Faculty of Electrical and Electronic Engineering Technology

The Development of an Electronic Board Game of a Triple Triad Game for the Purpose of Testing Kindergarten Student of Numerical Concept

NIK MUHAMAD ARIF FAHMY BIN NIK AB AZIZ

Bachelor of Electronics Engineering Technology with Honours

2022

The Development of an Electronic Board Game of a Triple Triad Game for the Purpose of Testing Kindergarten Student of Numerical Concept

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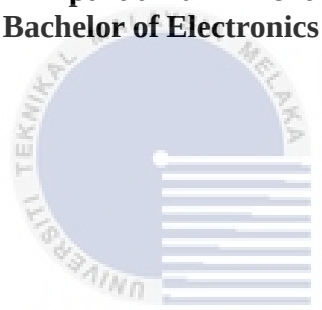
A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology with Honours



Faculty of Electrical and Electronic Engineering Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2022

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI TEKNOLOGI KEJUTERAAN ELEKTRIK DAN ELEKTRONIK

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : The Development of an Electronic Board Game of a Triple Triad Game for the Purpose of Testing Kindergarten Student of Numerical Concept.

Sesi Pengajian : Sem 1 2022/2023

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I approve that this Bachelor Degree Project 1 (PSM1) report entitled “The Development of an Electronic Board Game of a Triple Triad Game for the Purpose of Testing Kindergarten Student of Numerical Concept” is sufficient for submission.

Signature : 

Supervisor Name : AMAR FAIZ BIN ZAINAL ABIDIN

Date : 13 / 01 / 2023

APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology with Honours.

Signature : 

Supervisor Name : AMAR FAIZ BIN ZAINAL ABIDIN

Date : 13 / 01 /2023

DEDICATION

I would like to express my gratitude to my parents for their support and education throughout this project. I also want to thank my supervisor and friends for their encouragement, guidance, and inspiration in completing this project.

ABSTRACT

Teaching and learning a arithmetic is a rigorous process, especially for young students who quickly grow bored, listless, and uninterested when they perceive a task to be difficult. As a result, to get the best outcomes in arithmetic acquisition, with this gameboard will create new way in study arithmetic. In this regard, games are regarded as an engaging and challenging activity to be used in the arithmetic classroom. However, it is not always simple to locate a game that fits into the arithmetic syllabus so, an useful option for the instructor would be to use a board game. For kindergarten students, math concepts typically include counting, number recognition, shapes, basic addition and subtraction, and measurement. The Development of an ElectronicBoard Game of a Triple Triad Game for the purpose of Testing Kindergarten Student of Numerical Concept is a project aims to create an electronic-based educational board game which called Triple Triad with the purpose as educational kit to test Kindergarten students' knowledge of numerical number. Implementing game-based learning in the educational system presents several challenges. The cost of producing and distributing game boards, as well as limited access to technology for some students, can be impediments to their widespread adoption. This is expected to be done by attaching each RFID reader to a Arduino Mega (Slave) and then connect to Arduino Mega (Master). The project outcomes are measured by running different scenarios to test the output of the electronic board game whichshould be equivalent to the original game and then run an oral survey towards target audiences (kindergarten teachers and students) on the effectiveness of the game in aiding thelearning process of the numerical concept.

ABSTRAK

Pengajaran dan pembelajaran aritmetik adalah proses yang ketat, terutamanya untuk pelajar muda yang cepat bosan, tidak bersemangat dan tidak berminat apabila mereka menganggap tugasan itu sukar. Hasilnya, untuk mendapatkan hasil terbaik dalam pemerolehan aritmetik, dengan papan permainan ini akan mewujudkan cara baharu dalam pengajian aritmetik. Dalam hal ini, permainan dianggap sebagai aktiviti yang menarik dan mencabar untuk digunakan dalam bilik darjah aritmetik. Walau bagaimanapun, tidak selalu mudah untuk mencari permainan yang sesuai dengan sukatan pelajaran aritmetik jadi, pilihan yang berguna untuk pengajar adalah menggunakan permainan papan. Bagi pelajar tadika, konsep matematik lazimnya merangkumi pengiraan, pengecaman nombor, bentuk, penambahan dan penolakan asas, dan ukuran. Pembangunan Permainan Papan Elektronik Permainan Tiga Tiga untuk tujuan Pengujian Konsep Berangka Pelajar Tadika adalah projek yang bertujuan untuk mencipta permainan papan pendidikan berasaskan elektronik yang dinamakan Triple Triad dengan tujuan sebagai kit pendidikan untuk menguji pelajar Tadika. pengetahuan tentang nombor berangka. Melaksanakan pembelajaran berasaskan permainan dalam sistem pendidikan memberikan beberapa cabaran. Kos pengeluaran dan pengedaran papan permainan, serta akses terhad kepada teknologi untuk sesetengah pelajar, boleh menjadi penghalang kepada penggunaan meluas mereka. Ini dijangka dilakukan dengan melampirkan setiap pembaca RFID pada Arduino Mega (*Slave*) dan kemudian menyambung ke Arduino Mega (*Master*). Hasil projek diukur dengan menjalankan senario yang berbeza untuk menguji output permainan papan elektronik yang sepatutnya setara dengan permainan asal dan kemudian menjalankan tinjauan lisan terhadap khalayak sasaran (guru dan pelajar tadika) tentang keberkesanan permainan dalam membantu proses pembelajaran konsep berangka.

ACKNOWLEDGEMENTS

I am deeply grateful to Allah for blessing me with the ability to successfully complete my Projek Sarjana Muda (PSM). I would like to express my sincere appreciation to Universiti Teknikal Malaysia Melaka (UTeM) for giving me the opportunity to further my studies in the Bachelor of Electronics Engineering Technology program at the Faculty of Electrical and Electronic Engineering Technology (FTKEE). I am also extremely thankful to my supervisor, En. Amar Faiz Bin Zainal Abidin, for his unwavering guidance, advice, encouragement, inspiration, and support throughout the development of my final year project, "The Development of an Electronic Board Game of a Triple Triad Game for the purpose of Testing Kindergarten Student of Numerical Concept." His constant support and interest were instrumental in enabling me to complete this project with full commitment and dedication. Additionally, I am very grateful to my family and friends for their unwavering support and encouragement throughout this project. Their moral support and care were greatly appreciated and helped me to achieve my goal. I hope that their kindness and generosity will continue to be blessed.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In this chapter focuses on developing the framework and introducing of the project basic concept. It centered the project overview, outlining the objectives, briefly stating the issue statement, scope, and providing project outcomes.

1.2 Background

Children begin their education in elementary school with varying levels of mathematical proficiency [1]. Some have a solid grasp of the basics, such as numbers and mathematical concepts, while others may struggle with simple counting, identifying numbers, using symbols, distinguishing between quantities, and understanding basic addition and subtraction [1]. These foundational skills, often referred to as "number sense" or "early numeracy competencies," are crucial for students to master before advancing to more challenging mathematical concepts [1]. The motivation of doing this project is to test kindergarten students' knowledge of numerical number by using electronic gameboard based on Triple Triad. This game board will help student to understand more about numerical concept. Teaching and learning a arithmetic is a rigorous process, especially for young students who quickly grow bored, listless, and uninterested when they perceive a task to be difficult. As a result, to get the best outcomes in arithmetic acquisition. Electronic game board will be focus on kindergarten student to test the knowledge of numerical number. The students will be thought in the class by the teacher about the concept of numerical number. That will make the student understand the difference in value between numbers. The student will go through two session, first session will be theoretical, and second session will be test the understanding of the student by using the gameboard.

The lesson will take place in kindergarten with some of students. In theoretical session, teacher will explain the concept of numerical number to the students. In this session will be

seen that only a few students that focus and the other will getting tired, bored, and lost concentration. Kindergarten teacher will be face significant challenge while though kindergarten students by using the theoretical method cause nowadays students more interest in physical interaction. After the lesson, the students will be must to answer the question that was prepare by the teacher. Only a few students that can answer the question with the right answer meanwhile others student will answer the question with random answer.

1.3 Problem Statement

Implementing game-based learning in the educational system presents several challenges. The cost of producing and distributing game boards, as well as limited access to technology for some students, can be impediments to their widespread adoption. Additionally, there may be resistance to change from educators and students who are accustomed to traditional methods of teaching and learning. It is important to carefully consider these challenges and find ways to address them in order to effectively utilize game boards as a tool for improving education. This may require investing in the necessary technology and resources, as well as conducting research to ensure that game-based learning is an effective and efficient means of teaching and learning.

Overall, the incorporation of game boards into the educational system has the potential to greatly improve student engagement and learning outcomes. By finding ways to overcome the challenges and effectively utilize this technology, we can create a more dynamic and engaging learning environment for students.

1.4 Project Objective

The main aim of this project is to propose a systematic and effective methodology to estimate system. Specifically, the objectives are as follows:

a) To study how many connections RFID sensor can connect with one Arduino Mega 2560 in order to be able to determine how many RFID and Arduino mega will be used in this project.

b) To design an electronic-based educational board game base on game that called ‘Triple Triad’ with the purpose as educational kit to test kindergarten students’ knowledge of numerical number by using RFID sensor with the purpose as educational kit with a portable, durable, and affordable

c) To validate electronic-based educational board game base on game that called ‘Triple Triad’ with the purpose as educational kit by test through the student and teacher from kindergarten.

1.5 Scope of project

Project scope is a technique to establish project's limits and describe the specific objectives, timeframes, and project deliverables that be working toward. It’s may guarantee that will meet project goals and objectives without delay or overwork by specifying by project scope. In designing an electronic-based educational board game base on game that called ‘Triple Triad’ with the purpose as educational kit with the main goals of this project are to create a portable educational kit relevant to the kindergarten students. Weight will be around 1kg and 25cm x 30cm x 10cm of size. The durability of product will be test with a few methods such as drop from 0.5m. The cost of this product or educational kit when it develops will be around RM200.00 with the component such as RFID sensor, RGB, Arduino MEGA 2560 and jumper wire.

In this project will required to construct the circuit on PCB. This circuit design for easy to understand and to make the arrangement of component in neat. Will be use 4 Arduino mega as a microcontroller. 3 out of 4 Arduino mega will be act as a slave mean while the other one will be a master. For each of Arduino mega that act as a slave will control 3 RFIDsensor and it will send data to Arduino mega that act as master. The 9 RFID sensor will be arranged3x3 on the top of box. Which is the game will be play by two students facing each other and the 9 RGB that control by master will be the indicator who will start first. After the card had been put on the board RG LED will be indicator as the player own that space and the buzzer

will act as the card in the middle of fighting. For the prototype, will be using junction box because it will save the cost of product and durable.

For designing the rule of game will be use Arduino ide software. In this software will give the command who will start first, what will happen if player put the card on the board and who will win or lose the space on the board. In this software also will distinguish the numbers on the card that have been put on the board.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

To ensure the success of this project, we conducted thorough research and gathered information from various sources such as books, papers, journals, and websites. This information served as a guide to help us complete the project within the designated time frame. The research focused on major topics and those relevant to the project.

In this study, we conducted a literature review of articles from the Scopus website on instructional kits for teaching primary students about numerical number by using RFID sensor. The search terms "electronic gameboard" and "educational kit" were used to identify relevant articles. A total of ten articles were selected for this review, with five of them focusing specifically on the development of teaching kits for numerical number. The aim of this literature review is to evaluate the effectiveness of instructional kits as a tool for enhancing students' ability to understand and solve problems related to numerical number.

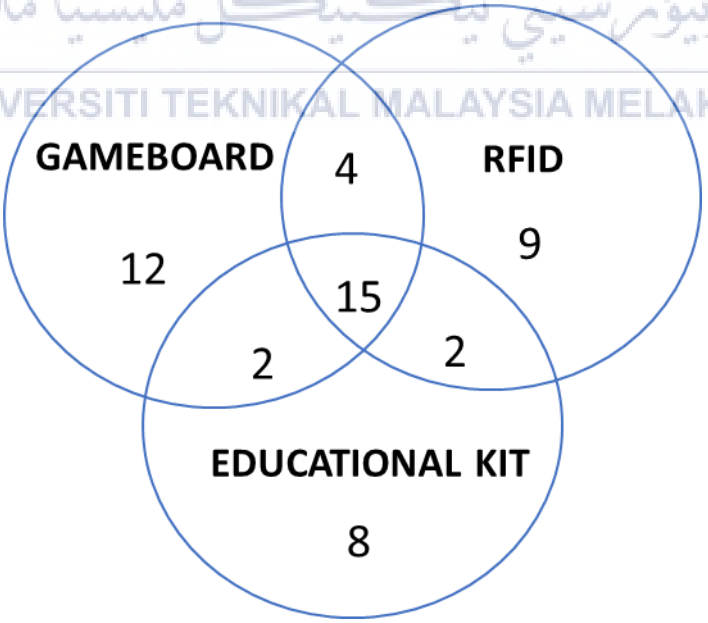

Figure 2.1 : Common type of related article.

In figure 2.2 the growth of paper by continent from 2002 to 2022. There are 4 total of continent that contribute in all of research paper. According to the figure Europe continent show the most percentage of developing a gameboard, meanwhile the percentage different Asia and Europe continent are 5%. This will show that Europe and Asia

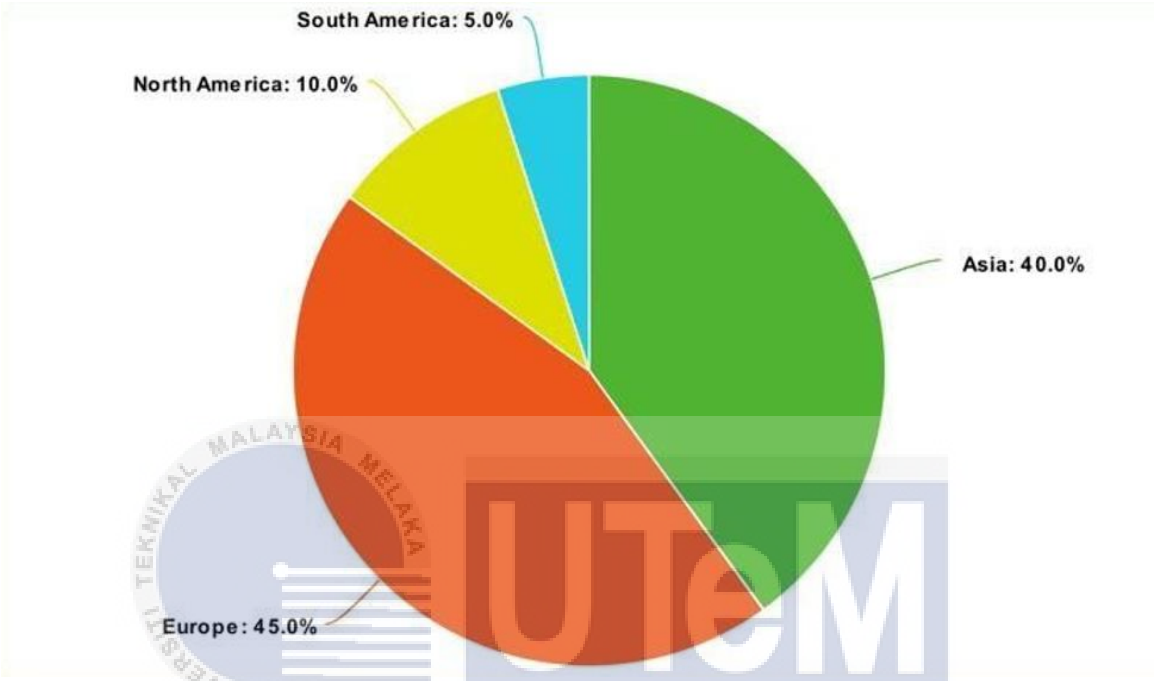

Figure 2.2 : The growth of paper by continent

In this figure 2.3 show the countries of origin of the paper researchers. The most origin researchers come from United State and Switzerland. that can conclude that United State and Switzerland had make more attention in this field or do more extensiveresearch for RFID and gameboard.

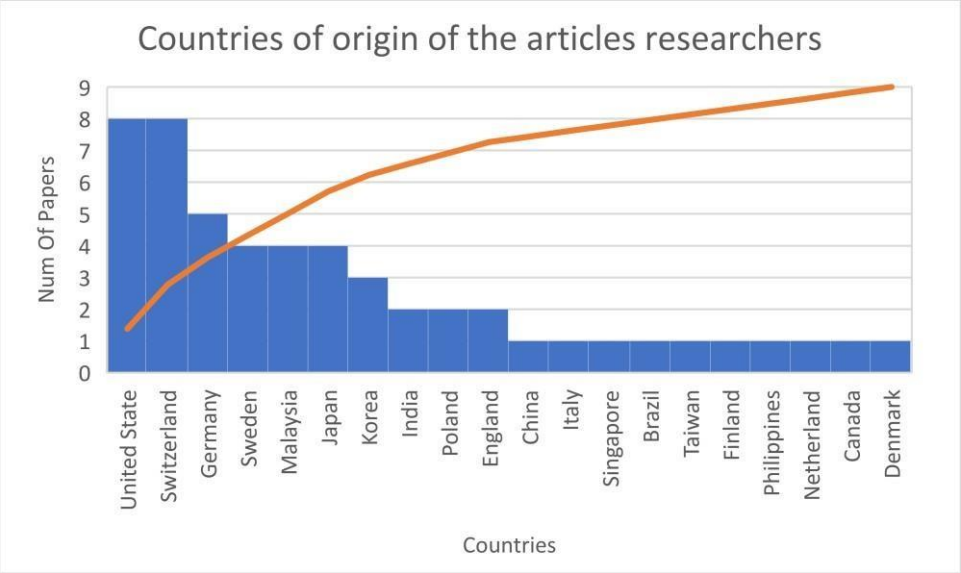

Figure 2.3 : Countries of origin of the paper researchers

The growth of research paper from 2002 to 2022 as in Figure 2.4. This show increase of research paper by year. In this figure show that in 2007 show the most

Figure 2.4 : Growth of research paper

This shows the distribution of the references by years. In this figure 2.5 show that the highest reference is from year 2020 with the reference is 64. This figure also shown that with the advancement of technology and the development of the internet the number references rapidly increase by year.

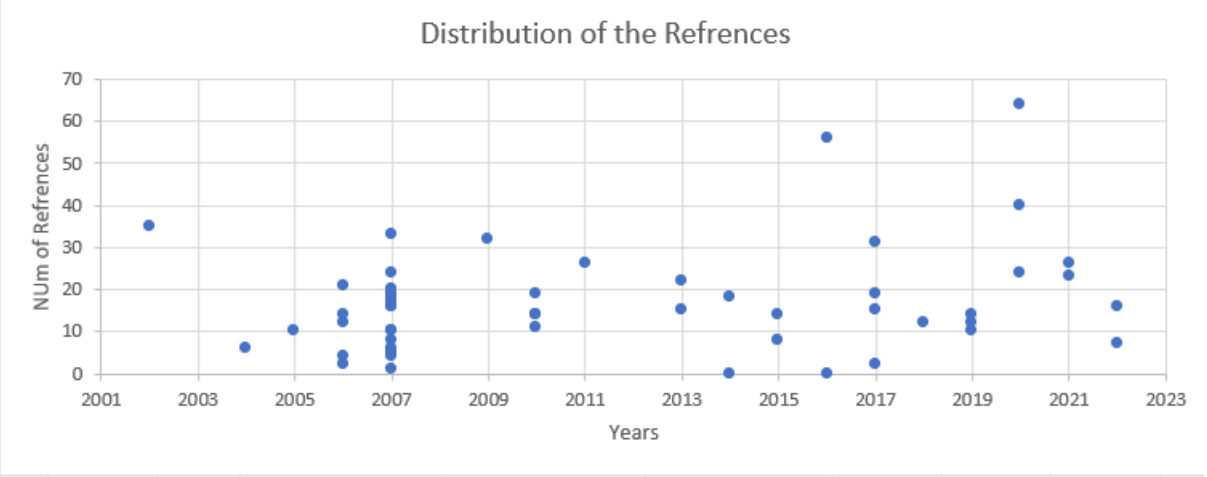

Figure 2.5 : Distribution Of References

In this figure 2.6 shown that the average number of references by year. In the graph show that average

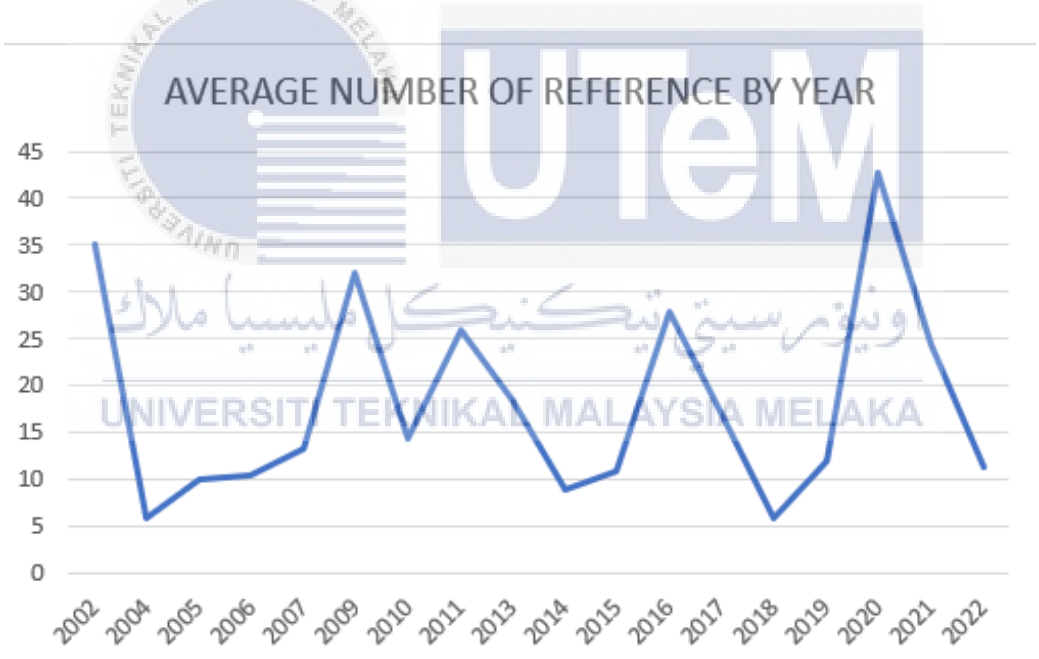

Figure 2.6 : Average of Reference

In figure 2.7 shown the keyword from papers in years 2002 until 2022 that had been described to tag cloud by using the tools in tagcrowd.com. as can see at the keywords that had been provide by the researcher the trend within games board and RFID.

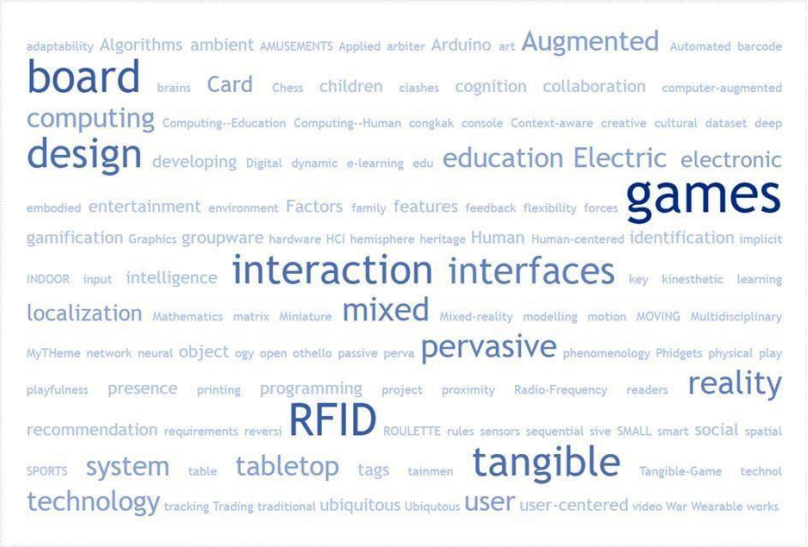

Figure 2.7 : Tag Cloud

In figure 2.8 k-chart for gameboard.

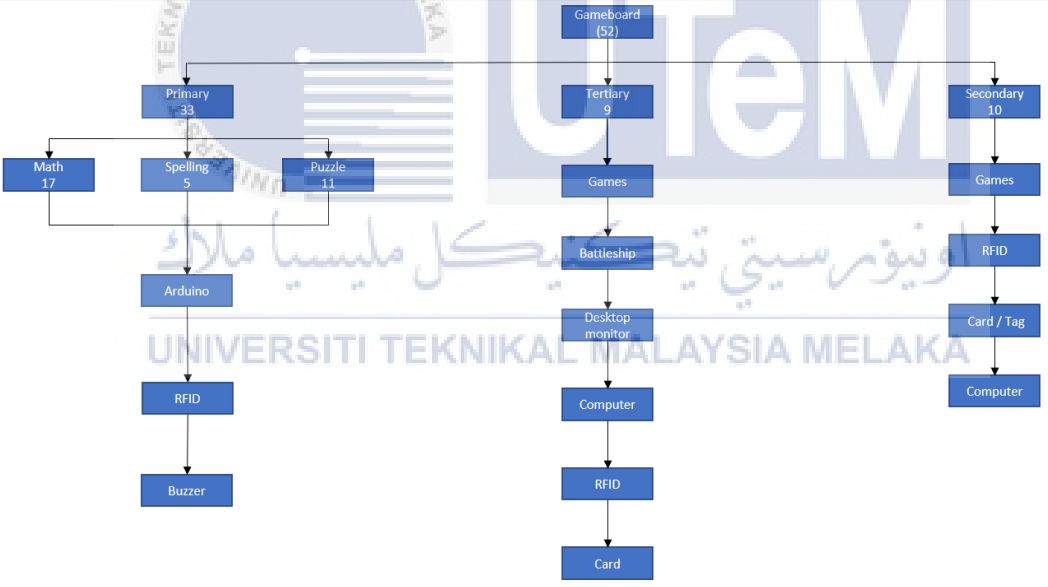

Figure 2.8 : k-chart