# Utilization of Gardner's Multiple Intelligence Theory for School Counselling System with Usability Testing

**Nik Azlina Nik Ahmad, Sharifah Nina Shadzrina Syed Dzulkarnain**

*Abstract*: *Counselling unit plays a vital role at school as they deal with students' problem and finding solutions to that. In most cases, students are not aware of their actual strength(s) which led to unsatisfied performance in academic and uncertainty in choosing the right courses which later affect their career. The aim of this research is to identify the evaluation criteria for Malaysian school students' context in order to discover students' major strengths, which in turn will help counsellors to consult students in terms of academic achievement and suggest suitable courses for them based on the intelligence test. The interview was conducted with several number of counsellors and the multiple intelligence theory was used to generate set of automated intelligence test based on the evaluation criteria. A series of evaluation were conducted to test its usability and quality requirements.*

*Keywords: Multiple intelligence, intelligence test, Gardner's intelligence theory, quality requirements evaluation*

## I. INTRODUCTION

Counselling is an engagement session between two persons; a counsellor and a client. It is a one-to-one relationship which normally involves a private meeting between two persons with the aim to restore or solve the emotional well-being of the client [8]. Counselling promotes fearless feeling in expressing the client's emotion making them feel comfort to share their thoughts and feeling without fear of judgement, criticism, or unwanted advice [9]. Counselling is a kind of therapy session to some people which can help people to find a way out of certain problems. This is because, without someone having a counselling session at least once in a life may cause a misleading about themselves. They may tend to make a wrong decision since they did not have any guidance and knowledge about their strength. Because of that, it is important to develop working skills and cultivate the capabilities for the students based on their strength, besides just lay the practical exercises [2].

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Counsellors work in diverse settings, but they also can work in equally diverse fields. Counselling practice at school is held by conducting a personality test, face to face consultations and using a theory of facts. While the types of areas in counselling could be vocational counsellor, rehabilitation counsellor, mental health counsellor, marriage and family therapist, art therapist, music therapist or school counsellor.

In this 21st century, technology play a big role. Computers and gadgets have become part of the life for accessing information. With the advanced technology, there are many ways can be used to gather information such as mobile application and web based system. This will become a big opportunity to develop a new system for that specified situation. *my*Counsellor is one of the example of system that need to be implement nowadays especially during school. However, in Malaysia, this type of system is still new and rarely to be used. *my*Counsellor will be used for Puteri Secondary School which is located at Seremban Negeri Sembilan, Malaysia. Generally, *my*Counsellor is a mobile application for counsellors to manage counselling session and also help students to discover their major strength by having an intelligence test in mobile application platform. The design and development was based on the guidance and requirements from counsellors at Puteri Secondary School. The project was developed primarily using Android Studio and Atom. The idea of this system is to give a guidance for the students to identify their strength in specified field which they can implement after school. It is noted that, in counselling session that related to academic and future career guidance, having unexposed strength will be a challenge. Therefore, another objective of this research is to develop a mobile application equipped with an intelligence test session to enhance the counselling guidance using the 9 intelligences. This will result to students will gain more information about themselves as the counsellors are giving advices according to the result of the intelligent test. Therefore, proposing myCounsellor to Puteri Secondary School will both ease the counsellor and the students. This is because, the application allows the student to have an idea on which field that they are good with and also allows the counsellor to manage the students record in a systematic way. This can be done using 9 intelligences which based on the theory of Howard Garner, a psychologist from Harvard University.

# Utilization of Gardner's Multiple Intelligence Theory in School Counselling System

## II. BACKGROUND STUDY

The theory of multiple intelligences is a theory that segregates the human intelligences into different modalities, in which it does not classify the intelligence as one single general ability [6]. [3] claimed that there are challenges in educational system which put the assumption that everyone is capable to learn the same subject using the same approach and method. However, not all learners possess equally the same intelligences [3][4][1] thus the education system should not be biased by assuming that all students will have the same ability and able to produce the same outcome. [3] has outlined the 9 intelligences of human and stressed that it can be used to measure and stimulate the student learning accordingly.

Based on multiple intelligence theory by Gardner, all human beings have multiple intelligences in varying amounts. Gardner claimed that each human brain develops different kind of intellectual silhouette, where these intelligences reside in different parts of the brain and those intellectual silhouette can either work independently or together [4][5].

The first theory of Multiple Intelligence and its categorization was postulated by the developmental psychologist, Howard Gardner. In 1983, Gardner has written about the nine categorization of human intelligence in his book namely Frames of Mind: The Theory of Multiple Intelligences. Based on Gardner, multiple intelligence is classified into nine categories which sometimes be addressed as the nine domains of intelligence too. Ever since, the theory of Multiple Intelligences has become as guidelines and being utilised by many researchers dealing with human perception. Gardner strongly believe that human intelligence cannot be measured by one single ability. Instead, he believed that human brain is tied to various cognitive capabilities. In most cases people think that those who are good in logical and mathematic are having a sole intelligence. However, Gardner argued that, as he belief that some people may find it difficult to solve mathematical problems yet become the best achievers or solvers in different areas. Therefore, by understanding how the human brain works will make us agree that human intelligence does not only limited to those who are good in mathematical and logical, but can be in many fields. Those fields are categorized into nine [3]. Figure 1 shows a diagram classifying the 9 multiple intelligences.
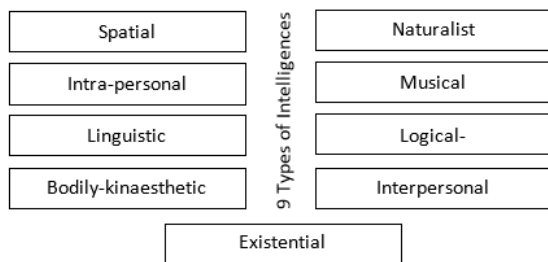


**Fig. 1. Multiple Intelligences Classification**

In the case of teaching and learning, educators will face different students' abilities. Some of the students unable to grasp the information by just giving them textual or verbal explanation. Some of them completely need different approach. Apparently, there are students who hardly understand the fraction topic in mathematics, until the educator demonstrates an apple being cut into slices. Or in other case a student really struggles with writing until the educator give him/her the option to create a visual story,

which in the end turn into a very beautiful and complex narrative. The theory of 9 intelligence explains to us that different student has different capability and they need to discover which are theirs. Thus, by referring to the theory of multiple intelligence will eventually discover their actual strength in education. Obviously, different people blossomed in different way and that will lead to different contribution and expertise.

### A. Interpretations of 9 intelligences

**Table- I: The 9 intelligence types and their description [11]**

| No. | Intelligence Type | Description |
|---|---|---|
| 1 | Naturalist Intelligence | The ability to understand other features of the natural world such as plants, floras, faunas, other creatures, ground and environment. |
| 2 | Musical Intelligence | One's capability to recognize tone, sounds, pitch, noise, rhythm, and reverberation. This will contribute to music recognition, creation, and reproduction. |
| 3 | Logical-Mathematical Intelligence | The skill of calculating, quantifying, measuring propositions and hypotheses, and working with mathematical operations as well as arithmetic expressions. This kind of intelligences not only found in mathematic genius but those who are involved with engineering, scientific experiments as well as developing strategy for games and forensic purposes. |
| 4 | Existential Intelligence | This intelligence concerns about life. Its ability to understand religions, empathy, and the relationship about life and death. |
| 5 | Interpersonal Intelligence | Those who possess this kind of intelligence are suitable to be a leader. They are very good in communication, which can have an effective interaction, verbally or non-verbally with other people. This intelligence has the ability to find differences among others, and able to tackle conversation from different perceptions. |
| 6 | Bodily-Kinesthetic Intelligence | The ability to handle objects and possess various physical skills. This skill able to perfectly use the mind to control the body movement/action in union. |
| 7 | Linguistic Intelligence | The capacity to work with language and text ideally. The ability to apply meta-linguistic for the purpose of composing or understanding language. People with this kind of intelligence love to read, write, or solve crossword puzzles. |
| 8 | Intra-personal Intelligence | Intra-personal intelligence people are self-motivated and has the ability to understand other people's thoughts and feelings. |
| 9 | Spatial Intelligence | The capacity to think in mental imagery, spatial reasoning, image manipulation, graphic and artistic skills, and an active imagination. Those who steering the ship for sailing, piloting and aircraft, or fostering the buildings exhibit the spatial intelligence. |

## III. METHODOLOGY

Interviews were conducted with 3 counsellors of Puteri Secondary School. Based on the interview, it is found that current implementation of the test in the school is by using a manual way.

There are several number of questions that will be given to the students. Each question consists of semantic differential scale from 1 to 3 which represent low, medium and high.

After all questions has been answered, the scale will be counted and the highest scale will represent the intelligence field for that specific student. Basically, the intelligence of the students will be decided based on the majority scale that has been answered.

### A. The students' result will be based on the highest mark counted;
  a) Score 1 – 49 = Low
  b) Score 50 – 69 = Medium
  c) Score 70 – 100 = High

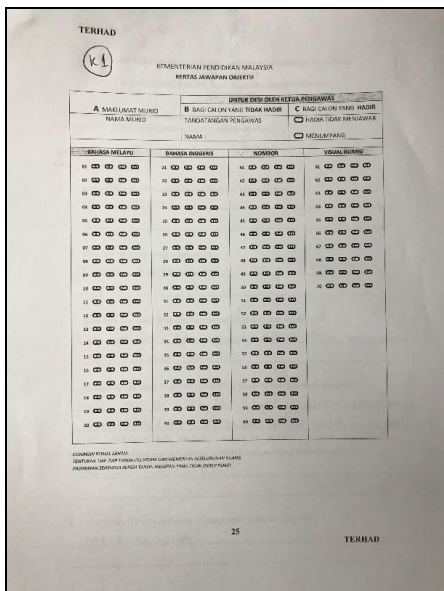Figure 2 and figure 3 below show the example of answer sheet of the manual intelligences test questions.



**Fig. 2. Answer sheet for paper 1**

The answer sheet in paper 1 contain only 4 column of answer to be ticked which refer to only 2 intelligences which are verbal linguistic and logical mathematics. This is because, there are more questions need to be tested on student in order to get an accurate interpretation on both intelligences category.
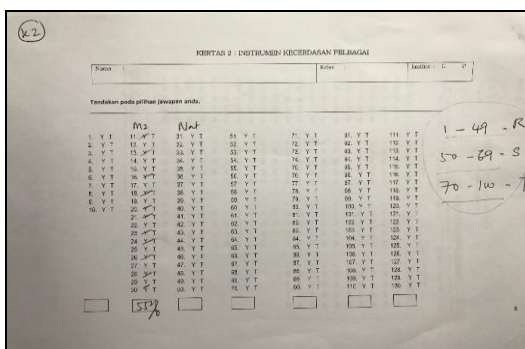


**Fig. 3. Answer sheet for paper 2**

The answer sheet in paper 2 contain the remaining categories of intelligence which are naturalist, intrapersonal, interpersonal, kinesthetic, musical, existential and spatial. Each category has to be counted over total percentage (100%). Only "Y" answered will be counted. There are 3 range of score which are low, medium and high. Score 1-49 will be classified as low, while 50-69 is classified as medium and 70-100 is classified as high.

### B. Evaluation Criteria

All of the criteria are all depends on one's interest and from the interest, they can be concluded based on this characteristics [10] :

1) **Nature Smart -** One who present the capacity of navigating the nature and understand the connection between living and non-living elements in nature. (Naturalist Intelligence)
2) **Music Smart -** One who learn well through songs, patterns, rhythms, instruments and musical expression. (Musical Intelligence)
3) **Logic/Number Smart -** Present their capacity in numbers, reasoning and problem solving. (Logical-Mathematical Intelligence)
4) One who learn in the context of life, understanding the reason of human existence. (Existential Intelligence)
5) **People Smart -** Markedly outgoing and people-oriented, able to communicate well and learn cooperatively in groups or with partner. (Interpersonal Intelligence)
6) **Body Smart -** Experienced learning best through activity. (Bodily-Kinesthetic Intelligence)
7) **Word Smart -** Exhibit strength in the arts and languages. They are most likely to success in traditional classrooms. (Linguistic Intelligence)
8) **Self Smart -** One who especially in touch with their own feelings, values and ideas. (Intra-personal Intelligence)
9) **Picture Smart -** Demonstrate learning through visual and organize things spatially. (Spatial Intelligence)

**Table- II: Evaluation criteria and career mapping [10]**

| No. | Evaluation Criteria (Intelligence) | Career Suitability |
|---|---|---|
| 1 | Nature Smart | This kind of intelligence is practically applied to the role of chef, botanist, agriculturalist, agronomist, hunters, and hoarders. |
| 2 | Music Smart | This intelligence type mostly unveils in those who have the capacity as composers, conductors, musicians, vocalist, and sound engineer. |
| 3 | Logic/Number Smart | Those involve in engineering, scientific, computer programmer, games strategy development, accountancy and forensic exhibit the logical-mathematical intelligence. |
| 4 | Life Smart | Existential intelligence mostly exhibited by scientist, philosopher, and theologian. |
| 5 | People Smart | People who dominantly possess this interpersonal intelligence is suitable to work as salesperson, politician, counsellor, public relation, or minister. |

| 6 | Body Smart | Most of the athletes, dancers, actors, surgeons, fire-fighters, coach, magician, physician exhibit well-developed bodily kinesthetic intelligence. |
|---|---|---|
| 7 | Word Smart | Those who possess high linguistic intelligence are suitable to work as journalist, poet, writer, lawyer or translator. |
| 8 | Self Smart | This intelligence can be found in psychologist, researchers, trainers, theorists, spiritual leaders, and philosophers. |
| 9 | Picture Smart | Those who steering the ship for sailing, piloting and aircraft, fostering the buildings, photographer, designer or artists exhibit the spatial intelligence. |

### C. Question Formation

The process of the question formation is legally used by Malaysian Examination Board and it is shown below for this research purposes.
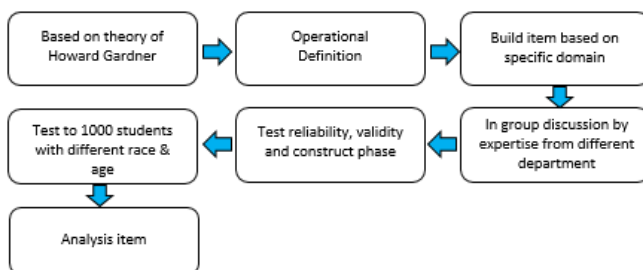


**Fig. 4. Flow of question formation**

## IV. IMPLEMENTATION OF MOBILE-BASED INTELLIGENCE TEST FOR COUNSELLING SYSTEM

Using all the input and findings of the interview sessions, a preparation towards mobile-based intelligence test that is based on Gardner's 9 intelligence was made. 9 different sets of mobile-based questions were formed to test the 9 category of intelligences which focus on spatial, naturalist, intra-personal, musical, linguistic, logical-mathematical, bodily kinaesthetic, interpersonal and existential. The system was implemented using Android Studio. The features in Android Studio gives benefits specially to build Android Application. Android Studio provides a function to test the code called emulator program. Fully function system can only be installed in Android mobile phone. The database and server gives a lot of challenged in integration part. But overall, it gives benefits for the system security and system efficiency. The overall system must meet the requirements without having any errors or problems. In order to deploy this project in own device, user need to have an android device to access the mobile based system. The application need to be run in android studio and being deploy in android device using USB cable. For web based system, user need to run the hosting URL in own personal computer (PC) in order to access to the web based system.

Unfortunately, a MySQL database and an Android app unable to communicate directly, thus PHP language is the solution for that. Figure 5 shows how an android application communicates with a remote database (MySQL) using PHP. The process requires android application to fetch data from a database stored in a web browser. The required parameters are used by android application to communicate with PHP in order to let PHP communicates with MySQL database for fetching the data before returning those data back to the android application. Both Java and PHP languages have certain codes that allows application to parse JSON data. In that case, the data that taken from the database for both Counsellor and Student will be convert through JSON data to display in user interface, which is in Android.
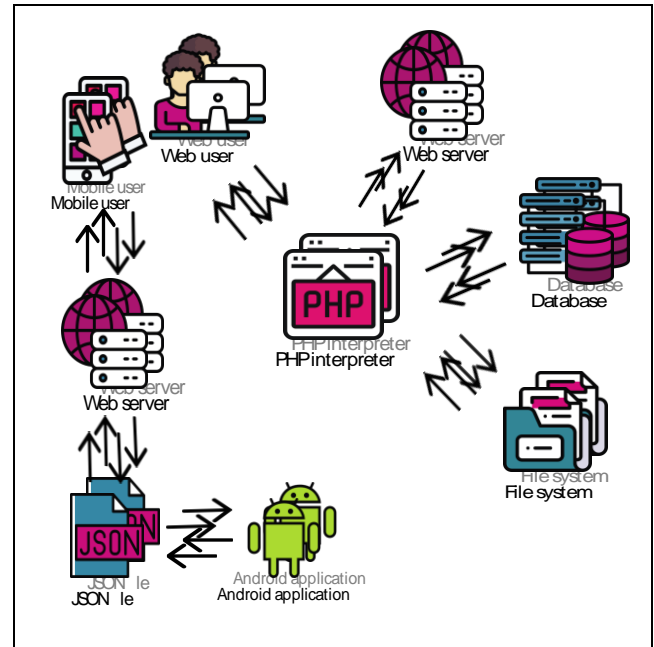


**Fig. 5. System architecture for the counselling system**
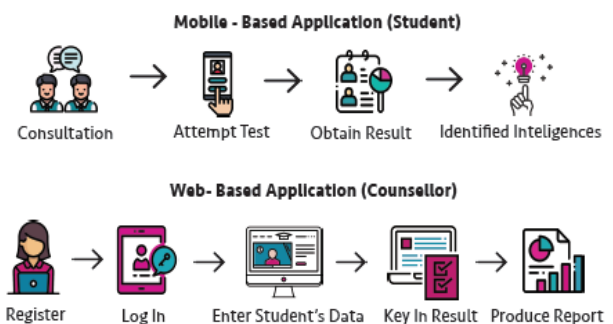


**Fig. 6. The flow of the mobile based intelligence test in counselling system**

In order to ensure that the intelligence test application satisfy its users, a set of quality requirements for the *my*Counsellor was defined and shown in Table III.

**Table- III: Quality requirements for the intelligence test application**

| Requirement ID | Requirements Description |
|---|---|
| **Reliability** | |
| REQ_N101 | The availability of the system and data storage shall be 24 hours a day, 7 days a week. |
| REQ_N102 | The system shall be equipped with detail information on system failures and errors that contains the source and description of error or failure. |

| REQ_N103 | The system shall produce results textually and visually |
|---|---|
| **Accuracy** | |
| REQ_N201 | The test results shall display accurate data in both mobile and web platform. |
| REQ_N202 | The graph shall be accurately reflect the number and figures of the test results. |
| **Reusability** | |
| REQ_N301 | The system shall allow the intelligence test questions to be modified and updated. |
| REQ_N302 | All used questions shall be able to be reused by different users. |
| REQ_N303 | The questions shall be repeatedly displayed. |
| **Usability** | |
| REQ_N401 | All system messages, texts and information shall be in English. |
| REQ_N402 | The system shall be easy to use by school students |
| REQ_N403 | The system shall be easy to navigate |
| **Efficiency** | |
| REQ_N501 | The system shall support a minimum of 200 concurrent tests attempt. |
| REQ_N502 | The system shall have the following average response time:<br>− 80% of executions of any function shall be within 2 seconds<br>− 90% of executions shall be within 3 seconds<br>− 100% of executions shall be within 4 seconds |

## V. EVALUATION AND DISCUSSION

The intelligence test application for the counselling system was evaluated using User Acceptance Test (UAT) by the selected counsellors and school students. Additionally, an open evaluation session was also conducted with public users which focused on the system's usability features.

- UAT by real clients; counsellor and students from Puteri Secondary School
  The purpose of having a real client testing is to allow client to test the application by themselves and identify whether the application has meet the user requirement.
- Application Testing
  It also involved the application testing to allow them to evaluate the automated intelligence tests questions in terms of its reliability, accuracy, reusability, usability and efficiency.
- Open Evaluation
  The purpose of open evaluation form is to allow the users such as counsellors, public people to evaluate the system and identify whether the system is meet the requirements or not. Open evaluation form also verified that the functions of the system should solved the current problem.

### A. User Acceptance Test (UAT)

User acceptance testing is the final stage of system validation and verification activity performed by the user or client, testing against the corresponding requirements that was agreed between client and developers. The goal of acceptance testing is to get the user's acceptance through a satisfying system. The main purpose of this testing is to validate the process and business flow. The most important element in UAT is to demonstrate that required business functions are operating as expected and its usage is able to cope with the real-world working environment. UAT requires involvement of users as they are the sole stakeholders who will determine whether or not the system is acceptable. The process involves the evaluation of the system from the users' point of view and the results will be recorded.

The functional requirements of MyCounsellor system were tested. To ensure that those functional requirements meet the user's satisfaction, 45 students from Puteri Secondary School were selected to involve in test process.

They were asked to test the automate applications and manual-way of answering the test, and evaluate them. Besides testing the application, a set of evaluation forms were also distributed which focus on the system's usability. Table IV shows the list of modules that has been tested.

**Table- IV: List of Tested Modules During UAT**

| Module No. | Module Name |
|---|---|
| 1 | Registration |
| 2 | Appointment |
| 3 | Schedule |
| 4 | Report |
| 5 | Intelligence test result |
| 6 | Student management |
| 7 | Admin management |

### B. Application Test

The purpose of this testing is to evaluate the quality requirements of the automated test questions by comparing it to the manual test. The evaluation was performed based on the quality criteria defined in Table III which are reliability, accuracy, reusability, usability, and application's efficiency. The test is conducted by selecting a few students of Puteri Secondary School and the result of each criteria is being recorded and illustrated in bar chart in Figure 7.
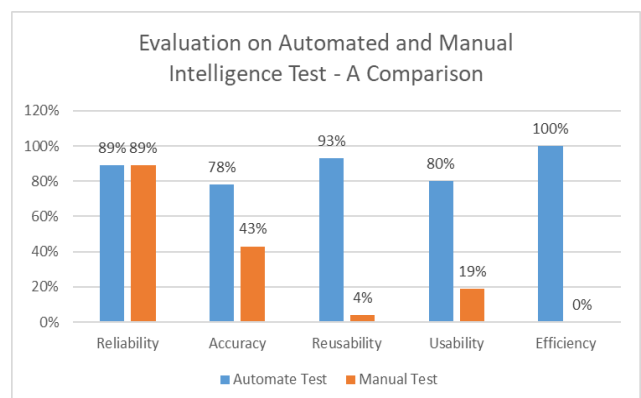


**Fig. 7. Result of application testing**

Evaluation on the defined quality requirements was conducted on reliability, accuracy, reusability, usability, and efficiency of the application when users' attempt to answer the test questions. 1 counsellor and 45 random students of Puteri Secondary School were selected to evaluate the tests.

| 11 | 12 | 20 | **34** | 12 | 20 |
|---|---|---|---|---|---|
| 12 | 17 | 20 | **35** | 17 | 20 |
| 13 | 20 | 30 | **36** | 20 | 30 |
| 14 | 25 | 35 | **37** | 25 | 35 |
| 15 | 15 | 30 | **38** | 15 | 30 |
| 16 | 14 | 31 | **39** | 14 | 31 |
| 17 | 16 | 26 | **40** | 16 | 26 |
| 18 | 15 | 25 | **41** | 15 | 25 |
| 19 | 21 | 37 | **42** | 21 | 37 |
| 20 | 14 | 31 | **43** | 14 | 31 |
| 21 | 15 | 28 | **44** | 15 | 28 |
| 22 | 22 | 30 | **45** | 22 | 30 |
| 23 | 13 | 35 | **46** | 13 | 35 |

Each participant was given two sets of questions which are the automated intelligence test on mobile device and a manual paper-based test question. The results and response were recorded.

a. Reliability of the result interpretation

41 participants (89%) think that the automated test on mobile device is reliable where they do not face any system lag nor the system failures. Participants were satisfied with the result interpretation on both ways of answering the intelligences test questions.

b. Accuracy of the test results

36 participants (78%) think that the results are accurate and reflect themselves. Both results displayed in mobile device and counsellor's workstation are exactly the same figure. All the numbers and graph were correctly presented without any error and no data mismatch.

c. Reusability of the test questions

All participants agreed on the reusability of the automated intelligences test questions. Only 3 of them are on the opposite thoughts. The only reasons that the students did not agree on the reusability of manual tests is because, there are only 3 columns on the paper answer sheet. This disallow them to have a same answer sheet for the next test attempt. Therefore, they cannot trace their past marks.

d. Usability

37 participants which is equal to 80% think that the automated intelligence test is usable and meet its need. They highlighted that the test is able to produce the results in detail, in summary, as well as in graph basis which is very helpful to them. They also agree that suggestion made by the application regarding their inner strength is very useful in terms of study and future career development.

e. Efficiency - Time saving

The time taken was recorded for each particpant to finish answering the test in both manual and automated way. Table V below shows the recorded result for each participant in minutes (mins). Based on the record, none of the participants spent more time in automated intelligence test as compared to the manual one. Thus, participants agreed that automated test performs better and save almost half of their time.

**Table- V: Results on Efficiency Based on Time Taken to Complete the Intelligence Test**

| Partici-pant's ID | Auto (mins) | Manual (mins) | Partici-pant's ID | Auto (mins) | Manual (mins) |
|---|---|---|---|---|---|
| **1** | 15 | 30 | **24** | 15 | 30 |
| **2** | 17 | 25 | **25** | 17 | 25 |
| **3** | 15 | 25 | **26** | 15 | 25 |
| **4** | 20 | 35 | **27** | 20 | 35 |
| **5** | 14 | 25 | **28** | 14 | 25 |
| **6** | 15 | 30 | **29** | 15 | 30 |
| **7** | 20 | 30 | **30** | 20 | 30 |
| **8** | 13 | 24 | **31** | 13 | 24 |
| **9** | 16 | 33 | **32** | 16 | 33 |
| **10** | 15 | 31 | **33** | 15 | 31 |

## C. Open Evaluation

Additionally, an open evaluation session was also conducted with public users. The open evaluation form as was distributed to 30 university students during the prototype (of the intelligence test application) showcase. The open evaluation focus on the system's usability and used 5-points Likert scale to identify the level of user's agreement. The score range is between one to five which represent "Strongly Disagree", "Disagree", "Neutral", "Agree", and "Strongly Agree" respectively. The results of the questionnaire on the open evaluation form (on the usability part) are presented in table VI – table X below. Q1-Q5 signify the questions of open evaluation form. Only selected questions that related to the system's usability were selected for discussion.

Table VI-X use the following scale :

SD – Strongly Disagree
D – Disagree
N – Neutral
A – Agree
SA – Strongly Agree

**Table- VI: Result for Q1**

| Question 1: The system is attractive and well designed | | | | | |
|---|---|---|---|---|---|
| SD | D | N | A | SA | Total Respon-dent |
| 0 | 0 | 0 | 2 (6.67%) | 28 (93.33%) | 30 (100%) |

Table VI represents the open evaluation form from 30 university students. Only two students which hold a 6.67% agreed that the system are well designed and attractive whereas, majority of the respondents which hold a 93.33% are strongly agreed that the system is well designed and attractive. None of them disagree.

**Table- VII: Result for Q2**

| Question 2: The system is easy to understand | | | | | |
|---|---|---|---|---|---|
| SD | D | N | A | SA | Total Respondent |
| 0 | 0 | 0 | 2 (6.67%) | 28 (93.33%) | 30 (100%) |

From Table VII, it is clear that only two students which hold a 6.67% agreed that the system are easy to be understood whereas, majority of the respondents which hold a 93.33% are strongly agreed that the system is easy to be understood.

**Table- VIII: Result for Q3**

| Question 3:  The system flow is clear | | | | | |
|---|---|---|---|---|---|
| SD | D | N | A | SA | Total Respondent |
| 0 | 0 | 0 | 1 (3.33%) | 29 (96.67%) | 30 (100%) |

Table VIII recorded that only one students which hold a 3.33% agreed that the system flow is clear whereas, majority of the respondents which hold a 96.67% are strongly agreed that the system flow is clear.

**Table- IX: Result for Q4**

| Question 4:  The system functions perfectly | | | | | |
|---|---|---|---|---|---|
| SD | D | N | A | SA | Total Respondent |
| 0 | 0 | 2 (6.67%) | 8 (26.67%) | 20 (66.67%) | 30 (100%) |

Table IX shows two students with a percentage 6.67% have neutral agreement about the system's functions perfectly. 26.67% which represent eight students agreed on the system functions perfectly whereas the other 20 students, 66.67% are strongly agreed that the system functions perfectly.

**Table- X: Result for Q5**

| Question 5:  The project is good and gains respondents satisfaction | | | | | |
|---|---|---|---|---|---|
| SD | D | N | A | SA | Total Respondent |
| 0 | 0 | 0 | 3 (10%) | 27 (90%) | 30 (100%) |

Based on Table X, majority of the respondents, 90% are strongly agreed that the project is good and has gains his/her satisfaction. Whereas, 3 students which is equal to 10% agreed that the project is good and gain their satisfaction.

## VI.  CONCLUSION

In this work we have presented the importance of recognizing the students' inner strength to help them build their future career as well as to assist them in study. The 9 intelligence types were explained and based on the study, it is found that the Gardner's 9 intelligence theory is best used to identify people strengths, and it can be applied to academic too. We portray the 9 intelligence to be integrated with a counselling system, digitally on mobile platform. An intelligence test questions which are based on the Gardner's theory were formed with the help of school counsellors. This work however, can be expanded to university students too, not only to school students. In order to ensure that the intelligence test application satisfy its users, a set of quality requirements were formed. The mobile (automated) intelligence test was expected to assist the counsellors to identify the students' inner strength and necessarily consult them for better academic performance and future career. Evaluations were made towards the automated intelligence test application by

various users and achieved positive results in terms of its usability and quality requirements.

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## AUTHORS PROFILE

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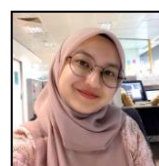
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After graduating on October 2019 with first class degree, she was attached to Group Technical Data department in Petroliam Nasional Berhad (PETRONAS) which was also her internship placement. She was involved in doing data visualization, data analytics and real-time data monitoring for Metering and Mechanical Static Equipment which involves all regions in PETRONAS Malaysia. Her research interests lie in the area of software engineering, software testing, software maintenance, agile software development and mobile UX design.