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Application of Scholastic Test Using Computer Based Tests

Wayan Eka Paramartha [1*)], I Ketut Dharsana[2]
[12]Universitas Pendidikan Ganesha
*Corresponding author, e-mail: eka.paramartha@undiksha.ac.id

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Abstract: The purpose of this study was to find a practical procedure in applying the CBT-based Scholastic Talent Test (Computer Based Test) at SMK Negeri 2 Singaraja. The method of this research is development research, namely the development of computer-based tests. There are three stages in this research, namely the preparation of a computer system, test calibration and utilization on a limited scale. The benefit of this research is that it can be used as an alternative to giving Talent Tests by the Guidance Counseling Teacher in providing talent-interest counseling services at the School. Then the use of computers as a substitute for tests that use paper and pencil becomes more efficient and effective.

Keywords: Scholastic Talent Test, CBT (Computer Based Test), Counseling Guidance.

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Introduction

Today in the field of education, information technology has been used to support administrative services, the learning process, re-registration, libraries, access to grades, quick and easy reference searches, research processes, tuition payments, even for selection of new admissions. The existence of technology has made the education sector easier, more effective and efficient. In developed countries the application of technology has been going on for a long time. And the application of information technology in the learning process has changed the learning model and pattern in their education. There are many learning systems that use computer aids, one of which is a learning application that refers to multimedia-based and Web-based (Internet) technology (Elmabaredy, 2020).

Computer-Based Instruction (CBI) is a form of computer application that is applied in the learning process (Butcher, 2016). Initially, the application of popular Computer-Based Education used Computer-Assisted Instruction (CAI), Computer-Assisted Learning (CAL), Computer-Managed Instruction (CMI), and Computer-Assisted Guidance programs (Parmar, 2018). Likewise, the learning evaluation system, especially the testing system, can also take advantage of information technology, namely conducting a Computer Based Test (CBT) or computer-based evaluation / test. Students can do the test from different places, either on the internet network or on the intranet network in an organization. Computer Based Test can be used as a means of evaluating learning. In some schools, the evaluation of learning, both daily tests or school exams, still uses manual methods, namely paper and pencil. This method is considered inefficient and practical, including in terms of the cost of providing material for questions and examinations. With the learning evaluation model utilizing information technology, the learning evaluation system will be more effective and efficient and able to carry out evaluations quickly, precisely and facilitate the measurement and assessment itself. It is hoped that all the obstacles encountered when running the manual method can be minimized or even eliminated. The advantages of using the application of the CBT model include (Van Bronswijk, 2020) : (1) The test results can be known immediately and quickly as soon as the participant has finished taking the test (time saving). (2) There is no need for a special team to correct questions because the system will immediately correct and calculate the number of right and wrong questions (saving energy). (3) No need to duplicate question papers and answer sheets to be distributed to test takers (cost-effective). (4) Can build a question bank The development of computer-based tests has recently become a trend in several agencies including government agencies. One of them is in the recruitment of civil servant candidates (CPNS). The government carries out a selection or test using computer media, which is called a computer assessment test (CAT). In the future, the CAT system will be applied in the acceptance of CPNS, because the system is considered more efficient and practical (Kurniawan, 2020). So as a test for developing a computer based test (CBT), the researcher developed it on the Scholastic Talent Test, the researcher developed it in the Practical Assessment Technique Test course where the researcher taught 1 class in the Counseling Guidance Study Program. Based on the explanation above, the researcher views the need for a test model development with a Computer Based Test (CBT). The reasons the authors reviewed this were: 1) In an effort to find new breakthroughs regarding a more efficient and effective learning evaluation system, 2) The test system at SMK Negeri 2 Singaraja still used paper and pencil.

Method

The population in this study were students of class X SMK Negeri 2 Singaraja. The sampling of this research was 20 students on a limited scale utilization, namely the Scholastic Talent Test. The sampling technique used random sampling. This research is a development research to produce a CBT-based Scholastic Talent Test model. The data obtained in this study are those related to: Calibration Result Data and Utilization Data on a limited scale. The development procedure in this study consisted of several stages, namely (1) the identification stage of the Scholastic Talent Test and literature study. (2) The stage of compiling the questions and question bank according to the indicators of the competency field to be used. The reference source for the test is Prof.'s Scholastic Talent Test Instrument. Dr. I Ketut Dharsana, M.Pd., Kons. Preparation of questions is required before they are applied to a computer system. (3) Stage of creating a CBT program After preparing the questions, the next step is making a CBT program using easy quiz software. (4) CBT Implementation Stage The final stage of developing this model is the calibration carried out on the final level test takers who will take the test. This calibration is needed to see the quality of the questions, whether the questions are standard or not.

The scholastic test that is built is that students take a verbal and numerical aptitude test then produce a report in the form of a psychologist's examination which is a combination of the results of the verbal and numerical aptitude tests. For this scholastic test using a multiple-choice model. Multiple choice test is a test where each item has more than one number of alternative answers. Usually there are two to five alternative answers that are presented and the number of alternative answers should not be too much because it will be very confusing and also very difficult for the preparation of items. This Scholastic test uses scoring without correction. This test contains 20 questions with 5 answer choices and one of the correct answers. Uncorrected scanning, namely scoring in a way that each item is answered correctly gets a value of one (depending on the weight of the item), so that the total score obtained by students is by counting the number of items that were answered correctly.

Based on this model, to get the score for each sub-aspect (verbal / numeric), the formula for the 1st equation can be used as follows:

$\mathbf{N}_{SA} = \mathbf{Q} - \mathbf{S}$ …. (1)

Information:

$\mathbf{N}_{SA}$ = Sum of sub-aspect values

Q = Number of items

S = The number of questions answered incorrectly

Database Design

In Figure 01 are the tables needed to build a scholastic test prototype:

a) Participants table to store data from test takers.

b) Login table for access to the system using a username and password.

c) Test Tables to store test implementation data.

d) Tables of interest and cognitive exams to store answers from participants.

e) Tables of interest and cognitive questions to store questions from the psychological test.

f) Aspect table to store the types / types of aspects of cognitive problems.

g) Section table for storing the types / types of sub-aspects of cognitive problems.

h) Interest table to store the types / types of aspects of interest questions.

i) A majors table to store the criteria for a department.

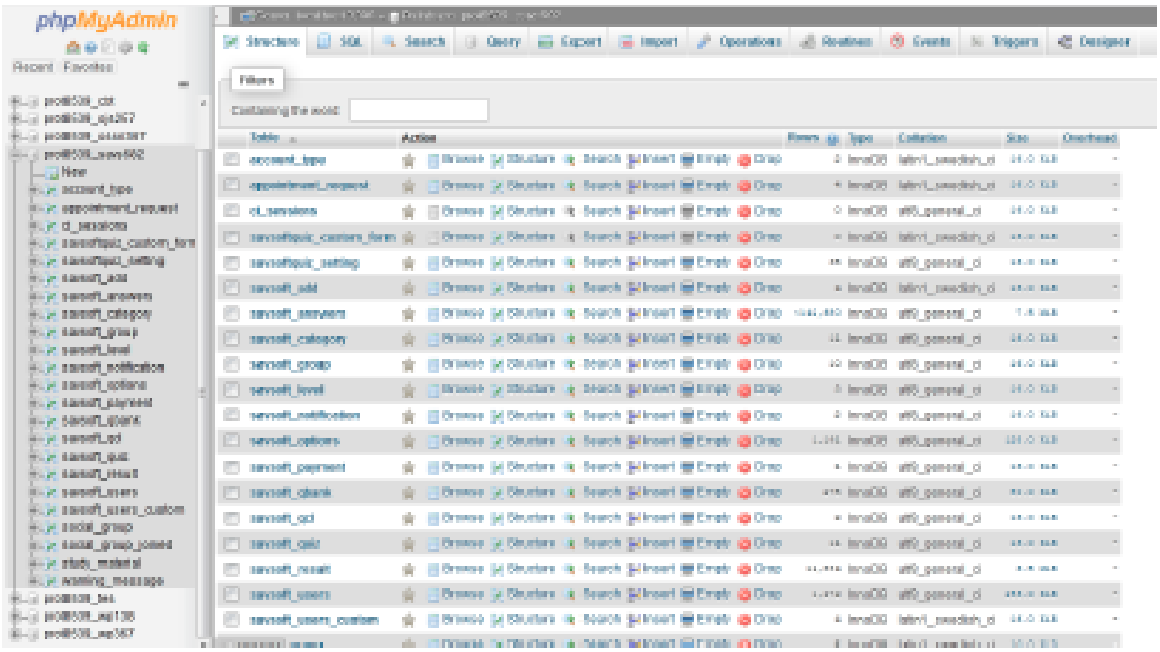

Figure 01. Scholastic Test Database
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Result and Discussion

The aim of this research is to find practical procedures in applying CBT-based Scholastic Talent Test (Computer Based Test) at SMK Negeri 2 Singaraja. Based on the results of the needs analysis that the researchers conducted, it was found that a conventional approach was still used in schools in giving tests, in particular giving Psychological tests which still used book-shaped questions and answer sheets that were duplicated as many as students who took the test along with other writing tools such as pencils and black markers. So, this shows a lack of efficiency in the activity of giving Psycho Tests. Especially like the current conditions during the Corona pandemic (Covid-19), schools are required to carry out activities in accordance with the health protocol recommended by the government. Therefore, the researcher tries to use the Computer Based Test System which has been through the feasibility test for use in administering the Scholastic Talent Test. There are advantages to giving tests through the CBT system, including: allowing the test to be done at the right time for participants, reducing time for test assessment work and making written reports, eliminating logistical work such as distributing, storing and paper tests.

The CBT system that researchers use is Online PTPK which researchers have designed in the mobile android and PC versions. The PTPK Online application has been registered and verified on the Google Play Store which can be downloaded by test takers at:

https://play.google.com/store/apps/details?id=com.wPTPKOnline_11774978

Or you can type PTPK Online in the google play store application search field.

Figure 02. Online PTPK CBT system which can be downloaded on the google play store
Figure with permission ©Paramartha, Wayan Eka. 2020

User Interface Design

The prototype system created is based on functional requirements. Here are some user interface pages that have been designed.

1. Participant page (Admin)

Figure 03 is a page containing a list of participants (students) along with 3 functions (actions), namely the left side for resetting the login in the form of changing passwords, the middle action is to edit participant data, and the right action is to delete participant data.

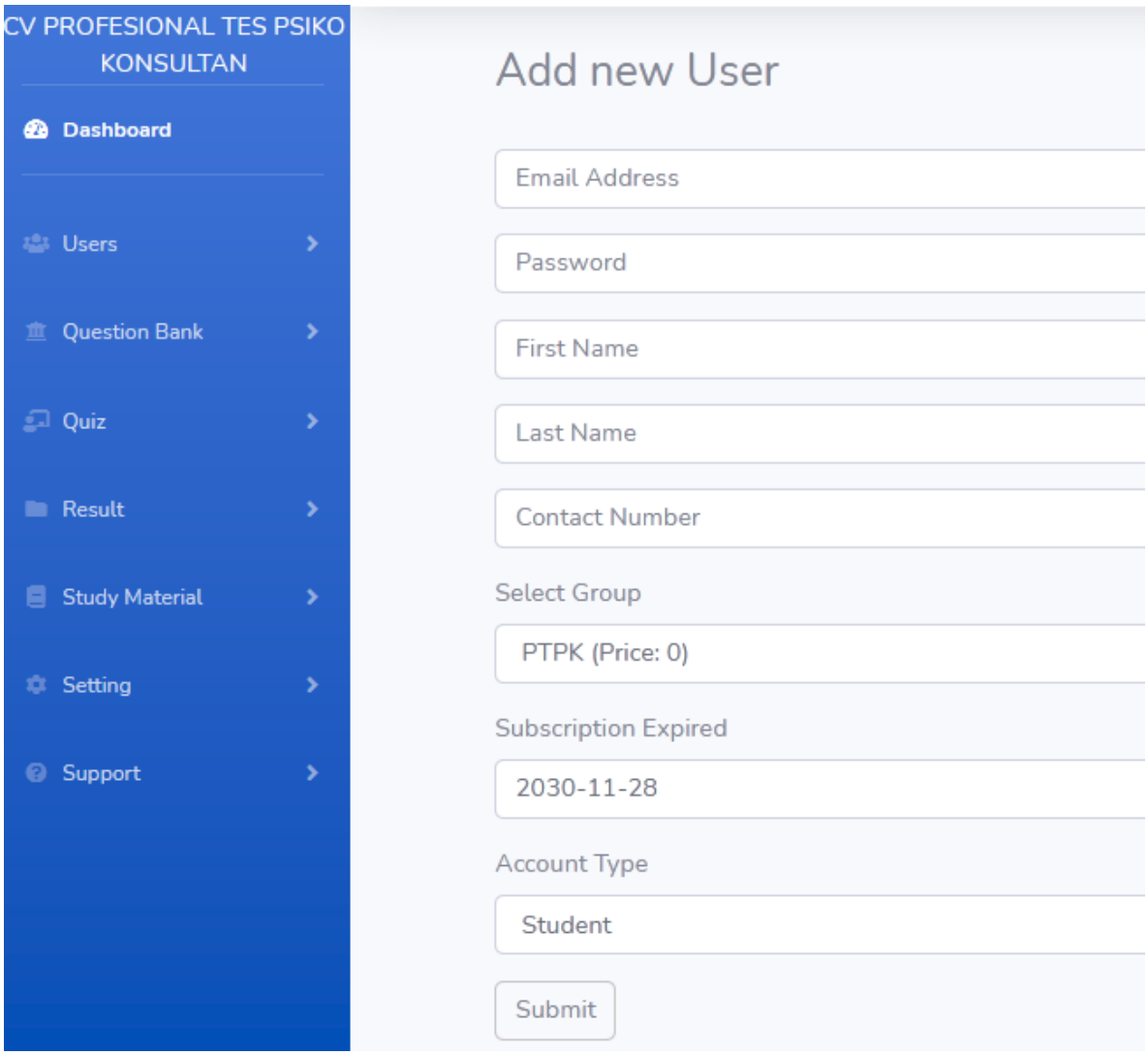


Figure 03. Participant List Page
Figure with permission ©Paramartha, Wayan Eka. 2020

2. Participant Test Process List Page (Admin)

Figure 04 is a page to list the participant (student) test process with additional information on the status of the test. If you have not done or are currently doing, a status of "NOT DONE" will appear, when you have finished working, a "RESULT" status will appear in the form of a link to the Psychological Examination Results (Report on Results).

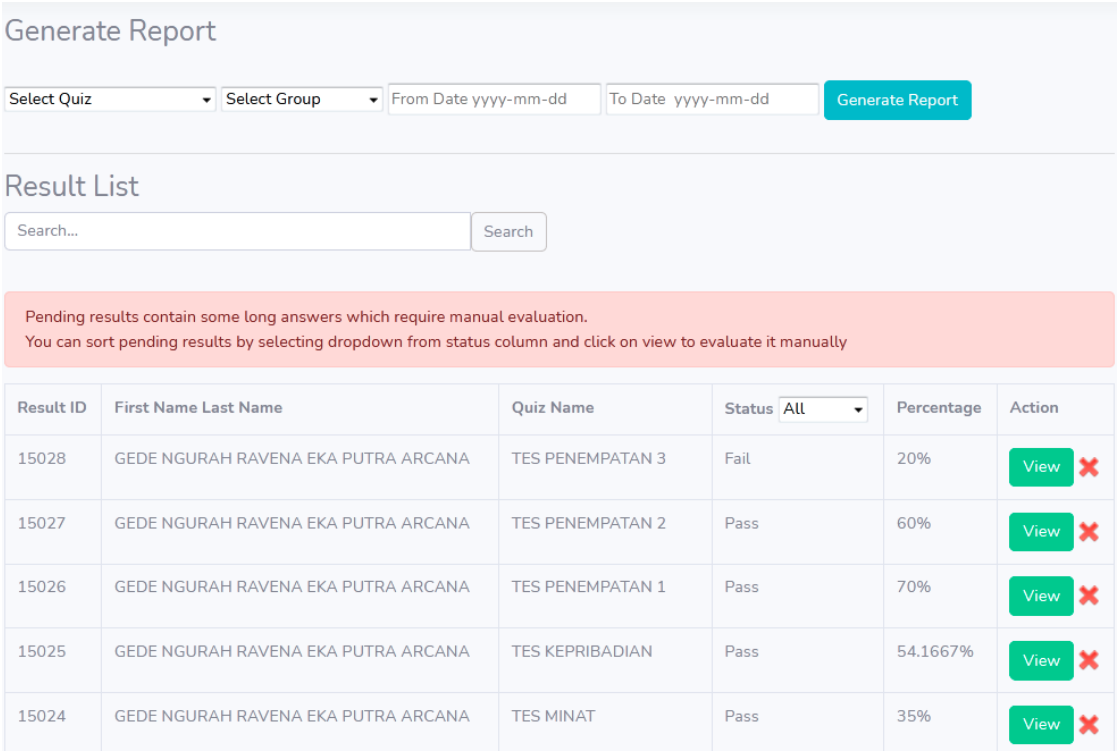


Figure 4. List of Participant Test Process Pages
Figure with permission ©Paramartha, Wayan Eka. 2020

3. Test Page (Student)

Figure 5 is a page to load the student test process. Choice of answers using radio buttons and given a time limit for processing

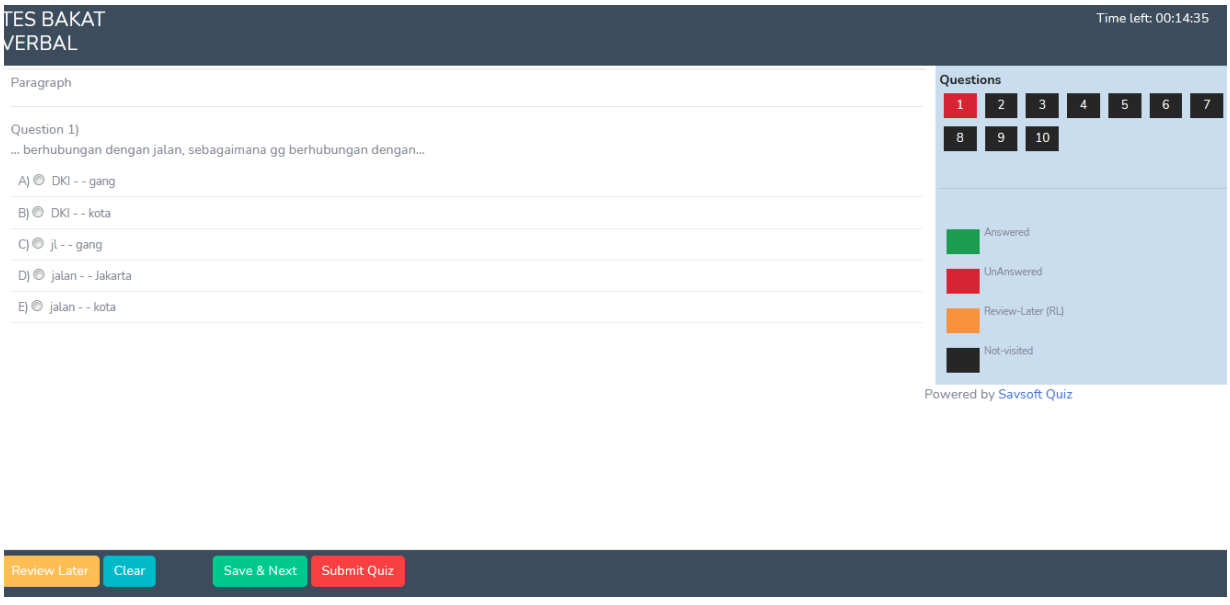
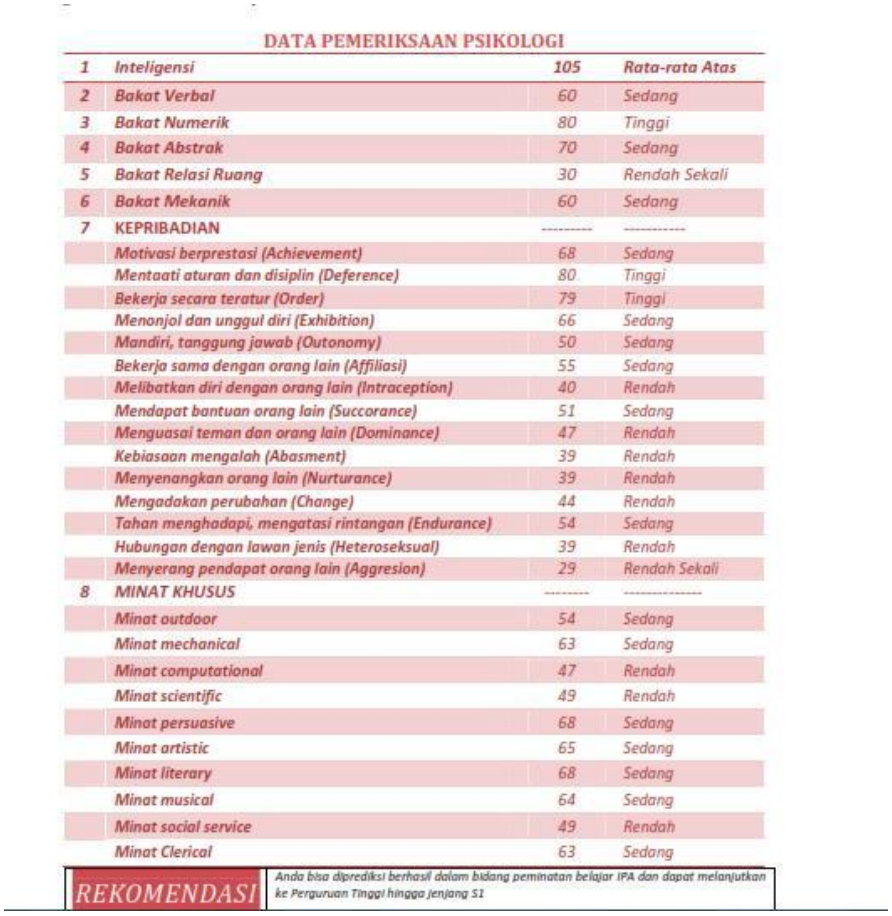


Figure 05. Test Participant page
Figure with permission ©Paramartha, Wayan Eka. 2020

4. Psychological Examination Result Page

Figure 06 is a report page of the prototype built. Contains student data, verbal test results, numerical tests and then recommendations.



DATA PEMERIKSAAN PSIKOLOGI

1	Inteligensi	105	Rata-rata Atas
2	Bakat Verbal	60	Sedang
3	Bakat Numerik	80	Tinggi
4	Bakat Abstrak	70	Sedang
5	Bakat Relasi Ruang	30	Rendah Sekali
6	Bakat Mekanik	60	Sedang
7	KEPRIBADIAN	---------	----------
	Motivasi berprestasi (Achievement)	68	Sedang
	Mentaati aturan dan disiplin (Deference)	80	Tinggi
	Bekerja secara teratur (Order)	79	Tinggi
	Menonjol dan unggul diri (Exhibition)	66	Sedang
	Mandiri, tanggung jawab (Outonomy)	50	Sedang
	Bekerja sama dengan orang lain (Affiliasi)	55	Sedang
	Melibatkan diri dengan orang lain (Intraception)	40	Rendah
	Mendapat bantuan orang lain (Succorance)	51	Sedang
	Menguasai teman dan orang lain (Dominance)	47	Rendah
	Kebiasaan mengalah (Abasment)	39	Rendah
	Menyenangkan orang lain (Nurturance)	39	Rendah
	Mengadakan perubahan (Change)	44	Rendah
	Tahan menghadapi, mengatasi rintangan (Endurance)	54	Sedang
	Hubungan dengan lawan jenis (Heteroseksual)	39	Rendah
	Menyerang pendapat orang lain (Aggresion)	29	Rendah Sekali
8	MINAT KHUSUS	--------	----------
	Minat outdoor	54	Sedang
	Minat mechanical	63	Sedang
	Minat computational	47	Rendah
	Minat scientific	49	Rendah
	Minat persuasive	68	Sedang
	Minat artistic	65	Sedang
	Minat literary	68	Sedang
	Minat musical	64	Sedang
	Minat social service	49	Rendah
	Minat Clerical	63	Sedang

REKOMENDASI: Anda bisa diprediksi berhasil dalam bidang peminatan belajar IPA dan dapat melanjutkan ke Perguruan Tinggi hingga jenjang S1

Figure 06. Test Participant results page
Figure with permission ©Paramartha, Wayan Eka. 2020

5. Functional Requirements Testing

This test is carried out using Black Box Testing to test the functions of the system whether the results of this system match the desired needs. The following list of tests is described in the following table:

Table 01. Testing System Functionality

No	Nama Pengujian	Rancangan	Hasil	Keterangan
1	Menambahkan data peserta	Data peserta masuk ke *database* sistem.	Data peserta berhasil ditambahkan ke *database* sistem.	*Valid*
2	Merubah data peserta	Data peserta berubah.	Data peserta berhasil diubah.	*Valid*
3	Menghapus data peserta	Data peserta terhapus dari.	Data peserta berhasil dihapus dari *database* sistem.	*Valid*
4	Menampilkan data peserta	Data peserta tampil.	Data peserta berhasil ditampilkan.	*Valid*
5	Proses tes.	Peserta mengerjakan tes.	Peserta berhasil menyelesaikan tes.	*Valid*

6	Menambahkan soal tes.	Data soal tes bertambah.	Soal tes baru berhasil ditambahkan kedalam database.	*Valid*
7	Merubah soal tes.	Data soal tes berubah.	Soal tes berhasil dirubah.	*Valid*
8	Menghapus tes.	Data soal tes terhapus.	Soal tes berhasil dihapuskan dari database sistem.	*Valid*
9	Menampilkan data soal tes.	Data soal tes tampil.	Daftar soal tes berhasil ditampilkan.	*Valid*
10	Menampilkan Report	Report ditampilkan	Report berhasil ditampilkan.	*Valid*

From the results using data that out of 30 students there were 28 students whose reports were classified as valid, so that the accuracy of the system reached 80%. The factors that influence why the results of student recommendations do not appear or invalid are as follows: a. The value of the students' cognitive results is not included in the recommendation category, b. The number of majors in the database is still limited.

The advantages of this system prototype are: a) More complete because it includes the cognitive aspects of students. By combining students' cognitive (aptitude), getting a recommendation for a major that is more appropriate for the student's condition is compared to just using an interest test or aptitude / intelligence test. b) Using Sternberg's theory is more suitable because it can determine the tendency of students' talents (analytical-creative-practical). Meanwhile, the intelligence test (IQ) only measures academic intelligence (analytical) and the results can change.

The weaknesses of this system prototype are: a) It takes more time and effort for the psychology team to judge the combination of majors. b) It takes test support facilities to meet the needs of a large number of students.

Based on the stages of the implementation of this research, in general there are no significant obstacles. Everything can be done well, it's just that coordination which can usually be carried out face-to-face between the medical counselor and the researcher has been done online or online several times, namely by using the Zoom application. This is due to the Covid-19 pandemic so that for the sake of mutual security and this activity is still ongoing, everything is done online. But if there are things that require the implementation of going directly to the field, the researchers and field staff continue to carry out the recommended health protocol.

Conclusion

This research is a development research to produce a CBT-based Scholastic Talent Test model. Based on the results of the needs analysis that the researchers conducted, it was found that a conventional approach was still used in schools in giving tests, in particular giving Psychological tests which still used book-shaped questions and answer sheets that were duplicated as many as students who took the test along with other writing tools such as pencils and black markers .

So this shows a lack of efficiency in the activity of giving Psycho Tests. Especially like the current conditions during the Corona pandemic (Covid-19), schools are required to carry out activities in accordance with the health protocol recommended by the government. From the results using data that out of 30 students there were 28 students whose reports were classified as valid, so that the accuracy of the system reached 80%. The factors that influence why the results of student recommendations do not appear or invalid are as follows: a. The value of the students' cognitive results is not included in the recommendation category, b. The number of majors in the database is still limited.

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The assessment stage or the results of this recommendation is still limited to the psychological aspects of students, it has not been combined with the academic results of students at schools or at other guidance institutions. There needs to be additional information or suggestions for substituting counseling in the report if the student has less cognitive value than the major he wants.

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