoolings (Holland 1997; Super 1957). The career decision process was made systematically based on the information. The choice of program study is part of the execution made earlier. The relationship between constructs of aspiration and career interest is useful to shape the career environment in TVET and STEM as in Figure 1.

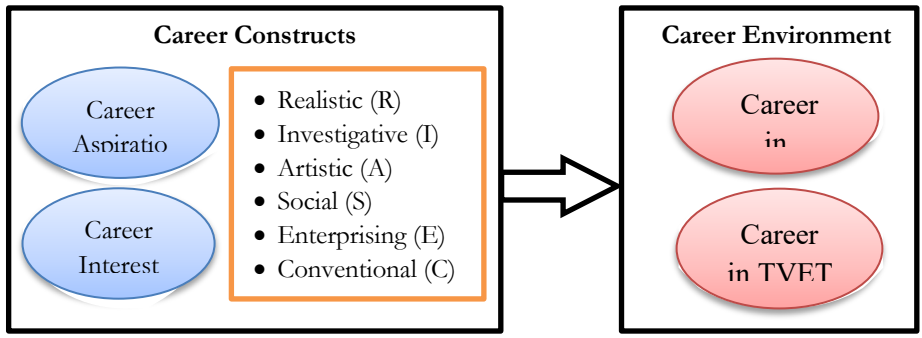

Figure 1.
Conceptual Framework of Profiling Career Aspiration and Interest in STEM and TVET

Career aspiration refers to a goal, ambition, objective, purpose, dream, planning, design, intention, desire and hope. Aspiration refers to an idea or fantasy choice of what a person wants to do or achieve. It also refers to what a person desires for his or her future. Education aspiration is related to the academic and co-curriculum achievement of a particular student. On the other hand, career aspiration is an interest that a person demonstrates in words, actions and tendencies. Past findings showed that career aspiration helps to determine the interests of students in the context of education and future career (Mahmud et al. 2016), and gender difference in career aspiration of STEM (Bishop 2015). In this study, career aspiration is measured through interest or ambition stated by students. Career interest is described by Holland Career Interest Theory that categorizes human in general into six personalities: (R) Realistic, (I) Investigative, (A) Artistic, (S) Social, (E) Enterprising and (C) Conventional, or in the abbreviation of RIASEC. Secondly, the surroundings of an individual can also be classified into categories based on the six surroundings RIASEC. Holland (1973, 1985) affirms that an individual will look

for suitable surroundings to suit his or her personality in order for him or her to show attitude, values, abilities and skills in those surroundings.

The constructs of career interest to measure interest from six career personality types were based on Holland's theory. The meaning of career includes work or activities performed in a conscious manner with the aim to produce something worthwhile for oneself and also for others. Holland's Career Personality concept, which assumes that employment tendencies referred to as career personalities are different and can be categorized into six types: Realistic (R), Investigative (I), Artistic (A) Social (S), Enterprising (E) and Conventional (C), or simply RIASEC, which can be combined to form a personality pattern. This personality pattern has a dominant personality that is more prominent personality than others, and consistency which is a combination of personality traits that sits nearby in the hexagonal model of career personality. There are tendencies to seek for a work environment that is congruence or suitable with the personality traits, because a congruent environment will provide an opportunity to develop talent, highlight capabilities, provide a challenge that can be managed and determine the success of one's career. In the context of this study, it refers specifically to the construction of individual career paths that include actions such as setting career goals, efforts to provide relevant training plans and following the selected plan accordingly.

Assumption about the congruency or incongruency between the personality type and the selected career is the fundamental to the Holland's theory of career choice and this is accepted as a method of explaining the success and failure of the decision-making process. Holland assumed that satisfaction, stability and achievement depended directly on the degree of congruency between the personality and the environment in which one is working. Incongruency occurs when a person is in an environment that is not seen as creating opportunity to develop the individual's skills and abilities (Salleh 2010). Previous studies also show the factor influences in career interest, career choice, career decision making, career value, career maturity, and career self-efficacy (Turner & Lapan 2002; Walker & Tracey 2012; Scott & Ciani 2008; Behrend et al. 2007; Luzzo 1995; Talib et al. 2015; Ismail 2011).

Model of Environment-Human proposed by John L. Holland indicates that there are six personality attributes known as: Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C). Each type of interest has different attributes and each individual may be categorized in one or combination of two or three interests. Moreover, work environment is also described with similar characteristics, RIASEC environment. Each individual is prone to choose a job or in work environment that is congruent or fit the career interest. Matching environment offers opportunities to develop talents, maximize potentials and challenges that can be overcome as well as it can also determine career success and job satisfaction. On the other hand, the unmatch work environment provides

otherwise results. It is considered as unable to develop potential and does not offer an individual to succeed. As such, like any other workers who complement the work environment and their career interest, there is high probability that students in suitable study environment succeed in their study as compared to those who are in incongruent study environment. Figure 2 explains the model environment-human (PI).

Figure 2.
Model of Surroundings-Human (PI) Holland
Source: Holland J.L (1973; 1977; 1985)

This study aims to profile the career interest among form one students in a secondary school in Selangor state, Malaysia. Specifically, this study has three objectives. The first objective is to determine the personality pattern of STEM and TVET careers among respondents. The second objective is to examine the career interest of STEM and TVET fields among different gender of respondents. Finally, the third objective is to examine the congruency between career aspiration and career interest of the research participants.

Method

Research Design and Sample

This is a quantitative research using cross-sectional survey design, meant to profile the respondents' interest towards STEM and TVET careers. Administration of a career inventory was conducted in order to gather information to develop such profiling. A total of 138 Form One students from SMK Engku Husain (SEMUHSIN), Semenyih, Selangor were sampled as respondents of the study. The respondents were selected by the State Education Department of Selangor with the assistance from school, based on their mid-term examination result on Science and Mathematics subjects. From the total of 138 respondents, aged 13 years old, 74 were male students (54%) whereas 64 were female students (46%).

Instrument

This study used the Career Exploration Inventory (Self-Directed Search) developed by Holland, which was adapted to suit to Malaysian context. The result of the *Cronbach Alpha* value analysis was 0.90, which indicated high reliability and validity value of this adapted career interest instrument. The inventory consists of 90-item of close-ended questionnaires set to measure six constructs of career interest – R, I, A, S, E, C – as proposed by Holland. A pilot study was conducted on 94 students involving two schools, public and private universities with similar characteristics of the population studied.

Data Analysis

In order to discuss the three objectives in this study, the data analysis measures were as follows: for the first objective which was to identify the personality pattern students, trend analysis was carried out to look at the three combinations of dominant personality in career of STEM and TVET. The second objective was to examine the career interest of gender difference in STEM and TVET field. The third objective was to examine the congruency career interest and career aspiration in STEM and TVET fields. The data was descriptively analyzed using mean, frequency, percentage and crosstab in order to answer the three set objectives. The t-test analysis was conducted to differentiate career interest in both fields among students' of different genders.

Results

Figure 3 showed that majority of respondents have the first dominant career interest for categories: Social (S), followed by Artistic (A) and Conventional (C). Meanwhile, the second dominant career interest was Investigative (I), Social (S) and Conventional (C). The findings for the third dominant career interests were Artistic (A), Realistic (R) and Enterprising (E). The table also showed that 59 students who were interested in careers related to Realistic (R) category was in three Holland's Code. In terms of dominance level according to Holland's Code, 50.85% was in the third considered in the third level, 28.81% in second level, and 20.34% was in the most dominant level. The results showed that the students in Realistic (R) dimension has characteristics like love to work with objects, machines, plants and human. The best careers for Realistic dimension are engineers, mechanics, quantity surveyor and many more.

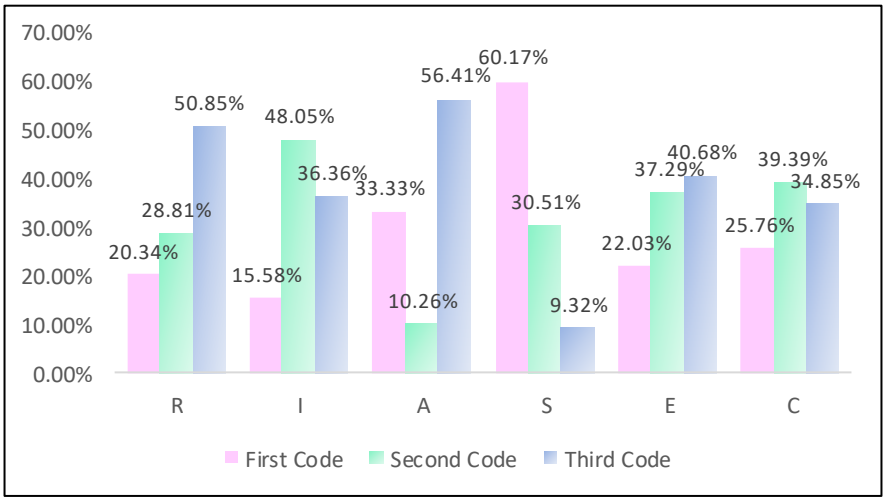

Figure 3.
Pattern of RIASEC Career Interest

Furthermore, the results showed that 77 students from total respondents have career interest dimension of Investigative (I), 36.36% was in third dominance level of Investigative (I) dimension, 48% were in the second level of Investigative (I), and only 15.58% was at the most dominant level of this dimension. According to Holland, some of the characteristics of Investigative (I) career interests are individuals who love to make observation, experiments, analysis, evaluation to problem-solving. Suitable jobs for Investigative (I) career interest are scientist, chemist, pharmacist, medical doctor, surgeon, psychiatrist and more.

Figure 4 showed the findings of gender difference in detail between female and male on career interest in Realistic (R) demonstrated that there were more male students as compared to female students for all three dominants. The findings were consistent to demonstrate that the male students were more interested in technical field as compared to the female students. However, majority of female was drawn to second and third dominance level of Investigative (I) trait as compared to the male students. Nevertheless, more male students were in the most dominance level as compared to female students.

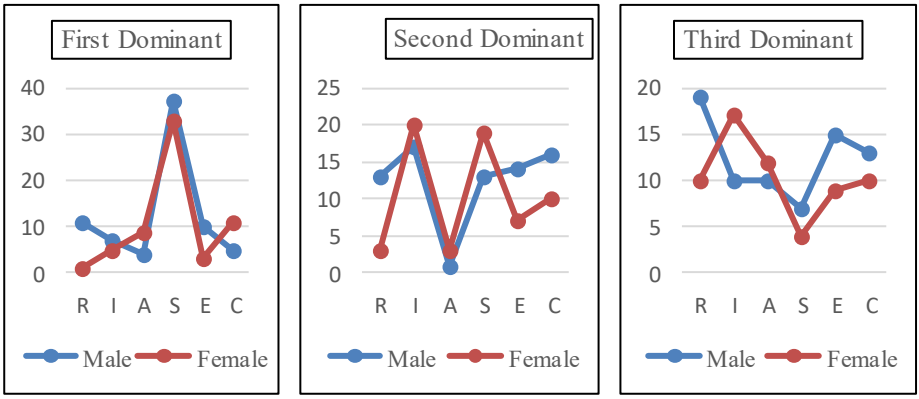

Figure 4.
Gender Difference for RIASEC Career Interest

Moreover, both male students and female students have almost similar dominant career interests: Social (S), Investigative (I), and Realistic (R). This is to suggest that male students and female students have social attributes that highlights relationship, friendliness, keen on helping others such as teaching, guiding and nursing. Meanwhile, the score for Investigative (I) was not too low and both groups showed similar scores. The most significant career interest was Realistic (R) for both male and female students, with male students showed slightly higher score than female students. To simplify, this data showed there was not much difference in career interest pattern between male and female students. They had interests on social activities, enterprising activities such as becoming a leader, having communication abilities and prone to work with people as compared to things or machines. They were also meticulous, careful and systematic. However, the most obvious difference for Realistic (R) career interest was the male students outshined the female students.

Congruency between aspiration and career interest are measured based on the congruency of ambitions mentioned by students with career interest measured based on Career Exploration Test. The results as in Figure 5 demonstrated that three combination of Holland code can be translated as having high congruency between career aspiration and career interest measured by Social (S), Investigative (I) and Realistic (R). This means that majority of students in Social (S), Investigative (I), and Realistic (R) categories have clear goals on self-capabilities which include interest, talent, ability, and values with work environment. The results also showed that students with aspiration in STEM career were Realistic (R) and Investigative (I) categories which carry high self-capabilities (interest, talent, ability, and value) in career interest of Realistic (R) and Investigative (I).

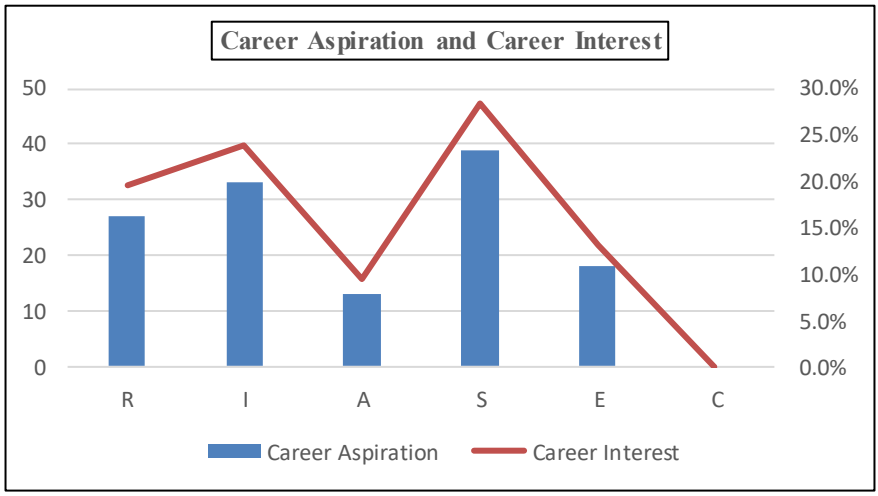

Figure 5.
Congruency between Career Aspiration and Interest in STEM and TVET

Discussions and Conclusion

Career in STEM and TVET has become the main focus in education system in Malaysia and this was stated in the PPPM 2013-2025. The Committee of Higher Education Planning (in 1967) has also set the gradual increase of students' enrollment in science/technical fields, in which the ratio of 45 percent was projected to increase to 60 percent by the year of 1980. This committee projection was in line with the current science and national policy to produce experts in both fields.

As such, the findings found that the pattern of dominant career interest is Social (S), Investigative (I), and Realistic (R). Career interest in Realistic (R) and Investigative (I) have similar characteristics needed in STEM and TVET fields. Generally, characteristics in Realistic (R) career are based on concrete and physical activities; materialistic in nature, stabil and not socialable. Meanwhile, characteristics of Realistic (R) environment is to enhance technical skills, easy orientation and realistic. Example of realistic environments are motorcycle workshop, building sites and others. Characteristics and Realistic (R) environment explains that types of occupations in TVET fields such as services, production, and information and communication technology (ICT) .

However, Investigative (I) characteristics are prone to use intellectual with abstract and scientific activities, original work and unsociable tasks. On the other hand, characteristics of Investigative (I) environment are to enhance the efficiency and achievement in science and research, complex-based activities, and abstract tasks. The findings are consistent with research findings conducted by Jelas et al. in

2013, which indicated that majority of students still have the interest in science and technical fields.

Taking into account the female students who are prone in Investigative (I) field programs, there were tendencies to come out from gender stereotyped field despite low interest in Investigative career interest. There were small numbers of female student who chose Investigative (I) jobs that match their program of study as compared to those who were in the field itself. Most probably, those who only have congruent Investigative (I) field will choose the Investigative (I) work. Students who choose incongruent study program may face inefficiency issues in their work performance because there is limited or little knowledge in the field or difficulty to find proper jobs. On the other hand, female students were prone to Realistic fields. Hence, they were easily attracted to programs of study which are not congruent with their career interests. This is totally different from female students who chose in congruent with career interest but not the study programs.

At the same time, the findings showed that there was a congruency between career aspiration and career interests for Social (S), Investigative (I), and Realistic (R). Students with career aspirations of Social (S), Investigative (I) and Realistic (R) in this study, were found to have matching categories in terms of career interests. This congruency suggested that when career aspiration is nearing the career interest, the students would have high capabilities (including interest, talent and value) toward the career, be able to engage with work environment, and able to make decision-makings with information. The findings also suggested that students with career aspirations in STEM and TVET fields need support as early as primary education (Wyss, Heulskamp & Siebert 2012).

In a nutshell, the findings of this study provide vital implications for Malaysian educational policymakers in order to encourage interest among school students to pursuit education in STEM and TVET fields, which are to:

a. expose them to the fields as early as in the lower secondary level; and
b. provide career development programs in both fields via counseling service.

These implications are helpful for students to explore career interest in early schoolings so that the career aspiration is built based on actual potential of students. This can be achieved by conducting career interest profiling as early as possible, establishing collaboration between teachers, counsellor and parents in formulating relevant career development programs, developing various intervention approaches to increase the interest of students in TVET and STEM careers; and cooperating with external agencies such as government bodies and non-government bodies in school programs like career visit, career lecture, career carnival and many more. Similarly, promoting career interest towards STEM and TVET fields needs early planning through career development programs which cater the needs of students.

To achieve this, good collaboration between school, parents and community is crucial to promote potential students in choosing and making career decisions.

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