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The Use of AI to Develop Students' Readiness in Finding Research Topics

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ABSTRACT

Finding a novel topic seems to be the most daunting task of the overall steps of a research project. This paper describes best-practices on the use of artificial intelligence (AI) to develop students' readiness in finding research topics. The use of AI in the three research classes in an Islamic college was informed by an initial exploration of students' challenges in starting a research project. Some AI applications that have been introduced in the classes are mainly those of previous studies finders such as Google Scholar, Open Knowledge Maps, Elicit and Connected Papers. Some other applications that have been used also include PoP and VoS Viewer. The students learn and use the application through workshops and tutorials. While Google Scholar has been claimed as the main source of previous studies students get the inspiration from, survey data shows that PoP and VoS Viewer best help students in finding novel topics within the area of discipline but still of their main interest. With these two applications the students have better readiness in finding research topics. The main challenge students found in using the application has been formulating the right keywords or prompts to get the appropriate result of the most and least popular topics in previous studies. Hence, students find it difficult to quickly identify the gaps in previous studies and formulate better and novel research topics. Students need more tutorials in using Boolean operations to help them formulate the keywords better for a more relevant search result so they can be more ready to find research topics.

Keywords: Artificial Intelligence (AI), novelty, research topic

INTRODUCTION

With the fast and advanced development of digital technology, Artificial Intelligence (AI) has been widely used in the area of language teaching and learning. Several studies report on the use of AI to facilitate the learning of language. Hockly (2023) found that in ELT, AI has been widely used in relation to developing the digital literacies of the teachers and learners. The findings inform that Chatbots have been popularly used in language learning in addition to translation application and automated writing evaluation. Findings by Patty (2024) share similar types of AI used in language learning. Machine translation, speech technology, Chatbot and virtual assistant and AI generated contents are among the most-used AI for the purpose of learning language. Betal (2023) suggests that AI enables learners to have a more customised curriculum and individualized instruction, personalized and adaptive learning experiences, and contextual understanding of the language they are learning. These studies signify the potentially crucial roles of AI in the teaching and learning of language.

Technology also plays crucial roles in research. Academic works have also experienced transformations. The transformation may also include ways in planning, conducting and publishing research. Cuff (2014) wrote about the use of technology in the research process. Technology plays roles in the process of defining research topics, discovering information, locating relevant and reliable sources, getting access to the resources, synthesizing and evaluating information related to the research. Ahmed et al (2020) also suggests that technology has enabled scholars to increase their understanding and take the endeavors of the complexity of ideas and themes in their research processes. Thunburg & Arnell (2022) conducted a study on the use of technology in research. Their study took data from existing studies and focused on the use of technology in using digital interviews. The findings suggest that in the existing Their findings suggest that while digital interviews serve as a good technique for data collection there are also some flaws identified. Issues related to technical problems become the main concerns. Also, the sensitivity to visual cues may be lacking in digital interviews.

The above studies on the use of technology have put on recommendation on how technology can be used in all research procedures (Cuff, 2014), understanding the research topics (Ahmed et al, 2020) and assistance in data collection (Thunburg & Arnell, 2022). However, the issues with novice researchers such as those doing bachelor thesis in undergraduate level is often on the difficulty in finding research topics. A study by Pangket &

Cayabas (2023) reports that students in majority have difficulties in identifying the research topics and problems. In regards to this issue of finding research topics and the potential use of AI to assist students to be more ready in the initial process of their research, this paper reports on the initial findings of an ongoing research on students' readiness in doing research projects. The paper in particular describes the use of AI to develop students' readiness in finding research topics.

METHOD

This study used a mixed-method design incorporating qualitative and quantitative methods with an element of classroom action research (CAR). While this paper is a working paper reporting on initial findings of an ongoing research, the research can be small in scale. However, the use of mixed method design can provide a degree of triangulation in which the qualitative and quantitative data in combination with the CAR can provide a certain degree of triangulation. Therefore, the reliability of the findings can be enhanced (Johnson & Christensen, 2019). Survey as the quantitative method was used to gather data on the kinds of AI students used to find research topics. The data from the survey was further explored using a qualitative method from student interviews. Points related to their experiences and perspective of using AI to find research topics and bring novelty to the topics were gathered using semi-structured focused group interviews. As many as 63 students from three research classes participated in the research. As preliminary study on the three classes inform that students find challenges in finding research topics and promoting the novelty of their research, a CAR introducing several AI was conducted in the classes. This CAR formed a minor part in this research, focusing on seeking action to find solutions to students' problems. Hence, it is a more problem-focused research (Johnson & Christensen, 2019). The action taken in the research was introducing and training students to use some AI to find research topics, including Google Scholars, Open Knowledge Maps, Elicit, Connected Papers, PoP and VoS Viewer.

RESULTS AND DISCUSSION

This section presents the findings of the research and the discussion. It initially presents data on the students' challenges on finding research topics, their strategies to find research topics and the AI. The sections then go on presenting data on the result of CAR conducted to assist students to use AI to develop their readiness to find research topics. The last part of the section discusses the findings in relation to the theories and previous studies.

Results

Challenges Related to Finding Research Topic

Data from focused-group interviews highlight five main challenges students found when finding research topics for their research projects. The major challenge the students reflected was finding research gaps. Seven students reflected on this issue. StudentNF reflected that her main challenge was "*finding research gap and choosing the most suitable topic….*" Student AN agreed that she was '*confused about …looking for gaps to use for future research*." Student HZ spoke about his endeavour,"*sometimes we think a lot [about several topics], but the topics we think about already exist*." This Student HZ's statement reconfirmed his peers' challenge in finding research gaps when they tried to find a research topic.

Another challenge reported by the students was difficulty in formulating the topics into titles. Three students stated that they have this challenge. It is common knowledge that students often think about titles instead of the research question or the inquiry of the research. Student TM stated that she found it difficult to '*put the topic into title*." The same case also happened to Student FN that found a challenge in "*arranging and choosing the word* [for a title]." Student HN added that she was '*...confused when choosing the final title because [she has] several options….*" These responses inform that although the students may have found a topic and identified the gap, they still found it daunting to formulate the title into a title that may attract readers' interest in their research.

Difficulty in finding relevant and free references is also a challenge for students working on their research project. Three students pointed out this issue. Student OA shared his experience that he sometimes found "*... the needed journal*…[but it is]*...pricey*." Student IL mentioned that the journal article about the topic she was interested in "*...is not available*." Student SA concluded that "[t]*he article or journal is not always free to access. Sometimes I find an interesting journal that I hope can be my reference, but unfortunately I cannot open it*." These students' challenge is not merely finding the relevant resources. In addition, they also have difficulty in accessing the journal article when they find the relevant ones. It is because high quality articles are often not available in open access platforms.

The above three challenges then lead to the other two challenges students recounted during the focused-group interviews. Difficulty in finding open access articles seem to lead to lack of challenges and difficulty in finding topics relevant to their major, English education. Two students reflected that their challenge when trying to find a research topic is because of the limitation on the references they read. Hence, they seemed to get stuck and run out of ideas. Lack of references also leads to problems in finding topics relevant to the major. Student FH

said about difficulty in "*finding topics related to* [her] *study major*." This then put Student ZA into doubt whether the topic she formulated ' is recommended to do in research" in her major.

The overall qualitative data from the focused group interview highlighted five main challenges students face in finding research topics. These include finding research gaps, formulating the title, finding relevant and free resources, finding topics relevant to the major and lack of references.

Ways to Find Topics Prior to CAR

Other data collected before the conduct of CAR on the use of AI are information related to students' strategy in finding research topics. In the survey, students may respond to more than one option, allowing students to use more than one strategy. Survey data highlight three main strategies students use. The most used strategy is reading journal articles (53 responses/85%). Another strategy is discussing with the lecturers. As many as 36 (58%) students ticked this option. The other strategy is having discussions with friends (38/61%). These responses signify that journal articles still serve as the first and most reliable source of inspiration for the students in initiating their research. This data confirms previous data from the focused-group interview in that students tried to find journal articles that not only attract their interest but also are relevant to their major.

AI Students Use Prior to CAR

Related to the use of applications using AI assisting the students in finding research topics and writing the research , data from the survey highlights that the popularity is gained by search engines such Google and Microsoft Bing with 93.7% responses. Some students also used Chatbot applications such as ChatGPT (42.9%). The students also reported using social media (49.2%) and recommendation algorithm (60.3%). Data from interviews further highlights that some students get the inspiration from the academic contents or strategies in doing and publishing research from social media. As many as 28.6% also use applications of text editor such as Grammarly. Students also reported using digital assistance (11%). The overall response informs that the students do not only use AI that directly refers to academic writing but also to other more general ones.

Use of AI to Develop Readiness in Finding Research Topics

After students' challenges were identified, the students were then introduced to and coached to use several AI that can assist them in finding research topics through CAR. The AI includes Google Scholars, Open Knowledge Maps, Elicit, Connected Papers, PoP (Publish or Perish) and VoS Viewer. The students have actually used Google Scholars a lot but were not familiar with Boolean operations. They were then coached to use the Boolean operations with the Google Scholars in addition to being introduced to some other applications such as Knowledge Maps, Elicit, Connected Papers, PoP and VoS Viewer. After the CAR, the students were invited to respond to the survey. Survey data show that the three mostly preferred applications were Google Scholar, PoP and VoS Viewer.

As many as 85% students responded that Google scholar helped them to be more ready in finding research topics. Further confirmation through interviews highlights that this popularity is due to the ease of access to the article. That is to say that Google scholar provides more open access articles. The second most selected AI helping students to be more ready in finding research topics is PoP (23%). The preference for PoP is because PoP helps them quickly get recommendations on the relevant resources to further explore in relation to the topics of their interest. The last AI that students selected as the most helpful in assisting them to find research topics is VoS Viewer (18%). Students reflected that features in VoS Viewer that show the network of related studies help them to directly identify which topics have been exhaustive and which networks that still have spaces for more studies.

Regarding the readiness to find research topics using AI, 63% students responded that they are sure they can find research topics. The other 31% are very sure about this readiness while the rest are not really sure. The students reflected that the use of AI such as PoP helps them to not only find previous studies but also give recommendations on the references they can further explore. Student SA, for example, reflected that she found "... *previous studies that are related to my topic… and PoP will automatically help to find journals that are related to* [the] *topic*." Meanwhile, VoS Viewer helps her in finding "*...updates on topics that have not been explored by previous researchers*." She also confirmed that the two applications help her "*...help me to discover the novelty of a research topic*." In addition, Student AR stated that '[f]*rom that, I will know which is the gap….*" Student TM also stated that the application " *helps* [her] *in choosing a suitable and good title*." Student ZM reconfirmed that "[i]*n the VoS viewer, I can see topics that have not been discussed by other researchers. It becomes an opportunity for me*."

The survey data and data from focused-group interviews signify the role of AI in developing the students readiness in finding research topics. The application enables them to find relevant resources, particularly journal articles based on their topic of interests. The applications also assist the students in mapping the topics that have

been researched in previous studies. Therefore, they can better identify the gaps and clarify the direction of their own research. Hence, they can bring novelty to their research topics.

Discussion

Data on the role of AI to help students find relevant resources confirm Cuff (2014) in that students found the application as useful in finding previous studies. The data highlights that the students find the AI useful particularly in understanding the networks of topics and themes of their research interest. This is inline with Murshed et al (2020). They stated that with the use of technology researchers can enhance their understanding of the complex ideas related to their research topics. While previous studies by Thunberg & Arnel (2020) explored issues related to the use of technology in data collection and found some technical problems, this current research does not explore this issue of challenges in relation to the use of AI. Hockly (2023) found that students learning language mainly use Chatbot. Similar finding is also reported by Patty (2024). Some other applications used include machine translation (Hockley, 2023, Patty, 2024) and automated feedback for writing (Hockly, 2024).

Findings of this research enriched this finding by Hockley (2023) and Patty (2024). Current findings suggest that students also use Chatbot to get an idea of what topic to take for their research. The students also reported that they use text assistant applications such as Grammarly to help them write their research. Together with findings by Hockley (2023) and Patty (2024) the findings of this research confirm that digital applications, particularly those AI generated, are found to be helpful not only for language learning but also help students to be more ready for the research process.

Betal (2023) suggests that AI enables learners to have a more customised curriculum and individualized instruction, personalized and adaptive learning experiences, and contextual understanding of the language they are learning. Taking these aspects of customization, personalization, adaptation and contextualization of learning of AI facilitated learning are also found in this research. Students reported on their ability to evaluate the relevance and suitability of journal articles suggested by PoP and VoS Viewer or search engines. They also reflected on their ability to go further from the networks of previous studies suggested by the application. This suggests that the students can contextualize the output from AI. Hence, considering Betal's (2023) idea on the ability of AI to provide more personalized, individualized and contextualized language learning, this study also suggests that AI also enables students to have a more personalized and contextualized process of research topic generating. While Pangket & Cayabas (2023) suggest that formulating the research topics is often problematic for students, the findings of this research highlight that the use of AI can be a solution to solve this problem. Students mainly report that after using AI, they are more confident not only with the selection of their topic but also with the degree of novelty of the topic.

CONCLUSIONS AND SUGGESTIONS

The findings of this current research highlight that the use of AI has enabled students to be better prepared for their research project. Students in the initial process of finding research topics found some AI applications as being helpful in assisting them in finding relevant resources. Once they get the resources suitable to their topic of interest, AI has enabled them to go further in mapping out the relationship among similar studies. Hence, a more novel topic on the area can be better generated and formulated. Their experience of using AI to assist their research topic generation have also boosted their confidence on the novelty of their research topics. This finding implies that in research classes, students need to be introduced to and be mentored on the use of AI in their initial research process. As this is a working paper, the findings reported here; however, does not present further on the challenges students face in using AI in the initial process of their topic exploration. Further research may explore such potential challenges and some ethical issues in the use of AI in research report writing.

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