Pictorial Stimuli: An Innovative Way to Assess Adolescents' Vocational Interest

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Most vocational interest instruments are using textual stimuli which require individuals' reading ability. For individuals with reading difficulty, another form of stimuli is needed. This study aimed to develop pictures that can be used as stimuli in a new vocational interest instrument for adolescents. 30 pictures which depicted job activities were developed based on Holland's theoretical construct. 101 professionals rated the pictures, while 171 adolescents examined whether the pictures could be interpreted appropriately. Six factors were formed according to the factor analysis with a total of 70.425% variance explained. 11 pictures were interpreted appropriately by 100% of the adolescents, while 19 pictures were interpreted appropriately by a minimum 89,4% of the adolescents. The limitation of this study such as the job activities that have not been depicted in the pictures as well as the small sample size of the professionals need to be considered.

Keywords: pictorial stimuli, vocational interest, Holland's theoretical construct

Introduction

Individuals with particular interests tend to prefer certain activities that distinguish them from other individuals with different interests. Individuals who are interested in art will tend to do art activities such as singing, dancing, or playing music compared to other activities such as conducting financial analysis. Therefore, individual interests can be identified through the activities they like to do.

Interest plays an important role in individuals' education. Academic interest was found positively correlated to academic achievement; the interest acts as a driving force for academic achievement (Corbière, Fraccaroli, Mbekou, & Perron, 2006). Interest also affects the students' choice of an education major as well as their likelihood of persisting in it (Allen & Robbins, 2008). In other words, the fit of students' interest with their education major can predict their retainment in their education major.

Various studies have established the impact of interest on individuals' work behavior. Nye, Su, Rounds, & Drasgow (2012) conducted a meta-analysis study based on 60 studies. Of the 60 studies, 42 studies were using employed samples with 9,472 total samples, while 18 were using academic samples with 5,829 total samples. The studies were obtained from the American Psychological association's PsycINFO database and Google Scholar which were published from 1942 to 2011. The result of the study addressed the relationship between vocational interest and performance; vocational interests are indeed related to performance and persistence in work (Nye, Su, Rounds, & Drasgow, 2012). Vocational interest was also found to be a strong predictor of job satisfaction (Passler, Beinicke, & Hell, 2014; Volodina, Nagy, & Köller, 2015).

Vocational interest is a term for referring to a job-related interest. It is defined as relatively stable individual differences which affect his behavior through preferences for certain work activities and environment (Van Iddekinge, Putka, & Campbell, 2011). Low, Yoon, Roberts, & Rounds (2005) defined vocational interest as an individual's psychological disposition which is associated with his preferences for certain activities and actions.

One of the theories of vocational interest was proposed by Holland (1985). Holland divides individual's vocational interest into six types i.e. Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Each type of interest has its own characteristics. Individual with a Realistic type of interest has a preference for activities that entail an explicit manipulation of

objects such as machines, tools, and animals; individual with an Investigative type of interest has a preference for activities that entail the observational and systematic investigation of biological and cultural phenomena; individual with an Artistic type of interest has a preference for free and unsystematized activities intended to create art products; individual with a Social type of interest has a preference for activities that entail the manipulation of others to develop, train, or cure them; individual with an Enterprising type of interest has a preference for activities that entail the manipulation of others to achieve economic objectives; individual with a Conventional type of interest has a preference for activities that entail ordered manipulation of data (Holland, 1985).

Holland's theoretical construct has been widely used in the development of vocational interest instruments. Based on his theory, Holland developed Self Directed Search (SDS) in 1970 which is known as the most widely used vocational interest instrument (Poitras, Guay, & Ratelle, 2012). The Rehabilitation Counselor Scale (Leierer, Strohmer, Blackwell, Thompson, & Donnay, 2008), Personal Globe Inventory-Short/PGI (Tracey, 2010), Verb Interest Inventory/VIT (Wetzel, Hell, & Passler, 2012), Maree Career Matrix (Maree & Taylor, 2016), and Flemish SIMON Interest Inventory (Fonteyne, Wille, Duyck, & De Fruyt, 2016) are some vocational interest instruments which have been developed in the last decade.

Most vocational interest instruments are using textual stimuli. The respondents are asked to read some statements, then they are asked to choose one of the response options. The examples of SDS' textual stimuli which represent the Realistic type of interest are "I know how to use a voltmeter", "I can adjust a carburetor", and "I can make simple electrical repairs" (Holland, 1985). The textual stimuli can also be manifested in the job's title. The respondents are asked to choose the job they preferred. The examples of job's title in the PGI are "musicians", "psychologist", and "dentist" (Tracey, 2010).

There are some problems with using textual stimuli in a vocational interest instrument. The use of textual stimuli requires the respondents' reading ability (Boerchi & Magnano, 2015; Enke, 2009; Šverko, Babarović, & Međugorac, 2014). Thus the instruments with textual stimuli are only suitable for those who have a good reading ability. The problem of using job's title as stimuli is that job's title can vary between countries (Tracey, Watanabe, & Schneider, 1997). Ting (2007) found that many students in Hong Kong do not understand some job's title in SDS, such as juvenile delinquency expert, locomotive engineer, bank examiner, and social science researcher since the jobs do not exist in Hong Kong.

Pictures can be used as stimuli to assess an individual's vocational interest. Compared to textual stimuli, pictorial stimuli have some advantages such as they can be used by individuals with reading difficulty as well as have supporting information related to the depicted job (Šverko, Babarović, & Međugorac, 2014). Pictorial stimuli are also closer to real life than textual stimuli which are widely used today (Boerchi & Magnano, 2015).

Several vocational interest instruments use pictures as the stimuli. One of them is the Geist Picture Interest Inventory (GPII). The stimuli of the GPII are 44 triads of pictures that describe individuals in certain jobs. Geist (1959) stressed that the pictures represent jobs which could be recognized in the United States. However, Sverko, Babarović, & Međugorac (2014) indicated that many jobs presented in GPII are no longer exist nowadays.

The development of vocational interest instrument with pictorial stimuli was also conducted by Enke (2009), Šverko, Babarović, & Međugorac (2014), and Boerchi & Magnano (2015). Enke (2009) developed a pictorial vocational interest instrument by converting 48 statements of Personal Globe Inventory (PGI) into pictures. Boerchi & Magnano (2015) developed the Iconographic Professional Interests Inventory (3IP) which composed of 65 pictures that represent individuals who perform a particular job. The presentation of each picture is accompanied by the name of the profession it is associated with. Šverko, Babarović, & Međugorac (2014) developed the Pictorial and Descriptive Interest Inventory (PDII) which consists of 48 jobs which are represented by photographs of individual involved in job activities accompanied by job titles and a short text description.

Several vocational interest instruments with pictorial stimuli, such as 3IP and PDII, are providing additional information in the form of text. It means that individuals with good reading ability are likely to obtain higher scores than individuals who have reading difficulty. Some pictures in the PGI-picture version also contain some English words. Enke (2009) suggested the need to investigate whether the pictures with the additional words are still interpreted appropriately by individuals who have reading difficulty.

As far as the researchers know, vocational interest instrument with pictorial stimuli has not been developed in Indonesia. Vocational interest instruments that have been developed in Indonesia are using textual stimuli (Artosandi, 2015; Kumaidi, 2016; Lubis, 2008; Muhrotien, 1993; Nurcahyo & Azwar, 2008). Therefore, the development of a vocational interest instrument with pictorial stimuli is needed for it can be beneficial for the individuals who have reading difficulty.

Holland's theoretical construct was developed in the United States which based on western culture. If it will be applied in Indonesia, then the descriptions of the job activities need to be adjusted to the Indonesian context. Art activities such as dancing will be more easily recognized by Indonesian adolescents if it is depicted by a dancer in Javanese or Balinese costumes. It is different from the dancing activity in the western culture which could be described by a ballet dancer.

Objective

This study aimed to develop pictures that can be used as stimuli in a new vocational interest instrument for adolescents. Each picture developed in this study describe a job activity which represents one of the Holland's vocational interest types.

Method

Instruments

Holland (1985) has described the characteristics of six vocational interest types. The characteristics of each vocational interest type were then manifested in statements of activity. The characteristic of the individual with Realistic vocational interest type which prefers activities that involving objects was manifested in statements i.e. fixing up electricity, repairing vehicle, operating tractor, repairing computer, and training animal. The same steps were applied to the other five vocational interest types. For each type of interest, five statements were developed so that there were 30 statements in total (see Table 1). Each statement was then coded with a letter indicating the type of interest that was depicted e.g. R1 was a code for "fixing up electricity", a statement that indicates an activity preferred by individuals with the Realistic type of interest.

Each statement of activity was then converted in the form of a picture. For each statement, two versions of the picture were develope i.e. picture with male and female figure (see Figure 1a & 1b). The pictures with male figure were compiled for male respondents, while the pictures with female figure were compiled for female respondents.

The developed pictures were then arranged into two questionnaires i.e. the questionnaire for professionals and the questionnaire for adolescents. The questionnaire for professionals was designed to investigate whether the pictures could represent Holland's theoretical construct (see Figure 2). The pictures that have been grouped per type of interest were presented to the professionals. They were asked to rate how close each picture could describe their job. The range

score for each rating was 1 to 5. A score of 5 indicates the picture was very close to describe their job.

The questionnaire for adolescents was designed to examine whether the job activities depicted in the pictures could be interpreted appropriately by the adolescents (see Figure 3). Each picture was displayed on each page of the questionnaire accompanied by the question "What activity does the person do in the picture?". The respondents were also asked to provide the arguments of their answers.

Respondents

There were two groups of respondent in this study i.e. the professionals and the adolescents. The list of jobs representing Holland's theoretical construct which has been determined by Holland (1985) was used for selecting the professionals. Engineer, electrician, and technician were the examples of the professionals whose job reflect the Realistic interest type. 101 professionals participated in this study, the detail of their jobs can be seen in Table 2. Most of the professionals have worked in their profession for at least five years.

The second group of respondents was the adolescents. The results of the meta-analysis conducted by Low, Yoon, Roberts, & Rounds (2005) showed that vocational interests are relatively stable at the age of 16-18 years. Therefore, the respondents selected in the study were adolescents who were 16-18 years old. 171 adolescents (63 male, 108 female, M_{age}=16.99 years) who were high school students participated in this study.

Procedure

The questionnaire for the professionals was administered online. The professionals were asked to name their job and classify their job as one of six type of interests. The characteristics of each type of interest were explained in the questionnaire. The professionals were then asked to fill out the questionnaire.

Since the adolescents participated in this study were students, the questionnaire for the adolescents was distributed in a classroom situation. As an introduction, the researchers explained that they were in the process of developing pictorial stimuli to assess adolescents' vocational interest. To examine whether the pictorial stimuli could be interpreted appropriately by the adolescents, the researchers asked the students to fill out the questionnaire.

Analysis

Exploratory Factor Analysis (EFA) was used to analyze the professionals' data. EFA was conducted to determine the number of factors formed from the data as well as to investigate whether the pictures which developed based on a certain type of interest could load on the same factor. The EFA was performed by using SPSS 21.

Descriptive statistics was used to analyze the students' answers. The students' answer was matched to the job activity that has been determined by the researchers. The students' arguments were used to clarify their answers. A score of 1 was given for an appropriate answer, while a score of 0 for an inappropriate answer. For each picture, a percentage was made based on the students' appropriate answers. The higher the percentage, the more students who can interpret the job activities depicted in the picture appropriately.

Result

Exploratory Factor Analysis

The Kaiser-Meyer-Olkin (KMO) test produced a value of .799, while the Measure of Sampling Adequacy (MSA) ranged from .612 to .919. This confirms that factor analysis was appropriate for the data. The result of the EFA indicated the formation of six factors based on the scree plot (see Figure 4). These six factors gave a total of 70.425% variance explained.

The factor loading of each picture and the grouping of the pictures resulted from the EFA can be seen in Table 3. The factor loading of the pictures ranged from .472 to .906. Three pictures which describe Realistic job activities i.e. R1, R2, and R3 were grouped in one factor based on their highest factor loading. The factor was named Realistic factor. R4 and R5 were not loaded on the Realistic factor. R4 loaded on the Investigative factor, while R5 loaded on the Social factor. According to the highest factor loading, four pictures i.e. I1, I2, I4, and I5 loaded on the Investigative factor, while I3 loaded on the Social factor. All of the pictures which describe Artistic job activities (A1-A5) loaded on one factor (Artistic factor). The same results were found in the pictures which describe Social, Enterprising, and Conventional job activities.

Descriptive Statistics

The percentages of the students who can interpret the job activities depicted in the pictures appropriately can be seen in Table 4. According to Table 4, the percentage of the students who can interpret the pictures which describe Realistic job activities appropriately ranged from 97% to 100%. Three pictures i.e. R1, R2, and R5 can be interpreted appropriately by all of the students,

while two pictures i.e. R4 and R3 can be interpreted appropriately by 97% and 98.8% of the students.

In general, the percentage of the students who can interpret the job activities depicted in the pictures appropriately ranged from 89.4% to 100% (see Table 4). Of the 30 pictures, 11 pictures were interpreted appropriately by 100% of the students, 18 pictures were interpreted appropriately by 92,3%-99,4% of the students, and 1 picture was interpreted appropriately by 89,4% of the students.

Discussion

This study produces pictures that can be used as stimuli in a new vocational interest instrument for adolescents. The pictorial stimuli produced in this study are different from the pictorial stimuli that have been developed in the previous studies. The stimuli developed by Sverko (2014) were photographs, while the stimuli developed in this study are drawing pictures. Each picture developed in this study represents a person performing an activity which differs from the pictures developed by Boerchi & Magnano (2015) that represent a person performing a profession. The pictures developed in this study are different from the pictures developed by Enke (2009) in PGI. The pictures in PGI were developed by drawing manually, while the pictures in this study were developed by drawing digitally. The use of a computer in the digital drawing can produce a clearer picture than manual drawing.

The gender of the figure depicted in the picture can affect the response of the respondents. The respondents could identify themselves with the figure depicted in the picture who has similar gender with them (Jose, 1989). To overcome the problem of the depicted figure, two versions of the picture i.e. male and female version were constructed in this study. The male version consists of pictures with male figures, while the female version consists of pictures with female figures. The PGI-picture version was also developed in male and female form. For each item, two versions of the picture were developed which were identical except for the gender of the figure who perform the activity (Enke, 2009).

Professionals are believed to have a particular interest which can be identified based on their job activities. Engineers tend to have the Realistic type of interest since their job activities involve the use of many tools, while teachers tend to have the Social type of interest since their job activities involve a lot of communication with other people. The result of the EFA based on the professionals' data indicates the formation of six factors which give a total of 70.425% variance

explained. This empirical finding is in accordance with Holland's theoretical construct which divides interests into six types. Hair (2010) stressed that in determining how many factors are extracted, the researcher must combine the conceptual basis (how many factors should be in the structure) with the empirical finding (how many factors are adequately supported).

All of the pictures which designed to describe Artistic job activities (A1-A5) loaded on one factor. This indicates that the five pictures show one factor in common i.e Artistic job activities. A similar result was found in the pictures which designed to describe Social job activities (S1-S5), Enterprising job activities (E1-E5), and Conventional job activities (C1-C5).

Based on the factor loadings, three pictures loaded on the unexpected factor. R4 which designed to describe Realistic job activities loaded on the Investigative factor. This indicates that the activity depicted in R4 i.e. operating tractor is closer to describe Investigative job activities compared to Realistic job activities. R5 and I3 were also found in group with the pictures which describe Social job activities. It indicates the activities depicted in R5 and I3 i.e. training animal and observing a child's behavior were closer to describe Social job activities.

The pictures that have been developed in this study were tested on the adolescents to examine whether the job activities depicted in the pictures could be interpreted appropriately by the adolescents. Azwar (2015) suggested the importance of testing the respondents' interpretation to ensure the items were interpreted appropriately by the respondents. Of the 30 pictures developed in this study, 29 pictures can be interpreted appropriately by more than 90% of the adolescents.

Limitations of this study make the result of this study must be applied carefully. The job activities depicted in the pictures developed in this study are samples of various job activities. There are many job activities that have not been described in the pictures. The limitation of this study is also related to the small sample size of the professionals. More professionals with various jobs are needed to validate the pictures.

Conclusion

This study contributes to the field of vocational psychology especially to the research on the development of a new vocational interest instrument by providing stimuli in the form of pictures. In general, the pictures developed in this study are able to describe Holland's theoretical construct. Most of the job activities depicted in the pictures developed in this study have been found can be interpreted appropriately by the adolescents. Overall the result of this study

confirmed that pictorial stimuli can be used as an innovative way to assess adolescent's vocational interest.

References

Allen, J., & Robbins, S. B. (2008). Prediction of college major persistence based on vocational interests, academic preparation, and first-year academic performance. *Research in Higher Education*, *49*(1), 62–79. https://doi.org/10.1007/s11162-007-9064-5

Artosandi, Y. S. R. (2015). The development of vocational interest instrument for career exploration of junior high school students. Retrieved from https://publikasiilmiah.ums.ac.id/handle/11617/6324

Azwar, S. (2015). *Penyusunan Skala Psikologi*. Yogyakarta: Pustaka Pelajar.

Boerchi, D., & Magnano, P. (2015). Iconographic Professional Interests Inventory (3IP): A new validation study. *Europe's Journal of Psychology*, *11*(4), 571–596. https://doi.org/10.5964/ejop.v11i4.927

Corbière, M., Fraccaroli, F., Mbekou, V., & Perron, J. (2006). Academic self-concept and academic interest measurement: A multi-sample European study. *European Journal of Psychology of Education*, *21*(1), 3–15.

Enke, S. (2009). *A pictorial version of the RIASEC scales of the Personal Globe Inventory*. Colorado State University. Retrieved from http://search.proquest.com/openview/f37bbeb6045991f13da9493e96edd4aa/1?pq-origsite=gscholar&cbl=18750&diss=y

Fonteyne, L., Wille, B., Duyck, W., & De Fruyt, F. (2016). Exploring vocational and academic fields of study: development and validation of the Flemish SIMON Interest Inventory (SIMON-I). *International Journal for Educational and Vocational Guidance*. https://doi.org/10.1007/s10775-016-9327-9

Geist, H. (1959). The Geist Picture Interest Inventory: General form: Male. *Psychological Reports*, *5*(2), 413–438.

Hair, J., Black, W., Babin, B., & Anderson, R. (2010). *Multivariate data analysis* (7th ed.). New York: Pearson.

Holland, J. L. (1985). *Making Vocational Choices: a theory of vocational personalities and work environments*. USA: Prentice Hall, Inc.

Jose, P. E. (1989). The role of gender and gender role similarity in readers' identification with story characters. *Sex Roles*, *21*(9), 697–713.

Kumaidi. (2016, 31 Mei). *Characteristics of an instrument of vocational interest scales*. Presented at the International Conference on Educational Research and Evaluation, Universitas Negeri Yogyakarta.

Leierer, S. J., Strohmer, D. C., Blackwell, T. L., Thompson, R. C., & Donnay, D. A. C. (2008). The Rehabilitation Counselor Scale: A new scale for the revised Strong Interest Inventory. *Rehabilitation Counseling Bulletin*, *51*(2), 68–75. https://doi.org/10.1177/0034355207311341

Leung, S. A., & Hou, Z. (2001). Concurrent validity of the 1994 Self-Directed Search for Chinese high school students in Hong Kong. *Journal of Career Assessment*, *9*(3), 283–296.

Low, K. S. D., Yoon, M., Roberts, B. W., & Rounds, J. (2005). The stability of vocational interests from early adolescence to middle adulthood: A quantitative review of longitudinal studies. *Psychological Bulletin*, *131*(5), 713–737. https://doi.org/10.1037/0033-2909.131.5.713

Lubis, F. Y. (2008). Pengembangan alat ukur minat untuk pengembangan karir pada lulusan Sekolah Menengah Atas. *Abstrak*. Retrieved from http://repository.unpad.ac.id/id/eprint/3028

Maree, J. G., & Taylor, N. (2016). Development of the Maree Career Matrix: A new interest inventory. *South African Journal of Psychology*, *46*(4), 462–476.

Muhrotien, A. (1993). *Pengembangan dan standarisasi tes minat jabatan (Vocational Preference Inventory) untuk bimbingan karier siswa kelas 1 SMA*. Universitas Gadjah Mada, Yogyakarta.

Nurcahyo, F. A., & Azwar, S. (2008). Pengembangan skala minat untuk penjurusan akademis di Perguruan Tinggi. *Humanitas*, *5*(2), 83–96.

Nye, C. D., Su, R., Rounds, J., & Drasgow, F. (2012). Vocational interests and performance: A quantitative summary of over 60 years of research. *Perspectives on Psychological Science*, *7*(4), 384–403. https://doi.org/10.1177/1745691612449021

Passler, K., Beinicke, A., & Hell, B. (2014). Gender-related differential validity and differential prediction in interest inventories. *Journal of Career Assessment*, *22*(1), 138–152. https://doi.org/10.1177/1069072713492934

Poitras, S.-C., Guay, F., & Ratelle, C. F. (2012). Using the Self-Directed Search in research: Selecting a representative pool of items to measure vocational interests. *Journal of Career Development*, *39*(2), 186–207. https://doi.org/10.1177/0894845310384593

Šverko, I., Babarović, T., & Međugorac, V. (2014). Pictorial assessment of interests: Development and evaluation of Pictorial and Descriptive Interest Inventory. *Journal of Vocational Behavior*, *84*(3), 356–366. https://doi.org/10.1016/j.jvb.2014.02.008

Ting, S.-M. R. (2007). Comparing the Chinese Career Key and the Self-Directed Search with high school girls in Hong Kong. *Journal of Career Development*, *34*(2), 192–209. https://doi.org/10.1177/0894845307307474

Tracey, T. J. G. (2010). Development of an abbreviated Personal Globe Inventory using item response theory: The PGI-Short. *Journal of Vocational Behavior*, *76*(1), 1–15. https://doi.org/10.1016/j.jvb.2009.06.007

Tracey, T. J. G., Watanabe, N., & Schneider, P. L. (1997). Structural invariance of vocational interests across Japanese and American cultures. *Journal of Counseling Psychology*, *44*(4), 346–354. https://doi.org/10.1037/0022-0167.44.4.346

Van Iddekinge, C. H., Putka, D. J., & Campbell, J. P. (2011). Reconsidering vocational interests for personnel selection: The validity of an interest-based selection test in relation to job knowledge, job performance, and continuance intentions. *Journal of Applied Psychology*, *96*(1), 13–33. https://doi.org/10.1037/a0021193

Volodina, A., Nagy, G., & Köller, O. (2015). Success in the first phase of the vocational career: The role of cognitive and scholastic abilities, personality factors, and vocational interests. *Journal of Vocational Behavior*, *91*, 11–22. https://doi.org/10.1016/j.jvb.2015.08.009

Wetzel, E., Hell, B., & Passler, K. (2012). Comparison of different test construction strategies in the development of a gender-fair interest inventory using verbs. *Journal of Career Assessment*, *20*(1), 88–104. https://doi.org/10.1177/1069072711417166

Tables

Table 1. Statements of activity developed according to Holland's theoretical construct

Type of Interest	Statement of activity
Realistic	Fixing up electricity (R1)
	Repairing vehicle (R2)
	Repairing computer (R3)
	Operating tractor (R4)
	Training animal (R5)
Investigative	Investigating with a microscope (I1)
	Doing chemical experiment (I2)
	Observing a child's behavior (I3)
	Investigating with a telescope (I4)
	Investigating X-ray's photo (I5)
Artistic	Dancing (A1)
	Painting (A2)
	Playing a musical instrument (A3)
	Designing clothes (A4)
	Reading poetry (A5)
Social	Teaching in class (S1)
	Assisting for the sick (S2)
	Caring for the sick (S3)
	Training a child to walk (S4)
	Teaching children (S5)
Enterprising	Offering a house (E1)
	Offering a car (E2)
	Guiding on travel (E3)
	Chairing a meeting (E4)
	Giving motivation (E5)
Conventional	Computing with a calculator (C1)
	Organizing the library's books (C2)
	Typing (C3)
	Doing archiving (C4)
	Photocopying files (C5)

Table 2. The Professionals' Job

Holland's Interest Type	Job	Number	Percentage
Realistic	Engineer, electrician, contractor's staff, technician	13	12.87
Investigative	Physician, lecturer, pharmacist, quality inspector	9	8.91
Artistic	Artist, architect, wedding organizer	10	9.90
Social	Psychologist, teacher, physiotherapist, public service	28	27.72
Enterprising	Entrepreneur, banker	22	21.78
Conventional	Bank clerk, finance officer, accountant, auditor	19	18.81
Total		101	100

Table 3. Factor loading of each picture

Picture	Factor					
	1	2	3	4	5	6
R1						.906
R2						.747
R3						.833
R4					.472	
R5	.680					
I1					.770	
I2					.848	
I3	.820					
I4					.536	
I5	.567				.577	
A1		.893				
A2		.824				
A3		.569				
A4		.761				
A5		.735				
S1	.768					
S2	.729					
S3	.709					
S4	.829					
S5	.868					
E1				.863		
E2				.833		
E3				.658		
E4			.438	.474		
E5	.487		.402	.508		
C1			.581			
C2			.731			

C3			.755		
C4			.843		
C5			.824		

Factor 1: Social, factor 2: Artistic, factor 3: Conventional, factor 4: Enterprising, factor 5: Investigative, factor 6: Realistic

Table 4. Adolescents' appropriate answers

Picture	Appropriate Answers' Variation	Percentage of the Appropriate Answers
Fixing up electricity (R1)	fixing the socket, checking the power supply, fixing the switch	100%
Repairing vehicle (R2)	repairing motorcycles, changing the oil	100%
Repairing computer (R3)	fixing the CPU, fixing the motherboard, testing the CPU voltage	98,8%
Operating tractor (R4)	plowing the fields with tractors, farming with tractors	97%
Training animal (R5)	training dolphin, training animals for the circus, teaching animals	100%
Investigating with a microscope (I1)	observing objects, researching things, doing science research	100%
Doing chemical experiment (I2)	carrying out chemical experiments, researching in chemistry labs	100%
Observing a child's behavior (I3)	examining children's activities, observing children, examining child development	95,9%
Investigating with a telescope (I4)	observing stars, observing objects in the sky	100%
Investigating X-ray's photo (I5)	analyzing x-rays, examining x-ray results	98,8%
Dancing (A1)	dancing performance, puppet/traditional show	100%
Painting (A2)	drawing, sketching objects,	100%
Playing a musical instrument (A3)	playing bands, playing music, music concerts	100%
Designing clothes (A4)	drawing clothes, drawing clothes sketches	99,4%
Reading poetry (A5)	poetry performance, staging poetry	94,7%
Teaching in class (S1)	explaining the material, teaching chemistry subjects	100%
Assisting for the sick (S2)	treating people, caring for the elderly, rehabilitating patients	95,3%
Caring for the sick (S3)	controlling the patient, checking the patient's health, examining the patient	97%
Training a child to walk (S4)	teaching a child to walk, guiding a child, helping a child to walk	98,2%
Teaching children (S5)	explaining something, telling stories to children, teaching origami	95,9%

Offering a house (E1)	promoting products, explaining products	95,9%
Offering a car (E2)	selling cars, explaining products, promoting cars	100%
Guiding on travel (E3)	tour guiding, explaining sight	98,2%
Chairing a meeting (E4)	explaining company profits, giving instructions, leading discussions	89,4%
Giving motivation (E5)	presenting something, giving speeches	97,6%
Computing with a calculator (C1)	calculating financial report, recording notes, calculating reports	93,5%
Organizing the library's books (C2)	tidying up books, checking books, sorting books	98,2%
Typing (C3)	writing a letter, copying files, entering data	95,9%
Doing archiving (C4)	organizing folders, retrieving files, tidying up documents	92,3%
Photocopying files (C5)	duplicating files	98,8%

Figures

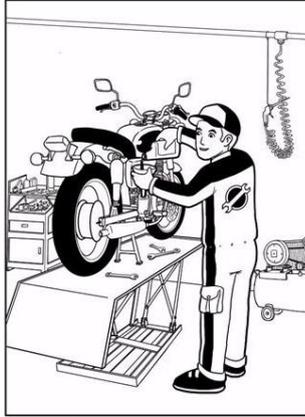Figure 1a. Pictures which describe Investigative job activities for male respondents

Figure 1b. Pictures which describe Investigative job activities for female respondents
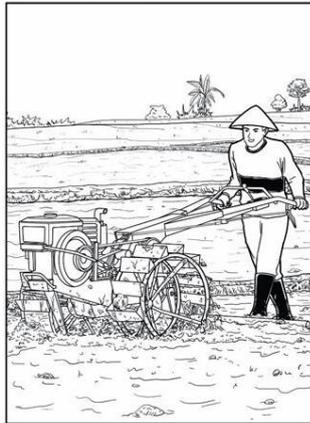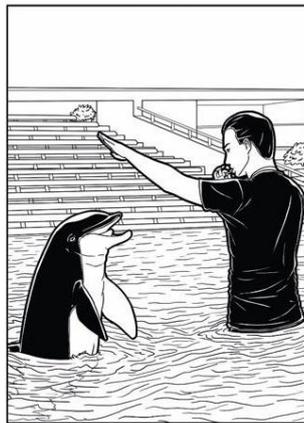
How close each picture could describe your job? Give a score from 1 to 5 for each picture. A score of 5 indicates that the picture is very close to describe your job.

Picture	1	2	3	4	5
A					
B					
C					
D					
E					

Figure 2. Example of the questionnaire for male professional

"What activity does the person do in the picture? Give your arguments".

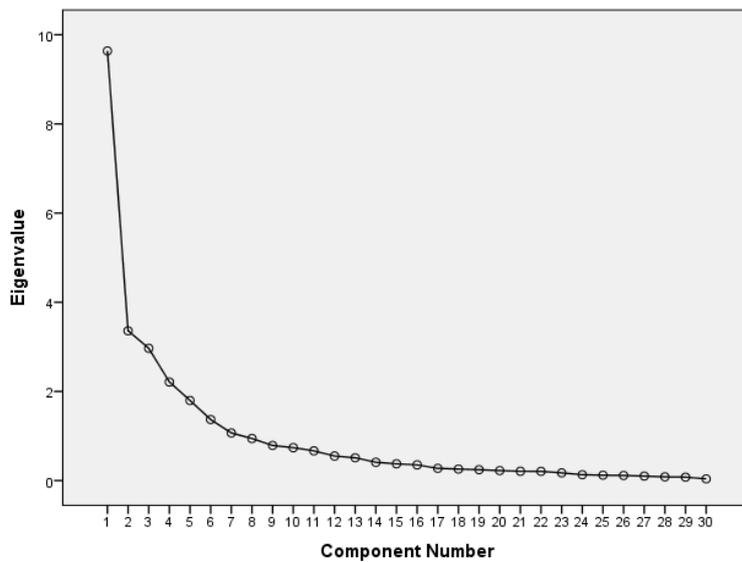Figure 3. Example of the questionnaire for male adolescent

Figure 4. Scree plot

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