Profile Matching As A Decision-Making Support System In The Fields Of Interest

Heri Purwanto[1], Rikky Wisnu Nugraha[2], Azis Masum[3], Teguh Wiharko[4] , Fahmi Reza Ferdiansyah[5], Rudy Sofian[6], Asep Sukmarian[7]

[1] Information Systems Study Program, Faculty of Engineering, Sangga Buana University YPKP Bandung Indonesia

, Information Systems Study Program, Faculty of Engineering, Widyatama University Bandung Indonesia

[3]Information Systems Study Program Faculty of Information and Computer, Singa Perbangsa Karawang Indonesia

[4] Informatics Engineering Study Program Faculty of Engineering, Sangga Buana University YPKP Bandung Indonesia

[567]Informatics Engineering Study Program Faculty of Engineering Institute of Digital Economy – LPKIA Bandung Indonesia

heri.purwanto@usbypkp.ac.id
rikky.nugraha@widyatama.ac.id

Abstract. Decision support system (DSS) is part of an information system that has benefits in supporting an effective decision-making process, and focuses on a perception-based management system. Understanding DSS is very important for decision-makers. Therefore, the advice of a knowledge-based DSS will be better and the resulting application will cover a wider field. The student's major/interest is very influential in achieving student achievement. The purpose of this study is to help students determine their choice of majors and help the school make recommendations for majors by using a decision support system based on the abilities of the students. The research method used is descriptive qualitative method. Profile Matching as a decision support tool using four criteria, namely the value of Junior High School report card, and Assessment along with student interests and parental suggestions is very suitable to be applied in this research, in accordance with Government Regulation number 74 of 2008. Processing majors in Pasundan 1 Senior High School Bandung have not used the DSS method. After being compared using the profile matching method, it was found a difference of 36% with details: an absolute difference of 7% and a possible difference of 29% which has the same potential/value. It concludes that using the *Profile Matching* method can produce more accurate information in a quick time.

Keywords: Profile Matching, Interest, Major.

1. INTRODUCTION

The global economic era, information-driven economy, and high unemployment rates have put significant pressure on students' decision-making when choosing schools and majors. The pandemic has disrupted the learning process, affecting students' psychology and reducing their skills. The state is responsible for ensuring con-

tinuity of schools for all educational stakeholders. The rising cost of education raises questions about the value of education as a worthwhile investment. In developed countries, around 50% of students are unsure of their major choice, and 75% undergo major changes before graduation. Factors such as lack of information about majors and mismatches in job interests also contribute to major switching. Education is a process of coaching both physically and spiritually, with regulations regulating majors and schools having special regulations. Interest is a key factor in determining majors, as it affects students' efforts and success. Errors in determining majors can lead to decreased quality and academic achievement, impacting higher education selection.

Fig. 1.1 Data error in majoring according to IDF and *its consequences according to* BPS
(Source: [15], accessed on 18/02/2022, at 12.08)

The choice of majors in Indonesia is influenced by factors such as individual characteristics, academic experience, and parental expectations. In 2018, the Ministry of Research and Higher Education reported a student dropout ratio of 4.66% in the engineering field, 3.733% in the economics study group, and 3.595% in the art study group. The lowest dropout rate was 1.30% in Mathematics and Natural Sciences (MIPA) students. Personality can predict career choices and aspirations, and studies have examined the relationship between personality characteristics and academic major choices. However, strict parental control can encourage students to choose uninteresting majors, leading to regret and potential switching. Previous studies have shown a negative relationship between primary choice motivation and academic satisfaction, highlighting the importance of careful academic handling in determining the right direction for each student.
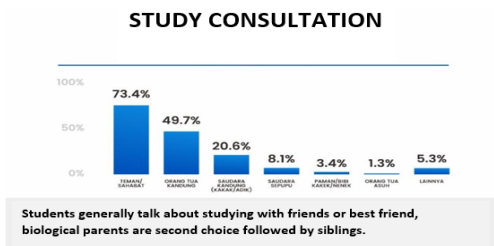

Fig. 1.2 Survey of Student Behavior in the Selection of Education Majors conducted by Aku Pintar and Katadata Insight Center.
(Source, accessed on 07/04/2022, at 15.59)

The study reveals that students are more open to discussing study problems with friends and family than with their parents and siblings. The decision to choose a major can create confusing conditions and perpetuate inequalities based on race, class, and gender. Environmental support, including social support from friends and family, positively affects student satisfaction, especially in early education. Intrinsic motivation is crucial for students, and can be influenced by current environmental conditions and perceived strength barriers. The research at Pasundan 1 Senior High School Bandung found that students' decision-making process is influenced by their orientation and personal transformation. Major guidance and career guidance are closely related, and schools should classify students' interests based on the value of the subject. This study aims to assist students in choosing their majors and assist schools in making recommendations based on their abilities.

2. METHODOLOGY

The method used in this study is a descriptive method, with the type of correlational study the approach used in this research is a qualitative approach with profile matching as a decision support system, it is hoped that by determining the weight of the standard value of the existing criteria by mapping the *GAP* of the resulting value in accordance with problem-solving from existing case studies. *Profile Matching* is the process of comparing the actual data value of a profile to be assessed with the expected profile value, in order to know the difference in competence (GAP). The steps for the *profile matching* method are 1) Determine the data variables needed, 2) Determine the criteria used for assessment,
3) Profile Gap Mapping

$$Gap = ValueAttribut - ValueTarget$$

4) Weighting for each Gap value (difference)

Table 2.1 Weighted Value

GAP	Weighted Value	Information
0	5	Competence as needed
1	4,5	1 level excess competence
-1	4	Competence deficiency 1 level
2	3,5	2 level excess competence
-2	3	Competence deficiency 2 level
3	2,5	3 level excess competence
-3	2	Competence deficiency 3 level
4	1,5	4 level excess competence
-4	1	Competence deficiency 4 level

5) Grouping and calculation of *Core Factor* and *Secondary Factor*,

a. *Core Factor,* which is the most important or most needed criterion of an assessment.

$$NCF = \frac{\Sigma \; NC}{\Sigma \; IC}$$

Information:

NCF : Average value of *core factor*

NC   : Total value of *core factor*

IC   : Number of *core factor* items

b. *Secondary Factor*, which is a supporting criterion as a supporting value / added value of an assessment.

$$NSF = \frac{\Sigma \ NS}{\Sigma \ IS}$$

Information:

NSF : Average value of *secondary factor*

NS   : Total value of *secondary factor*

IS   : Number of *secondary factor* items

6) Total Value Calculation. The total value is obtained from the percentage of *core factors* and *secondary factors* that are estimated to affect the results of each profile.

$$NT = (x)\% * NCF + (x)\% * NSF$$

Information:

NT   : Total score of criteria/variable

NCF   : Average value of *core factor*

NSF   : Average value of *secondary factor*

(x) %   : *Entered* percent value

7) Determination of ranking.

The system analysis and design method used is the *Object Oriented Methodology* with the *Prototype* process model, which is an *iterative* process in system development where *requirements* are changed into a *working system* which is continuously improved through collaboration between users and analysts.
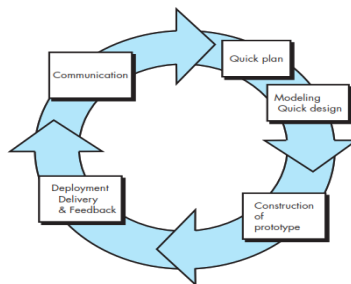

Fig. 2.1 Prototype Method

3. RESULTS AND DISCUSSIO

The software development method used in this research is *Prototype*, with five stages as follows: Communication, Quick Plan, Modeling Quick Design & Construction of prototype, Deployment Delivery & Feedback. Based on this, a research framework was created to solve and describe the concept of these stages.
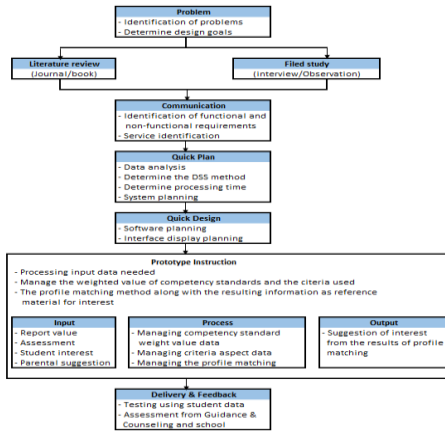
Fig. 3.1 Research framework based on the Prototyping methodology

Based on observations and trials conducted in this study, it was found that there was a match/closeness between the criteria selected by the *Profile Matching* method, namely:

1. In mapping the GAP profile, the value of the *ValueTarget* is usually the ideal/standard value of the desired assessment. However, in this study, the value of ValueTarget is the minimum standard of majors.

Table 3.1 Standard Weighted Value

Criteria	Report Card Value		Assessment Value		Student Interest		Parental Suggestion	
	Natural Science	Social Science	Natural Science	Social Science	Natural Science	Social Science	Natural Science	Social Science
Standard Weighted Value	3	3	3	3	3	3	3	3

2. This study takes the criteria of academic value as the main value (Social and Natural Science scores from the junior high school report card with codes C1, and C2 and from assessment scores with codes C3, and C4) as well as student interest criteria (codes C5, C6) and suggestions/expectations of parents (code C7, C8) as supporting values.

3.

Table 3.2 Weighting Criteria for Main Values

Report Card & Assessment Value	Category	Value
90 - 100	Very good	5
80 - 89	Good	4
60 - 79	Enough	3
50 - 59	Poor	2
< 50	Very poor	1

Table 3.2 Weighting Criteria for Supporting Values

	Category	Value
	Extremely interested	5
	Interested	4
Student Interest & Parental Suggestion	Enough	3
	Slightly interested	2
	Not interested	1

In *Profile Matching* the main value is referred to as the *Core Factor* and the supporting value is the *Secondary Factor*.

Table 3.3 CF & SF for Natural Sciences   Table 3.4 CF & SF for Social Sciences

Natural Science (IPA)

Alternative	CF (70 %)	SF (30 %)
A1	5	4,75
A2	5	4,5
A3	5	3,5
A4	5	4,25
A5	5	5
A6	5	4
A7	5	3,5

Social Science (IPS)

Alternative	CF (70 %)	SF (30 %)
A1	5	4,25
A2	5	4,5
A3	5	4
A4	5	3,75
A5	5	4,25
A6	5	3,5
A7	5	3,5

4. The final stage of *Profile Matching* is doing a ranking to find the best value/result. However, in this study, this was not done, because the decision to be made had 2 (two) options, namely: Social or Natural Science. So in this case, the final Science score obtained will be compared with the final Social Science score, looking for the best value. If the final natural science score and the final social science score are balanced, then it is left like that to be used as data/material for the counselling teacher to conduct interviews. Even from this step, we can find the percentage value of the existing gap, as data/material, for the interview stage by counselling teachers if this is needed.

At the testing stage, *black-box testing* is carried out, which is a software testing method that focuses on the functionality side, especially on the input and output of the application (whether it is in accordance with the expected needs or not). To produce recommendations for majors as follows:

Fig. 3.2 Majoring Recommendations

Fig. 3.3 Details of Majoring Recommendations

The case study at Pasundan 1 Senior High School Bandung reveals that the processing of majors currently does not use the DSS method (old method). The study involved 94 respondents and compared the results of majors' recommendations with the profile matching method (new method). The results showed that the academic value of natural science is higher than social science, with a weighting value of 4. The case study highlights the importance of considering secondary factors in academic evaluations.

Table 3.3 Comparison of the results of the new method with the old method

Total Customers	94	
Total Difference	34	36%
Absolute Difference	7	7%
Possible Difference	27	29%

Found a difference of 36% with details: an absolute difference of 7% and a possible difference of 29%, because it is worth "Social/Natural Science", which has the same potential and means that the student can choose a major in Social or Natural Science. It concludes that using the *Profile Matching* method can produce more accurate information in a fast time.

4.   CONCLUSION

The Decision Support System uses academic scores, assessment scores, student interests, and parental suggestions to recommend majors in junior high school. The Profile Matching method is suitable for determining majors, as it compares natural science values with social science scores. The study found a 7% absolute difference and a possible 29% difference in major recommendations between the two methods. This suggests that the profile matching method can produce accurate information faster, allowing students to choose a major in Social or Natural Science, demonstrating its potential for faster decision-making.

REFERENCES

[1]   F. Atuahene, "An analysis of major and career decision-making difficulties of exploratory college students in a Mid-Atlantic University,".

[2]   W. Wahyudin and H. Purwanto, "Prediksi kasus COVID-19 di Indonesia menggunakan metode backpropagation dan regresi linear,".

[3]   R. H. S. Aji, "Dampak COVID-19 pada pendidikan di indonesia: Sekolah, keterampilan, dan proses pembelajaran,".

[4]   L. S. Shaffer and J. M. Zalewski, "Career advising in a VUCA environment,".

[5]   V. N. Gordon and G. E. Steele, *The undecided college student: An academic and career advising challenge*. books.google.com, 2015.

[6]   J. M. Beggs, J. H. Bantham, and S. Taylor, "Distinguishing the factors influencing college students' choice of major,".

[7]   J. Meyer, K. Leuze, and S. Strauss, "Individual Achievement, Person-Major Fit, or Social Expectations: Why Do Students Switch Majors in German Higher Education?,"

[8]   E. I. Astia Weni Syaputri and Mustakim, "Naïve Bayes Algorithm for Classification of

Student Major's Specialization,".

[9]   R. C. Baker, "Nonlinear unstable systems,".

[10]   V. N. Widowati, *Studi Kasus Tentang Proses Penjurusan Beberapa SMA di Yogyakarta*.

[11]   K. P. Kebudayaan, "Pedoman Peminatan Peserta Didik,.

[12]   P. Ngalim, "Psikologi pendidikan," *Bandung PT. Remaja Rosdakarya*, 1990.

[13]   E. Wicaksana, "Efektifitas Pembelajaran Menggunakan Moodle Terhadap Motivasi Dan Minat Bakat Peserta Didik Di Tengah Pandemi Covid-19,".

[14]   A. S. R. Sofian, *Pelaksanaan Penempatan Siswa dalam Penjurusan di SMA Negeri 4 Bengkulu Selatan.* repository.unp.ac.id, 2020.

[15]   R. Asshiddiqie, "Ingin Wujudkan Mimpi? Kenali Potensimu Lebih Dalam Bersama Youthmanual Premium!,".

[16]   Amiruddin, "Mahasiswa Teknik Paling Banyak Putus Kuliah, Data Kemenristekdikti 2018! Apa Alasan Kuliahnya Berat?,".

[17]   H. Naparin, "Klasifikasi Peminatan Siswa SMA Menggunakan Metode Naive Bayes,"

[18]   J. L. Holland, "Making vocational choices: A theory of vocational personalities and work environments: Psychological Assessment Resources,".

[19]   K. Lee, M. C. Ashton, and C. Novitsky, "Academic majors and HEXACO personality,"

[20]   D. M. Tokar and J. L. Swanson, "Evaluation of the correspondence between Holland′s vocational personality typology and the five-factor model of personality,"

21]   A. Ng, W. Fan, F. M. Cheung, F. T. L. Leong, and ..., "The CPAI-2 as a culturally relevant personality measure in differentiating among academic major groups,".

[22]   M. Clariana, *Personality, procrastimation and cheating in students from different university degree programs.* repositorio.ual.es, 2013.

[23]   F. Lievens, P. Coetsier, F. De Fruyt, and ..., "Medical students' personality characteristics and academic performance: A five-factor model perspective,"

[24]   S. Pu, Y. Yan, and L. Zhang, "Do Peers Affect Undergraduates' Decisions to Switch Majors?,"

[25]   R. Zubaedah, M. Lintang, and N. P. Putra, "Decision Support System for Departemen Selection for Prospective Students using the Naïve Bayes Method and Analytical Hierarchy Process Model at Faculty of …,".

[26]   P. Arcidiacono, "Ability sorting and the returns to college major,"

[27]   P. Arcidiacono, V. J. Hotz, and S. Kang, "Modeling college major choices using elicited measures of expectations and counterfactuals,"

[28]   J. M. G. Cohoon, "Toward improving female retention in the computer science major,"

[29]   S. Davies and N. Guppy, "Fields of study, college selectivity, and student inequalities in higher education,"

[30]   E. P. Bettinger and B. T. Long, "Does cheaper mean better? The impact of using adjunct instructors on student outcomes,".