

AN INTELLIGENT SYSTEM TO ASSIST STUDENTS IN ENGAGEMENT WITH THEIR STUDYING USING GENERATIVE ARTIFICIAL INTELLIGENCE MODELS

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ABSTRACT

Oftentimes students in the high school system tend to have the least amount of studying assistance despite being in the most rigorous curriculums that the K-12 education system has to offer. Students need someone to guide them on how to complete their homework. TeachNow is a proposed application that would help these students by allowing them to post to a global message board and help out each other. The app centrally relies on a ChatGPT API, to be used by students when no one has responded to their question yet [1]. It works by converting the user's question into a prompt and then sending it over to the ChatGPT API for processing [2]. Students are able to get these responses from ChatGPT as soon as their question is posed. To test the effectiveness of this system, we perform a test of the ChatGPT API by asking it several mock questions, to which the results were generally desirable [3]. With further revisions, this application would be a perfect fit for students struggling with their education.

KEYWORDS

ChatGPT, Tutoring, Education, Database, Artificial Intelligence

1. INTRODUCTION

Homework is one of the biggest problems students are facing now when they don't receive help from their teachers. Many students failed to complete their homework because of a lack of understanding on the topic, however it will be difficult for them to reach help from their teachers when they leave school. This is a serious issue that many of us ignored, students need to get more than off school. Moreover, this application can also benefit freelancers, housewives, and hobbyists by giving them reliable resources to read through. Learners like them often struggle to find a reliable resource online for the information they try to look for.

In conclusion, TeachNow is an AI based teaching platform [4]. While tutors can assist with difficult problems but might limit students critical thinking skill and creativity. Similar to tutor, TeachNow can help students with AI responses but provide communication with other users. However, some students think AI is powerful and is helpful with their work [5]. Other students are afraid the existence of Ai will cause decrease of motivation, cheating and loss of writing skills, but TeachNow allows users to participate and use critical thinking through its comment system. TeachNow is presented as a better solution to save students time and solve the problem

efficiently, while reducing homework is not the best solution, TeachNow's ability with AI response can help stress and time management.

This app can solve the problem of accurate research online without redundant information or distraction [6]. The idea of this app is to collect precise and reliable information for researchers to learn, to make sure information is reliable, and publishers will be verified. Although, users might find other resources such as google, wikipedia, and youtube to find their information. However, this app is cleaner than other search engines because our app is a pure resource that only gives researchers information that is related to the topic. Google, youtube and Wikipedia are more often to show non topic related information such as advertisements, and unverified information [8]. Moreover, with the credibility of the app, only the publisher himself has permission to edit information, unlike wikipedia because information could be edited by any wikipedia user [7].

To test the effectiveness of my application, I did an experiment where I analyzed the accuracy and quality of responses as generated by ChatGPT for my application [14]. My application uses the ChatGPT API to generate responses to questions. Students will use this API so it is vital that it does not give inaccurate or faulty information. I asked ChatGPT through my API using the application a series of questions and evaluated each of the responses to see if it was good or not. The responses that the API gave back were mostly good. A lot of them were consistently detailed, but sometimes the responses given back were not the most relevant due to the method by which I sent the prompt over to the API. In future revisions to this application, I will improve the ways that we use the ChatGPT API so that students get the best learning.

2. CHALLENGES

In order to build the project, a few challenges have been identified as follows.

2.1. Too many questions

While using AI responses from ChatGPT is fast and accurate, TeachNow faced the problem of being asked too many questions that will lead to being blacked by AI. However, we figured out a solution to solve this problem, that is saving AI responses to the database when users are asking similar questions. This saves AI responses from overloaded questions and provide faster response time to users

2.2. Controlling user's information

Controlling user's information is another problem TeachNow faced, each user will be signed up to an account that will collect their information such as posts and comments. However, when a user wants to delete the account not all of the user's information will be deleted immediately such as comments. TeachNow gives every users a unique custom code to make information in the app, when a user decide to delete the account, the system will recognize the code and delete all related posts and comments.

2.3. Privacy

Privacy is one of the most important parts we deal with TeachNow, many users are afraid that their posts or comments will be distorted by others. However, this is not a problem in TeachNow, because only the creator has the ability to edit their posts and comments. We understand the consequence when posts and comments were edit by strange users, TeachNow use conditional

visibility that will only give permission to edit for the person who made the post or comment by recognizing the user's code to the comment or post.

3. SOLUTION

My program is linked with the post system, comment system and profile page system. These three are the major structure of my project. In this project, a post system is used to serve users post their ideas and comments. This system allows users to communicate in this app. Similarly, comment systems allow users to communicate as well. Comment system appears almost everywhere in the program [9]. This app's user profile page is a key feature that allows users to manage their personal information, view their activity history, and customize their settings. Using the Flutter framework, developers can build user profile pages that are visually appealing, easy to navigate, and responsive across different devices [10]. The user profile page is tested and optimized to the app, however the page will continue to develop based on user feedback and analytics to ensure user experience.

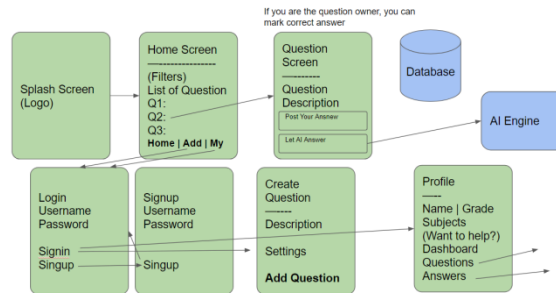


Figure 1. Overview of the solution

The post system's purpose in this app is to serve users to share their thoughts, ideas, and experiences with other users in this community. Posts can take various forms, such as text, photos, videos, and links. Our post system features commenting, liking, sharing and reporting, which allow users to interact with each other and communicate in various ways.

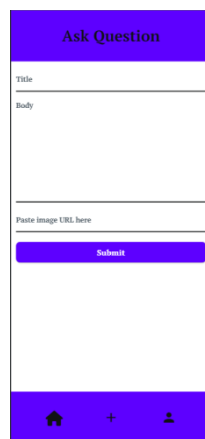


Figure 2. Screenshot of the question box

```

1 // Generated code for this Button Widget...
2 Padding(
3   padding: EdgeInsetsDirectional.fromSTEB(0, 20, 0, 0),
4   child: FFBUTTONWidget(
5     onPressed: () async {
6       _model.result = await ChatgptCall.call(
7         query: _model.bodyFieldController.text,
8       );
9       final postsCreatedData = {
10        ...createPostsRecordData(
11          title: _model.titleFieldController.text,
12          body: _model.bodyFieldController.text,
13          user: currentUserReference,
14          image: _model.imageFieldController.text,
15          chatgptresponse: (_model.result?.jsonBody ?? '').toString(),
16        ),
17        'last_edited_date': FieldValue.serverTimestamp(),
18      };
19      await PostsRecord.collection.doc().set(postsCreatedData);
20      context.pushNamed('HomePage');
21      setState(() {});
22    },
23    text: 'Submit',
24    options: FFBUTTONOptions(
25      width: 130,
26      height: 40,
27      padding: EdgeInsetsDirectional.fromSTEB(0, 0, 0, 0),
28      iconPadding: EdgeInsetsDirectional.fromSTEB(0, 0, 0, 0),
29      color: FlutterFlowTheme.of(context).primary,
30      textStyle: FlutterFlowTheme.of(context).titlesSmall.override(
31        fontFamily: 'PT Serif',
32        color: Colors.white,
33      ),
34      elevation: 2,
35      borderSide: BorderSide(
36        color: Colors.transparent,
37        width: 1,
38      ),
39      borderRadius: BorderRadius.circular(8),
40    ),
41  ),
42 )

```

Figure 3. Screenshot of code 1

Our first action is to make a call to a backend server that utilizes the ChatGPT API. ChatGPT is capable of understanding and responding to users' questions within a wide range of topics. Using ChatGPT summarizes long pieces of text users wrote into more digestible key points for research. The second action is to store the post information in Firebase. Some information that is stored includes title, body, author, and the ChatGPT response. All of these except for the ChatGPT response are form data that are on this page. The third action is to navigate to the home page after finishing creating the post. In flutter, the navigate system is used to navigate between different pages in the app. The system provides a consistent and intuitive way for users to interact and change between different parts of the app.

The comment system is used to store and show information users put inside the app. This system will use firebase, which is a cloud based platform that can be a service to ensure that only editors are able to edit comments, it helps the app secure and prevents from fake information.



Figure 4. Screenshot of comment box

```

1 // Generated code for this Button Widget...
2 Padding(
3   padding: EdgeInsetsDirectional.fromSTEB(0, 30, 0, 0),
4   child: FFButtonWidget(
5     onPressed: () async {
6       final commentsCreateData = {
7         ...createCommentsRecordData(
8           body: _model.bodyFieldController.text,
9           user: currentUserReference,
10          post: widget.post,
11        ),
12        'last_edited_date': FieldValue.serverTimestamp(),
13      };
14      await CommentsRecord.collection.doc().set(commentsCreateData);
15      context.pop();
16    },
17    text: 'Submit',
18    options: FFButtonOptions(
19      width: 130,
20      height: 40,
21      padding: EdgeInsetsDirectional.fromSTEB(0, 0, 0, 0),
22      iconPadding: EdgeInsetsDirectional.fromSTEB(0, 0, 0, 0),
23      color: FlutterFlowTheme.of(context).primary,
24      textStyle: FlutterFlowTheme.of(context).titleSmall.override(
25        fontFamily: 'PT Serif',
26        color: Colors.white,
27      ),
28      elevation: 2,
29      borderSide: BorderSide(
30        color: Colors.transparent,
31        width: 1,
32      ),
33      borderRadius: BorderRadius.circular(0),
34    ),
35  ),
36 )
37

```

Figure 5. Screenshot of code 2

When the user hits the 'create comment' button on the comment creation page, then the program performs multiple actions. First, the system creates a new document to store in the Firebase database. This document contains the body of the comment, the user who posted it, as well as the post that the comment is supposed to be replying to. After the comment document is created, the program will then go back a page. On the question page itself, the comments are all loaded in from a query. This query filters only for comment documents where the post field is the reference to the question document that they meant to be a response to. This way, a commenting system is trivial and simple to use. It is also easy to implement, since it just involves creating a document and subsequently loading it as well.

The profile page is for users to upload their personal information that they want other users to see, such as their username, profile picture, grade level and interests. This allows users to find other friends who share the same interest or similar situation. Profile pages help users to know other people before further communication.



Figure 6. Screenshot of profile page

```

1 // Generated code for this Button Widget...
2 FFButtonWidget {
3   onPressed: () async {
4     final selectedMedia = await selectMediaWithSourceBottomSheet(
5       context: context,
6       allowPhoto: true,
7     );
8     if (selectedMedia != null &&
9         selectedMedia
10          .every((e) => validateFileFormat(e.storagePath, context))) {
11       setState(() => _model.isDataUploading = true);
12       var selectedDownloadFiles = <FFDownloadFile>[];
13       var downloadDirIs = <string>[];
14       try {
15         selectedDownloadFiles = selectedMedia
16           .map((e) => FFDownloadFile(
17             name: e.storagePath.split('/').last,
18             bytes: e.bytes,
19             height: e.dimensions?.height,
20             width: e.dimensions?.width,
21             blurHash: e.blurHash,
22           ))
23           .toList();
24         downloadDirIs = (await Future.wait(
25           selectedMedia.map(
26             (e) async => await uploadData(e.storagePath, e.bytes),
27           ),
28         ))
29           .where((e) => e != null)
30           .map((e) => e!)
31           .toList();
32       } finally {
33         _model.isDataUploading = false;
34       }
35       if (selectedDownloadFiles.length == selectedMedia.length &&
36           downloadDirIs.length == selectedMedia.length) {
37         setState(() {
38           _model.uploadedLocalFile = selectedDownloadFiles.first;
39           _model.uploadedFileUrl = downloadDirIs.first;
40         });
41       } else {
42         setState(() {});

```

Figure 7. Screenshot of code 3

This part of the code is executed whenever a user hits the upload photo button when trying to edit their profile picture. When the button is pressed, the user is prompted to upload a photo from their phone's gallery. Once that is complete, it will be uploaded to the Firebase Storage microservice, which specifically houses images. Once the upload is confirmed, the program will get the user's reference to their own profile document in Firebase Firestore. The program will then update the document at that reference and replace the URL of their current profile picture with a new one. After this, the user is brought back to the normal profile viewing page. The page will display the newly uploaded profile picture that they just uploaded and the changes will be live for all players who are using the application. This is a simple but effective implementation of a profile updating procedure that leverage tools from Firebase.

4. EXPERIMENT

Since this program hinges on the use of ChatGPT to give accurate answers to questions whenever other users don't provide their own answers, it's important to test the functionality of the API calls to ensure that users are getting quality answers.

For this experiment, I will create several questions with varying levels of complexity to gauge whether or not the ChatGPT API that we are using can accurately give responses to my questions. The questions will be as follows:

- Question 1
 - Title: What is the answer to $5+(7-6)*2$?
 - Question: I would like to know if I need to use a formula.
- Question 2
 - Title: Who was the first king?
 - Question: I would like to know who the first king was and what region the first king ruled over.
- Question 3
 - Title: What is the fastest animal on Earth?
 - Question: What is the name of the fastest animal on Earth and how far can the animal go?
- Question 4:
 - Title: What is a common theme in the Great Gatsby?
 - Question: What is the most common theme in the Great Gatsby and how does it contribute to the overall narrative?
- Question 5:
 - Title: How do I conjugate the word "aller" in French?
 - Question: How would I conjugate the word aller in all subjects in French?
- Question 1: It depends on what you are trying to do. If you need to calculate something, then you may need to use a formula. However, if you are just trying to enter information into a spreadsheet, you may not need to use a formula
- Question 2: The first known king in recorded history was Narmer, who ruled over the region of Upper and Lower Egypt around 3100 BCE. He is often credited with uniting the two regions and establishing the first dynasty of ancient Egypt.
- Question 3: The fastest animal on Earth is the Peregrine Falcon, which can reach speeds of up to 242 mph. It can travel up to 160 miles in one hour.
- Question 4: The most common theme in the Great Gatsby is the pursuit of the American Dream.

This theme is seen throughout the novel as Jay Gatsby strives to win back the love of Daisy Buchanan, who symbolizes the wealth and glamor of the upper class. The pursuit of the American Dream is what drives Gatsby to throw lavish parties and try to make himself appear wealthy and successful. It also serves to highlight the social and economic inequalities of the time, as Gatsby is unable to gain access to the higher echelons of society despite his wealth. The theme of the pursuit of the American Dream contributes to the overall narrative by providing a backdrop for the character's struggles and motivations. It also serves to illustrate the consequences of the pursuit of wealth and power, as Gatsby ultimately fails in his quest and is left with nothing.

- Question 5: Je vais, Tu vas, Il/Elle va, Nous allons, Vous allez, Ils/Elles vont

In question 1, ChatGPT was not able to give a concrete answer. This is because only the body of the question was sent in the ChatGPT API request and not the title of the question, so ChatGPT did not know what in question a formula could have been applied to. For question 2, there are multiple possible answers as history records are ambiguous on the matter, but ChatGPT only gave one name. Question 3 was correct and is a largely fact-based question. Question 4 was a good response as well, as ChatGPT went in depth and provided the longest answer out of all the

responses in this experiment, demonstrating knowledge of the source material and being able to properly articulate its ideas. The fifth question like question 3 is simply a matter of fact and knowledge and ChatGPT was able to understand these. Overall, it seems like the ChatGPT response system is working well, but I will have to modify this app in the future in order to include the title alongside the body in the API request.

5. RELATED WORK

The article states that children should have extra help with their school work, this can help them with confidence and success in school [11]. Using an outside tutor is beneficial for kids. Tutors can help with difficult problems that teachers do not have time or forgot to explain, with tutors children can be more prepared than studying on their own. However, a tutor might limit children's creativity and critical thinking ability on their own, it's possible for kids to rely on their tutor rather than participating in class. Therefore, TeachNow is similar to a tutor with the ability to teach and answer questions, but TeachNow is more precise with the answer provided by AI, and it's easier to carry than using a human tutor. Moreover, using TeachNow allows users to communicate with other people and discuss the question or topic they have.

Many teenagers found that ChatGPT is powerful with solving problems and it was helpful to them [12]. However, other students panic that ChatGPT will decrease students' motivation and critical thinking skills, they worry about cheating and the loss of writing skills by the smart AI responses. Even Though, TeachNow shares many similarities with ChatGPT such as AI responses that cause the threat to students to avoid critical thinking. However, TeachNow is not only capable at AI responses, TeachNow's commnet system allows other users who are interested in the question can participate using critical thinking to give a different answer.

The article said that many students do not have good time management skills and struggle with doing homeworks [13]. The author suggests schools should deduce the amount of homework that is unnecessary and increase break time for students. This is a good suggestion to teach children proper time management and improve their overall happiness and health. However, the less amount of homework students receive does not help them with their purpose in school for studying. TeachNow is a better solution to manage students' stress with time management for homeworks. With TeachNow, students will spend less unnecessary time struggling on their homework, because TeachNow allows them to solve their difficult problems quicker than working on their own. This will save more time for students to expand their interests outside school and improve their overall happiness

6. CONCLUSIONS

There are some limitations to my project such as uploading images and videos in posts because we do not have access to a cloud base that will store every picture and video that is going to be uploaded. The home page and profile page could be more detailed designed to provide users with enhanced using experience. If I have more time next time, I would add more features to the app such as group chat, social area and search bar [15].

In conclusion, TeachNow is decently made with firebase and flutter flow, the app contains comment system, post system, and profile system allowing users to explore and communicate online. The app is serviced with AI responses to questions that are asked in AI's response range. Users provide their personal information such as grade level, interests and username to make new friends in the app. Using TeachNow is a great opportunity to learn, communicate and help others.

REFERENCES

- [1] Gilson, Aidan, et al. "How does ChatGPT perform on the United States medical licensing examination? The implications of large language models for medical education and knowledge assessment." *JMIR Medical Education* 9.1 (2023): e45312.
- [2] Dowling, Michael, and Brian Lucey. "ChatGPT for (finance) research: The Bananarama conjecture." *Finance Research Letters* 53 (2023): 103662.
- [3] Biswas, Som S. "Potential use of chat gpt in global warming." *Annals of biomedical engineering* 51.6 (2023): 1126-1127.
- [4] Sun, Zhuomin, M. Anbarasan, and D. J. C. I. Praveen Kumar. "Design of online intelligent English teaching platform based on artificial intelligence techniques." *Computational Intelligence* 37.3 (2021): 1166-1180.
- [5] Sipior, Janice C. "Considerations for development and use of AI in response to COVID-19." *International Journal of Information Management* 55 (2020): 102170.
- [6] Granello, Darcy Haag, and Joe E. Wheaton. "Online data collection: Strategies for research." *Journal of Counseling & Development* 82.4 (2004): 387-393.
- [7] Milne, David, and Ian H. Witten. "Learning to link with wikipedia." *Proceedings of the 17th ACM conference on Information and knowledge management*. 2008.
- [8] Bisong, Ekaba, and EkabaBisong. "Google colabatory." *Building machine learning and deep learning models on google cloud platform: a comprehensive guide for beginners* (2019): 59-64.
- [9] Liu, Jiawei, and Douglas M. McLeod. "Pathways to news commenting and the removal of the comment system on news websites." *Journalism* 22.4 (2021): 867-881.
- [10] Faust, Sebastian. *Using Google's Flutter framework for the development of a large-scale reference application*. Diss. Hochschulbibliothek der Technischen Hochschule Köln, 2020.
- [11] Xu, Jianzhong, and Lyn Corno. "Family help and homework management reported by middle school students." *The Elementary School Journal* 103.5 (2003): 503-517.
- [12] Firat, Mehmet. "How chat GPT can transform autodidactic experiences and open education." *Department of Distance Education, Open Education Faculty, Anadolu Unive* (2023).
- [13] Epstein, Joyce L. "Homework Practices, Achievements, and Behaviors of Elementary School Students." (1983).
- [14] Islam, Rashedul, Rofiqul Islam, and TohidulMazumder. "Mobile application and its global impact." *International Journal of Engineering & Technology* 10.6 (2010): 72-78.
- [15] Zhang, Amy X., and Justin Cranshaw. "Making sense of group chat through collaborative tagging and summarization." *Proceedings of the ACM on Human-Computer Interaction* 2.CSCW (2018): 1-27.