

# Interest Patterns Measurement Application for Vocational High School Students

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## Abstract

Interest patterns are the characteristic of a student's interest in which the student wishes to engage in a particular field. The pattern of interest of students in vocational high school in Indonesia should be known to obtain an appropriate career based on the student's interest. To reveal the pattern of interest, an instrument based on the Holland theory has been developed in Indonesia. Nevertheless, the test is performed manually using pencil and paper thus there are some ineffectiveness during the implementation. Moreover, it requires longer time for data processing and is susceptible to error. Therefore, a computer-based application that can measure the interest patterns is built. With the existence of this computer-based application, data processing can be done quickly and accurately without any errors and can be accessed anywhere and anytime. This research found that the use of the application can support the effectiveness and efficiency of the test in recognizing the interest pattern of a student.

**Keywords:** application, Holland theory, measurement, interest patterns, vocational high school

## 1. Introduction

The selection of educational programs for graduate students of Junior High School and Senior/Vocational High School to the higher level of education is one determinant of success in the career or professional world. To determine the choice of educational program, the pattern of student's interest is required. The identification of students' interest patterns can help to determine an advanced education program that best fits the characteristics of a student. Moreover, it can minimize students' confusion in determining specific educational program. To help students recognize the interest pattern, psychometric measurements are required to measure students' interest patterns. The instruments of vocational interest patterns have been developed by Holland (1985), one of them is Self-Directed Search (SDS). Furthermore, it was modified by Aljufri & Kumaidi (1989), and has been used for the selection of vocational school entry in West Sumatra in 1994-1998 in which the results were claimed good. Furthermore, Kumaidi *et al.*, (2014) developed an instrument of interest patterns for vocational students and generated an instrument of measuring vocational patterns for 43 skill packages out of 128 vocational skills packages in Indonesia.

Vocational interest patterns instrument can be used as an initial way to identify student's personality patterns and to match them with the personality patterns of people in specific set of occupation. Subsequently, it will help to adjust the success and opportunities of newcomers to specific jobs. If the introduction of the typology (pattern) of occupation and individual characteristics can be established accordingly, as adopted by Holland, the career development opportunities of learners and appropriate workers can be made more suitable. The Hexagonal Theory of RIASEC from Holland (1985) has been widely used and applied in the development of interest pattern instruments, such as SDS, VPI, and Strong-Campbell (Aiken, 1996). This

theory is called person-environment interaction that is intended to match the suitability between individual characteristics and desired job characteristics.

Several studies have indicated that interest patterns of Holland theory has suitability applied in Hong Kong, Taiwan, Chinese Society with four different characteristics and in Greece, especially in the education sphere (Farh & Leong, 1998; Dimakakou, *et al.*, 2008; Tien, 2009; Wong & Wong, 2009). It suggests that Holland's theoretical interest patterns are potentially applicable in the educational sphere and on various cultural backgrounds that exist in diverse populations in the Asian region.

The biggest drawback of this instrument is it is manual paper-based test, which is distributed to each student. Assessor and students must be in one room and at a same time to perform this assessment. Subsequently, assessor must examine the answers from students. This instrument also has many questions, which is 228 questions divided into 5 (five) sections. Therefore, it required time to assess the results. To examine a student's answers, it requires 5—10 minutes, data input to excel approximately 15—20 minutes, and data processing of 5—10 minutes. Therefore, for one subject (a student in the test), a total time of approximately 25—40 minutes is needed. It is not very effective considering the number of the participated students. With the length of data processing for each student, it is possible that the assessor as the expert will make mistakes in data processing, thus providing results that are less precise in accordance with the assessment process.

Based on the results of the study, an effort to develop a computer-based application as the interest patterns instrument was carried out. The application is structured to facilitate the exploration process of students' vocational interests as a more practical form of the vocational interest patterns resulting from previous studies (Kumaidi *et al.*, 2014).

In general, a computer-based application of vocational interest patterns was developed in this research. It contains the identity of the subject as well as the items that must be responded by the subject. After the process of filling the identity and responding the items on a scale, the computer processes the results of subject data and produces output in the form of subject typology (patterns interests) that is compared with the pattern of typology package for the subject.

## **2. Research Methods**

### **2.1. Location and Subject of Research**

The first step in making the application was to conduct a study on interest patterns for determining the norms of each skill package. Once computer-based application was generated, the next step was to test the product. The experiment was conducted in two stages. *First*, it involved the subjects, namely the students as the users of the exploration of interest patterns. *Second*, it was conducted with the subject of the teachers as the administrator who would use the product to identify the student's interest or other needs related to the exploration of student's vocational interest. The location used as study site was vocational high schools (SMK) in Surakarta, Sukoharjo, Karanganyar, Sragen, Klaten, Semarang, Purwokerto, and Pacitan.

### **2.2. Instrument of Research**

Instrument of vocational patterns interest is a measurement of the student's vocational interest based on Holland's personality theory (1985). The main focus of Holland's theory is to understand the vocational behavior to produce practical ways of helping people, ranging from the adolescents to the elderly in their career, both in education and the world of work (Louis,

2010). This theory emphasizes the concept of interest as the basis of the formation of one's personality. It also highlights personal competence, educational behavior, social behavior and personality. The basic assumption of Holland Theory includes four assumptions (Holland, 1997, pp. 2-4) as follows:

- a. Everyone can be classified according to the standards to how far they approach one of six personality types: The Realistic Type (R), The Investigative Type (I), The Artistic Type (A), The Social Type (S), The Enterprising Type (E), and The Conventional Type or Type of Routine (C).
- b. There are six environmental models in which each environment is dominated by a certain type of personality and each environment has a picture of the physical state, problems and provides opportunities, namely: The Realistic Environment, The Investigative Environment, The Artistic Environment, The Enterprising Environment, The Social Environment, and The Conventional Environment. The more the similarity of a particular environment with one of the six environmental models, the more visible the typical lifestyle and environment.
- c. Humans tend to seek the right environment for using as a medium in developing skills and abilities, expressing attitudes and values, and obtaining appropriate problem solving, in accordance with their distinctive characteristics. The combination of certain personality types and the appropriate environmental model produces occupational homogeneity. Furthermore, one can develop in a certain occupational environment and be satisfied.
- d. Behavior is a manifestation of the interaction between personality and environment. Compatibility between individuals and their environment will determine the level of conformity of majors and stability of education, as well as determine satisfaction and achievement.

The research instrument used in this study was called vocational interest patterns assessment, which was modified and reviewed by Kumaidi *et al.*, (2014) based on Holland's previous theory. The instrument consisted of 216 items that were responded by the subjects to reveal indicators of the 6 (six) types of personality (interest patterns) according to Holland's theory, namely: Realistic (R), Investigative (I), Artistic (A), Social (A), Enterprising (E) and Conventional (C). Based on the theory developed by Holland (1985), an individual will tend to belong to one type of personality and will tend to have an interest that matches the nature of one's personality. The scale of vocational interest consisted of three aspects, namely: Activity, Competence and Dream job which is the aspect of interest patterns.

### **2.3. Application Development Technique**

The interest patterns measurement application was built on website-based platform to be accessible by anyone and anywhere. Layout on the website was created using HTML5 and CSS3 with responsive design, so this application can be opened by using various devices, such as PC, Laptop, Tablet or Mobile phone. Because it uses a responsive design, each device will show a different layout, adjusting the width of the screen of each device used to open the application.

Technique used in the development of interest patterns measurement application was a waterfall model on web development. Waterfall is a paradigm that is usually used for well-defined systems, which covers requirements specifications, processes, input details, and output requirements. The process in the waterfall method consists of: System analysis, System design,

Coding or Development, Testing and Maintenance. This paradigm also allows the system to do the repetition in its development.

The interest patterns measurement application on this website was built using PHP programming language and MySQL database with the concept of Relational Database. This application is placed on the internet host server, hence it can be accessed by users anywhere and anytime, provided that the user is connected to the internet. Placement of applications on the internet host server makes the application can be unlimited used by tools that must be located in a certain place.

### **3. Results and Discussions**

#### **3.1. Decision Making Method**

The interest patterns application for vocational high school students is an example of Decision Support System (DSS). Kurniawan (2015) explicated that Decision Support System (DSS) is a computer-based system that helps in the decision-making process. DSS as an adaptive, interactive, flexible, computer-based information system is specifically developed to support the solution of unstructured management problems to improve the quality of decision making. Thus, DSS can be defined as an adaptive, flexible, and interactive computer-based system used to solve unstructured problems that increase the value of decisions.

The determination of decision-making for interest patterns is formulated based on research conducted by Kumaidi (2015). There are 228 questions consisting of:

- a. 66 questions for “Activity” by choosing “Agree” or “Disagree” based on the activities undertaken by each student.
- b. 66 questions for “Competency, Ability or Skill” by choosing “Yes” or “No” based on the competencies or skills are displayed in accordance with the individual personalities of students.
- c. 84 questions for “Jobs” by choosing “Yes” or “No” based on work conformity to each student’s desire.
- d. 12 questions for “Self-Capability Estimation” by choosing the numbers between 1 and 5 based on student’s self-efficacy towards some types of work.

After completing the questions, the system calculates the 228 answers from each student by classifying the questions into 6 (six) aspects, namely: The Realistic Environment, The Investigative Environment, The Artistic Environment, Enterprising Environment, The Social Services Environment (The Social Environment), The Environment Routine Activities (The Conventional Environment). Each aspect will be given its own value based on the answer given by student. Furthermore, students will get score from each aspect. The 3 (three) aspects with the highest score are student’s interest patterns that are categorized based on the result. Each aspect has some types of major in vocational high school in Indonesia. From each aspect that has the highest match for each student, subsequently, recommendation will be provided in the form of suitable majors that can be taken.

#### **3.2. System Architecture**

This interest patterns application is website-based application. Thus, users have to use the web browser as their primary medium. The users of this application are divided into 3 (three) groups as follows:

1. Administrator  
Users who can perform the main data processing, including the user's data application, questions data, and the results of analysis of each student who has conducted vocational interest patterns.
2. Teachers  
Users who can perform specific data processing, particularly data of the students at respective school. In addition, teachers can also see the results of the assessment of the students in the respective school.
3. Students  
Users who become the main subject of this application. Students will fill in their personal data and complete the questions in the application. After completion of the test, students can see the results of the assessment.

Each user can access the application using web browser, either from PC, tablet or mobile phone. When accessing the app, the user initiates a request to the application server. The server retrieves data from the database and responds to requests from users and displays it in HTML layout based on the respective web browser.

### 3.3. Application Flowchart

Flowcharts provide a general overview of the process that occurs in every activity within the application. With the flowchart, the processes and general overview of the contents in the application can be observed.

The description of the basic flowchart of the application is presented as follows:

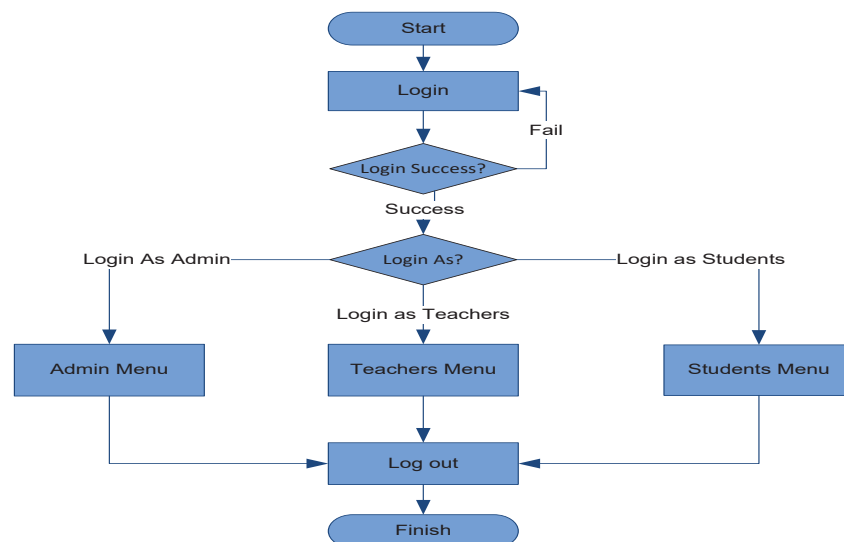


Figure 1. Application Flowchart.

The process starts from the users who open the application using their respective web browser. After the app is opened, the first layout will be the login page. Users will be required to enter their username and password to log into the application. If they enter wrong username and password, the application will return to the login page. If they enter the correct username and password, the app will authenticate the privilege of the user, whether they are an admin, a

teacher or a student. If the users log in as an admin, the menu will appear for the admin. If they are registered as teacher, the menu for teacher will appear. Similarly, if they are registered as student, the menu page for students will be displayed. The last step is to log out or exit the application.

### 3.4. Application Results

The interest patterns measurement application can be accessed at <http://psikometriums.com> page by selecting the “Skala Minat (*Interest Scale*)” menu. The initial layout of the app for users after login is depicted below:



Figure 2. Initial Application Layout.

After filling in the personal data, the user will be requested to fill in 228 questions in the application. The example of questions can be shown as follows:



**Aktifitas**

**Petunjuk Soal : Silangi huruf S pada lembar jawaban apabila Anda setuju dan T apabila Anda tidak setuju terhadap aktivitas yang diungkapkan.**

1. Saya suka memperbaiki peralatan listrik  
 S  T
2. Saya suka memperbaiki alat mekanik (misalnya sepeda atau mainan anak)  
 S  T
3. Saya suka membangun atau membuat benda (baru) dari kayu atau sejenisnya  
 S  T
4. Saya suka merangkai peralatan mekanik  
 S  T
5. Saya suka menyetir truk, traktor, atau alat sejenisnya  
 S  T
6. Saya suka menggunakan peralatan untuk kerja metal atau mesin perkakas  
 S  T
7. Saya suka bekerja di bengkel motor atau mobil  
 S  T

Figure 3. Questions in Application.

After completing the 228 questions in the app, the result will be examined and calculated. The result of the assessment will be shown directly based on the student's answer. An example of the result of a user is demonstrated below:

**Hasil Tes Skala Minat Kejuruan : Eni Risma Anggraini ( Administrasi Perkantoran )**

Show  entries Search:

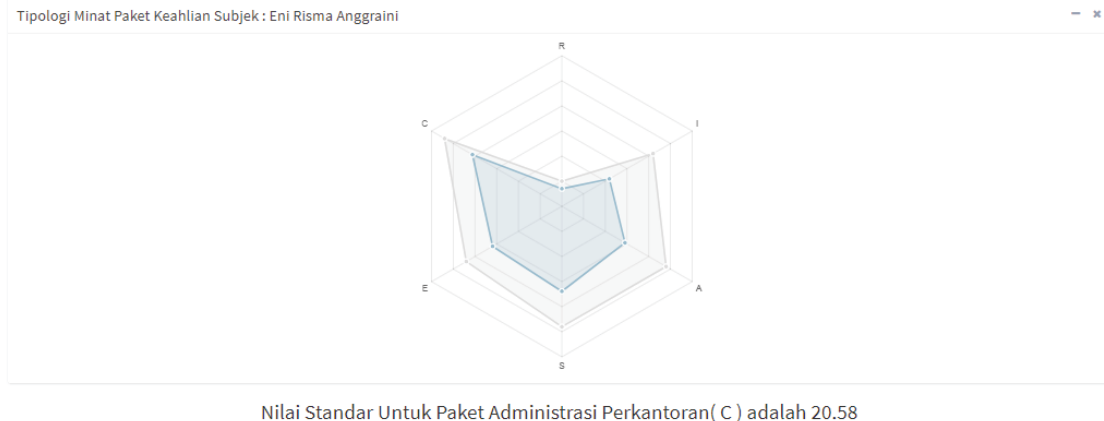
No	Aspek	Kode	Nilai	Standar
1	REALISTIC	R	5	3,5
2	INVESTIGATIVE	I	21	10,94
3	ARTISTIC	A	24	14,53
4	SOCIAL	S	24	16,94
5	ENTERPRISING	E	22	15,94
6	CONVENTIONAL	C	27	20,58
7	AKTIVITAS	A	37	30,25
8	KOMPETENSI	K	43	27,55
9	MIMPI	M	43	24,63
10	AKTIVITAS REALISTIC	AR	1	1,31
No	Aspek	Kode	Nilai	Standar

Showing 1 to 10 of 27 entries Previous **1** 2 3 Next

Figure 4. Layout of Results in Application.

Figure 4 shows that a student from the "Office Administration" major is classified in the category of Realistic, Investigative, Artistic, Social, Enterprising and Conventional, which is formulated in accordance with the answers.

Furthermore, the application also demonstrates the typology of interest (interest patterns) and the standard value for the major that is being studied by the student. It is subsequently classified the student into the categories of “High”, “Medium” or “Low”.



Berdasarkan Tabel Skala Minat, Nilai Kecocokan Eni Risma Anggraini Untuk Aspek C Termasuk Dalam **KATEGORI TINGGI**

Figure 5. Layout of Interest Pattern Result in Application.

In the end, the highest score for students who have taken the test along with the recommendation of majors that is perceived appropriate for the interest of respective students based on their highest value is provided. The following picture is an example of a major recommendation for a student who has taken the test:

Nilai Tertinggi Eni Risma Anggraini

No	Aspek	Kode	Nilai
1	CONVENTIONAL	C	27
2	ARTISTIC	A	24
3	SOCIAL	S	24

Jurusan Yang Direkomendasikan Untuk Eni Risma Anggraini ( **Aspek C** ) Adalah :

No	Aspek	Jurusan	Nilai Kategori Kecocokan Tinggi	Nilai Kategori Kecocokan Sedang	Nilai Kategori Kecocokan Rendah	Nilai Standar
1	C	Administrasi Perkantoran	$\geq 26.36$	18.68 - 26.35	$\leq 18.67$	$\geq 20.58$
2	C	Akuntansi	$\geq 27.36$	17.68 - 27.35	$\leq 17.67$	$\geq 24.76$

Figure 6. Example of Major Recommendation.

In General, this application provides recommendation whether a student is suitable to enter a specific major or not. If it recommends unsuitability, it further provides suggestion for the appropriate major in accordance with the student’s interest.

### 3.5. General Discussion

The interest pattern measurement application for students in vocational high school is developed to facilitate the assessment of vocational students’ interest whose background is various in relation with the exploration of students’ interest. This application was created based



on a study carried out by Kumaidi, *et al.*, (2012) that produced a vocational interest measurement instrument with 228 items of question to reveal the typology (pattern) of student's interest based on Holland's personality theory.

The instrument used to measure vocational interest patterns in the earlier research is a set of paper and pencil or manual test. Implementation or presentation of vocational interest measurement using the manual method takes a relatively longer time in compared to the computer-based application. Paper and Pencil test (manual test) requires an assessor to guide the assessment, whereas in computer-based application, students is guided directly by computer program so that the test implementation does not require guidance from an assessor from beginning to end as well as more efficient. In addition, the processing of data on a manual test requires a relatively longer time and may lead to errors due to human error factor, especially at the time of data input.

The use of interest patterns application to explore student interests requires a relatively shorter time in compared to the manual test (paper and pencil test). The process of presenting and performing a conventional assessment requires approximately 45 minutes, whereas with the computer-based application, the duration required to complete the 228 questions is approximately 15-25 minutes depending on the duration of the subject's answer to the questions. Subsequently to the process of assessment by the subject, the next step is the process of input and data processing to reveal the student's interest patterns. The process of data input using manual method with Microsoft Excel program and the result is in the form of a spiderweb diagram to see the pattern. For each student, 5—10 minutes is required to assess the result, 15—20 minutes for data input to excel, and 5—10 minutes for data processing. Therefore, for one test subject (a student in the test), a total duration of approximately 25—40 minutes is required. Manual data input process may lead to error, hence the processed score becomes invalid. The use of vocational interest applications can minimize the occurrence of errors in the data input process since the data of the subject's test results is directly displayed in the form of scores and spiderweb diagram. In addition to efficient use of this application, it can also provide more accurate results and relatively faster because the results is directly displayed in the end of the application.

This applications is also more practical and more accessible since it does not require specific tools, such as books and answer sheets, to carry out the test. It reduces the cost to perform the test, in compared to the manual test that entails the copy of answer sheets and books. Moreover, each school that has been registered as a user can independently conduct the test. In addition, the data of users or subjects—who have conducted vocational interest pattern test—can be recorded in one server, and the data can be the standard data source for each skill package. Therefore, the validation process can be done continuously along with the increasing number of application's users.

The vocational interest patterns application can be accessed using a variety of media, such as PCs, tablets, and even mobile phones, which are connected to the internet connection since it is an online-based application. It facilitates the implementation of test anytime and anywhere. Any registered school can conduct the test independently in accordance with the user manual of the application. Thus, the process of test does not require experts from the psychology.

#### 4. Conclusions

From the explanation in the previous sections, several conclusions can be drawn as follows:

1. An application to assess the interest patterns of vocational school's students in Indonesia has been built, named "Interest patterns measurement application".
2. This application provides a computer-based application for the measurement or the exploration of student's interest. The application divides the users into three groups, namely: administrator, teachers as administrator at school level, and students as the subject of the test in the application. The results of this study revealed that this application can be used and to conduct an assessment of student's interest.
3. This application is another form of the vocational interest assessment from the result of previous research. Thus, the content is not changed. It consists of 228 items to reveal the type of student's interest patterns, which is distinguished into Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C), based on Holland's theory.
4. This application of vocational interest patterns can be used as an exploratory instrument for more efficient assessment and obtaining test results compared to the assessment of vocational interest patterns in paper and pencil test.
5. This application can be used and accessed anywhere and anytime if there is an internet connection. It does not require any books and answer sheets hence it is more inexpensive and effective.
6. Data on the interest measurement can be recorded and stored in one server.

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