JITE (Journal of Informatics and Telecommunication Engineering)

Development of Engineering Vocational Choice Systems in Higher Education

Elsa Sabrina1)*, Muhammad Anwar2), Hansi Effendi3) & Resmi Darni4)

1,2,3,4) Technology and Vocational Education Study Program, Universitas Negeri Padang, Indonesia

*Coresponding Email: elsasabrina40@gmail.com

Abstrak

Tingginya angka pengangguran menjadi tantangan bagi dunia pendidikan karena tidak semua lulusannya berhasil masuk ke dunia kerja. Perguruan Tinggi sebagai salah satu penyumbang angka terbesar pengangguran yang ada di Indonesia. Begitu juga dengan tujuan dari pendidikan vokasi yang diharapkan dapat langsung bekerja maupun menciptakan lapangan kerja. Permasalahannya adalah tidak semua mengambil jurusan sesuai dengan tipe kepribadian. Oleh karena itu, peneliti akan mengembangkan sebuah sistem bertujuan untuk merekomendasikan jurusan pada pendidikan tinggi berdasarkan tipe kepribadian. Metode yang digunakan yaitu metode Research and Development (R&D) menggunakan model Four D (4 D) a. Tahap pendefinisian (Define); b) Tahap Perancangan (Design); c) Tahap Pengembangan (Develop); d) Tahap Penyebaran (Disseminate). Penelitian ini hanya dilakukan sampai batas pengembangan dan menghasilkan sebuah sistem yang valid untuk diimplementasikan berdasarkan penilaian validator. Instrument pengumpulan data terdiri dari lembar validasi ahli produk dan kebahasaan. Penelitian ini menunjukkan bahwa hasil validasi memiliki persentase rata-rata penilaian sebesar 92,5 % dengan kategori valid. Berdasarkan hasil penelitian dan pembahasan dapat disimpulkan bahwa sistem sudah valid untuk digunakan sebagai rujukan dalam pemilihan jurusan.

Kata Kunci: Pilihan Kejuruan Bidang Keteknikan, Tipe Kepribadian, Metode Research and Development (R&D).

Abstract

The high unemployment rate is a challenge for the world of education because not all graduates succeed in entering the world of work. Higher education is one of the largest contributors to unemployment in Indonesia. Likewise with the objectives of vocational education which are expected to be able to immediately work and create jobs. The problem is that not all majors are according to personality type. Therefore, researchers will develop a system aimed at recommending majors in higher education based on personality types. The method used is the Research and Development (R&D) method using the Four D (4 D) model a. Defining stage (Define); b) Design Stage (Design); c) Development Stage (Develop); d) Stage of Spread (Disseminate). This research was only carried out to the extent of development and resulted in a valid system to be implemented based on the validator's assessment. The data collection instrument consisted of product and linguistic expert validation sheets. This study shows that the validation results have an average percentage of 92.5% with a valid category. Based on the results of the research and discussion, it can be concluded that the system is valid to be used as a reference in selecting majors

Keywords: Vocational Choices in Engineering, Personality Types, Research and Development (R&D) Methods.

I.   INTRODUCTION

The superior quality of human resources in a country is a reflection of the progress of that country. Based on a report from the World Economic Forum (WEF) Indonesia's global competitiveness index is ranked 50 out of 141 countries in 2019 (Hafizuddin & Che, 2016). Meanwhile, in ASEAN, Indonesia is in fourth place after Singapore which managed to rank first in global competitiveness, Malaysia (27th) and Thailand (40th). This was also conveyed by Hafizuddin & Che (2016) Indonesia is still lagging behind in almost all components of competitiveness such as innovation capability, business dynamics skills and

others, except for components of macroeconomic stability and economic size. The low level of competitiveness causes high unemployment in Indonesia. This can be seen in the BPS report which noted that the number of unemployed in Indonesia reached 11.53 million people, while the open unemployment rate for PT graduates was 39.69% or educated unemployed (Badan Pusat Statistik, 2022).
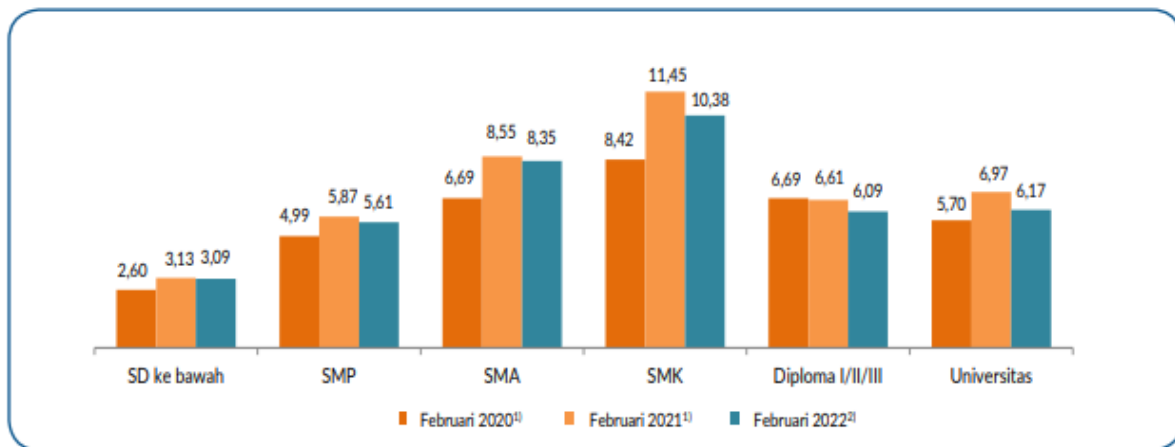

Figure 1. Unemployment Rate
Source : Badan Pusat Statistik, 2022

This relatively high unemployment rate is a challenge for the world of education because not all graduates succeed in entering the world of work (Handayani et al., 2015). Universities, as one of the largest contributors to unemployment in Indonesia, must assist the government in reducing this number (Sparrow et al., 2020). Higher education is one of the main pillars that is expected to transform the nation (Sudarmaji et al., 2021). Likewise with the goals of vocational education. However, vocational education is included in the realm of applied science (Eichhorst et al., 2015), not in a theoretical setting, which aims to produce certain "experts" who are capable of carrying out certain jobs in a professional manner (Hoang Tien GAIE et al., 2020).

Vocational college graduates are expected to be able to work immediately, both working in companies and creating jobs (Masykar, 2019). The use of strategies in education is very necessary because it will facilitate the educational process so as to achieve optimal results (Hia, 2013). Efforts to minimize the problem of 'skill mismatch' require a mechanism that links the education curriculum in schools with what is expected according to the competency demands of the world of work (Amalianita & Putri, 2019). Efforts to overcome the problem of 'skill mismatch' are by conducting job training centers for students (Amani, 2017). However, the problem is that not all majors are according to their personality type.

Holland's theory argues that traits are important factors in individual career choices and development (Hartmann et al., 2021). Holland's Hexagon states that the RIASEC area is hexagonal based on the relationship between one type and another (Schinka et al., 2010). Individuals must be in the scope of education that matches their personality type (Lalima & Lata Dangwal, 2017) because this will affect the level of satisfaction with the chosen major. Based on this background, to assist students in determining majors, the researchers conducted a study entitled "Development of a Vocational Choice System in Engineering in Higher Education".

One of the studies ever conducted by (Novita et al., 2018) which aims to develop an expert system application to provide an overview of the interests that students have in choosing majors. The same was also investigated by (Hidayat & Wahyuni, 2019) and (Effendi & Nurcahyo, 2020) which examines how to identify student abilities in the vocational field. However, research only focuses on aspects of student interest without considering all aspects that will influence the student's decision. The update in this research is to provide a personality description that will assist students in making vocational selection decisions in this vocational field. Thus, students can consider all aspects other than interest in choosing the major.

II. RESEARCH METHODS

The method used in this study is a type of research and development (R&D), which is a research method used to produce certain products, and test the effectiveness of these products. This research procedure adapts the 4D development model, which is a development model consisting of four stages consisting of (1) Define, (2) Design, (3) Develop and (4) Disseminate. The validity test of the vocational choice system was carried out by competent validators, namely media expert validators and linguist validators. Furthermore, the validator was asked to provide a general assessment and suggestions for the vocational choice system being developed, whether the vocational choice system that had been made could be said to be valid or invalid. The data analysis technique used in this study is descriptive analysis, namely by calculating the percentage of validation results.

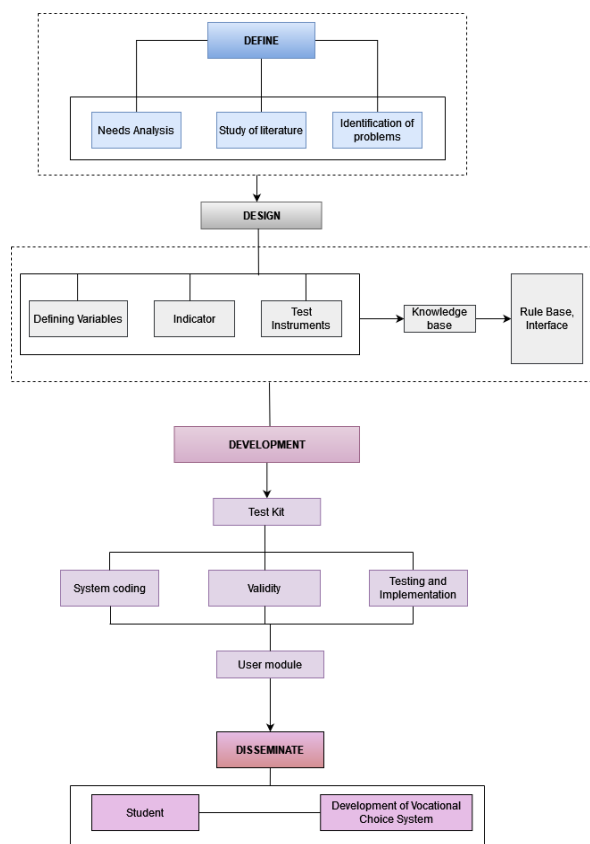$$Percentage = \frac{Obtained\ Score}{Maximum\ Score} \ x\ 100\%$$

(1)

Figure 2. Development Stage of the Vocational Choice System Using the 4D Model

The feasibility level of product development research results is identified with the presentation score. The greater the presentation of the score on the results of data analysis, the better the feasibility level of the research and development product. Criteria for making decisions in validating the vocational choice system can be seen in table 1.

Table 1. System Eligibility Criteria

No	Percentage	Category
1	80% - 100%	Valid
2	60 % - 79,99%	Valid Enough
3	50% - 59,99%	Less Valid
4	0 – 49,99%	Invalid

(Rasyid et al., 2016)

III. RESULTS AND DISCUSSION

The product resulting from this development research is a web-based vocational choice system. This vocational choice system product was created and designed by the researchers themselves, with the aim that it can be used as a student tool to determine majors in higher education based on personality types. The development of this vocational choice system uses a 4D design model. The Four-D model goes through four stages of media development (Anwar & Sabrina, 2020), namely: a) Define; b) Design; c) Develop; d) Disseminate. Research on the development of the four D (4D) model was carried out only up to the Development stage, because the purpose of this research was only limited to developing and producing a valid vocational choice system to be implemented based on the validator's assessment. The stages of development research are explained as follows:

a. **Defining Stage**, aims to determine and define all the requirements needed when making the system (Elsa Sabrina, Dedy Irfan, 2020). Determination of these conditions is done by considering and adjusting the needs of users. This stage is divided into several steps viz:

1. Preliminary analysis is carried out to find out the basic problems in the development of the vocational choice system. At this stage facts and alternative solutions are raised to make it easier to determine the initial steps in system development.

2. Needs Analysis is an analysis carried out to determine the needs or conditions that must be met in a new product or product change, which takes into account the various needs that intersect among various stakeholders. The needs of the results of this analysis must be implemented, measured, tested.

3. Student analysis is carried out at the beginning of planning by observing the characteristics of each participant. This analysis was carried out by considering the characteristics, abilities, and experiences of students, both as a group and individually.

4. Concept analysis aims to determine the construct and content of the instrument based on personality theories obtained through literature studies.

5. Objective analysis is carried out to determine indicators of achievement of system development and to measure the effectiveness of the product being developed

b. **The design stage**, the purpose of the design stage is to design a system device (Sabrina, Dony, et al., 2022) with the following stages: 1) personality instrument design; 2) design of knowledge base system; 3) media selection; 4) interface design. At this interface design stage, the following results are obtained:
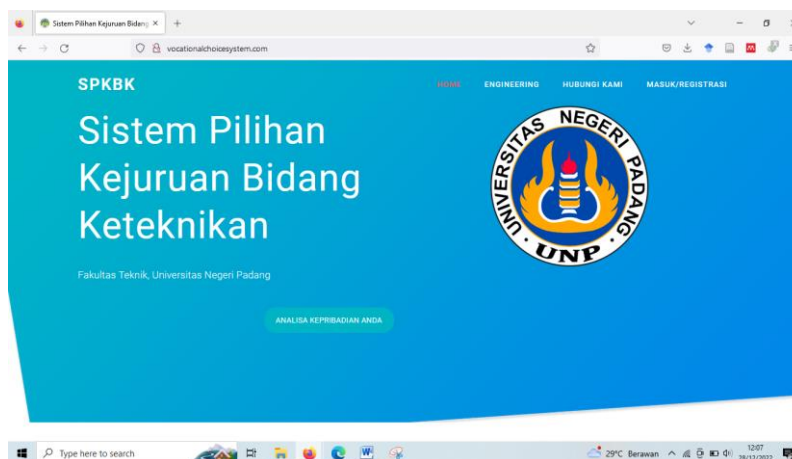

Figure 3. System Start Page

In figure 3, the initial page of this system has several menus such as the login or registration page and the admin contact menu.
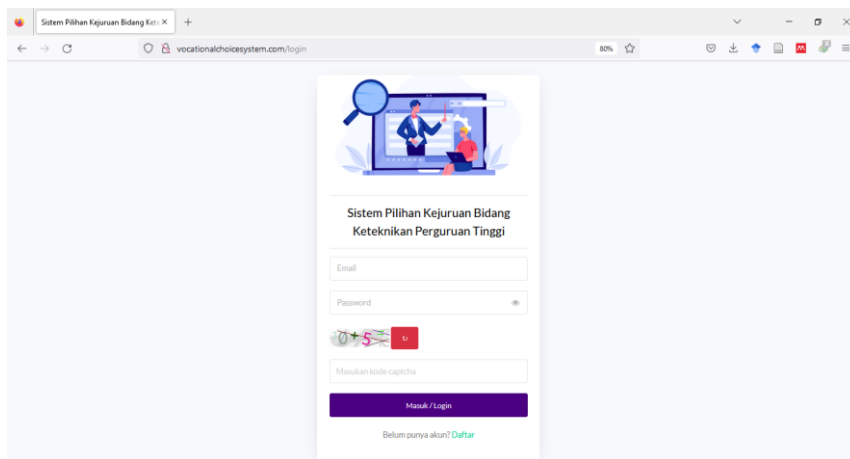
Figure 4. User Login Page

Figure 4 is the display of the login page for user access. Before accessing the system the user must log in first, enter the username, password and enter catpcha then click the login button. If the username, password and captcha are correct, the system will display the user's main page.
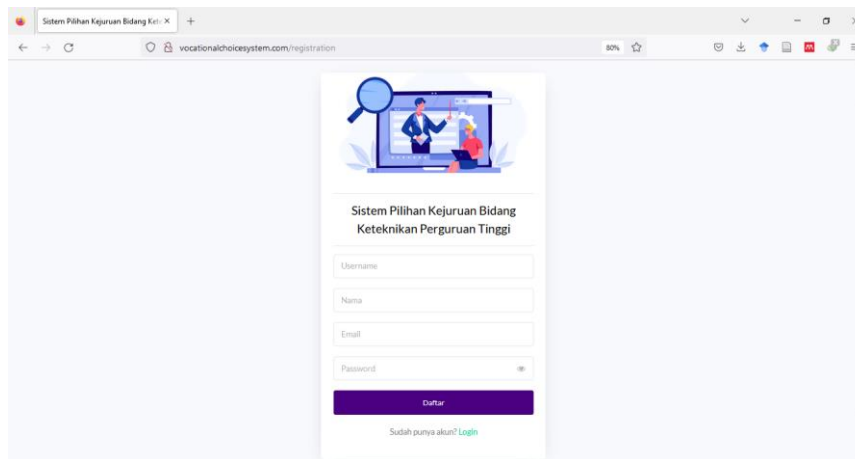

Figure 5. Registration page

Figure 5 The user enters the username, email and password to create an account on the system then click register. After that please return to the login page.
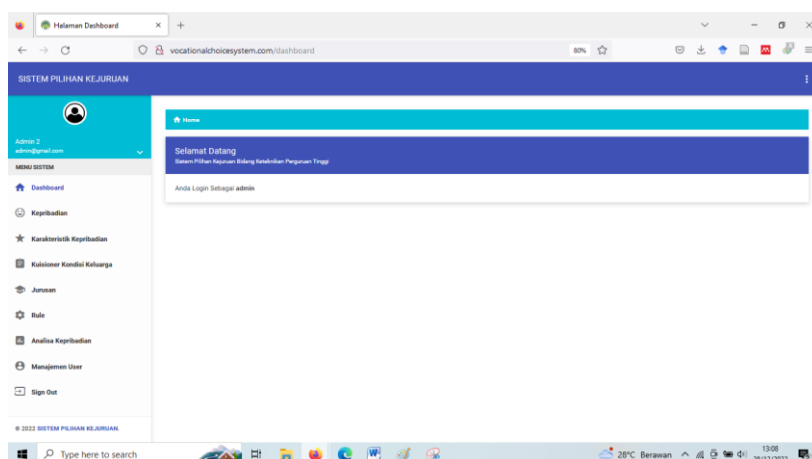

Figure 6. Admin Main Page

In Figure 6, there is the admin main page which has several menus that can be accessed by the admin including: user management, personality characteristics, family condition questionnaire, majors and rules.
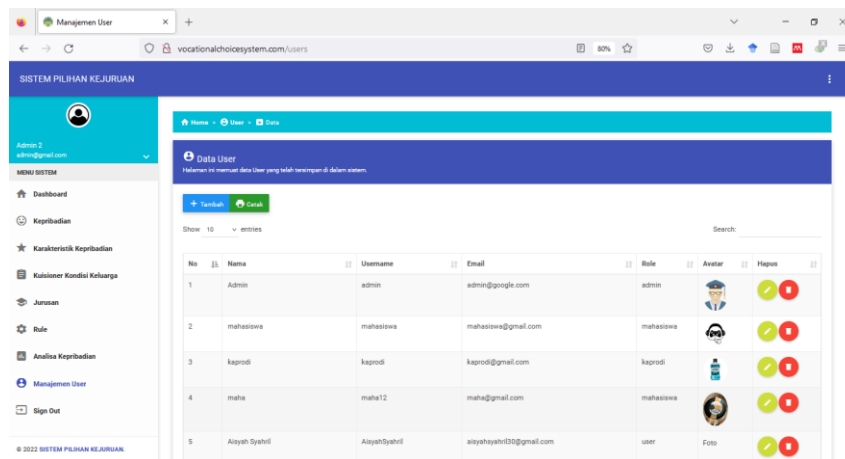
Figure 7. User Management Page

In Figure 7, is a page for managing users who use the system. On this page the admin can create, update, print and delete the user data.
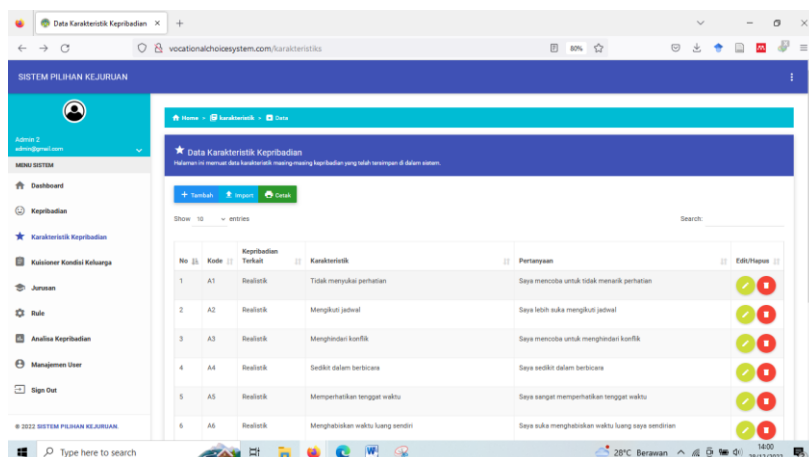

Figure 8. Personality Characteristics Questionnaire Page

In figure 8, is a page for managing questions that will be answered by students related to personality. On this page the admin can create, update, print and delete the question data.
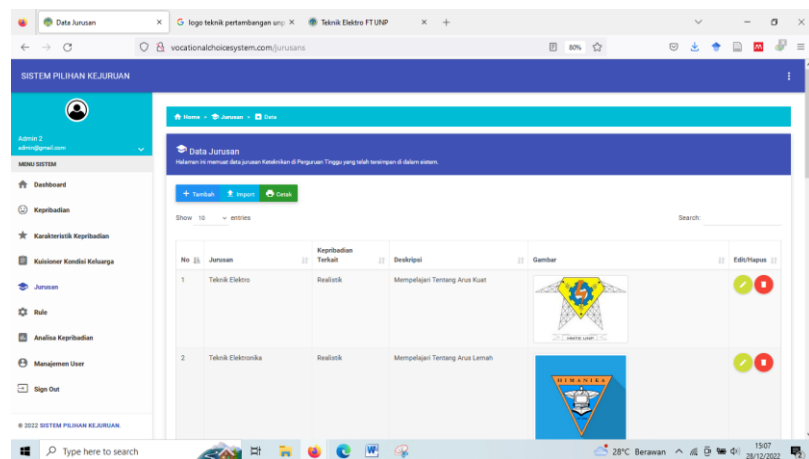

Figure 9. List of Majors in the System

In figure 9, is a page for managing majors that will be chosen by students, especially in the field of engineering. On this page the admin can create, update, print and delete data for the department.
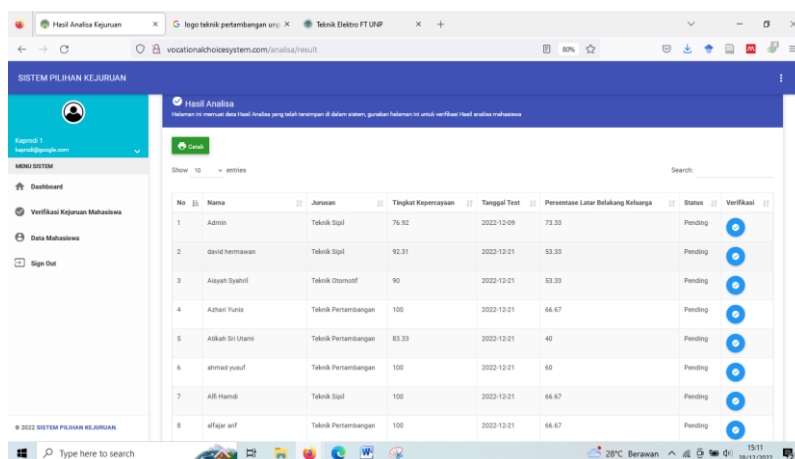
Figure 10. Vocational Verification Page

In figure 10, the lecturer gets access rights to the vocational verification page. This page serves to verify the majors that have been chosen by students.

c. **Development stage**, the stage when the product is ready to be worked on and developed into a system that can be tested and used where it will be studied (Sabrina, Giatman, et al., 2022). At this development stage, the validity of the product is tested by the validator with the following results:

Table 2. Product Expert Validation Results

No	Aspect	Persentage
1	Design Aspect	94%
2	Operational Aspect	90%
3	Benefits Aspect	85%

Based on the results of the product expert validation analysis regarding the vocational choice system that was developed to produce a percentage of 90%. Things that are assessed include appearance, color selection, button functions, output from menus, and also ease of access to program processing and system use. Suggestions from the validator are that this application is good, but pay attention to the font size again. Meanwhile, the results of language validation can be seen in table 3 below.

Table 3. Linguist Validation Results

No	Aspect	Persentage
1	Aspects of Language Use	92%
2	Language Accuracy Aspect	98%
3	Readability and Communicative Aspects	95%

Based on the results of the validation analysis of linguists regarding the vocational choice system that was developed to produce a percentage of 95%. Things that are assessed include the accuracy of language structure, spelling accuracy, accuracy of using language rules and readability of the message conveyed.

This research resulted in a vocational choice system in the field of engineering. This system uses procedural stages based on needs analyzes so that the problems involved in predicting student personality are known. Based on the stages of research and development procedures that have resulted in the engineering vocational choice system, it can be concluded that the existence of this engineering vocational choice system will assist students in making decisions to choose majors based on personality type. This can be proven by the validity of the system which has been assessed by the validator with an average value of 92.5%. The limitation of this research is that it is only carried out to the extent of developing and producing a valid vocational choice system that is ready to be implemented.

IV. CONCLUSION

From the results of the research conducted, it can be concluded that the vocational choice system in the field of engineering in higher education has been successfully created. This vocational choice system is included in the very good category as a system that is in accordance with the tests carried out. Based on the collection of data validation that has been carried out by the assessor (validator) obtained an average proportion value of 92.5% with a valid category. So the vocational choice system in engineering in higher education is stated to be valid for use as a reference in directing majors based on personality type in higher education.

V. ACKNOWLEDGMENTS

REFERENCES

Amalianita, B., & Putri, Y. E. (2019). Perspektif Holland Theory serta Aplikasinya dalam Bimbingan dan Konseling Karir. JRTI (Jurnal Riset Tindakan Indonesia), 4(2), 63–70. https://doi.org/10.29210/3003490000

Amani, J. (2017). Prevalence of, and Factors Associated with, Unemployment among Graduates: Evidence from Tanzania. Africa Education Review, 14(3–4), 230–244. https://doi.org/10.1080/18146627.2017.1300064

Anwar, M., & Sabrina, E. (2020). Design of decision support system in determining the single student tuition fee in higher education. COUNS-EDU: The International Journal of Counseling and Education, 5(4), 185. https://doi.org/10.23916/0020200531440

Badan Pusat Statistik. (2022). BRSbrsInd-20220509104634. 34.

Effendi, I., & Nurcahyo, G. W. (2020). Sistem Pakar Menggunakan Metode Forward Chaining dalam Identifikasi Kemampuan Siswa Terhadap Bidang Vokasi Pada Sekolah Menengah Kejuruan. Jurnal Informasi Dan Teknologi, 3, 9–12. https://doi.org/10.37034/jidt.v3i1.83

Eichhorst, W., Rodríguez-Planas, N., Schmidl, R., & Zimermann, K. F. (2015). A road map to vocational education and training in industrialized countries. Industrial and Labor Relations Review, 68(2), 314–337. https://doi.org/10.1177/0019793914564963

Elsa Sabrina, Dedy Irfan, A. H. (2020). Development of E-Office Information System in Administration Faculty of Engineering, State University of Padang. Jurnal Paedagogy: Jurnal Penelitian Dan Pengembangan Pendidikan, 7(4), 281–288. https://e-journal.undikma.ac.id/index.php/pedagogy

Hafizuddin, M., & Che, B. (2016). Perkembangan Indeks Daya Saing Global: Indonesia. 25(3), 1–23.

Handayani, T., Penelitian, P., Lipi, K., & Penulis, K. (2015). Relevansi Lulusan Perguruan Tinggi Di Indonesia Dengan Kebutuhan Tenaga Kerja Di Era Global (the Relevance of Graduates of Higher Education in Indonesia With the Requirements of Labor in the Global Era). Jurnal Kependudukan Indonesia |, 10(1), 53–64.

Hartmann, F., Heine, J.-H., & Ertl, B. (2021). Concepts and Coefficients Based on John L. Holland's Theory of Vocational Choice—Examining the R Package holland. Psych, 3(4), 728–750. https://doi.org/10.3390/psych3040047

Hia, Y. D. (2013). Strategi dan Kebijakan Pemerintah Dalam Menanggulangi Pengangguran. Jurnal Program Studi Pendidikan Ekonomi STKIP PGRI Sumatera Barat, 1(2), 77–82.

Hidayat, F. K., & Wahyuni, S. N. (2019). Pendeteksian Minat Dan Bakat Menggunakan Metode Riasec. Indonesian Journal of Business Intelligence (IJUBI), 2(1), 32. https://doi.org/10.21927/ijubi.v2i1.1023

Hoang Tien GAIE, N., Hoang Tien, N., Paul Dana, L., Jiminez Santural Jose, R., Thanh Vu, N., & Thanh Hung, N. (2020). Human resource development strategy of Ton Duc Thang University to improve its position on the international rankings E-learning, E-government, E-business View project gender research

View project Human resource development strategy of Ton Duc Thang Unive. International Journal of Advanced Education and Research International Journal of Advanced Education and Research Www.Alleducationjournal.Com, 5(July). https://www.researchgate.net/publication/342623825

Lalima, D., & Lata Dangwal, K. (2017). Blended Learning: An Innovative Approach. Universal Journal of Educational Research, 5(1), 129–136. https://doi.org/10.13189/ujer.2017.050116

Masykar, T. (2019). Analisa Kebutuhan English for Specific Purpose untuk Pendidikan Vokasi. VOCATECH: Vocational Education and Technology Journal, 1(1). https://doi.org/10.38038/vocatech.v1i0.9

Novita, R., Azis, S., Sains, F., & Teknik, F. (2018). Sistem Pakar Untuk Menentukan Minat Siswa Bidang Vokasi. November, 1–9.

Rasyid, M., Azis, A. A., & Saleh, A. R. (2016). Pengembangan Media Pembelajaran Berbasis Multimedia. Jurnal Pendidikan Biologi, 7, 69–80.

Sabrina, E., Dony, N., Herayono, A., & Firdaus. (2022). Development of Camera and Lens Recognition Learning Media Based on Augmented Reality. Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran, 8(1), 1–9.

Sabrina, E., Giatman, M., & Ernawati. (2022). Development of curriculum management in the world of education. Fair Value: Jurnal Ilmiah Akuntansi Dan Keuangan, 4(10), 4691–4696. https://doi.org/10.32670/fairvalue.v4i10.1741

Schinka, J. A., Dye, D. A., & Curtiss, G. (20010). Correspondence Between Five-Factor and RIASEC Models of Personality. Language and Learning Across the Disciplines, 6(3), 54–60. https://doi.org/10.37514/lld-j.2003.6.3.08

Sparrow, R., Dartanto, T., & Hartwig, R. (2020). Indonesia Under the New Normal: Challenges and the Way Ahead. Bulletin of Indonesian Economic Studies, 56(3), 269–299. https://doi.org/10.1080/00074918.2020.1854079

Sudarmaji, H., Prasojo, G. L., Rubiono, G., & Arif, R. (2021). Pendidikan Vokasi Aviasi : Peluang dan Tantangan. Jurnal Aviasi Indonesia, 1(1), 1–6. http://ejournal.icpa-banyuwangi.ac.id/index.php/skyhawk/article/view/1