

A Review on Application of Holland's RIASEC Theory in Educational Settings

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Abstract

RIASEC typological theory of persons and environments is regarded as one of the most influential theory in the field of career counseling. This theory is extensively used as a holistic career theory attending to the needs of students on career choices, that subsequently influence their college majors. Some empirical literatures show shortcomings of RIASEC while others indicated it is still the simplest measure to be used in school, college or university settings for quick understanding. Some findings also highlighted that RIASEC's interest definition maybe at its best with combination of other additional interest measures. Hence, the purpose of this study was to identify how Holland's RIASEC theory was used in students from various educational settings. The methodology applied inclusion and exclusion criteria based on the SCOPUS, Wiley, Ebscohost and Google Scholar database. The results of this review address that RIASEC play a significant role in career decision-making and academic achievements, with considerations for individual differences by sex and the influence of additional dimensions such as personality traits and abilities and also clarify the gaps and limitations in the body of research evaluating the application of Holland's RIASEC theory in educational setting in various nations. Through the process, ten articles in total were chosen. The results of this review are helpful for counselors and other professionals in the mental health field who work with families and students. Counsellors can use this information to help them create counseling plans for their clients that take into account the significance of raising parents' and students' awareness of the importance of choosing majors that complement each student's personality.

Keywords: Counseling, Holland Theory, RIASEC, Schools, College and Universities

Introduction

Vocational interests are stem during school days. Students start to mold their vocational choices or preference from what they learn in schools, family and peers' influence, or simply

exposure to internet information. Therefore, schools somewhat are bestowed as the main point to provide avenues for students to learn and explore a variety of vocational interest based on their interest and abilities (Sander et al., 2017; Makwana & Nisarta, 2022). With diverse curriculum and educational syllabus, coupled with vast amount of career options available today, it is increasingly important for students to explore deeply into their interests and their abilities so as to match their desired career paths (Hilling, 2017; Chen et. al., 2021).

Career counseling helps to connect students' education experiences and exposure to their future (Curry et al., 2013; Chen, 2021). Once students identify their vocational interests, it will enhance their academic motivation as it now provides meaning and purpose for the work they are doing in schools (Nye et al., 2021). As such, career counseling in school becomes an essential educational program to help students to understand their interests and craft their readiness for their future including the choice of their courses and career (Brown, 2012; Lau et. al., 2020).

In additional to that, career counseling also allows assessment on individual's prerequisites and match them to the requirement of education choices and occupations (Paßler & Hell, 2012; Firkola, 2021). Individuals select their educational and occupational paths based on their personalities, abilities and interests. Empirical studies supported that personality and interest are the determinants to academic and career achievement particularly with a congruent environment (Allen & Robbins, 2010; Holland, 1997; Hussain et al., 2021).

In order for school or college counselors to analyze and draw results more objectively based on gathered information, the use of theory may help to justify and strengthen the objectives of their assessments and conclusions (Québec's professional order of career and guidance counsellors "OCCOQ", 2011; Lemberger-Truelove, Ceballos, Molina, & Dehner, 2020). In pursuit of a popular theory to use, Holland's RIASEC theory seems to be the most influential theory with its related tools such as Self-Direct Search (SDS) Holland (1994) will enhance evaluation on educational and work interests (Bullock-Yowell & Reardon, 2021).

Holland's RIASEC theory and Self-Direct Search (SDS; Holland 1994) have become the familiar icons used in school career counseling field (Reardon & Bertoch, 2011; Ramadhani et al., 2020). Holland categorized individual's personality, interest and environment into six types i.e., Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), or Conventional (C) – also called the RIASEC model (1997). Holland's typology emphasizes that individual tend to choose an interest-major or job that interests them the most (Holland, 1992). He further stressed that the higher the congruence between a person's interest and their academic or career choices, the more successful and satisfied that person will be (Rocconi et al., 2020).

Therefore, this systematic review will look into various relations of Holland's RIASEC in school context and its difference of vocational choices by sexes.

Objectives

The objectives for this review are:

1. To investigate the relationship between RIASEC interest types and i) career choices ii) college major.
2. To explore RIASEC interest when combine with other measures and additional dimensions.
3. To identify if there is any distinctive differences by sex In RIASEC interest type.

Methodology

Search Procedure

The objectives serve as the guidelines to filter relevant articles for the search. This review was conducted on both qualitative and quantitative related articles adopting Preferred Reporting Items for systematic reviews and Meta-Analyses criteria (Moher et al., 2009; Page et al., 2021). Articles were retrieved from SCOPUS, Wiley, Ebscohost and Google Scholar databases.

The search started with keywords of a) counseling, b) Holland Theory, c) RIASEC, and d) schools, colleges and universities. Filtration was then conducted by limiting the search results to abstracts and journals that were related to school counselors and students. The number of literatures found was high but the relevancy of literatures that related to Holland Theory and different educational settings for the latest five year were very limited, thus the search was extended to 2012.

The step-by-step selection process is shown in *Figure 1*. The initial search on keyword terms produced 908 articles. To retrieve more relevant articles, further filtration was conducted on journals that covered the terms of school counselors and students. Exclusion criteria on duplicated articles, articles that included other theories, reviewed articles, books & chapters, non-counseling articles, and full text assess, reduced the number to 13 and 10 literatures were selected for this review.

Findings of Literatures Review

The information of the selected articles pertaining to Holland's RIASEC theory to various educational settings is shown in *Figure 2*. The author, year of publication, title of journal articles, participants, survey method and main findings of each literature are clearly outlined. *Figure 2* is to provide clearer and better view of the information related to application of RIASEC to various educational settings. The literatures included in this review were studies done in Germany, Hong Kong, Indonesia, Kenya, Korea, Taiwan, and US, with the hope to have a more balance findings.

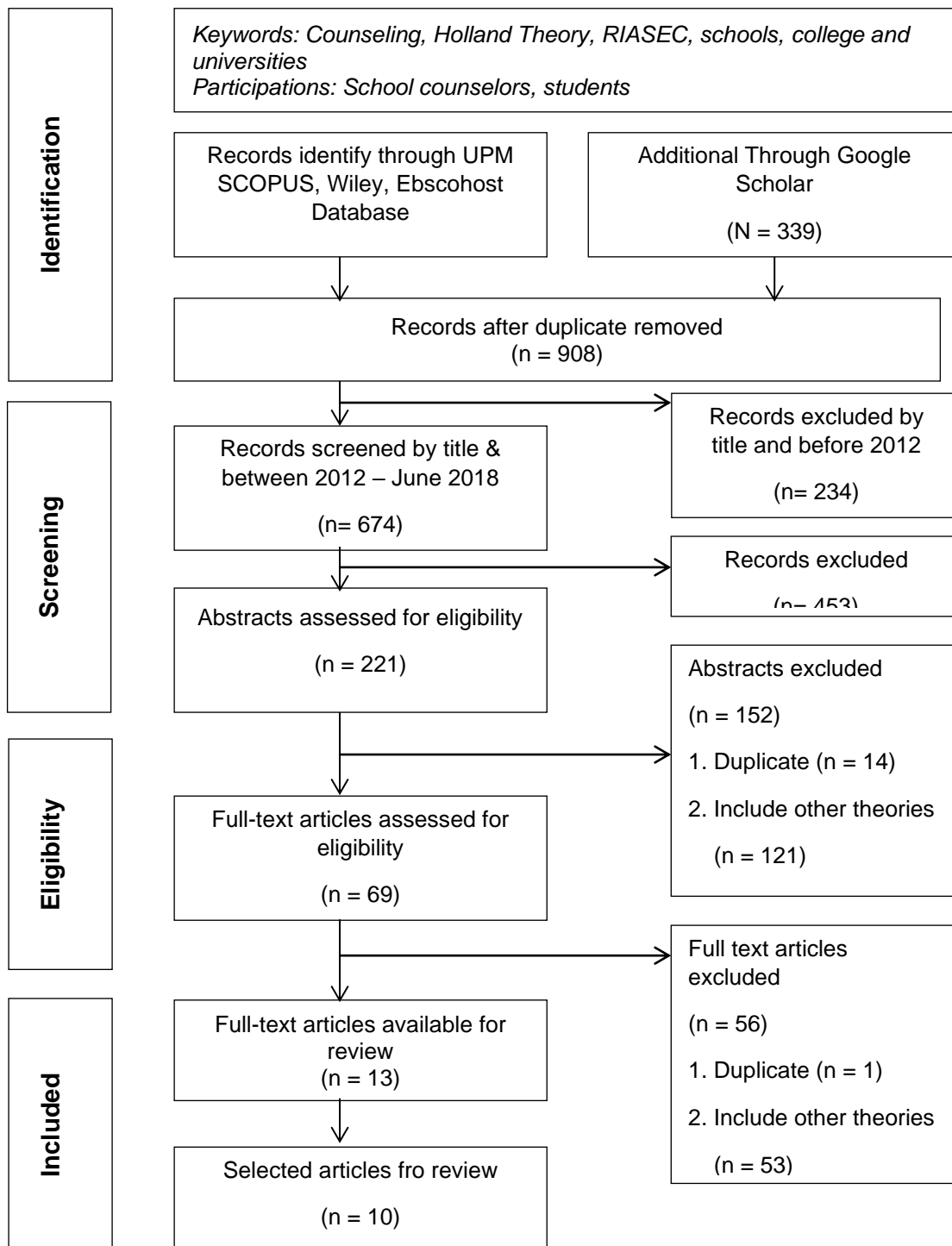


Figure 1. Flow diagram for selection review of studies on Application of Holland's RIASEC Theory in educational settings

Author/Year	Title	Country	Journal	Participants of study	Study Design	Findings Highlights
Bai, L., Liao, HY. (2018)	The relationship between interest congruence and college major: evidence from the basic interest measures	Hong Kong	Journal of Career Assessment	1,044 college students in one university	RIASEC General Interest Measure; Basic Interest Measure; Strong Interest Inventory	<ul style="list-style-type: none"> • Stronger congruence-satisfaction relations were shown when assessed academic majors and career choices compared to RAISEC scoring • RAISEC is not the only model used to measure congruence of P-E fit
Coulter-Kern, G. R., Coulter-Kern, E. P., Schenkel. A. A., Walker, R. D & Fogle, L. K. (2013)	Improving student's understanding Of career decision-making through service learning	USA	College Student Journal	14 college students	SDS	<ul style="list-style-type: none"> • Higher degree of understanding of career decision making for students who attended career session and advising compared to those who did not
Gitonga, C. M., Orodho, J. A., Kigen, W. & Wangeri, T. (2013)	Gender Differences in Holland	Kenya	International Journal of Education and Research	389 university students	SDS	<ul style="list-style-type: none"> • Gender predicts the choice of career • I and R dimension were more males oriented thus skewed to science related subjects • Female more in social sciences with dominant S and A codes

Author/Year	Title	Country	Journal	Participants of study	Study Design	Findings Highlights
Joeng, JR., Turner, L. S., Lee, KH. (2012)	South Korea College student's Holland types and Career Compromise Processes	Korea	The Career Development Quarterly	376 college students	Occupation Preference Test (OPT) adapted from SDS	<ul style="list-style-type: none"> • Both genders preferred job with higher prestige regardless of interest dimension • Parents' influence on career choice was significant
Kaufman, J. C., Pumaccahua, T. T., & Holt, R. E. (2013)	Personality and creativity in realistic, investigative, artistic, social, and enterprising college majors	USA	Personality and Individual Differences	3,295 college students	SDS and Congruence using IACHAN Index	<ul style="list-style-type: none"> • I & A majors scored higher openness and self-assessed creativity • R & E were more extraverted; R was more conscientious and E was more open
Kemboi, J.K. R., Kindiki, N., & Misigo. (2016)	Relationship between Personality Types and Career choices of undergraduates students: A case of Moi University, Kenya	Kenya	Journal of Education Practice	399 undergraduates	Student Personality Questionnaires adapted from SDS	<ul style="list-style-type: none"> • Study showed that Interest congruent with their majors • Personality was important element to decide the appropriate career choices
Nurchayho, A. F. & Irawati, E. (2012)	Exploring Holland's environmental model: A case study in Pelita Harapan Surabaya University, Indonesia	Indonesia	The International Journal of Social Sciences	276 undergraduate students from psychology course	SDS	<ul style="list-style-type: none"> • Two types of environmental model (derived from RAISEC) were showed in 6 university departments that eventually would assist

Author/Year	Title	Country	Journal	Participants of study	Study Design	Findings Highlights
						faculty member to review their courses according to interest showed
Paßler, K. & Hell, B. (2012)	Do Interests and Cognitive Abilities Help Explain College Major Choice Equally Well for Women and Men?	Germany	Journal of Career Assessment	1990 university students	“What should I study?” online-based questionnaire	<ul style="list-style-type: none"> • Interest and cognitive abilities affect choice of major • A big difference between women and men in selection of choices
Sung, YT., Cheng, YW., & Hsueh, JH. (2016)	Identifying the Career-Interest Profiles of Junior-High-School Students Through Latent Profile Analysis	Taiwan	Journal of Psychology	13,853 junior high school students	Latent Profile Analysis based on RIASEC	<ul style="list-style-type: none"> • 44% of students showed low interest in vocational activities. Not ready for career choices • Female showed higher A & S; whereas Male indicated higher R & I in general
Vock, M., Köller, O., & Nagy, G. (2012).	Vocational interests of intellectually gifted and highly achieving young adults	Germany	British Journal of Educational Psychology	2,318 final year students	General Structure of Interest Test; Analogy and Verbal Analogies	<ul style="list-style-type: none"> • Gifted participants had stronger I & R • Higher achievers reported stronger I & A • Gifted students’ interest profile remained

Author/Year	Title	Country	Journal	Participants of study	Study Design	Findings Highlights
						stable after 2 years of study

Figure 2. Selected articles pertaining to Holland's RIASEC theory to various educational settings

Discussion

Relationship between RIASEC interest and career choices

Students with regular exposure of career information since high school, showed higher preparedness for career decision-making at college level compared those who did not (Coulter-Kern et al., 2013; Kim & Ra, 2023). It indicated that sufficient career information could help to push college students to play pro-active stance in exploring careers that are of their interests. Coulter-Kern et al., (2013) and Arghode et al., (2020), also emphasized that self-efficacy play an important predictor of career decision-making attitudes and skills. Family influence and schools' guidance will help to build students' self-efficacy, which in turn will increase their confidence to make sounder career choices.

College students exhibited high-differentiation profile (i.e., different preference for all six interest types) on their abilities when help in establishing their interest preference compared to junior high-school students (Sung et al., 2016). Meanwhile, junior high-school students showed a reversed pattern of low-differentiated profile (i.e. almost similar preference for all six interest type) as they believe career options can be determined at later age i.e. at adolescent stage. As such, it is critical to introduce career education curriculum in phases such as from introduction, intermediate to advance level to set their career preparedness as early as possible.

Kemboi et al., (2016) and Khlobystova and Abramov (2023), re-confirmed that personality had significant relationship to career choices in Holland Theory. Students who major in courses that were not aligned to their RIASEC's dimensions, which include their interest, values and ability, would likely experience frustration and dissatisfaction. It is essential that students should be exposed and taught on appropriate skill-set in accordance with their personality at early age. This is because it will affect students' development of interest, value and ability in assessing their likings towards a desired career in the future.

While career choices must be congruent with individual interests to produce maximum satisfaction, career compromise can take place with influence from parents and society, according to Joeng et al., (2012) and Koçak et al., (2021). Despite dominant RIASEC interest types were identified, findings in Korea indicated that graduate would rather opt for occupations with high prestige that were preferred by their parents or society norms despite incongruent with their interests (Joeng et al., 2012). This phenomenon is rather prominent in Asia countries with the collectivism and filial piety culture. Similar condition happened In Kenya. Students with government scholarships will compromise with whatever jobs that were offered to them regardless of their interest dimensions (Kemboi et al., 2016). Low moral and productivity were seen when career compromise took place, which aligned to Holland's theory that satisfaction of career can only derive from high congruence with their interest. In summary, RIASEC dimension can be the key preference for career options but reality and society pressure may influence the ultimate career decision.

Relationship between RIASEC interest and college major

When it comes to college major, RIASEC dimensions were significant predictors to motivate vocational choices (Paßler & Hell, 2012; Kemboi et al., 2016; Nurcahyo & Irawati, 2012; Gitonga et al., 2013; Gfrörer et al., 2021) These studies indicated that students chose their majors (i.e., Engineering, Science, Humanities and Social Science) in congruent to their interests. College majors that are congruent with individual's vocational interests will enhance their academic achievements (Holland, 1997; Ochnik, & Arzenšek, 2020).

In order to produce high productivity and satisfaction, it is important to help students, especially at university level, to find their majors that were in line to their interest value and ability (Kemboi et al., 2016). Positive and high satisfaction was obvious when congruence was achieved between personality and college major. This group of students would likely succeed in their studies and employment in the future (Wang et al., 2020).

Nurcahya and Irawati (2012) and Wardani et. al., (2020) also further confirmed that a congruence between interest or abilities and academic choice enhance learning motivation and academic excellence. Overall, personality interest information was considered useful for higher institution to review the offered courses so that courses match with students' interest to enhance learning process and good academic achievement.

More distinctive interest types showed higher readiness of career choices (Paßler & Hell, 2012; Su, 2020). Therefore, students with dominant interest types would have determined their academic disciplines that match their RIASEC codes at early stage.

In short, RIASEC typology measure is able to provide rather accurate indications for counselors to proceed with necessary steps to steer them towards their desired goals. Congruence is the key element to look into.

RIASEC interest when combined with other measures and additional dimensions

Studies showed that other psychometric measures work better if not equally well as RIASEC, in evaluating individual's interest type. Basic Interest Marker (BIM; Liao, Armstrong & Rounds, 2008), could predict a more holistic career outcomes compared to RIASEC. It can be used for both academic majors and job assessment (Bai & Liao, 2018). BIM is found to be superior in differentiating college students' academic majors. Bai & Liao (2018) had also challenged that RIASEC, being slightly outdated in typology, did not include fields like technology and communication (e.g. social media) that can address to current trend. Therefore, this had made RIASEC not scalable for today's requirements and unable to demonstrate congruence-satisfaction relations with current demand (2018).

Basic Interest Scales (BIS) (Donnay et al., 2005; Harmon et al., 1994) was proved to be a more accurate predictor than RIASEC in respect to occupational choices and college majors. It is found that BIS could better at distinguishing between satisfied and dissatisfied students compared to RIASEC measures (Bai & Liao, 2018, Rottinghaus et al., 2009). Despite having more superior results outcomes compared to RIASEC, both BIM and BIS required more time to process due to lengthy scales and items (Bai & Liao, 2018). Thus, less practical to be adopted in school settings.

Personality, when coupled with creativity play their part in affecting RIASEC dimension of an individual in selecting academic major. Kaufman et al (2013), combining Big Five's personality traits with RIASEC found out that realistic majors were more extraverted and conscientious; investigative majors were more open and agreeable; artistic majors were more open; and enterprising majors were more extraverted and open. These personality traits would influence the selection of major. For instance, psychology students are normally with

domain codes of social and investigative. However, students with high investigative are more open thus may choose research work whereas those high in social dimension may go for clinical work who like to help people (2013). The element of Big Five will further filter our academic majors based on RIASEC types.

When numerical, spatial and verbal abilities of individuals were combined with RIASEC dimensions, the selection of majors somewhat shifted marginally (Paßler & Hell, 2012). For example, numerical and spatial abilities were closely linked with realistic and investigative; whereas verbal abilities were positively correlated with artistic. Paßler & Hell's study found out that individual with strength in verbal reasoning tend to choose disciplines within humanities; engineering and science tend to attract individual with strength in numeric and logic abilities (2012). Therefore, it is important to consider these abilities during the process of course selection.

According Vock et al (2012), degree of intelligence also affect RIASEC dimension in college majors. Students with higher intelligence normally have stronger interest in the field they studied compared to other students or their peers. They would select more challenging tasks in the field of their majors. Vock et al (2012) reported that gifted students have stronger investigative and realistic interest and much weaker social and enterprising interests than less intelligent students. This group of students would have chosen specialization or focus in science and technology "scholarly" at earlier age of their vocational development. Therefore, additional evaluations needed to be provided to this special group of students when identifying their RIASEC interest so as they can excel in their choice of majors 2012; Kaufman, Pumacahua, & Holt, 2013).

Other psychometric measures such as BMI and BIS had proven their superiority in terms of outcome but the practicality were less in favour by counselors due to its time consuming process and complicated interpretation as compared with RIASEC which was straight-forward and easy to execute. Additional personality variables i.e. BIG Five traits, numerical, spatial, verbal abilities and intelligence degree do play their parts in providing more accurate career and college major predictions.

Differences by sex in RIASEC interest type

There is a distinctive difference between male and female on RIASEC's vocational interest (Joeng et al., 2012; Gitonga et al., 2013; Vock et al., 2012; Paßler & Hell, 2012; Gfrörer et al., 2021). Females were more people-oriented and males were skewed to things (Bai & Liao, 2018; Khun & Walter, 2022). Females prone to choose vocational choices that allows them to deal with people whereas males tend to work with objects or things. This further substantiated by study from Paßler and Hell (2012); Hedrih (2023) on engineering students where level of realistic and enterprising interest will determine their major such as higher number of males students found in mechanical or civil engineering due to higher score in realistic dimension compare to female students.

Male students have higher dimension in realistic, investigative and enterprising; and female has higher dimension in social and artistic and mostly restricted to these two types (Gitonga et al., 2013; Sung et al., 2016; MacDonald et al., 2023). As such, females would incline to choose a people-occupation or social sciences disciplines while male will dominate in science related field. (Paßler & Hell, 2012; Gitonga et al., 2013; Gao, 2022). Also, females were better in linking their interest to their future development at earlier age compared to male. In general, the future-time perspective was higher for female students to plan their college majors and career choices (2016).

Studies also indicated that highly intelligent males students received more pressure from parents compared to female when it came to choosing vocational interest (Vock et al., 2012). While female students were encouraged by parents to keep their options open until later, society expectation and pressure on their performance for males students was much higher.

Male and female display a distinctive difference in RIASEC interest types. It is obvious that the inclination of people versus things divided male and female quite equally. Female is perceived more matured and thoughtful towards their career goal and future versus their counterpart. Overall, males may have greater pressure from family and society compared to female.

Limitation

There are a few limitations in this review. Firstly, most of the studies were either combined with other variables such as cognitive abilities, creativity which diluted the review to focus only on the strengths or weaknesses of RIASEC solely. As such, this review cannot be generalized for RIASEC application in educational settings. Also, single samples were used in some journals, i.e., Korea, Africa, Taiwan, Hong Kong and Germany, thus it may restrict a comprehensive interpretation and generalizability. In this review, most of the samples were from students with high point Holland type. Therefore, possibility of data biases.

Implication and future research

RIASEC type has been widely used in various educational settings since it was developed. While it still holds its validity, using 3 codes is not sufficient and oversimplified to some scholars (Bai & Liao, 2018). Individuals' interest dimensions based on RIASEC alone is too general and individual's interest should be measured beyond these 6 types. Therefore, measurement such as *Basic Interest Marker* (BIM) (Liao et al., 2008) or *Basic Interest Scales* (BIS) (Donnay et al., 2005) emerged. Variables such as Big Five's personality traits, cognitive abilities, prestige, satisfaction, achievement and etc., are encouraged to be incorporated in the measurement against RIASEC, with the hope to demonstrate a more reliable and accurate definition of an individual's interest.

Most of the studies in this review did not take into consideration of equal split of sexes. Future research of equal sample of sexes should be able to deliver more objective insights into gender difference in education and occupational choices. Selected studies were mostly conducted in quantitative approach, qualitatively research is encouraged to further explore RIASEC from the perspective of career counselors. Another area that requires further studies will be the cross-cultural studies to clarify further relationship between interest types with different race or ethnicity or culture.

Conclusion

RIASEC is still one of the most used measures to help identify students' vocational interest to explore their college majors or career choices. This review showed that the importance of taking into consideration of various variables such as cognitive abilities, cognitive abilities, prestige, satisfaction, achievement so as to assist students' on their goal setting of college major and career choices. These variables help career counselors and students to explore their interest at broader, wider and more accurate perspectives. An accurate definition of an individual's interest will boost students' self-confidence and self-

understanding, thus the more accurate of their choices will be. By expanding beyond RIASEC, it would help to dig deep into areas where their ulterior interests lie. This is because studies indicated that students might not choose academic discipline or occupation choice that match their RIASEC interest types as that may not be where their ultimate interests are (Lubinski, 2010).

In addition to that, it is crucial to start career counseling at high differentiation stage i.e., at adolescent stage, as this is the period where college major and career choices becomes important for future life development. When students display differences in RIASEC scores, it demonstrated some form of preferences in their vocational choices.

Interesting to note that in general, males students received more pressure from society compared to their female counterpart. Thus, counselors can craft special curriculum in accordance to the needs from these findings in order to guide students to achieve their maximum potential academically and professionally at later stage.

Implication on Career Counseling

Vocational interest paly an important role in predicting students' choice of major or career, and RIASEC still seems to be one of the easiest measured used to identify students' interest for primary level of understanding. Therefore, RIASEC scores will facilitate career counseling process to help map students' interests that are congruent to their academic majors. This relationship has been evidently substantiated that students tend to have higher satisfaction with college majors that congruent with their interest.

Career counselors needs to expand their work view by considering current society's pressure to enhance their counseling skill. Looking at 3-letter code may not be adequate anymore. Additional interest measures such as cognitive abilities, career prestige, academic or career satisfaction, and academic achievement are becoming too important to ignore when providing counseling service. These are useful elements to facilitate students' career exploration stage. Meanwhile, students should also be encouraged to explore their area of abilities so that they learn about what tasks or activities they are comfortable within their capacity of effort and motivation.

Lastly, It will be good if special designed measurement tools, a curriculum, or experiential activities can be introduced to students at different stages to enable them to explore career possibilities, and to encourage them to think ahead their career plan in order to select the right college majors.

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