



Abstract

In the program of Human-Centric Computing, our group aims to develop a plug-in "ILink" for all researchers who have the demand of reading scientific articles online. The main issue they face is the reduction of reading efficiency. Our project solve their problems through web-app development technical which includes a clear user interface through front end developing and functionalities using JavaScript framework to realize the wanted interactive system. At the same time, we use API from OpenAI to implement the network between papers. The project has three functionalities to help them improve interactive experience in the process of reading papers. They are **Keyword searching**, **Visualization** and **Network between articles**.

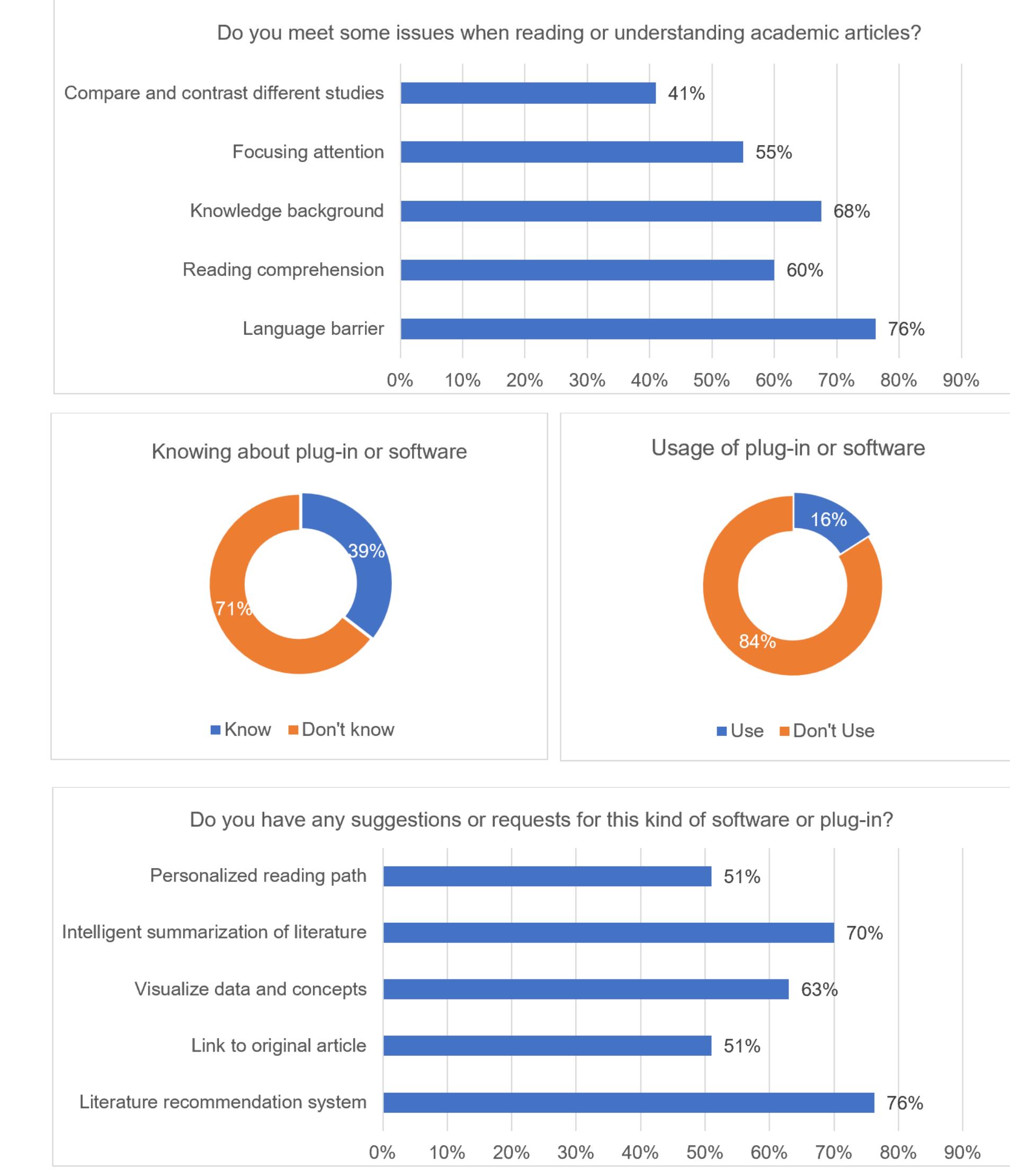
Requirements discovery

Discovery Process

- Interview**: A semi-structured many-to-one interview with 3 teachers from SAT and 1 TA from the CPT208 module.
- Survey**: An online survey with both open-end and closed-end questions and received 80 valid results.

Requirement Analysis

Here we show our data collection from the online questionnaire:



Analysis Combined with the results of the interview and survey to summarize the target users requirements as follows:

- Recommend articles in related fields.
- Visualize the non-intuitive data, concepts, and models.
- Intelligently summarizes the content of the article.
- Expand the search scale to the articles opened in the PDF reader and automatically search in the scholar like IEEE Xplore or Google Scholar.
- Build a network of articles to better understand the relationship between articles.

Evaluation

Usability Testing & Heuristic evaluation

For evaluation methods, the combination of controlled setting and without users is used to achieve a more comprehensive evaluation from the two dimensions of target users and project developers. **Usability testing** [2] and **heuristic evaluation** [3] are used to implement the two methods mentioned above, respectively. For data collection, audio recordings and transcripts were used to ensure accurate recording of interview and discussion information.

The evaluation takes part in the each iteration of our interaction design. Just as Table 1, shows how the functionalities realized and improved based on the evaluation through these two methods.

Conclusion

In conclusion, we designed a plug-in to assist reading and follow the interaction design lifecycle. It provides three functions such as keyword search. For future work, the function of generating the inter-article network can be further optimized such as a more human-centric visualization and adding more content to the network than just the article title. Moreover, continue to discover the requirements of the target users and implement them in the future development.

Reference

- [1] Sharp, H., Preece, J., & Rogers, Y. (2007). Interaction design : beyond human-computer interaction (2nd ed.). Wiley.
- [2] Lewis, J. R. (2012). Usability testing. Handbook of human factors and ergonomics, 1267-1312.
- [3] Muller, M. J., Matheson, L., Page, C., & Gallup, R. (1998). Methods & tools: participatory heuristic evaluation. interactions, 5(5), 13-18.

Introduction

Motivation

Nowadays, reading academic articles online becomes a fundamental work for teachers and students who do research. However, during the process, there are lots of issues of current product (i.e. **Google Scholar PDF Reader**) such as the inconvenience of searching complex content inside a article, insufficient visual representation of academic concepts and experimental data, and lack of clarity of relationships between multiple articles in a same academic area. These issues affect their reading efficiency and cause an inability to fully understand the articles.

Aim

- Improving researchers' reading efficiency.
- Eliminating the obstacles to completely understand academic concepts and experimental data.
- Provide better user experience while reading many articles.



Why ILink

- ILink** represents "Innovation" which is not only our topic "创" but also the representation of our project is helping researchers to do innovative work.
- ILink** represents for the functionalities (i.e. link to the scholar to search) of our plug-in and our willing of developing the plug-in that is making reading papers a more efficient job through our human-centric design.

Design alternatives and prototypes

Design Process

Based on the user requirements analyzed from the interviews and surveys, we implement the requirements of the target users through three iterations, each of which follows the interaction design lifecycle model [1].

Each iteration follows a three-step process:

- Discovering requirements & Designing alternatives:** Choose one of the requirements found in discovery that meets it in designing alternatives and achieve the design in a conceptual way.
- Prototyping:** Realize alternative design through demonstration video or code to facilitate the display effect to target users. And prototype is also a good tool for us to enhance communication, increase learning, and inform decision-making.
- Evaluating:** Evaluation through prototype, and heuristic evaluation, interview, and other evaluation methods are used. Improvement will be made in the next iteration.

Table 1 Process of three iterations

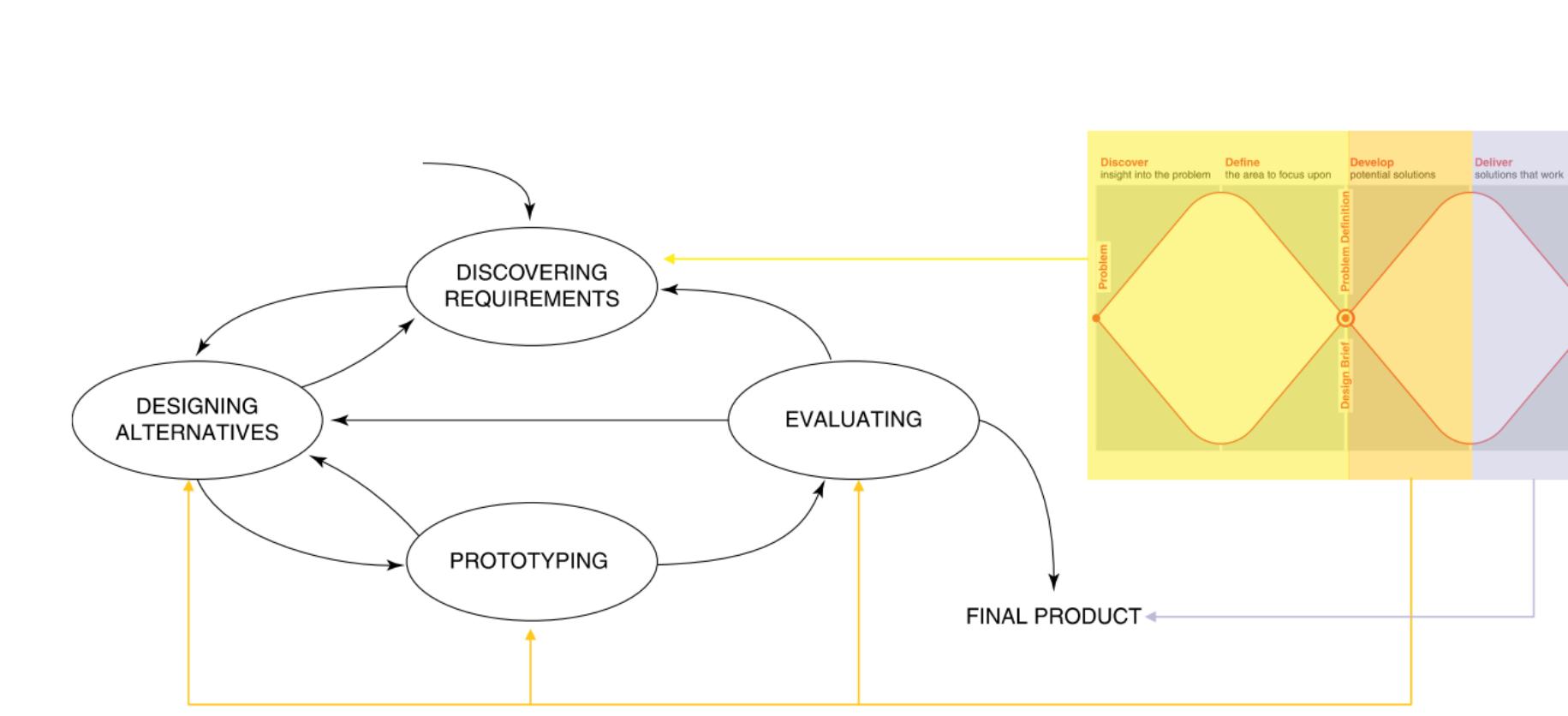


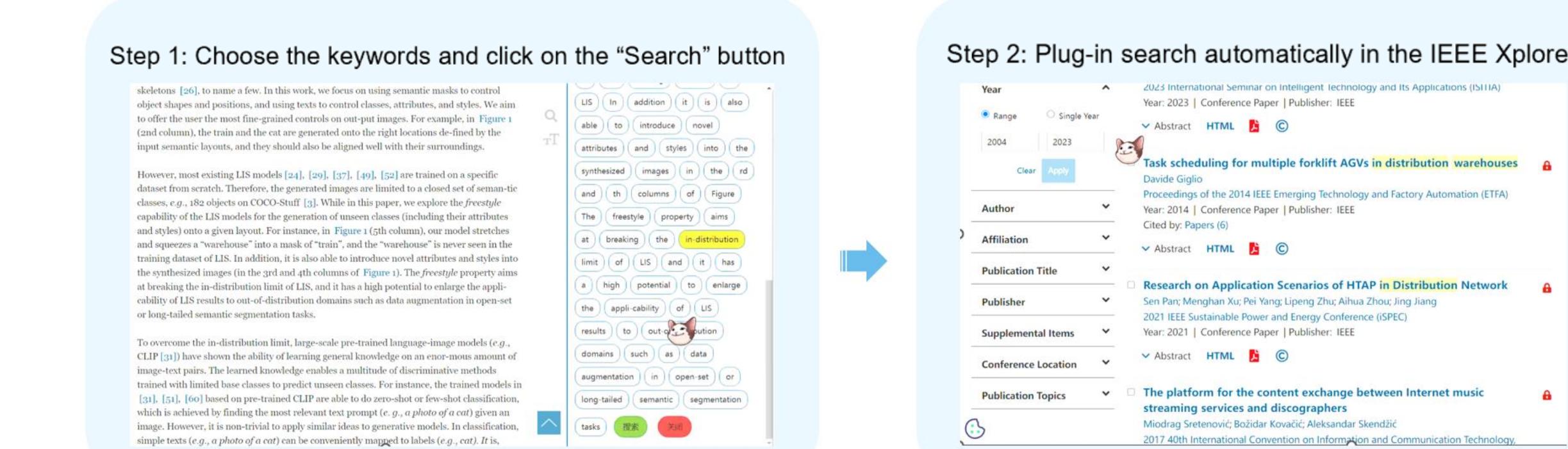
Figure 1 Interaction design lifecycle model [1]

Function	Iteration I ^①	Iteration II ^②	Iteration III ^③
Keywords search function ^④	All words including prepositions, articles, and punctuation can be selected and searched by the user ^⑤		
Visualization of experiment result and concept/model ^⑥		The user can't choose the chart type for the experiment result visualization ^⑦	
Building a network between articles ^⑧			The network just generates based on the reference list and just the network for the article name. ^⑨

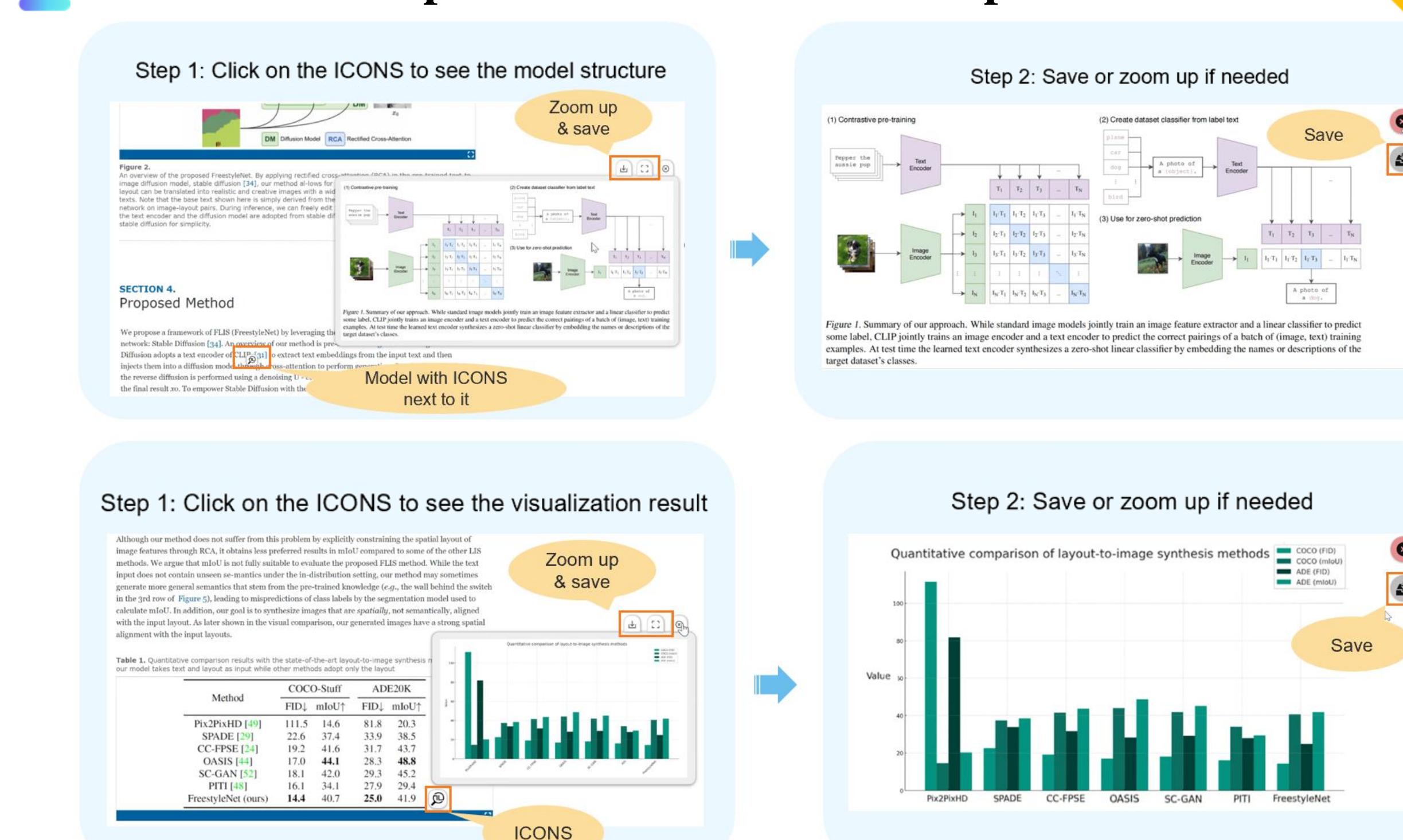
Functionality

The prototypes are used to show our functions step-by-step and the QR code can also be scanned to see the demo videos. The prototypes used in our design are evolutionary prototypes which means is easy for us to make changes in future iterations.

1 Keywords search function



2 Visualize the experiment results and concept/model function



3 Keywords search function

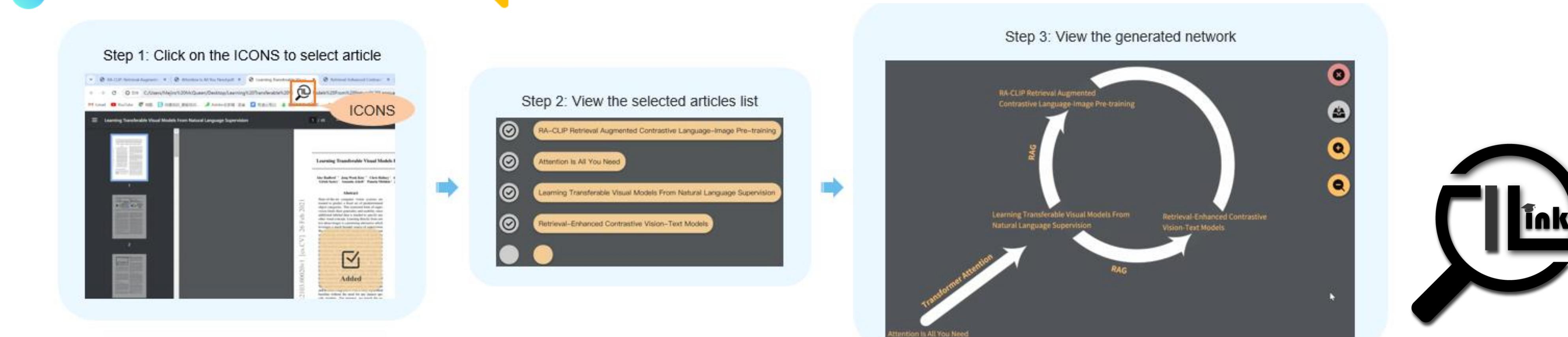


Photo for attendance



Figure 2 Taken in EE101 2024/5/7

Scan to see the demo videos for functionalities !!!

