

# Integrating Multiple Intelligences and Personality Traits in a Dynamic Personal Decision Aid for Youth

**Norfiza Ibrahim<sup>1</sup>, Ahmad Affandi Supli<sup>2</sup>, Siti Mahfuzah Sarif<sup>2</sup>, Norshuhada Shiratuddin<sup>2</sup>,  
Haslina Mohd<sup>2</sup>, Azizi Ab Aziz<sup>2</sup>, Syamsul Bahrin Zaibon<sup>2</sup>**

<sup>1</sup>*Universiti Teknologi MARA (UiTM) Perlis, Malaysia, norfiza@perlis.utm.edu.my*

<sup>2</sup>*Universiti Utara Malaysia, Malaysia,*

*ahmad\_affandi123@yahoo.com, {ctmahfuzah,shuhada,haslina,aziziaziz,Syamsulbahrin}@uum.edu.my*

## ABSTRACT

As far as the development of youth community is concerned, the implementation of a dedicated decision aid is believed to have ample potentials in building their skills in making decisions. The absence of proper guidance in making crucial decisions could cause irreversible effects to youth's future and consequently to the development plan of the country. Accordingly, this study focuses on the development of a computerized personal decision aid for youth named as Youth Personal Decision Aid (YouthPDA). The aid manifests the integration of Personality Traits (PT) and Multiple Intelligence (MI) data in a contextual aware recommender system. The system uses Rule Based Reasoning (RBR) that will display the recommendations based on set of programmed rules. This paper also discusses findings from helpfulness evaluation of YouthPDA, which comprises of four dimensions; reliability, decision-making effort, confidence, and decision process awareness. The mean value for each dimension (which is  $>5$ ) indicated that the YouthPDA is accepted to be a helpful tool for youth in making decision.

**Keywords:** personalized decision aid, dynamic decision aid, youth development

## I. INTRODUCTION

The way youth growing up today is a threat to society and the future stability of communities. Along the process of growth, plenty of decisions have to be made, including those that will shape their future. Having no proper or specific guidance to assist youth in making critical life decisions (e.g. college decision, course majoring decision, career decision etc.) could cause severe effects to their future and consequently to the development plan of the country. As far as the development of youth community is concerned, the implementation of computerized Personal Decision Aids (ComPDA) model in Siti Mahfuzah (2011) is believed to have ample potential to sharpen youth skills and ability to make decisions. Hence, this study foresees the need to improvise the conceptual design model to cater for youth related decisions.

Youth has a very significant role in determining the attainment status of a fully developed country. Currently, youth ages indicate considerable challenges in achieving what is best for the future. Their choices

will determine the consequences in the future. In order to make decision, human usually consider many factors to be evaluated before they can be assured about their choices. Typically, one could ask their family or friends for assurance. However, in some cases parental perfectionism can be the cause of indecisions among youth (Khasmohammadi *et al.*, 2010).

Naturally, in making decision, one will count the possible advantages and weakness towards choices and writing down on paper to identify their best choices. However, not all decisions situations could be accomplished using the manual ways. This is because of lack of information towards particular critical life decision (e.g. college decision, course majoring decision, career decision, etc.) areas could possibly occur, and thus this will affect the bad decision appears (Abbas, 2007).

Recently, the improvement of technology has facilitated human in many areas including decision-making. It is a need for human to have personalized recommendation system that could assist them to provide recommendation results. As explained in Zhang, Miao, and Luo (2011), the development of personal technology is very useful to recommend information that is valuable, so as to realize the personal needs of the user. Moreover, existing decision aids are too difficult to be used and understood by youth in making decisions (Alidrisi, 1987; Arsham, 2004; McGuire, 2002; Yaniv, 2008). People can have a tendency to be less accurate, if there is no effective decision aid available (Payne & Bettman, 2002).

Therefore, in this study, the focus is stressed on the making of YouthPDA in two areas, which are study and career as both areas have the highest demand from youth (Norfiza *et al.*, 2013). YouthPDA is a system that was deliberately designed to assist young people in making decisions in some areas, by providing options that are already in process and selected. Chen, Hu, Kuo, and Liang (2010) defined decision aid as a software (computer-based online) that can direct and assist people in identifying the appropriate product choices, by certain criteria consideration.

Nevertheless, developing a decision aid is not only about the use of approaches that are able to deliver the accurate answer or the matter of using the best interface to display results, but it is also about the more effective ways to comprehend human problem solving need (Hayes & Akhavi, 2008). Thus, gaining recommendations results from trusted sources is so imperative component of being natural in human decision-making.

## II. MULTIPLE INTELLIGENCES AND PERSONALITY TRAITS

In developing YouthPDA, two significant psychological inventories are integrated, Multiple Intelligences (Gardner, 1993) and Personality Traits. This is due to human is different one another, and thus these two famous theories could describe and give valuable information to be taken into account to determining the possible solutions. The novelty is by incorporating these two theories to yield the solution in youth PDA.

Basically, Multiple Intelligence (MI) highlights on education and cognitive science field. According to (Gardner, 1983), people are born with a uniform cognitive capacity that can be easily measured by short-answer tests since MI reconsiders our educational practice of the last century and provides an alternative. There are nine different kinds of intelligence that emphasized in this theory which are; Linguistic, Logical/Mathematical, Musical Rhythmic, Bodily/Kinesthetic, Spatial, Naturalist, Intrapersonal, Interpersonal And Existential Intelligence.

Personality Trait is one of the personality approach that will look into multiple aspects of human being. Each individual has his own unique behaviours and thoughts that could discriminate one personality to another. The reaction of individuals behaviour might be effected by trait that according to Cherry (2013) is a recognized characteristic. There are a few types of personality indicator that able to measure each individual including Myer Briggs Type Indicator (MBTI) and Big Five personality traits. In particular, MBTI is used as assessment of personality theories. MBTI comprises 16 types of human differences in personality traits group (Robbins & Langton, 2007).

## III. YOUTH PERSONAL DECISION AID

As mentioned earlier, the YouthPDA consists of two decision areas, study and career. The prototype would provide assistance in a way that not only helps youth to choose but also learn from the process. By using YouthPDA, the users (youth) will not only received the recommendation results, but they will also know the

kind of personality (from the PT test) and intelligences (from the MI test) that they possess.

### A. The Conceptual Model

This study focuses on the personalized recommendations with emphasis of context aware approach. Generally, the context aware approach is based on environment of the user and adheres to adaptive context assignment (Figure 1).

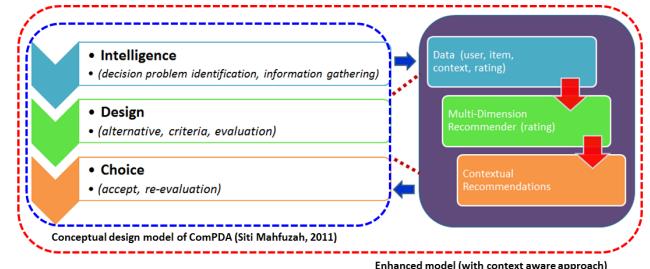


Figure 1. Enhanced ComPDA model (with context aware approach)

The model is briefly explained as follows;

- **intelligence** process: user profiling is introduced by capturing data from multiple intelligence and personality trait questions;
- **design** process: the normalized user profiles together with the acceptance threshold will go through case based reasoning process before recommendation is presented to the user;
- **choice** process: involve the options of either accepting or rejecting the recommendation while updating the knowledge repository with new case. The knowledge repository is also referred to in situation where recommendation is rejected or deadlock takes place.

### B. Process Flow

Figure 2 exhibits the flow chart of the system. The YouthPDA system requires user input for profiling purposes, including academic achievement as well as their characteristic value in both personality traits and intelligent. Before the user profile has been normalized, threshold setting should be setting up and stored in user profile database.

Next, the context aware information will be extracted and subsequently the results from user will be calculated. The recommendations as output will be retrieved and directly will be displayed to the user.

Hence, the results will go through the threshold re-evaluation process if they are unable to satisfy the user and will undergo the user profiling once again. The dynamically result changes will be based on a few factors such as does not earnestly reading and answering the personality and multiple intelligence test or the aging factor that might change the interest or habit of the user that might affects their personality.

Lastly, the results that have been generated will be updated in the database and the recommendations will be displayed to the user.

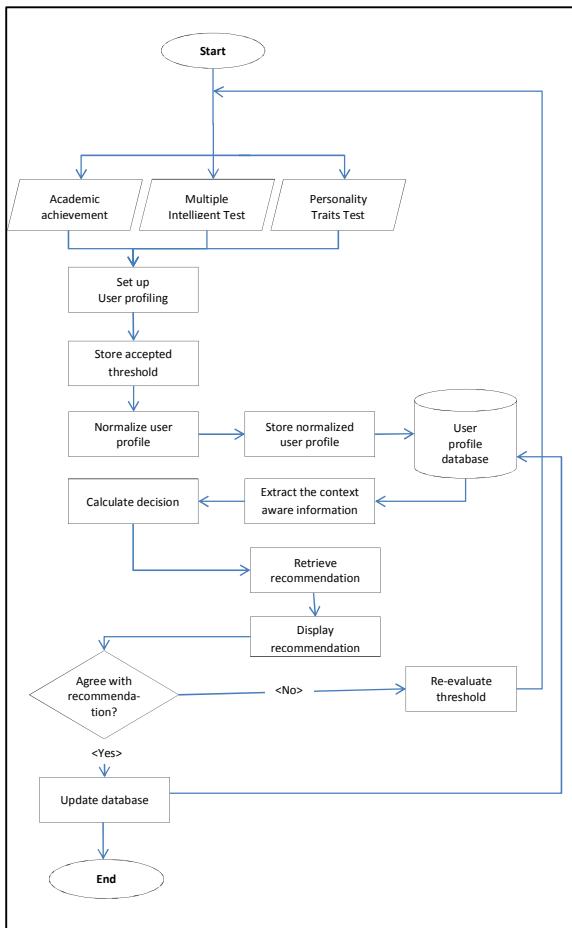


Figure 2. Flowchart of YouthPDA

### C. Development of YouthPDA

The development of youthPDA uses a type of reasoning that utilizes “if-then-else” rules statement. This approach is known as Rule Base Reasoning (RBR) that creates step-by-step logic rules for achieving appropriate solutions based on facts. The reason to use this technique is that because of the classification made (known as the knowledge base) from set of rules as suggested from previous studies about relation between MI and PT in career and study. In other word, this type of reasoning method could classify the solutions by using those facts (MI and PT) to be integrated as new solutions. RBR contains rule statements that create patterns for each of given solutions.

These patterns are used for inference engine to match the users input towards database as provided solutions. In particular, the “if” statement here means “when condition is true”, the “then” means “perform action A” and the “else” means “if the condition is not true take another actions”. Inference engine are programs that can process those rules based on facts of a certain condition.

The first version of the YouthPDA prototype is developed using Netbeans software (java programming) as a desktop application. The development of this application also uses MySQL database as case base knowledge to determine the study and careers result.

### D. Interface Design

A few main parts exist in YouthPDA interfaces. Firstly, this application required user to login into the system (Figure 3) by signing up and completing the profile requirement (Figure 4). Figure 5 shows the main menu that provides career and study sections.

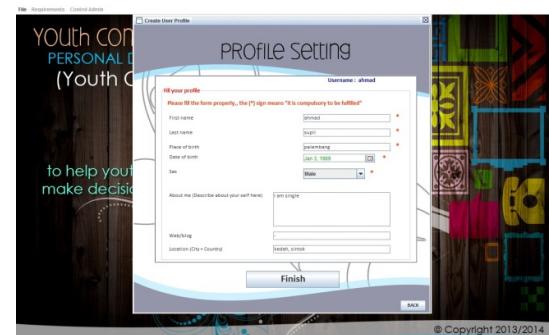
The study sections in the application provides SPM results form to be fulfilled by the user (Figure 6), and will be guided into the next sequence, Multiple Intelligent assessment.

Meanwhile, in career sections (Figure 7), the user is required to completing both of personality assessment questions and Multiple Intelligence questionnaires. The application displays the type of user in terms of what are her or his personality traits (Figure 8) as well as the most prominent intelligence type (Figure 9) before the user could perceive the given result of recommendations.

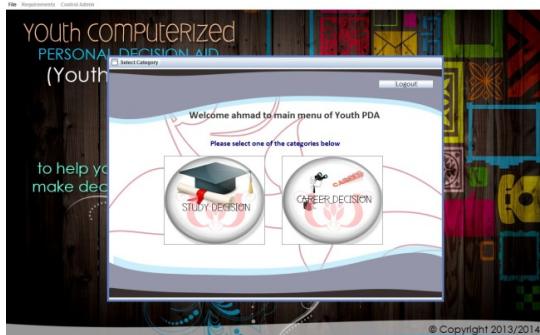
Lastly, the application will display the recommendations by using tag clouds visualization method. The tag clouds are used for faster insight understanding towards users to see what are their prominent studies or careers area. Tag clouds visualization indicates the calculating results by exhibiting the bigger word for the more recommended study (Figure 10) and career (Figure 11) area.



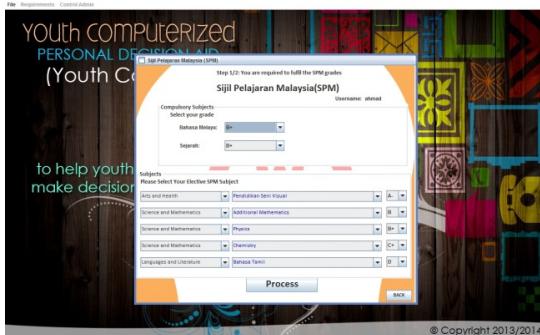
Figure 3. Login Interface



**Figure 4. Profile User Setting Interface**



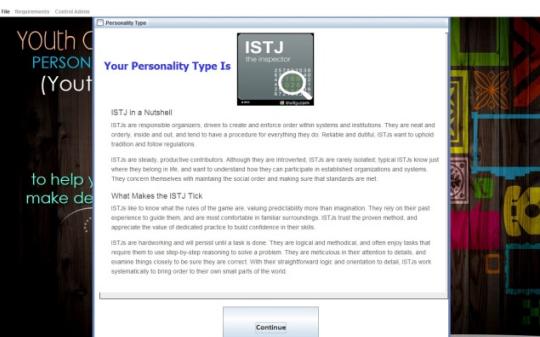
**Figure 5. Main Menu (Study and Career)**



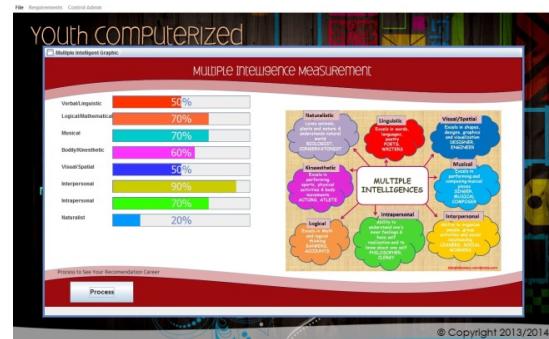
**Figure 6. Entering SPM Result Interface**



**Figure 7. Multiple Intelligence and Personality TraitsTest**



**Figure 8. Personality Types Result**



**Figure 9. Multiple Intelligence Result**



**Figure 10. Recommendations display using tag cloud visualization**



**Figure 11. Recommendations for Career Interface**

#### IV. HELPFULNESS OF YOUTHPDA

The YouthPDA model was validated through prototyping method and a series of lab experiments and walk in experiments were carried out for this purpose. This study focuses on measuring the helpfulness of the decision aid by using questionnaire as the mean of data collections. The next sections explain further on the instrument used and data analysis part.

##### A. Dimensions of Helpfulness

The helpfulness evaluation of the YouthPDA prototype follows the dimensions proposed in Siti Mahfuzah (2011), which considers four dimensions of helpfulness:

- i) **Reliability:** measured based on accuracy of the outcome and its consistency with user's preferences. (5 items)

- ii) **Decision making effort:** facilitates the cognitive effort of processing information for making decision. (4 Items)
- iii) **Confidence:** helps to increase decision maker's confidence in the process as well as the outcome. (4 Items)
- iv) **Decision process awareness:** makes the user more aware of his own decision processes. (5 Items)
- v) **Overall Helpfulness:** (4 items)

The evaluation of above-mentioned dimensions uses seven-point likert scales. Additionally, the evaluation also includes the following items, (i) the intention to use the application again, (ii) conferment to the application, and (iii) time spent.

## B. Findings and Analysis

As mentioned earlier, the evaluation wills measures helpfulness and respondents' experience towards the YouthPDA. There are 189 respondents involved in the experiment where 52.4% are male and 47.6% are female.

The experiment has been conducted into two conditions; in the computer laboratory (97 respondents) and in the open environment (92 respondents). Lab experiment was carried out where the respondents were given five tasks to be completed in the using the laboratory PC. In addition, walk in experiments have also been carried out at two venues, at the Malaysia Technology Expo 2014 exhibition and at two schools during the SPM results released day.

Result for helpfulness evaluation of YouthPDA prototype is shown in Figure 12.

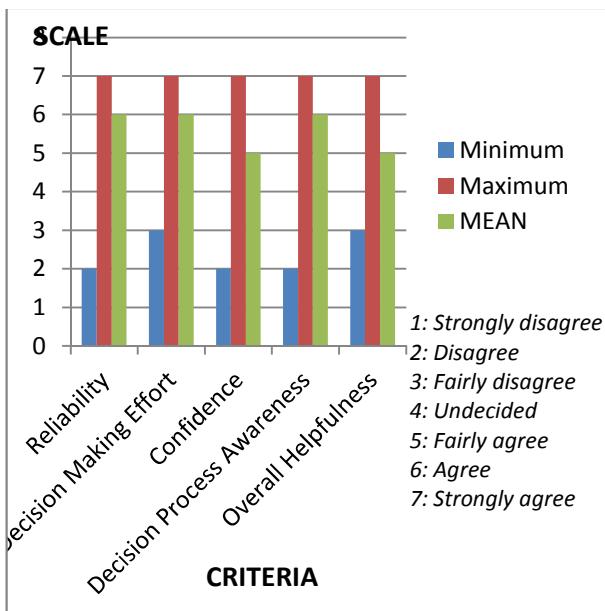


Figure 12. Analysis of YouthPDA helpfulness evaluation

As far as the helpfulness of the prototype is concerned, dimension of reliability, confidence and decision process awareness recorded the lowest score of 2 but with a small number of frequencies. In contrast, all four dimensions recorded the highest score of 7. As a result, this experiment shows a very impressive mean value of overall helpfulness. The mean value for each dimension that is greater than 5 indicated that the YouthPDA is accepted to be a helpful tool for youth in making decision.

Table 1. The result of users' experience towards using YouthPDA

	Use YouthPDA Again		Confer to YouthPDA		Reduce Decision Making Time	
	f	%	f	%	f	%
YES	183	96.8	179	94.7	180	95.2
NO	6	3.2	10	5.3	9	4.8

Table 1 represents the percentage of the three additional items in the instrument. Respondents were inquiring individually and 96.8% of them have interested to use the YouthPDA again in the future. Meanwhile, majority of the respondents (94.7%) agree that decision makers should confer with this kind of application before making decision. Most of the respondents seem satisfied with the use of YouthPDA. In addition 95.2% of them agreed that YouthPDA has shorten the time spent in making study and career decision.

## V. CONCLUSION

YouthPDA is a personalized decision aid that specifically designed for youth to help them choose their study and career path. By integrating data from both Personality Traits and Multiple Intelligences, the aid function as a contextual aware recommender system that work on rule based reasoning. The concept was validated through prototyping method where a series of experiments were carried out to measure the helpfulness of the prototype, which include four dimensions – reliability, decision making effort, confidence, and decision process awareness. The results show a mean value of greater than 5 for all dimensions of helpfulness, which indicated that the decision aid is helpful to the youth in study and career decision making. It is important that the youth gain benefits from a decision aid that considers their personality and intelligence. The decision aid not only meant to support the user to make a choice, but the dynamic of the recommendation is also meant for the youth to learn from it. After all, it is never too much to spend just a few minutes in considering decision now then to regret later.

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