



ASHESI UNIVERSITY

How Emotional Intelligence is being currently implemented and measured at Institutions.

THESIS

B.Sc. Management Information Systems

Thesis submitted to the Department of Computer Science and Information Systems, Ashesi University, in partial fulfilment of the requirements for the award of Bachelor of Science degree in Management Information Systems.

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April 2021

Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this University or elsewhere.

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.....Florence Mawusi Yawa Ofori.....

Date:

.....14th May, 2021.....

I hereby declare that preparation and presentation of this thesis were supervised in accordance with the guidelines on supervision of thesis laid down by Ashesi University.

Supervisor's Signature



.....

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Date:

.....14th May, 2021.....

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Abstract

Emotional intelligence is the ability to understand one's own emotions and other's emotions in order to use this understanding to achieve set goals both for oneself and others. Since an institution is usually created to meet a set of goals and objectives, Emotional Intelligence (EI) is, undoubtedly, a factor that plays a role in the attainment of these goals.

According to Daniel Goleman, EI is a strong determinant in the success or failure of an entity. However, many companies have not inculcated an Emotional Intelligence(EI) training for their employees.

This project sought to explore the ways in which few companies are taking advantage of the Emotional Intelligence skill in the working environment. It also sought to test if an EI training software could increase EI awareness in an institution.

The study was conducted with employees, business owners, and self-employed individuals. An emotional intelligence test was administered to the participants before and after they used the EI training application for 10 consecutive days.

The results were analyzed using the tableau software, and they showed a slight increase in their emotional intelligence awareness after the 10-day period. Hence, the use of technology to increase the emotional intelligence skill of workers is encouraged.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Over recent years, the subject of Emotional Intelligence has been discussed and researched on, with discoveries made on the need for a person to have a level of Emotional Intelligence in order to interact successfully with oneself and others in our environment [2]. One of these environments in which we spend a good amount of our time is at the workplace, be it virtually or in person [5]. Emotional intelligence then becomes a factor to be considered when thinking about how healthy and encouraging the working environment is [9]. Hence, this study seeks to investigate some of the effective ways in which organizations can implement strategies to increase the Emotional Intelligence of their workers.

Emotional intelligence is the ability to understand one's own emotions and others' emotions in order to use this understanding to achieve set goals both for oneself and others. In short, Emotional Intelligence is the ability to master and alter one's emotions for the good of the individual and the community [2]. Emotional intelligence can be divided into five elements; these are self-awareness, self-regulation, self-motivation, empathy, and social skills [2]. All these five factors come together to make a person intelligent when it comes to emotional skills.

1.2 Motivation

With automation and AI on the rise, Emotional Intelligence is increasingly becoming a valuable skill to have in the working environment [8]. Yet, many organizations are not investing into the Emotional Intelligence of their employees, especially those in non-managerial roles [10, 8].

Companies that have decided to inculcate a form of Emotional Intelligence training across teams in an organization have experienced tremendous improvement, and CEOs who implemented such a strategy have not regretted so far[4] because the return on investment in Emotional Intelligence of workers is significantly promising. This soft skill affects decision making processes, employee-turn-over rates, conflict management, and other areas of a business [9]. Companies that have put in effort to develop Emotional Intelligence traits in their workers have seen immense improvements. This shows that there is the need for a solution that can create awareness of Emotional Intelligence skills in employees across board in an organization.

In addition, studies show that Emotional Intelligence training in academia has not been very successful. Students' Emotional Intelligence levels were assessed both in their first year and in their final year. According to this assessment, the emotional intelligence levels at the beginning and at the end of final year were similar and had no significant difference [1, 7]. Thus, the academic way of teaching Emotional Intelligence has been fruitful at creating knowledge on the subject but has not implemented the skill into students. Since the workforce is mostly made up of former college students who graduated and joined or created an organization, the educational system has little effect on the Emotional Intelligence of these workers. Hence, a system that focuses on getting the Emotional Intelligence skills ingrained into an individual will be beneficial.

Also, the number of workers constitute about half of the world's population [3]. Developing the Emotional Intelligence of workers will, in effect, mean that the quality of lives of half of the people around the world, as well as the people they interact with, will improve. Implementing an Emotional Intelligence training application is therefore promoting the reaching of the following SDG goals [6]:

- SDG goal 3, good health and wellbeing.
- SDG goal 8, decent work and economic growth.
- SDG goal 16, promoting peaceful and inclusive societies for sustainable development.

1.3 Research questions

- i. What is the current state of Emotional Intelligence in formal employment?
- ii. What effect will an Emotional Intelligence checker have on the awareness of Emotional Intelligence in the workplace?

1.4 Hypothesis

- i. Using an Emotional Intelligence checker can create the necessary awareness for productivity and performance in an organization.
- ii. There will be no difference between male and female employees in the level of Emotional Intelligence awareness.

CHAPTER 2: BACKGROUND AND RELATED WORK

2.1 Introduction

This section gathers and synthesizes information and literature on Emotional Intelligence. Research undertaken over the past years to better understand Emotional Intelligence are discussed. This chapter also answer the question of whether or not Emotional Intelligence is being used by existing establishments. The manner in which this element is being explored in these environments is also carefully considered. The last part of this section looks into already existing applications and software that are used for Emotional Intelligence training.

2.2 History of Emotional Intelligence

Over the years, there has been a need for humans to quantify elements existing in the world, and our own intelligence has not been an exception. This need has been beneficial, because for most of the elements that we quantified scientifically, we were able to improve them. Intelligence was however thought to be a fixed element that could not be enhanced since it was something that one was born with [17]. This was the existing belief when the Intelligence Quotient concept became popular.

Many psychologists explored the Intelligence Quotient concept extensively, coming up with assessments and aptitude tests to evaluate a person's level of Intelligence Quotient [11, 17]. The Intelligence Quotient is estimated by means of these tests, which compare the performance level of an individual to others at the same age [17]. In the 1990s, a new kind of intelligence, Emotional Intelligence, was brought to light. Daniel Goleman was one of its pioneers, with his first ever book

on the subject, *Emotional Intelligence: what it is and why it can matter more than IQ*. In his book, he defined Emotional Intelligence as the "ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth[11]." He also argued that Emotional Intelligence may be one of the most crucial factors to be considered in a person's success.

More insights were made as the years went by, and Emotional Intelligence was adopted in some schools as a Social and Emotional Learning (SEL) Program, where young children were coached to understand their own emotions, to check in on themselves often, and to comprehend the kind of social relationships and complexities that were happening in the classroom [4, 11, 21]. Children who underwent this training:

- showed lesser signs of anxiety;
- had lesser emotional tremors; and
- were able to maintain their focus in class.

Their academic performance improved as well, with the explanation being that the children had no emotional distractions because they were able to understand and manage their emotions; hence, their academic grades had increased by 11% [11]. Their anti-social behavior such as disrupting class went down by 10%. Their prosocial behaviors relating to liking school and being well behaved went up by 10% as well [11]. This was why Goleman (one of the pioneers of Emotional Intelligence – pg. 9) stated that Emotional Intelligence may be more necessary than Intelligence Quotient because the former is the foundation necessary for the latter to thrive. There have also

been attempts to create the awareness of Emotional Intelligence in some organizations. This will be addressed in the section below.

2.3 Emotional Intelligence in Establishments

Google is one of the establishments that takes Emotional Intelligence into consideration when creating a conducive working environment for success[5]. In their quest to develop emotionally intelligent teams in the organization, Google researched on the attributes of a great team and discovered a list of qualities, which were interestingly not related to the level of smartness of each of the team members. The qualities that made an effective, innovative, and productive team, google realized, had a stronger relationship with Emotional Intelligence. Factors such as the psychological safety of team members, and the ability of team members to depend on each other were topmost [5].

Apart from the research and adoption of some Emotional Intelligence elements into its teams, Google also uses an Emotional Intelligence training program from the Search Inside Yourself Leadership Institute which was earlier created by Chade-Meng Tan, one of Google's first engineer employees [16]. Meng Tan created this training program with the help of experts in mindfulness, leadership, Emotional Intelligence, and neuroscience to serve as an internal course for Google's employees. However, other companies started to demand for this course and hence, Meng Tan, along with two other colleagues, formed the Search Inside Yourself Leadership Institute (SIYLI) [16]. This global institution trains employees of organizations such as Netflix, Ford, LinkedIn, The United Nations, Google itself, and many more [2].

The Search Inside Yourself program is in three phases: the educational phase, the practical and exercise-involving phase, and then the capstone webinar phase [16]. They organize programs for individuals, organizations, and communities. 60% to 66% of the people who took the training developed the ability to regulate their stress levels, improved ability to focus on a present activity, and increased their listening skills by approximately 40% [19].

Similar to Google's SIYLI, the Institute of Health and Human potential , which is located in Toronto - Canada, also works with establishments by offering different kinds of training programs which are all aimed at building Emotional Intelligence [12]. It was founded by JP Pawliw-Fry. They offer virtual classroom programs, self-paced courses, in person classes, and learning reinforcements for organizations. They also offer Emotional Intelligence assessments to give feedback to organizations on their progress. Their most certified EI assessment test is the EI360 test [12]. Some of their organizational clients are Johnson and Johnson and United Technologies. There was a case study of one of the beneficiaries of their Emotional Intelligence program. One of the managers at Medard, a medical hospital located in Indianola, Pennsylvania, had great technical skills but got his colleagues frustrated with how he worked with them. After undergoing the training program, he received outstanding reviews from his co-workers and is now mentoring three other people in the organization to be emotionally intelligent [26].

The School of Life is a similar institution which offers virtual classes for individuals and organizations [29]. Its headquarters is based in London and the company was founded primarily by Alain de Botton – a philosopher, speaker, and writer born in Switzerland. The School of Life has brick and mortar schools in different regions across the world where they teach topics such as resiliency and other EI related content. They also sell different kinds of books, both for children and adults, relating to Emotional Intelligence [29].

The SAP Global Mindfulness Practice is also similar to Google's Search Inside Yourself program in that it was created internally and then was made available to other organizations [18]. SAP (Systems, Applications, and products in Data Processing) company is an enterprise management system which is headquartered in Walldorf - Germany and founded by Dietmar Hopp and four other AI engineers. The SAP Global Mindfulness Practice was created by SAP and is focused on mindfulness practices that build Emotional Intelligence, since they create a contemplative space between emotional stimuli and action, giving people the ability to become aware of and regulate their emotions.

2.4 Emotional Intelligence Tests

There are a number of Emotional Intelligence methods and tests created and used till date. The three main methods of assessing a person's Emotional Intelligence are

- the self-assessment ("I am good/ bad at...")
- the 360-degree assessment ("He is good/ bad at...")
- the performance/result assessment ("His performance on the given test shows he is good/ bad at...") [15].

The most effective method has been the performance assessment [15]. Some of the credible emotional testing tools are stated and described below.

The Mayer-Salovey-Caruso Emotional Intelligence Test was one of the first EI tests to be created [13]. This test assesses a person's ability to perceive, manipulate, understand, and manage emotions. There are about 141 questions in total, with these questions grouped into about seven

tasks that have different ways of assessing such as identifying the associated emotion in a given picture, and an assessment through a 1 to 5 scale measurement [13].

The EQ360 test is a “multi-rater assessment” [1]. This means that an EQ-i 2.0 test is taken by the person in question and others around him to come out with his Emotional Intelligence score. The EQ-i 2.0 test is in five elements:

- self-perception
- self-expression
- interpersonal
- decision making
- stress management [1, 15, 20].

These are all measured separately, and guidelines are sent to the individual to help him choose and categorize his raters. After accumulating the EQ-i 2.0 results that involve the perception of him and his raters, the results are now ready for viewing and interpretation. There are some sites online, like the Emotional Intelligence Training Company, that offer certificates for the EQ360 course[1]. People who wish to get certified for the EQ-i 2.0 test alone can do that as well. This means that the test will only involve the perception they have of themselves in relation to the questions.

Emotional and Social Competency Inventory (ESCI) test is another EI assessment tool that assesses the emotional and social competence of an individual, rather than their behaviors [7, 28]. It can also be tested in a 360-degree view. It determines what sets apart an average person from a competent leader [7]. This test includes scales such as emotional self-control, empathy, inspirational leadership, conflict management, teamwork, and influence.

Designed in Australia, the Genos EI test is another EI tool meant to examine one's behavior in association with Emotional Intelligence [15]. It can be taken by oneself, with the 180-degree perspective, or that of the 360-degree. It comes in multiple languages as well and can be completed in about ten to fifteen minutes. The Genos test assesses behavior relating to self-awareness, authenticity, positive influence, and other traits [10]. For example, the tests evaluates if the person taking the test is insensitive or empathetic, temperamental or resilient, and the likes [10].

2.5 Existing Emotional Intelligence Applications and Software.

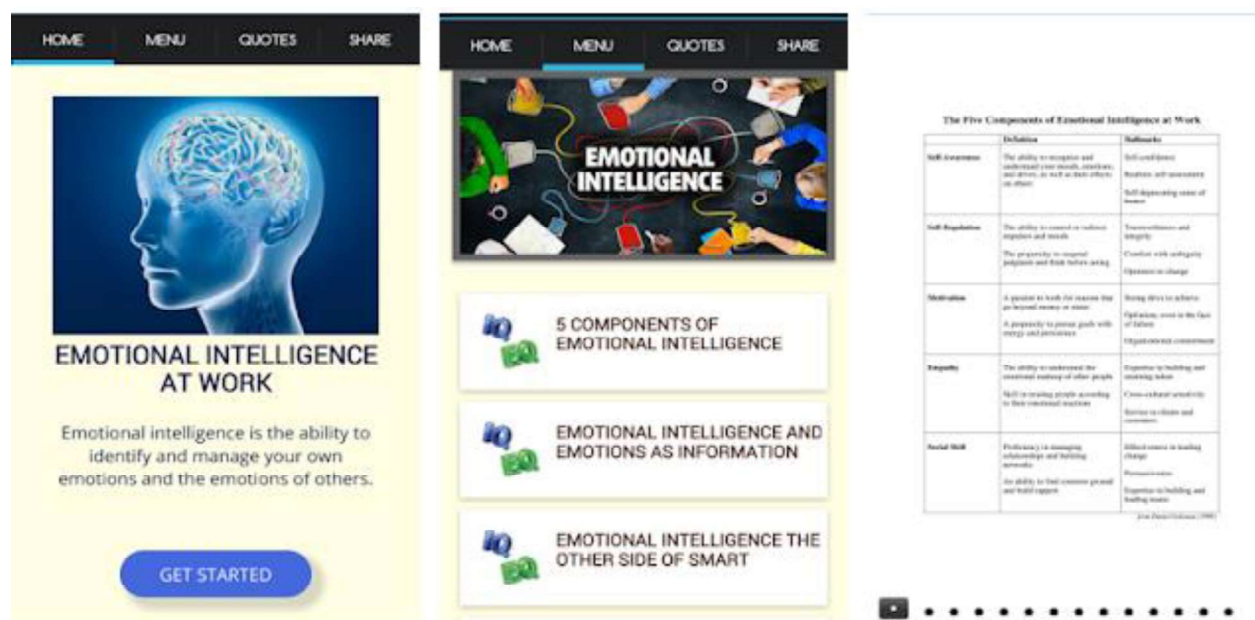


Figure 1 Screenshot of Emotional Intelligence at Work application

The *Emotional Intelligence at Work* application helps people to learn about what Emotional Intelligence is and why it is important [8]. There were pictures and content gathered from the Web to further illustrate Emotional Intelligence. As seen above in *Figure 1, Screenshot of Emotional*

Intelligence at Work Application, graphics were visually appealing, and the content was easy to understand, which the researcher can include into the study. The shortcoming of this application is that it explained what Emotional Intelligence is but failed to give the user more options such as a test to evaluate the Emotional Intelligence level. It also did not inform the user about the necessary steps that could be taken to improve one's Emotional Intelligence skill. The reviews accompanied by this app did not have encouraging reviews as well.

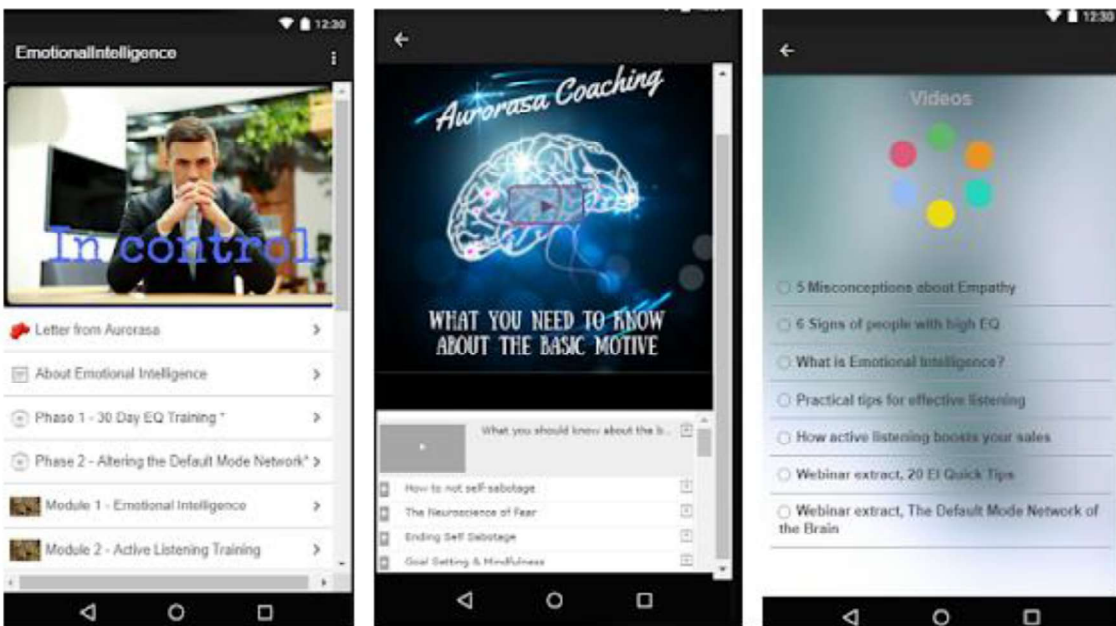


Figure 2 Screenshot of Emotional Intelligence Training App

Another existing software application is the Emotional Intelligence Training App in *Figure 2 Screenshot of Emotional Intelligence Training App*. It has a number of Emotional Intelligence courses that displays content on the knowledge and implementation of this skill[9]. It also offers a form of evaluation process to test one's Emotional Intelligence skills. These courses on the platform are structured in daily doses. Some of them are webinars with a video allocated for each

daily lesson[9]. This is a great way to get people knowledgeable about Emotional Intelligence and so this can be implemented in an emotionally intelligent system. However, the overload of daily content may be strenuous for people especially if they have a lot of tasks to accomplish already.

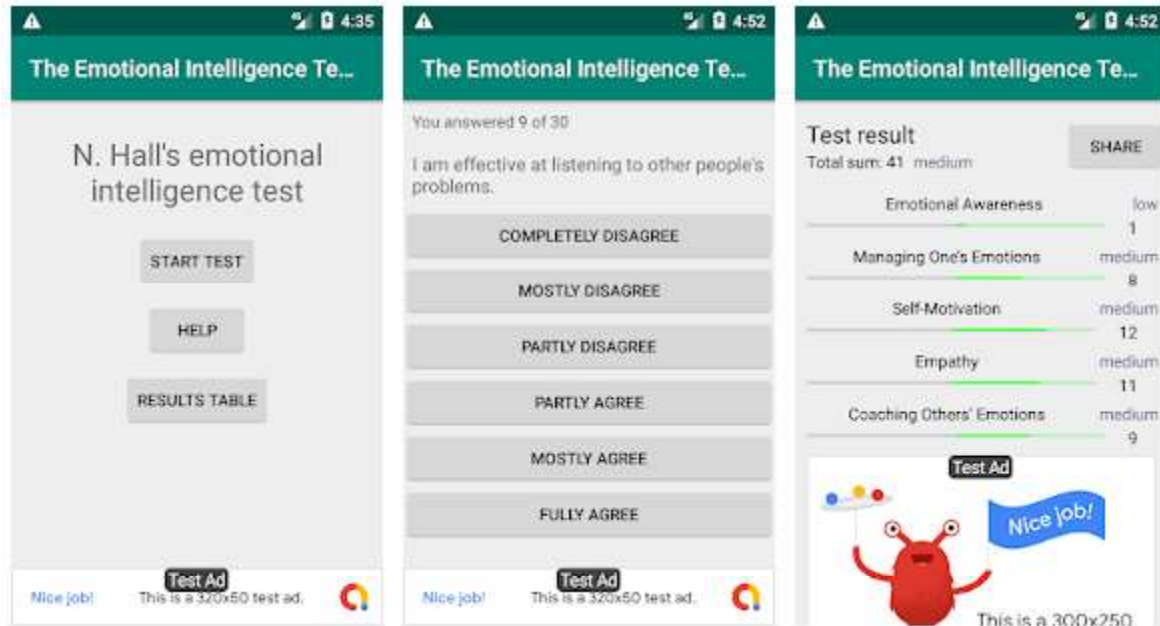


Figure 3 Screenshot of the Test Hall Emotional Intelligence application

Figure 3 Screenshot of the Test Hall Emotional Intelligence application is an Emotional Intelligence evaluation system that tests the Emotional Intelligence level with 30 statements [22]. These statements have multiple choice answers ranging from strongly disagree to strongly agree. After answering these questions, the results are displayed with five categories of scales: emotional awareness, managing one's emotions, self-motivation, empathy, and coaching others' emotions [22]. It, however, does not keep track of the changes in a user's results over time and serves only as a one-time evaluation system. Some of the questions utilized in this system can be used as inspiration in creating a suitable evaluation system for establishments.



Figure 4 Screenshot of The Zones of Regulation Application

In Figure 3 Screenshot of the Test Hall Emotional Intelligence application, a virtual world is created in the application where simulated situations are created to enable the user to think critically in rectifying the situation [24]. The user would require Emotional Intelligence to handle these problems that arise in the game. Even though the application seems relevant, it does not have a high rating on Playstore. One review also said that the game had a limited number of scenarios and that once a user was done solving these problems, the game ended and there was nothing else to do than delete the application [24]. The researcher finds this style of teaching helpful as it is hands-on, entertaining, and engaging at the same time. This method of simulated problem in the setting of an organization with Emotional Intelligence can be integrated into the Emotional Intelligence checker.

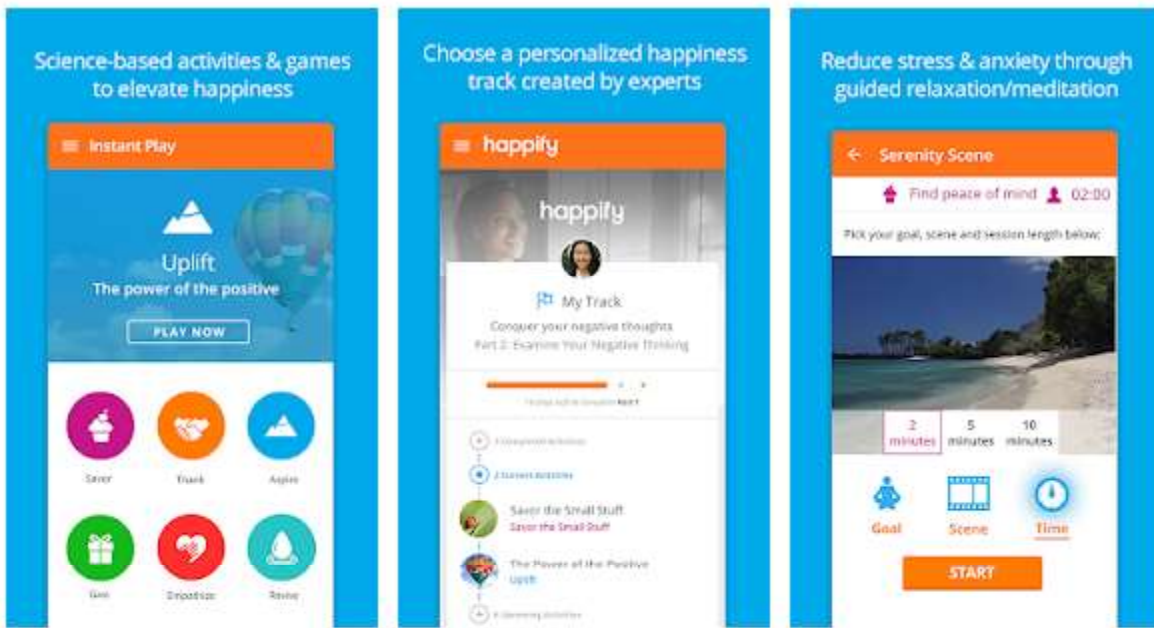


Figure 5 Screenshot of The Happify Application

In *Figure 5 Screenshot of The Happify Application*, it is seen that the Happify Application provides activities and games meant to boost emotional resilience and relieve stress[6]. The content of these activities and games are backed by science-based research and clinical evaluation, adding to their credibility. The app displays activities and game-based courses which are called tracks[6]. Each of these tracks deal with issues such as stress, developing leadership, and conquering negative thoughts. Every two weeks, an evaluation is automatically taken by the app to gauge the user's happiness level. The app also keeps track of changes in the ratings of the evaluation to see if the user's happiness is improving. According to the Happify organization, there are six skills that increase emotional wellbeing:

- savoring
- gratitude
- a sense of purpose

- acts of kindness
- empathy
- and physical health [23].

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter contains the description of the research design, requirement specification and the technological infrastructure to be developed. The population with which the research was conducted, the steps for the research, and the data analysis process are also discussed in this chapter.

3.2 Population

The population used in this experimentation were employees of the Société Générale Bank, the employees of Express Pay Ghana, self-employed individuals, and entrepreneurs. For Société Générale, the population was selected precisely from offices across the country. Such a population was suitable for the study because it represented a formal establishment where EI could be beneficial. Being a French bank situated in Ghana, the population had a diverse employee base as well. The researcher had 60 participants onboard for the study.

3.3 Sampling Method

Stratified sampling, where a population is divided into groups with participants being selected from each group, was utilized. In this case, the population was divided into departments such as Marketing and Information Technology. This was for the reason of getting participants across the

organizations so that the research would be less biased. Convenience sampling was then used to select a number of employees from each department for the study.

3.4 Steps for the Study

After getting the sample population, the participants were made to access the application. The first step was to take a pre-test which was made available to the participants on the application. The test consisted of a number of questions. After taking the test, the scores were stored in the database for future reference.

The applicants were then allowed to utilize the Emotional Intelligence application for 10 days. Even though studies show that it takes about twenty-one days to develop new mental habits and behaviours [19], the study was conducted for 10 days due to the scarcity of time. At the end of the period, each participant took a post EI test. The results from the test were recorded and used to answer the question of whether an Emotional Intelligence application could create Emotional Intelligence awareness.

3.5 Requirement Analysis Plan

The functional and non-functional requirements of the application are stated below. The functional requirements describe the specific functionalities of the application, while the non-functional requirements focus on the usability, performance, and other properties for the application that relate to the users' expectations. There was a case scenario, and a use case diagram was used to illustrate the functionalities of the applications.

The requirement analysis plan was derived with the knowledge from the research and literature review, specifically from the Happify application and the Zones of Regulation Application. Feedback and advice from the experts were also utilized. One of the experts is a recruitment associate at MEST Africa, “an Africa-wide technology entrepreneur training program, internal seed fund, and network of hubs offering incubation for technology start-ups in Africa [14].” Another expert contributing to the development of this application is the former Human Resource manager at the Société Générale Bank, Accra – main branch.

3.5.1 Functional Requirements

Intended Users

The intended users are employees, workers, teammates, or any group of people in an establishment or institution.

- The user will be able to sign up, login and logout from the system.
- The user will be able to view the available daily Emotional Intelligence activities to be taken.
- Once the user clicks on an activity, the user is given the option to save the activity for later use or to submit it as completed.
- The user is allowed to type a reflection on how the activity went and lessons learned.
- There will be a webpage dedicated to displaying the reflections from each user.
- For each reflection, a user can decide to keep it private or public.

3.5.2 Non-Functional Requirements:

- Web pages should load within 2 to 5 seconds [3].
- The application must be up and running throughout with no downtime.
- For security, all passwords must be encrypted before saving in the database.

3.5.3 Feature Specification (User Stories)

- As a user, I would like to login into the EI application.
- As a user, I would like to view the available daily Emotional Intelligence prompts or activities to be taken.
- As a user, I would like to be able to save an opened activity for later use or submit it as completed.
- As a user, I would like to type a reflection on how the activity went and lessons learned once the activity is completed.
- As a user, I would like to be able to keep a reflection private or public.
- As a user, I would like to log out from the EI application.

3.5.4 Use Cases

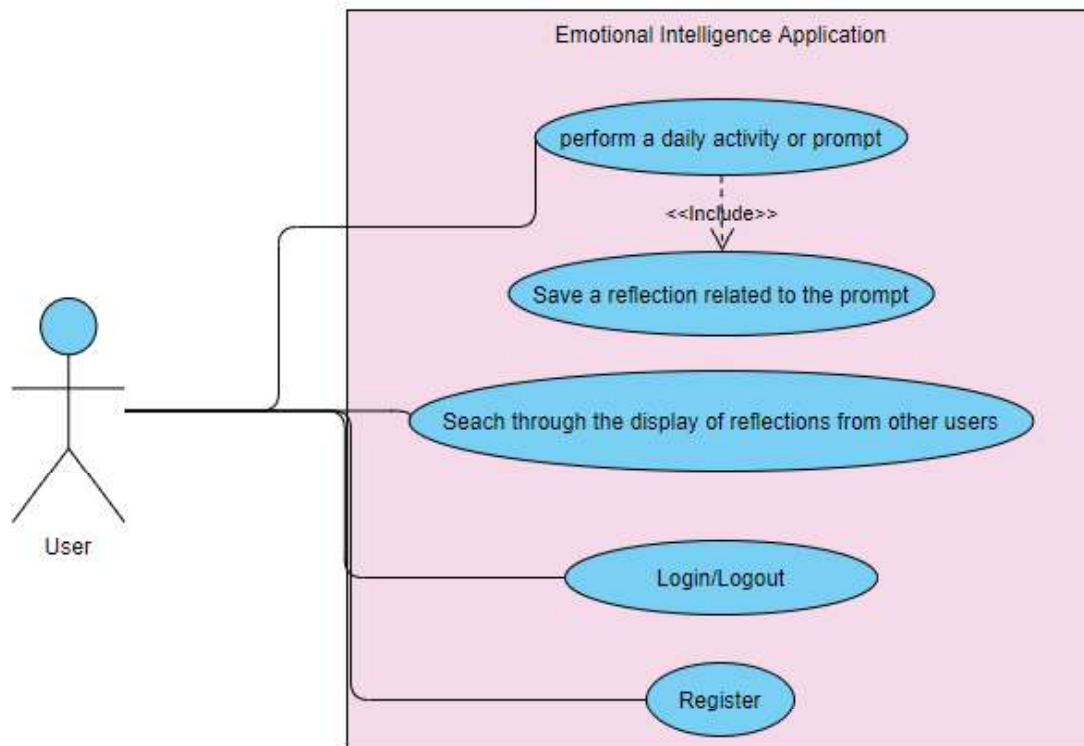


Figure 6 Use Case Diagram for EI Application

In *Figure 6 Use Case Diagram for EI Application*, the user was required to create an account by registering. The user could log in and out of the system. When the user logged into the system, he could see a display of the reflections from himself and other users. He could also write a reflection for each of the given Emotional Intelligence activities and save the reflection related to the prompt.

3.5.5 Case Scenarios

Example 1: The atrocities of the recent COVID-19 pandemic have left Kojo quite traumatized. After losing one of his relatives, he finds it hard to regulate his emotions. Working from home is difficult as well since he feels isolated and does not have his colleagues around to help him feel

motivated. Working virtually is also tough because there is miscommunication at times, and this causes conflicts between Kojo and his team members.

Example 2: Adwoa is a marketing associate at ABC institution. She has been praised for her hard work and work performance by her bosses. However, she received feedback from her mates and some members of management that she is not easy to relate with. She can be judgmental and does not allow her other team mates to openly express their opinions. Most of her colleagues say that they feel they are walking on eggshells whenever they are around her. Adwoa has tried to be more friendly and interactive but has not been successful so far.

3.6 Technology Overview

3.6.1 Technology Platform

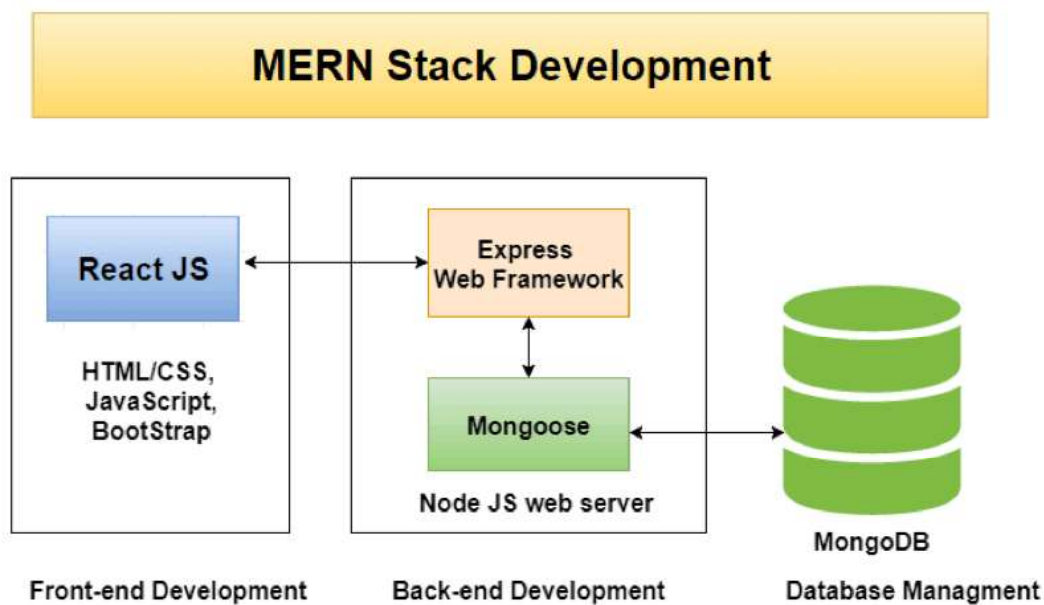


Figure 7 Illustration of MERN Stack

The application was built on a web platform. Using a web platform allowed the user to access the application with any kind of device or operating system. The technologies used for the web application were React.js, Express.js, and MongoDB (MERN) as seen in *Figure 7, Illustration of MERN Stack*. These technologies are further elaborated below:

- **React JS:** React JS is a JavaScript framework for front end development. It makes use of html and JSX (JavaScript and html together) as well as other JavaScript tools and libraries in building front ends for web development.
- **Express JS:** Express JS is a backend framework for node.JS (a runtime environment built on Google Chrome's V8 engine). Express JS accepts requests from the client tier and processes the request asynchronously in routes, after which responses are sent back to the client.
- **Mongo DB:** Mongo DB is a NoSQL database management system (DBMS) that stores each new data in documents. Mongoose will be used to create the schema object in the Node.js models. The website data will be stored on Mongo DB's, cloud DBMS (Mongo DB Atlas)

This development stack uses the JavaScript programming language and libraries predominantly. The MERN stack was suitable for the Emotional Intelligence software as it facilitated more user interactivity [25]. It also allowed for scalability, which would be needed when more features and activities were added to the application in the future [25]. It supported the Model View Controller (MVC) architecture for a smooth development process and possesses libraries for unit testing and integration testing of the Emotional Intelligence application [27]. In addition, the MERN stack was suited for an Agile development process which was to be adopted in building this application [3, 27].

3.6.2 Approach to Building the Application:

The application was built using an agile approach, which involved creating progressive prototypes to ensure the stated functionalities are being implemented in the application. Feedback was received from experts as well during each phase of the agile development to rectify or change requirements as need be.

3.6.3 Database Schema

The database structure for the Mongo DB is illustrated below:

- User
 - Id, required, string
 - Name: required, string
 - Email: required, string, email validation
 - Hashpassword: required, string
 - Reflections, not required, list of foreign keys to reflections, string
- Activities
 - Id, required, string
 - Name: required, string
 - Description: string
 - Content: required, string
 - Reflections, not required, list of foreign keys of reflections, string
- Reflection
 - Id: required, string
 - ActivityID: required, string, foreign key -> activities.id
 - UserID: required, string, foreign key -> user.id
 - isPublic: required, boolean,
 - content: required, string
 - isPublished: required, boolean.

3.6.4 Wireframes



Figure 8 wireframe displaying the main page.

< Back to main page

<Activity Name>

Activity Description

Benefits

Reflection : <Reflection Prompt>

Save as Draft Submit

Figure 9 wireframe displaying an activity.

< Back to home page

Reflections Timeline

<Username> - <Activity name>

<Username> - <Activity name>

⌵

Figure 10 wireframe displaying the reflections timeline.

3.7 Data Analysis

Tableau Software was used to analyse the data collected from the application. A quantitative analysis was carried out on the data gathered. The information on the test was also analysed to show whether or not the hypothesis of creating Emotional Intelligence awareness through the application was met.

3.8 Ethical Considerations

To ensure confidentiality and protection of participants' integrity, a consent form was given to each participant to sign before the experimentation began. Also, the necessary authorities in the organization were contacted with our experiment approved preceding the commencement of the study.

CHAPTER 4: DEVELOPMENT, STUDY, AND RESULTS

4.1 Introduction

This section holds information on the study, the data analysis, and the results attained from analysing the data retrieved. The development section focuses on the building of the Emotional Intelligence system and some of the challenges encountered. The experiment section touches on the process of engaging with the participants to produce the required results. The results sections will discuss the analysis of the data gotten from the participants and its interpretation.

4.2 Development

The application was built using React JS for the user interface, Express JS for the backend, and Mongo DB for the database. In *Figure 11 Using Bcrypt to verify password* and in *Figure 12 using json web token for user authentication*, the user's account was secured with authentication libraries such as BcryptJS and json web token. *Figure 13 Creating and storing user token upon user sign in* shows how a token is generated each time a user logs into the system. The token is then sent through a json response to the user interface to be stored and sent along with any new request to verify the user.

```

103
104     try {
105         let user = await User.findOne({
106             email,
107         });
108         if (!user)
109             return res.status(400).json({
110                 msg: "User does not exist",
111             });
112         const isMatch = await bcrypt.compare(password, user.password);
113         if (!isMatch)
114             return res.status(400).json({
115                 msg: "Incorrect Password!",
116             });
117

```

Figure 11 Using Bcrypt to verify password.

```

1  const jwt = require("jsonwebtoken");
2
3  module.exports = (req, res, next) => {
4      const token = req.header("token");
5      if (!token) return res.status(401).json({ msg: "Auth Error, access denied." });
6
7      try {
8          const decoded = jwt.verify(token, process.env.JWT_SECRET_KEY);
9          req.user = decoded.user;
10         next();
11     } catch (e) {
12         console.error(e);
13         res.status(401).send({ msg: "Access Denied" });
14     }
15 };
16

```

Figure 12 using json web token for user authentication.

```

118 ✓    const payload = {
119 ✓      user: {
120 ✓        id: user.id,
121 ✓      },
122 ✓    };
123
124 ✓    jwt.sign(
125 ✓      payload,
126 ✓      process.env.JWT_SECRET_KEY,
127 ✓      {
128 ✓        // expiresIn: 3600,
129 ✓      },
130 ✓      (err, token) => {
131 ✓        if (err) throw err;
132 ✓        res.status(200).json({
133 ✓          token,
134 ✓        });
135 ✓      }
136 ✓    );
137 ✓  } catch (e) {
138 ✓    console.error(e);
139 ✓    res.status(500).json({
140 ✓      msg: "Server Error",
141 ✓    });
142 ✓  }
143 }
144 );

```

Figure 13 Creating and storing user token upon user sign in.

The app was built in a way that would collect the demographic data such as their field of work, age, and gender of the user while signing up. The application took about 10 weeks to develop and once it was ready, it was hosted on Heroku for the participants to have access.

```

1  const reflectionRouter = require("express").Router();
2
3  const auth = require("../auth");
4
5  const Reflection = require("../models/reflections");
6
7  reflectionRouter.get("/", auth, (request, response) => {
8    Reflection.find()
9      .populate("activity user")
10     .sort({datePosted: "descending"}) // Find related code in EmoWork
11     // .select("content activity isPublic isPublished user likes comments")
12     .then((res) => {
13       // const newRes = res.map((each) => ({
14       //   ...each,
15       //   isLiked: each.Likes.some(each => each.user === request.user.id)
16       // }));
17       const List = res.map((r) => r.toJSON());
18       response.status(200).json(List);
19     });
20 });
21

```

Figure 14 Reflection Router for requests and responses.

```

models > reflections.js > ...
1  const mongoose = require("mongoose");
2  mongoose.set("useFindAndModify", false);
3
4  const ReflectionSchema = new mongoose.Schema({
5    isPublic: {
6      required: true,
7      type: Boolean,
8    },
9    content: {
10     required: true,
11     type: String,
12   },
13   isPublished: {
14     type: Boolean,
15   },
16 },
17   datePosted: {
18     type: Date,
19     default: Date.now(),
20   },
21   activity: { type: mongoose.Schema.Types.ObjectId, ref: "activity" },
22   user: { type: mongoose.Schema.Types.ObjectId, ref: "user" },
23 }); // Find related code in EmoWork
24 ReflectionSchema.set('toJSON', {
25   transform: (document, returnedReflection) => {
26     delete returnedReflection.__v
27   }
28 });
29
30 module.exports = mongoose.model("reflection", ReflectionSchema);
31

```

Figure 15 MongoDB model of the user's reflection

```

39
40 app.get("/api", (req, res) => {
41   res.status(200).send(`Hi Welcome to the EmoWork API`);
42 });
43
44 app.use("/api/auth", auth);
45 app.use("/api/user", user);
46 app.use("/api/activities", activity);
47 app.use("/api/reflections", reflection);
48 app.use("/api/results", results);
49 // app.use("/api/Likes", Likes);
50 // app.use("/api/comments", comments);
51
52 app.use("/", express.static(path.join(__dirname, "build")));
53
54 app.get("*", function (req, res) {
55   res.sendFile(path.join(__dirname, "build", "index.html"));
56 });
57
58 //PORT
59 const PORT = process.env.PORT || 4000;
60 app.listen(PORT, () => {
61   console.log(`Server is listening on port ${PORT}`);
62 });
63

```

Figure 16 Screenshot of the index page for the API

4.3 The Study

After the Emotional Intelligence web application was ready, the web URL was sent to the participants from Société Générale and from Express Pay. Some entrepreneurs and self-employed individuals also participated in the study as well. The study lasted for 10 day, with the participants taking the Emotional Intelligence test before moving on to working on the daily activities that were meant to increase their emotional intelligence.

After taking the test, they were shown their results, and then directed to the activities page to begin reflecting on each daily activity for the next 10 days. *Figure 17 User Interface Displaying Opened and Locked Activities* shows how the activities were locked so that only the next activity was opened after the user had completed the current activity. This was to ensure that users followed the sequence of the 10 days.

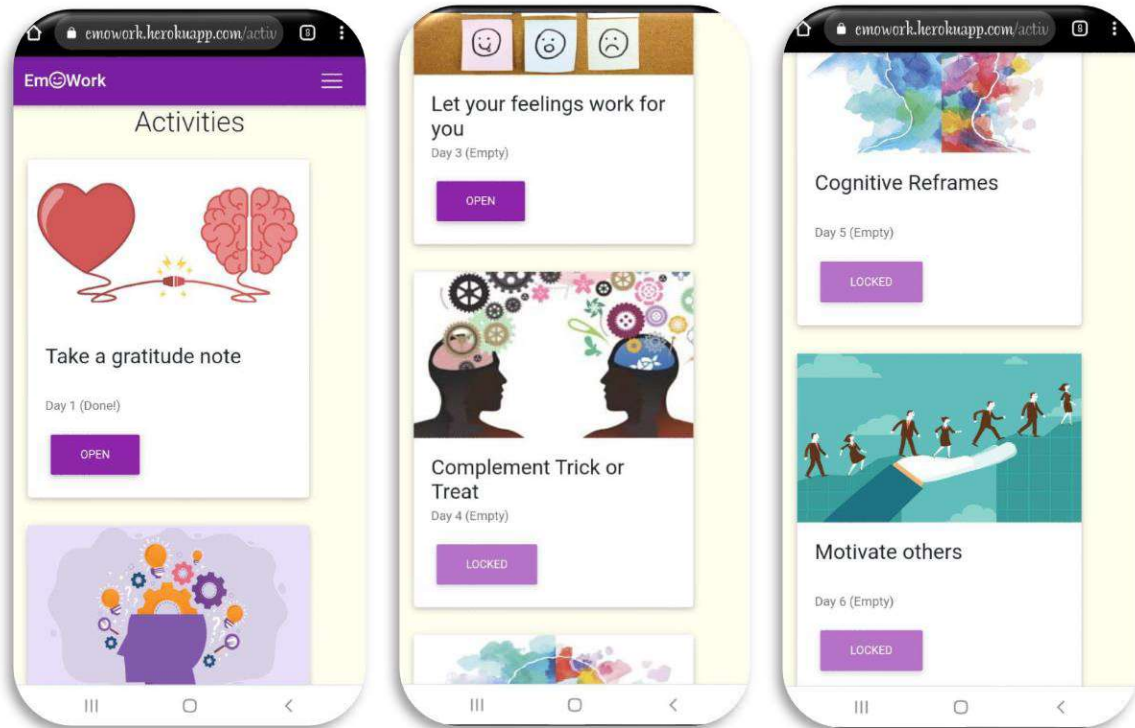


Figure 18 User Interface Displaying Opened and Locked Activities.

The Emotional Intelligence Test was also hidden so that all the activities would be completed before the user could take the test again. As seen below in *Figure 18 User Interface showing the prompt, benefits, and reflection*, each activity had a prompt that the user would read to understand the instructions of that activity. There was also a benefits section for the user to understand how that activity was going to impact them. After that there was a section for reflection where the users had to type how the activity went in a text area input.

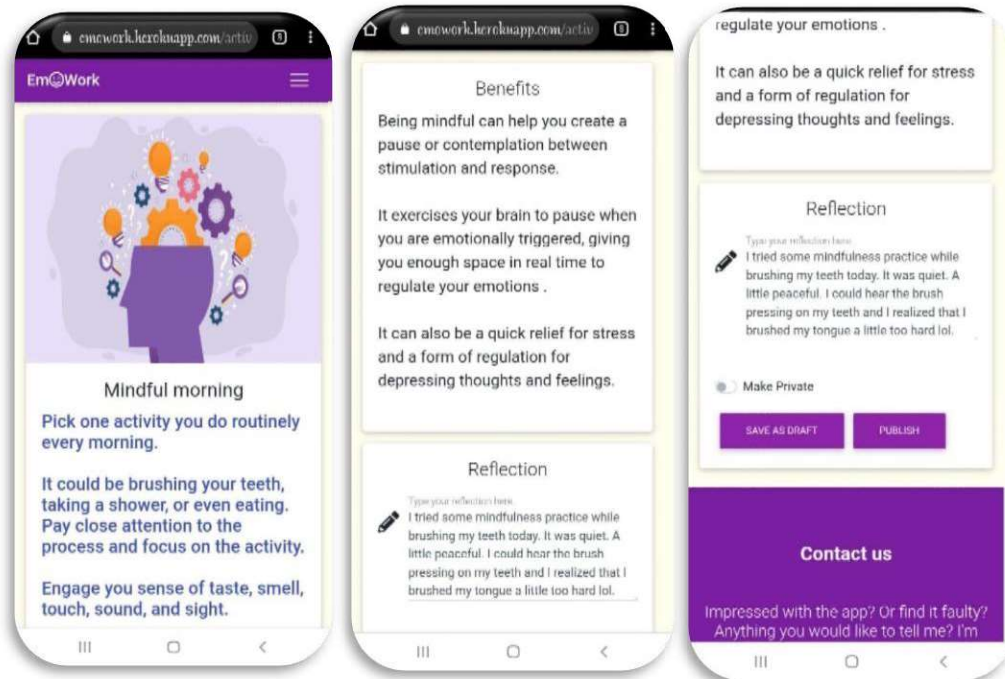


Figure 19 User Interface showing the prompt, benefits, and reflection.

The user could save the reflection as a draft or could publish it. If published, it would be shown on the timeline in *Figure 19 User Interface Showing the timeline view of the app* where other users would see the reflection as a post. The user could also make the reflection private to prevent other users from viewing it.

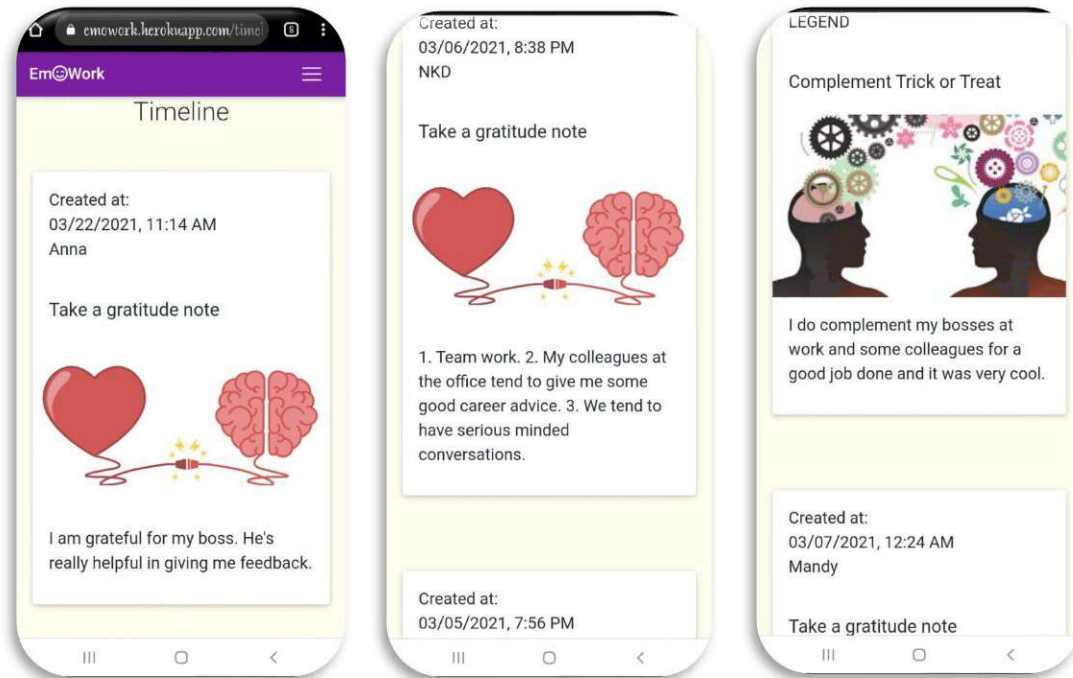


Figure 20 User Interface Showing the timeline view of the app.

After the 10-day period, the users took the test in *Figure 20 User interface of the Emotional Intelligence Test* again to gauge their progress in Emotional Intelligence after using their application. They showed their progress by displaying how much percentage in Emotional Intelligence they had increased by.

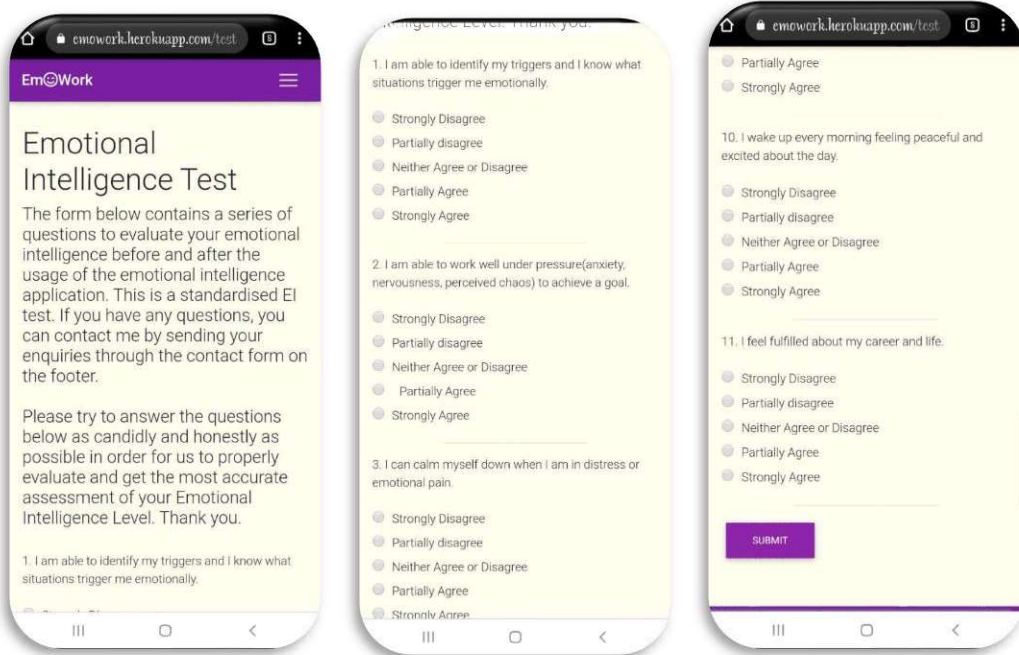


Figure 21 User interface of the Emotional Intelligence Test

4.4 Results

4.4.1 Pre-Test Analysis

Demographic data were taken from the users as they sign up. The user's age, field of work, and gender were taken and analysed. Below are the graphs:

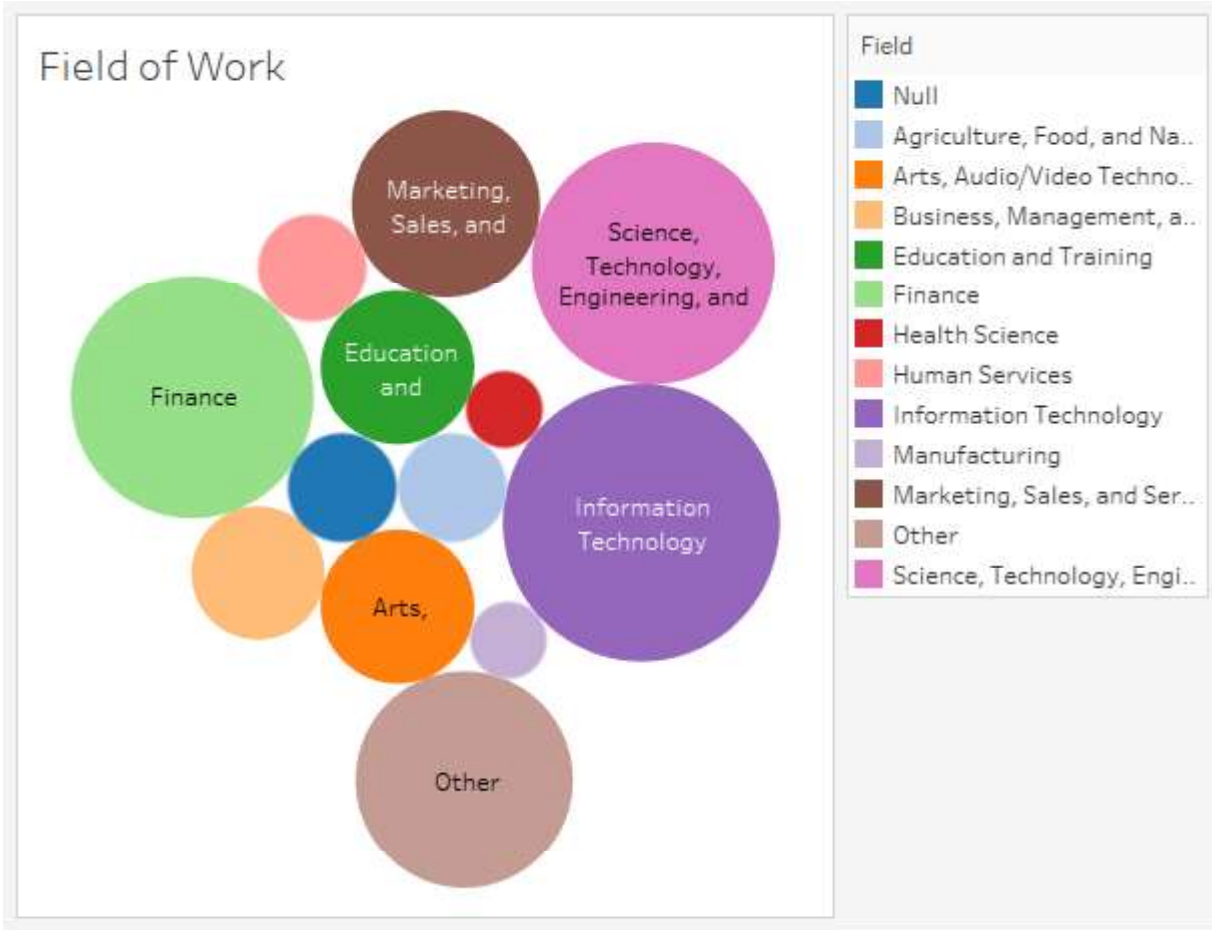


Figure 22 Participants' Field of Work Distribution

As seen in *Figure 22 Participants' Field of Work Distribution* above, the highest field of work amongst the users was the participants in the Information Technology sector, followed by the Science and Technology field, then the Finance field. The smallest field was the Manufacturing field.

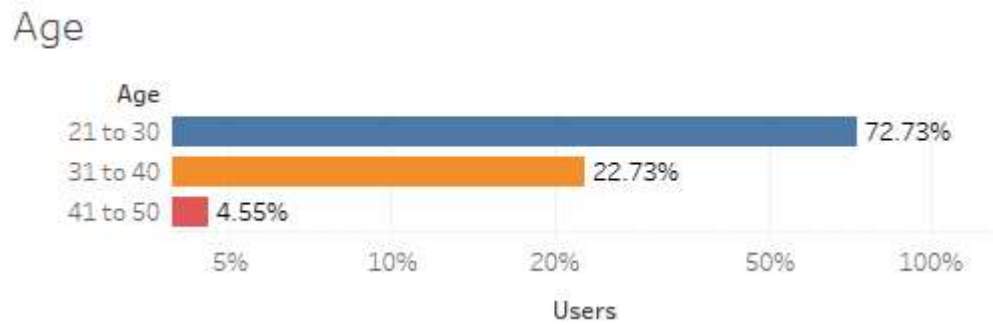


Figure 23 Age Distribution of Participants

In *Figure 23 Age Distribution of Participants*, the highest age group was between 21 and 30 years, followed by 31 to 40, then 41 to 50 with 4.5% of the total number of users.

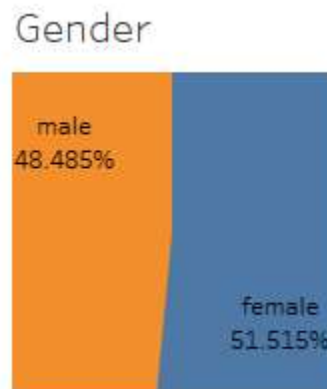


Figure 24 Gender Distribution of Participants

About 52 percent of the users were female, with the rest being male. From *Figure 24 Gender Distribution of Participants*, we can see that there was an almost equal distribution of the sample users with respect to gender.

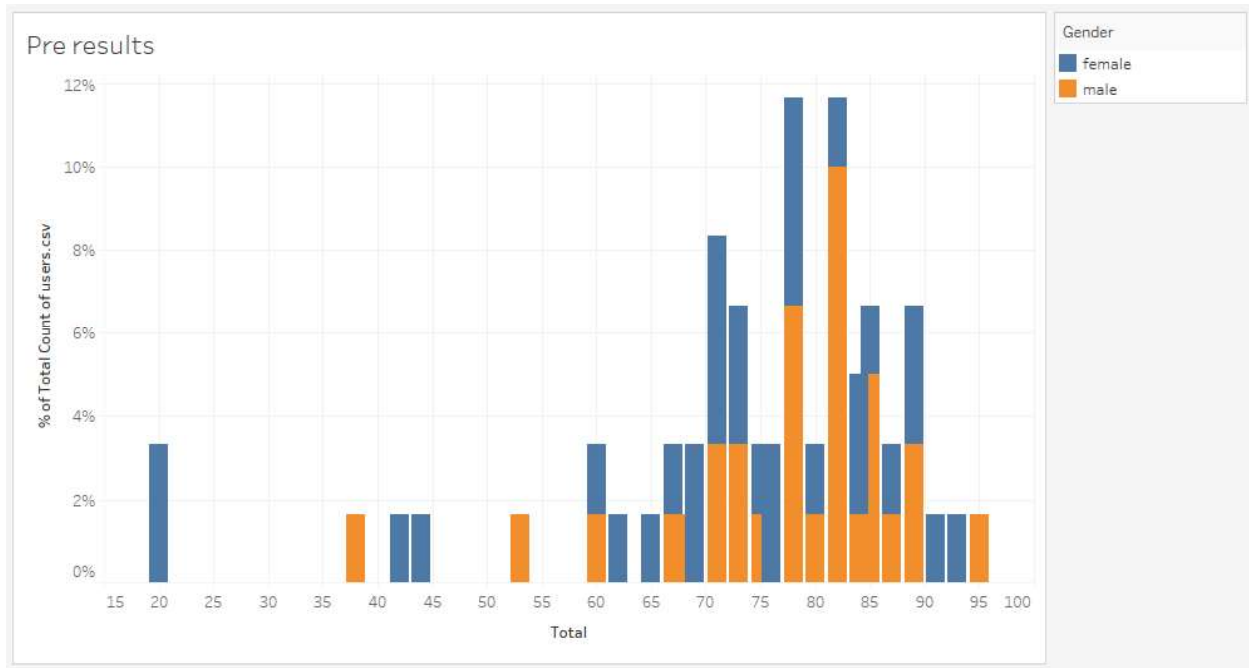


Figure 25 Pre-Test Results of Participants

In *Figure 26 Pre-Test Results of Participants*, we have the results of the users' Emotional Intelligence test before taking the daily activities for 10 days. The graph is left skewed, meaning that there were a few participants whose emotional intelligence results were considerably low. The scale of the results was between 1 and 100. Most of the participants' emotional intelligence ranged between 60 to 90.

4.4.2 Post-Test Analysis

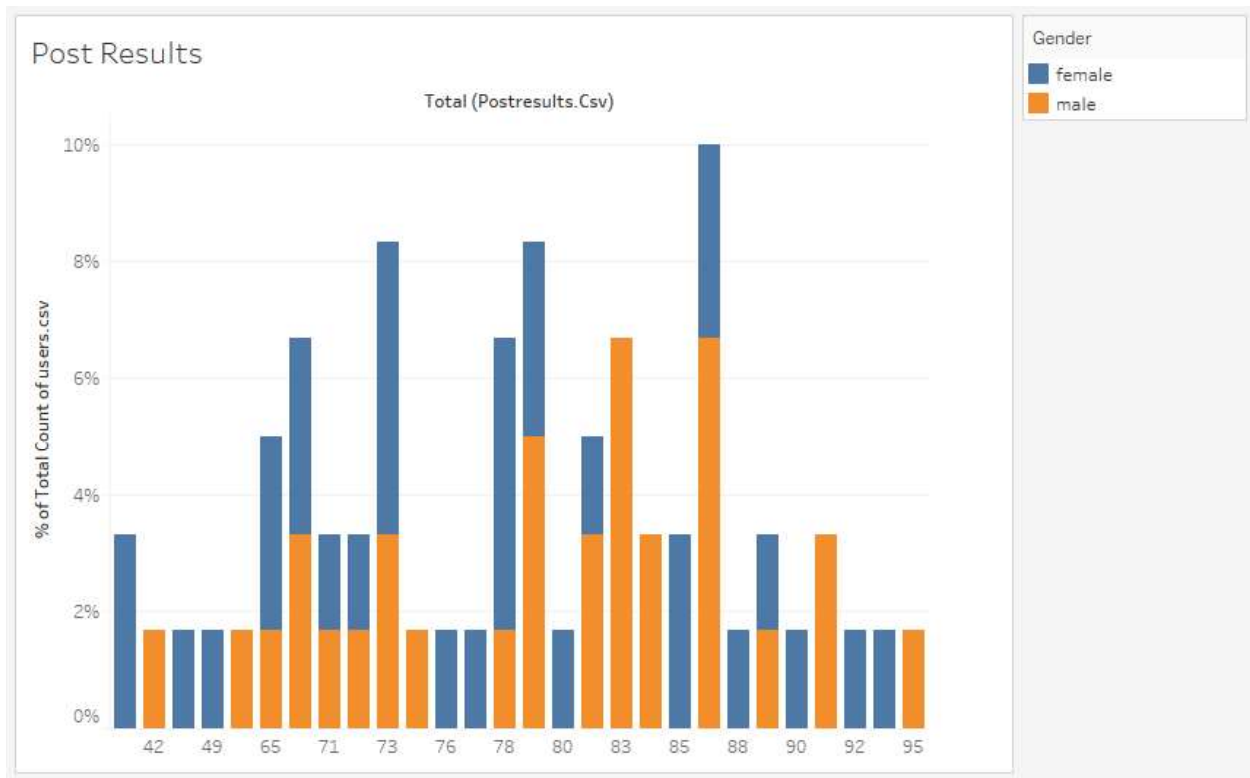


Figure 27 Post-Test Results of Participants

Figure 28 Post-Test Results of Participants is the graph showing the users' results after completing the activities in the application. The highest results were between 85 and 88. The graph of the post results has a more symmetric distribution.

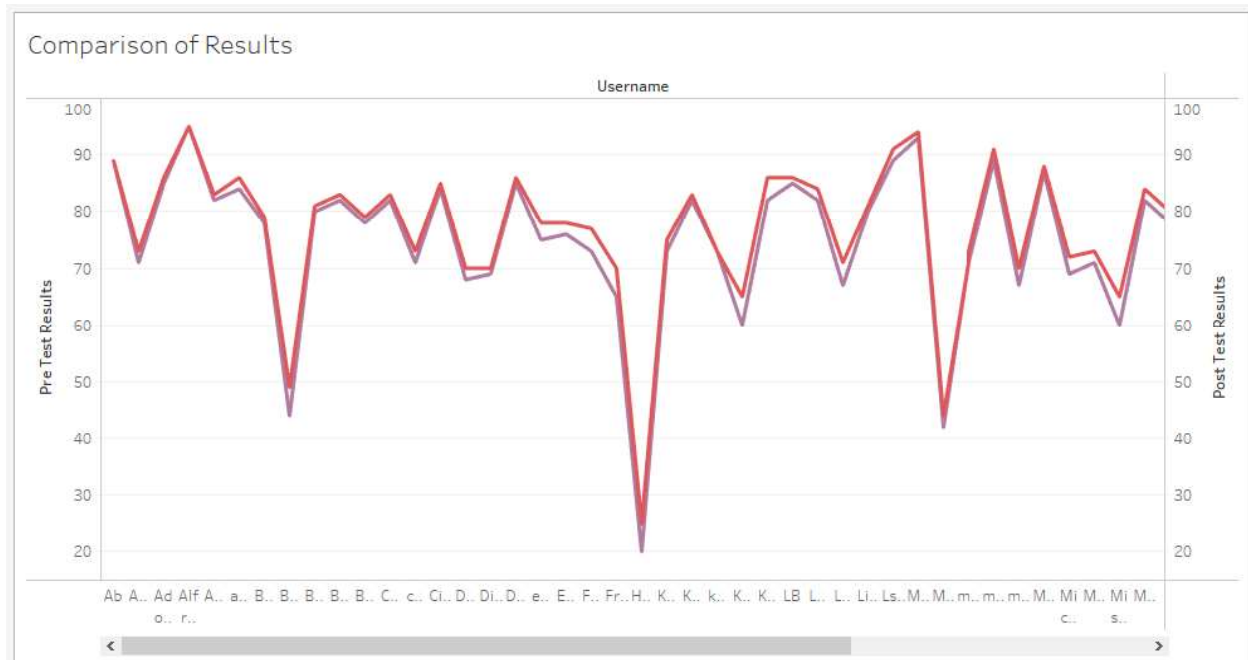


Figure 29 Difference between Pre-Test and Post-Test Results

Figure 30 Difference between Pre-Test and Post-Test Results displays both the pre and post-test for each user. The purple line is the pre-test while the red line is the line for the post test. The gap between the two lines shows the change in results for each of the users. We can deduce from the graph that there is usually a slight change in Emotional Intelligence for each user. A few users however did not experience a change in their emotional intelligence.



Figure 31 Average Change and Standard Deviation of Results

The average change of the Emotional Intelligence results before and after completing the activity was 2.15% as seen in Figure 31 Average Change and Standard Deviation of Results. This can be

interpreted as: on average, a participant's Emotional Intelligence increased by approximately 2% after using the Emotional Intelligence training application, with a variability of 1.5%.

4.5 Discussion of Findings

From the data analysis above, most of the participants came from different fields of work. It is also observed that the distribution of the participants' gender is almost even. Most of the participants in the study were between the ages of 20 and 30, with only a few being in an older age range.

In observing the difference between the test administered before the use of the application and after the use of the application, we see that the participants' Emotional Intelligence increased during the period of being exposed to the application. Hence it is safe to say that the use of an emotional intelligence training software has the potential of increasing the emotional intelligence awareness in a working environment.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the conclusions on the results obtained from the data analysis in chapter four. There are also sections in the limitations faced during the experiment and the future recommendations that individuals who want to take on the study from here can include in their further studies on this particular subject.

5.2 Application of Results

This section seeks to elaborate on the findings in relation to the research questions and the hypothesis stated in chapter two.

In answering the question of what the current of Emotional Intelligence(EI) in formal employment is, we discovered that EI is used in a few established organizations in countries located in the Western part of the world. Little research was found on workplaces in Africa that adopted a form of emotional intelligence training and assessment in the workplace. There were also a few software applications available that attempted to help users increase their emotional intelligence awareness, even though none of the appicated were made peculiarly for the workplace.

The study conducted was able to answer the question on what effect an emotional intelligence checker system would have on the awareness of EI in the workplace. From the study, the average change of the participants' emotional intelligence after using the application for 10 consecutive days was 2%, with a range between 0% and 5%. Hence, it was realized that with continuous use, such a system would increase the EI awareness of people in a working establishment.

According to the study, it is safe to accept the hypothesis that using an EI checker can create the necessary awareness for productivity and performance in an organization. It is also safe to accept the second hypothesis that states that there will be no difference between male and female employees in the level of Emotional Intelligence awareness since the percentage difference between the male and female participants in the study was little (about 2%).

5.3 Conclusion

From the analysis done in this research, it is seen that there was an increase in Emotional Intelligence during the time period of exposing the workers to the application. It showed that employees in the technology field are also interested in building their emotional intelligence. From the gender distribution as well, both women and men are interested in improving their emotional intelligence.

The literature review proved that some companies acknowledged that Emotional Intelligence was important in corporations. Exposing the sample workers to the Emotional Intelligence application for approximately a week increased the emotional Intelligence awareness of the workers. Thus, companies are encouraged to invest into using technological tools to train their workers on emotional intelligence, especially during this era of a pandemic and remote work.

5.4 Experiment Limitations

One particular limitation faced was the limited time that the researcher had for building the application and running the experiment. Consequently, a minimum viable product of the application was built, and the experiment was cut short from 21 days to 10 days. It may have,

however, been good for the participants as they could have gotten exhausted by the third week of using the application each day.

Another limitation was finding free standard Emotional Intelligence Test online that were complex enough to ensure that users could not intentionally choose answers to give them a higher emotional intelligence score.

5.4 Future Recommendations

Firstly, I would recommend that the study should be conducted for 21 days as it takes at least 21 days to build a new emotional habit in the human brain [19]. Hence, there will be a more significant change in the emotional test results if this is done.

In addition, a recommendation on the next steps to take on improving one's emotional intelligence can be displayed in the application after taking the emotional intelligence test the second time. This is to help give the users an idea of what next steps they can take to maintain or improve their emotional intelligence.

Also, a like and comment feature can be added to the timeline page to allow for interaction with other users' reflections. This will increase engagement and possibly the sustainable use of the application.

Lastly, the emotional intelligence test can be taken by the users upon using the application for the first time; however, they can only see their results after signing up. This will ensure the retention of more users.

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Appendix

Emotional Intelligence Test Questionnaire

Thank you for partaking in this experiment. The form below contains a series of questions to evaluate your Emotional Intelligence before and after the usage of the Emotional Intelligence applications. If you have any questions, you can contact Florence.ofori@ashesi.edu.gh for more information.

Please try to answer the questions below as candidly and honestly as possible in order for us to properly evaluate and get the most accurate assessment of your Emotional Intelligence Level.

Thank you.

1. I am able to identify my triggers and I know what situations trigger me emotionally.
 - ☐ Strongly Disagree
 - ☐ Disagree
 - ☐ Neither Agree or Disagree
 - ☐ Agree
 - ☐ Strongly Agree
2. I am able to work well under pressure(anxiety, nervousness, perceived chaos) to achieve a goal.
 - ☐ Strongly Disagree
 - ☐ Disagree
 - ☐ Neither Agree or Disagree
 - ☐ Agree
 - ☐ Strongly Agree
3. I can calm myself down when I am in distress or emotional pain.
 - ☐ Strongly Disagree
 - ☐ Disagree

- Neither Agree or Disagree
 - Agree
 - Strongly Agree
- 4. I can motivate myself to accomplish a task I have been dreading.
 - Strongly Disagree
 - Disagree
 - Neither Agree or Disagree
 - Agree
 - Strongly Agree
- 5. I am able to understand other's perspective even when I disagree with them.
 - Strongly Disagree
 - Disagree
 - Neither Agree or Disagree
 - Agree
 - Strongly Agree
- 6. I can approach a person about a wrongdoing without shouting or getting angry.
 - Strongly Disagree
 - Disagree
 - Neither Agree or Disagree
 - Agree
 - Strongly Agree
- 7. I can convince a person to accomplish or do a disliked activity.
 - Strongly Disagree
 - Disagree
 - Neither Agree or Disagree
 - Agree
 - Strongly Agree
- 8. I am able to express my views and opinions in a group setting without feeling sorry or guilty.
 - Strongly Disagree
 - Disagree
 - Neither Agree or Disagree
 - Agree
 - Strongly Agree
- 9. I do not hold grudges or resentment against anyone in my workplace.
 - Strongly Disagree

- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

10. I wake up every morning feeling peaceful and excited about the day.

- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

11. I feel fulfilled about my career and life.

- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree