Pinocchio

2021 SIGHT Project

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1. Introduction

1.1. Background & Problems

Mental health in Hong Kong is at its worst in 9 years since 2012[1], especially due to the COVID-19 pandemic which prevents people from social interaction and worsens their mental health as time goes by. Yet, despite the high number of people suffering from mental health conditions, it is worrying that only 10% of respondents seek professional help. This hesitancy to reach out greatly reduces the chances of recovery. One reason for this hesitance lies in the cultural aspect of Hong Kong, where social harmony and family reputation are heavily valued. People are wary of seeking help or even getting closer to people who have mental health problems in fear it will damage their reputation. Consequently, university students in Hong Kong do not want to seek help even when they suffer from mental health issues. This is worrying as 41% and 21% of students already have moderate to severe anxiety and depression levels respectively. Moreover, we surveyed 99 HKUST UG students to ask about their current situation with mental health. Expectedly, nearly 80% of respondents have not visited the wellness center, while 60% of students were diagnosed with mental health problems.

In addition, there is a hole in mental health services provided in UST, specifically in the peer-to-peer support system. While there are professional counselors, many students are too afraid to reach out for help due to the fear of being labeled as 'mentally unstable.' There are also peer counselors, but there is a limit to how many people they can handle due to the unbalance between the number of peer counselors and those suffering from mental health issues. Lastly, while there exists PaUST (a platform for students to share their worries), they are only an Instagram account and thus, lack timeliness and are limited to how many concerns they can address in a short period. Thus, our team believes that there should be a better solution of approaching students to let them be more open to the topic of mental health and therefore improve their mental wellness.

1.2. Objectives

The main objective of Pinocchio is to build a supportive community for HKUST students to grow a healthy mindset and inner wellness. We will be providing 4 main features, which are: writing stories, publishing the stories either for the users' self or for the public, bookmarking stories of other users, and looking back at the stories of what individual users wrote. Users will be allowed to comment on other users' stories that

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[1] www.jmhf.org/20201011p18-30

they published for the public; this will make users get engaged and thus build a supportive environment for everyone.

2.   Project Development

2.1.   Symbolism

Our solution to the addressed problem is to launch an online forum called Pinocchio, which allows HKUST students to anonymously share their experiences regarding mental health. In the story, Pinocchio is a wooden puppet that lies and eventually becomes a real boy after reflecting on himself when he was eaten up by a whale. Just like how Pinocchio lies, people who have mental health issues tend to lie or hide their feelings; and our website symbolizes the whale that ate Pinocchio. We want our platform to "eat up" the users' mental health problems and allow them to become their true selves by reflecting on themselves and interacting with others who may have gone through similar problems; thus, in the end, we hope that our users no longer hide their negative feelings.

2.2.   Design evolution

The design of Pinocchio also has evolved significantly since the whole project format has been changed 2 times. Initially, we were planning to launch a 1:1 private chatting app instead of an online forum. This was because 1:1 chat won the most votes when we conducted a survey among HKUST UG students to ask what new services they would like to have regarding mental health. However, we soon switched to launching a meditation app, as 1:1 chat requires heavy manpower and thus it is unrealistic for six of year 1 students to handle. Yet, our research in the market indicated that existing platforms already focus on individuals. Therefore, we started to believe that we should instead provide an online forum, a community-based platform, so that we are tackling the issue in a different way. Nevertheless, there still were problems with the design of the platform: too childish and too bright, as suggested by our survey[2]. To satisfy the users' needs as much as possible, we asked students to vote for their favorite designs among 5 new designs we came up with. The chosen design is shown below. Survey results can be seen here[3]. As we used a design thinking approach in the development of Pinocchio, we conducted many interviews and beta feedback talking with users. This was done approximately every 2 weeks to ensure that our design is in line with user's expectations. We invited users from different departments and various years to participate in the testings to ensure that the feedback we receive can represent the

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[2]
https://docs.google.com/spreadsheets/d/1EwFEDd6YJtk0XjgjCJCdTFcavtf2LOutGTAWxpAcDJw/edit?usp=sharing
[3]
https://docs.google.com/spreadsheets/d/10bSkYQ_7u9gJidhujGY70lDL_UqQoEzVJD7FqLaATqw/edit?usp=sharing

HKUST student body as best as possible. The interview results of beta users are here[4]. The feedback from our beta users are paramount to us and we encourage every team that comes after us to take a look at the above document.

Not only due to the voting but there is another reason behind deciding our final design. Many research published in health professional websites including the US National Institute of Health showed that color therapy[5] uses brighter colors to change people's moods, or even heal emotional problems including depression. Whilst dull color is what depressed people use to portray their emotion, which therefore can make people get depressed even more if they consistently see the dull color through our website design. Since this design was able to fix all the drawbacks of the past design; and therefore it is less childish, not too energetic but not too dull as well, and simpler.

2.3.   Significance of our idea & Meeting needs

The website will serve as a footstone that will lead us a step closer to creating an environment where people are no longer hesitant to share their true feelings regarding mental health. While our solution will not directly eradicate HKUST students' stigma on mental health, it does create a pathway wherein students find that they are not the only ones suffering from mental health issues.

We, as a team, strongly believe that our vision of creating this supportive community can be achieved because a past case study on healthyplace.com (an online mental health forum) has found that the most common interaction exchanged among members was to find support and information about depression. Support was often

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https://docs.google.com/document/d/1zKBdUH1hC3H5kXzYzVyeKZxb9ujyIzsdzBcUNdhAvZM/edit?usp=sharing

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expressed through shared experience where members tell their own stories of a similar experience to encourage the member in need. Hence, for HKUST students, the online forum can serve as a way for them to find support, wherein the platform's anonymity will create an appealing factor for students to freely talk about sensitive content. If our marketing strategy is successful, the anonymous nature of the forum can also act as an incentive for students to write on the platform because it has already been proven by the popularity of HKUSTSecrets and PaUST that many students look for such platforms to express their feelings.

Resource exchange (educating others on the available treatments and programs) was also another way through which members provided support. In our context, students can share their experiences about the Wellness Centre's counseling session and urge other students to try it out. Consequently, if we implement the online forum well, our solution would not only help students find support from each other, but it will also help augment the existing Wellness Centre services.

In addition, there also exists a psychological theory[6] that can vouch for the benefits of an online forum. When individuals experience an emotion, they tend to talk about it afterwards. This is in a nutshell what the "social sharing of emotion" or SSE is. It is a popular 'emotional venting' belief that claims that doing so dissolves the emotional impact. It also predicts that benefits vary according to the listener's response mode. A socio-affective (empathic) mode was expected to buffer emotional distress temporarily. A cognitive (reframing) mode was anticipated to grant emotional recovery. Thus, based on a research we found on a content analysis of 540 blog posts in a blog social network site called LiveJournal, they found that affective feedback predominated the response to the blog posts which provide emotional support and empathy. The study found evidence that the process of social sharing which occurs in LiveJournal replicates some features of face to face SSE. Instead of a superficial view of online social sharing, the results support a prosocial and beneficial character to online SSE. Thus, assuming that these effects can transfer into our forum, we hope that our users are able to enjoy the benefits of sharing their feelings through our platform.

2.4. System Development

The Pinocchio website is aimed towards HKUST students and faculties; thus, the website was made so that only users with ITSC emails (@connect.ust.hk) can access and sign up to the website. As for the website design, or so-called the frontend, the design of the website was built through Figma, then ReactJS was used to write the Pinocchio website. Afterward, as for the frontend of the project, Firebase was used, which is helpful for the identification and authentication of the website including login, signup, sending the password reset email to those who have forgotten their passwords, and so on. Firebase was also employed when storing users' information such as which country the users

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[6] www.sciencedirect.com/science/article/abs/pii/S0747563215003726

logged in to the website or how many people have used the website daily. Furthermore, and most importantly, we can figure out how many people or students have clicked the 24-hour hotline button to call the Wellness Center.

On the other hand, the Pinocchio website was designed to not interfere with any private information of the users. Even the administrators of the website do not have access to any of the posts or users. To have better maintenance and constant improvement to the Pinocchio platform, only limited members can have access to the database. Still, they cannot be informed of who wrote which kind of posts due to the anonymous posts of the Pinocchio website.

There are some key features that are crucial when users use the Pinocchio website. One of the most important features is that after the users have signed up, the users will also be led to a guide page. HKUST students that are first to our Pinocchio website will not be familiar with all the different buttons and what functions they include. Thus, we decided to show a guide page to explain to the users what kind of features our website has and what functions each button does. On each page in the guide, the website will explain to the users the buttons, Write Now button, which allows the users to write posts for themselves or to the community; Read Stories button, which allows the users to read all the posts in the forum or the storybook; Look Back button, which allows the users to review what posts they have made both private and publicly; Bookmarks, which allows the users to see posts they have bookmarked in the forum; and lastly, the Ask for the Help button, which will always be there to connect the Pinocchio users to a 24-hour hotline with the school counselors.

Another important feature is choosing your interests. It is imperative to divide the topics of posts on the website since different users will have different mental health issues from each other. After the users have successfully signed up to the Pinocchio website and have verified their ITSC emails, they will be led to an interests page. The interests page includes 8 different categories the users can choose: depression, motivation, exam anxiety, social anxiety, PTSD, panic disorder, eating disorders, or all. Individual users will have different aspects of mental health issues they want to see or receive advice from. Thus, the users can choose one or more categories so that the Pinocchio website could remember and prioritize what kind of categories or topics the users wish to see first on the forum page. For instance, if the users picked depression and motivation on the interests page since each post will have one topic each, the users would see posts about depression and motivation at the top while putting the other posts at the bottom.

We also provide a user manual for users, which can be accessed here, as a help center: https://www.notion.so/Help-Center-3da55e08068e48339572536e58537f10

2.5.   Technical details

Regarding which platform Pinocchio should be accessible to users, there were two choices for us: Desktop and Mobile. We later decided that mobile development should be our priority as students are more inclined to use mobile apps nowadays and that users generally stick to mobile apps more than websites. While app development was considered hard for our team, we chose to develop Pinocchio in Javascript as a website that is available both on mobile phones and desktop computers or laptops. However, we were aware that using our platform in mobile browsers provides a rather poor user experience. Thus, we try to deliver an app-like user experience to users via Progressive Web App(PWA). With PWA, users can "install" our website like any other apps on their phones. What's more is that it is available for both iOS and Android.
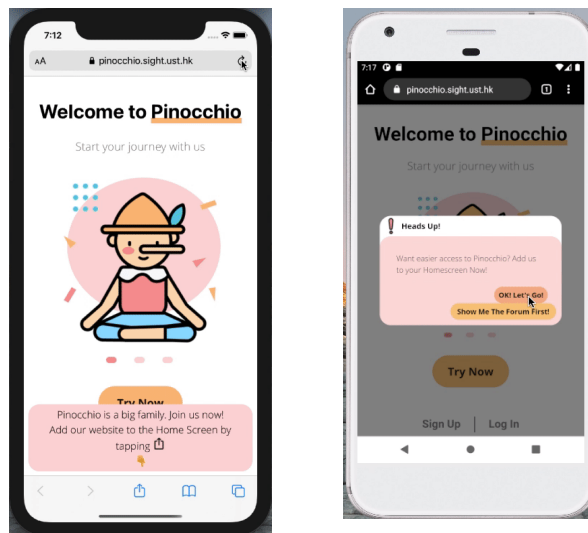
Pinocchio used React.js and Material UI library for development. Material UI follows the standard of Material Design which is very common in modern apps. For backend, we used Firebase as an all-in-one backend-as-a-service service provider. Firebase is powerful in many aspects. We used Hosting, Database, Authentication and Analytics

functions of Firebase, which are explained as follows:
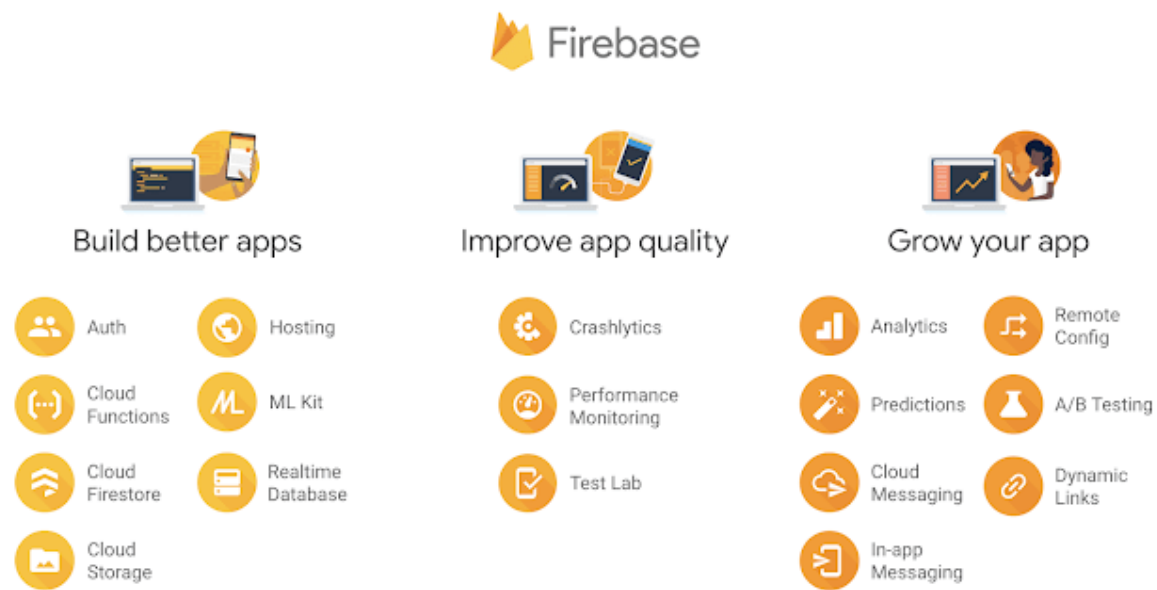
First of all, the Authentication service of Firebase provides an easy-to-use management system for us. It also has an in-built email verification and reset system so when users sign up, a verification email will be automatically sent to the user to prove that the user is a UST student. So we actually don't have to configure much to set up the authentication system.

Secondly, we use Firebase's Firestore service as our database to store users' data including all the posts and comments. Database structure is as follows:

users			stories			toxicStories			toxicComments	
id	varchar		**id**	varchar		**id**	varchar		**id**	varchar
email	varchar		bookmarkUsersID	[varchar]		bookmarkUsersID	[varchar]		text	varchar
interests	[varchar]		category	varchar		category	varchar		userID	varchar
isAdmin	boolean		comments	[varchar]		comments	[varchar]		toxicity	float
storiesID	[varchar]		isPublic	boolean		text	varchar		createdTime	timestamp
			text	varchar		createdTime	timestamp			
			createdTime	timestamp		title	varchar			
			title	varchar		userID	varchar			
			userID	varchar		textToxicity	float			
			weighting	integer		titleToxicity	float			

Notably, we designed a mechanism to better protect users' privacy and limit the power of the admin team. When using an online forum, privacy is always a common concern shared by many people. We want to ensure that users are genuinely anonymous on the forum and even us, who manages the forum, cannot trace the users. In the early stage of developing Pinocchio, admins who have access to the database can easily trace posts or comments to a specific user as we have an ID for every user that exists in every

comment and post. Since then we try to minimize personal identifiable data in our server by encrypting the UID. As such, even admins who have access to the database cannot relate posts/ comments to any users - the ID wouldn't match.

Thirdly, Analytics service allows us to understand our users more. With this tool, we can see the gender of users, when they are visiting our platform and even count which page has the most click rate. However, this statistics would not allow us to spy on a specific user, e.g., look up the gender of a specific user. One notable usage of this analytic function is that we add a click counter on the "Ask For Help" button. This button will direct users to call the wellness center whenever they feel they need to seek help. After one month of launching Pinocchio, we recorded about 16 clicks for this button, which is really encouraging for us.

Existing events					
Event name ↑	Count	% change	Users	% change	Mark as conversion ⑦
callWellnessCenter	16	-	10	-	
first_visit	441	↑ 128.5%	441	↑ 129.7%	
login	566	-	65	-	
page_view	1,027	↓ 40.9%	456	↓ 129.1%	
session_start	739	↑ 109.9%	439	↑ 196.6%	
sign_up	28	-	28	-	

Furthermore, we also used i18n-next for providing both Chinese and English on our platform. We see this as a way to make students, no matter local or non-locals, to feel more included - which is exactly what our objective is - to build a more inclusive,

主頁　　　我們的故事　　　pinocchio　　　設定　　　登出

為你而設

書寫你的故事 寫下你的故事，無論樂與悲	回顧
閱讀他人的故事 在眾人喜怒哀樂的故事中尋找啟發	書籤

尋求協助 ❗

At Pinocchio, we are devoted to creating a safe space for everyone to speak. One common challenge that almost all online forums face is toxic posts/comments. To protect our users, we introduced a Toxicity mechanism to measure the toxicity of each comment and post, and remove the toxic ones. The traditional practice of avoiding toxic contents in a forum is keyword filtering, which is not accurate and not suitable for us as a forum aiming to encourage people to speak freely of their feelings. Thus, we use the Prospective API, a product from Jigsaw and Google, which uses machine learning to reduce toxicity online. When the system detects toxicity, the related comment or post is withdrawn temporarily, until admins review them at the end of the day. This is because we understand no system is perfect and a human moderator can help increase the accuracy of identifying toxic contents, while their workload is minimized with the help of machines.

3. Marketing plan

3.1. Short-term Marketing

In regards to our short-term plan during the summer, we plan to continue implementing changes suggested by our users. We will also require more man-power to sustain the website and plan to recruit some moderators and potential people to join our team. We would need this prospective member to submit their CV and cover letter to see if we feel they would have the intention and necessary skill set.

3.2. Long-term Marketing plan & targets

In terms of long-term plans, we do not have a feasible timeline but would like to make this forum less UST-centric and possibly more open for all of the universities in Hong Kong. Though, for the moment we will be sticking with the audience we have amassed at our university, opening this platform to universities in a city like ours would really increase the conversations around mental health. Additionally, the mental health of our teachers/professors is not cared about enough. Providing them access to a professor-specific forum would allow them to address the worries they may have. As our university has faculty of different experience, this could serve as guidance to newer professors.

3.3. Timeline

A timeline for both our short-term and long-term plans can be seen below:

Approximate Date	Tasks To Do
Early June (June 1 - June 7)	1. Put up on Instagram and LinkedIn that we are looking for people to help with the forum 2. Looking for people to help with moderating, marketing, coding, etc. (depends on what we need at that point in time) 3. Interested parties will have to send in a CV and potentially interview with a few of us (if not all of us) before coming to a decision
June to August	Continuously post on Instagram and LinkedIn. Potentially speak with the HLTH 1010 coordinators and see if we can include Pinocchio as a Workshop or as part of the "Wellness & Enrichment" activities
August 2021 - May 2022	Work on increasing user engagement on the forum and ensuring that there is an active growth on a monthly basis, if not daily (bit of a stretch). Get the Instagram account to hopefully 1000 followers and Pinocchio an active part of the UST community
May 2022 - August 2022	Potentially start talking to other universities and see if Pinocchio can be less UST-centric and more university centric (HKU, CityU, CUHK, PolyU, etc.)
August 2022 - June 2023	Allow Pinocchio to get situated and grow as an online mental health forum across the universities. Potentially can open up to Hong Kong, and within a few years, open up to the bigger countries in the Asia Pacific region

3.4.   Methods to measure users' improvement

To measure the user's improvement, we will start by discussing the behavioural changes we have targeted. Our team wants to see people become more willing to open up to others in our student community. To know whether or not we have met the needs of the community, our group created an onboarding survey where we asked questions regarding their openness to mental health sharing and mental health services. The target audience for this onboarding survey are all active users of the forum. When users first sign up, they will come across this survey. To make sure that this does not deter users from going on with the sign up process, we limited our questions to 3 rating-type questions, making sure that it fits in one page. As it has only been a week since our website launched, we will ask all active users a month from our launch date (28th May) to fill in this same survey again. Three months after the initial sign up, users will get a similar set of questions which we will use to gauge the success of our website. The difference in their results will be measured and allow us to reach a conclusion about how behaviours have been affected among our users since the implementation of the forum. Our quantitative goal is if for each question, 30% of the users are able to increase their rating by one step, we will already consider this as a success for our group. The onboarding survey given to all users can be seen below:

In addition to this, we would like to hold a few workshops and events for our community to interact with one another. These could be in-person when both Minjin

and Tiffany are also in Hong Kong as well as online in the summer. We could also invite the freshman of the next academic year to participate so that they can have friends on their first day. We can hold several events and see the reaction students have by asking them to fill out a survey asking about their experience with mental health and the advice provided on the forums.

4. Future outlook

4.1. Target market and customers

At the beginning of this semester, we conducted a survey[7] among HKUST students to further collect data on their mental health state. According to the data gathered, the average anxiety level was higher than the average depression level regardless of the year of study and nationalities. Most of the students picked studying as the major source of their poor mental health state. Relationships (for year 1 students), career (for year 2 and 3 students), and family (for year 4 students) were the next major sources of unstable mental health. Since the issues of mental health are rising, especially among people of our age, as our research and survey results indicate, we decided to launch our project Pinocchio, which is an anonymous online forum for UG students in HKUST.

4.2. Software development

In terms of software development, we will organise and optimize our workflow such as code review and CI/CD. We would also like to develop tools for our admin team members to automate some of the workflow. For example a telegram bot can send a daily report about the toxic comments/posts that day for the admins to review.

Furthermore, as we said, we want Pinocchio to be more than just an online forum. We will try to organise events, such as discord night, meditation workshop, etc., to build a truly supportive community in UST. For that, we may develop new functions on our website, e.g., to allow users create and organise events on their own or to vote their favourite events for the admin team to host.

4.3. Sustainability

The coming summer will be very important for our platform to grow. We would like to recruit more people and improve our coding workflow for the sake of the sustainability of Pinocchio. We would continue to work on the Engineering wiki, so that whoever comes after us can know what we have gone through. The wiki will cover best practices

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https://docs.google.com/spreadsheets/d/1S9iAuzi6rd0fn1p7jqAP64hoWqZaoZ8OVjG3LvqJcg0/edit?usp=sharing

of coding, how to manage the backend, etc. We will also improve our UI/UX and add some new features which will need to be discussed further and later on during the summer. As we said, we hope Pinocchio becomes more than a forum. We will interview our users and see what they really want. Also, we will develop Telegram Bot to automate admins' workflow. The bot will send a daily report for admins, e.g. toxic posts that need review on that day or the number of new users registered today.

5. Conclusion

In conclusion, our website is a UST-centric mental health online forum that aims to build a supportive community for students to grow a healthy mindset and change their perception towards mental health. Currently, there is a hole in mental health services provided in UST, specifically in the peer-to-peer support system. Despite the existence of professional counselors, many students are still too afraid to reach out for help due to the fear of being labeled as having a mental health issue. Thus, while our website is not a one-for-all solution for HKUST student's mental health issues, it is the right solution that can fill the gap in our mental health support system that is currently in place. In one sentence, It will create a platform where students are free to discuss taboo topics and always have a supportive community to help back them up in times of need.

6. Appendix

1. **User Manual** at https://www.notion.so/Help-Center-3da55e08068e48339572536e58537f10
2. "全港精神健康指數調查2020." *JMHF*, 9 Sept. 2020, www.jmhf.org/20201011p18-30. Accessed 22 Apr. 2021.
3. Sheng, Zhi Zhao, et al. "Mental health crisis under COVID-19 pandemic in Hong Kong, China." *International Journal of Infectious Diseases*, International Society for Infectious Diseases, 15 Sept. 2020, www.ijidonline.com/article/S1201-9712(20)30746-3/fulltext. Accessed 22 Apr. 2021.
4. Hidalgo, C.T.Rodríguez, et al. "The Social Sharing of Emotion (SSE) in Online Social Networks: A Case Study in Live Journal." *ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books*, www.sciencedirect.com/science/article/abs/pii/S0747563215003726. Accessed 2 May 2021.