

Smart Assistant for MOOCs: Enhancing Learner Support and Accessibility

Theresa Zobel

Hasso Plattner Institute, University of Potsdam, Prof.-Dr.-Helmert-Str. 2-3, 14482 Potsdam, Germany

Abstract

This doctoral consortium paper investigates the design and implementation of a chatbot/smart assistant system for Massive Open Online Courses (MOOCs) in Technology-Enhanced Learning (TEL). The research question focuses on improving the effectiveness and user experience of a smart assistant in supporting learners during their learning journey. By addressing significant issues in TEL, such as learner engagement, information overload, and personalized support, this paper proposes a novel approach to improve learner support especially in MOOCs. The paper provides an overview of the current state of the problem domain. Preliminary ideas, the proposed approach, and the obtained results are discussed, highlighting the unique contribution of the PhD project. The applied research methodology is outlined, focusing on empirical investigation and the iterative design process. The proposed solution aims to provide a more interactive and personalized learning experience that differs from existing approaches by incorporating adaptive features, social interaction, and personalized recommendations. Through this work, the thesis project aims to advance the field of TEL by providing a more effective and engaging learning environment for MOOC participants.

Keywords

Smart Assistant, Chatbots, MOOCs

1. Introduction

Technology-enhanced learning (TEL) has made significant strides in recent years, with Massive Open Online Courses (MOOCs) becoming a popular and accessible form of online education. However, despite their widespread use, learners in MOOCs often face challenges such as lack of engagement, information overload, and the need for individualized support. To address these issues, the integration of chatbots has gained attention as a promising solution.

In this doctoral consortium work, the focus is on the design and implementation of a smart assistant system for MOOCs in the TEL domain. The primary research question revolves around (1) enhancing learner support and accessibility in MOOCs with the help of a smart assistant and (2) improving the effectiveness and user experience of the smart assistant to better support learners during their learning journey. By framing these research questions, the paper aims to contribute to ongoing efforts to optimize the learner support provided by MOOC platforms. There are significant problems in the TEL field that hinder learners' educational experiences. These problems include the overwhelming amount of course content, difficulty finding relevant information, and a lack of personalized guidance. The proposed research project

aims to address these problems by designing and implementing a smart assistant that is responsive to learners' individual needs, preferences, and learning progress.

To provide a comprehensive understanding of the problem domain, this paper reviews the current state of knowledge, including the status of existing solutions. The PhD project uses an applied research methodology that focuses on an iterative design process and empirical research. Through user testing and feedback collection, the effectiveness of the system and the user experience are evaluated and iteratively refined.

Intelligent chatbot systems represent a promising solution by leveraging natural language processing and machine learning techniques. These chatbots can serve as virtual learning companions that provide personalized assistance, answer questions, and offer timely support. By providing quick access to frequently asked questions, course progress updates, content searches, and recommendations, chatbots can bridge the gap between learners and the information they need, provide a sense of personalized support, and encourage active engagement.

By identifying and solving these problems, the research project aims to contribute to the TEL field by developing a chatbot/smart assistant specifically for MOOCs. This solution aims to fill the gaps in personalized support, access to course information, and interactivity, thereby improving the overall learning experience and outcomes in the MOOC context.

Proceedings of the Doctoral Consortium of the 18th European Conference on Technology Enhanced Learning Responsive and Sustainable Educational Futures Aveiro, Portugal, 4-8 September 2023

✉ theresa.zobel@hpi.de (T. Zobel)

🆔 0009-0001-9419-0284 (T. Zobel)

© 2023 Copyright for this paper by its authors. Use permitted under Creative Commons License

Attribution 4.0 International (CC BY 4.0).

 CEUR Workshop Proceedings (CEUR-WS.org)

2. Identified Problems in the TEL Domain

In the area of TEL, several significant issues have been identified that pose challenges to learners in the context of MOOCs. These challenges relate to the lack of personalized support, limited access to course information, and the lack of interactive learning tools.

Personalized support is a critical aspect of effective learning experiences. In traditional face-to-face courses, learners have the opportunity to interact with instructors and classmates, receive individualized feedback, and ask for clarification when needed. However, in MOOCs, it is often difficult to provide individualized support due to the large number of learners and the asynchronous nature of the courses. Learners may find it difficult to find tailored support for their specific needs, leading to a decrease in engagement and motivation. [1]

Another problem lies in the limited access to course information. MOOC platforms typically provide course descriptions and syllabi, but learners may have difficulty finding specific details such as prerequisites, course materials, or assessment methods. The lack of easily accessible and comprehensive information about courses makes it difficult for learners to make informed decisions about their learning goals and progress.

In addition, the lack of interactive learning tools in MOOCs can hinder learner engagement and active participation. While these courses often offer video lectures, quizzes, assignments, and sometimes even podcasts the interactive elements are limited, and learners may miss opportunities for hands-on exercises, collaborative activities, or immediate feedback. This lack of interactivity can hinder the development of critical thinking skills, problem-solving, and a deeper understanding of course content.

3. Current Knowledge and Existing Solutions

The current state of knowledge in technology-enhanced learning highlights several existing solutions that have been developed to address the challenges faced by learners in MOOCs. These solutions aim to provide support, increase accessibility, and improve the overall learning experience.

One common approach is the use of discussion forums or online communities within MOOC platforms [2]. These forums allow learners to interact with faculty, peers, and subject matter experts and facilitate knowledge sharing, collaborative learning, and peer support. Learners can ask questions, participate in discussions, and ask for clarification. However, these forums often

face issues such as high participation rates, overwhelming amounts of information, and delayed responses, which limit their effectiveness in providing timely and individualized support. [3]

Another approach is the availability of course mentors or facilitators who can accompany learners on their learning journey [4] [5]. Mentors provide individualized support, provide feedback, and address learners' questions and concerns. While mentors can provide valuable assistance, their availability may be limited due to the large number of learners in MOOCs. In addition, response times can vary, which affects the immediacy of support.

In terms of accessibility, MOOC platforms typically provide course materials in a variety of formats, such as video lectures, readings, and assessments. Still, learners may have difficulty finding certain information in the courses, such as prerequisites, assessment details, or additional resources. Navigating course content and accessing relevant information can be time-consuming and frustrating, hindering learner progress and engagement.

4. Proposed Approach and Preliminary Findings

The proposed approach focuses on the development of an intelligent assistant specifically tailored for MOOCs to improve learner support and accessibility. The chatbot initially enabled free communication, allowing users to interact with the system in a natural way. However, based on valuable user feedback, the chatbot was further improved by integrating buttons to facilitate user engagement and solve the common problem of users not knowing what to ask or how to start.

Key features of the chatbot include quick access to FAQs related to the MOOC platform, general information about MOOCs such as cost and duration, and instructions on how to get started. Learners can also inquire about their course progress and download their certificates, if applicable. In addition, the chatbot has a keyword-based content search function that allows learners to easily find specific course materials or information within a course. In addition, an external recommender-system has been integrated into the chatbot, allowing it to suggest relevant courses based on learners' preferences and interests. In the example conversation shown in 1, the chatbot helps a user change her name and also performs this action for the user.

Initial results show that the chatbot provides quick and accurate answers to frequently asked questions and retrieves price-related information. Users have found the chatbot helpful in answering their questions and accessing relevant information in a timely manner. The introduction of buttons has improved the usability of the

chatbot by guiding users and making it easier for them to interact with the system. However, the visibility of the "Forward to a Human" feature, which allows users to ask a real human for help, needs to be further improved to ensure that users can easily access it when needed.

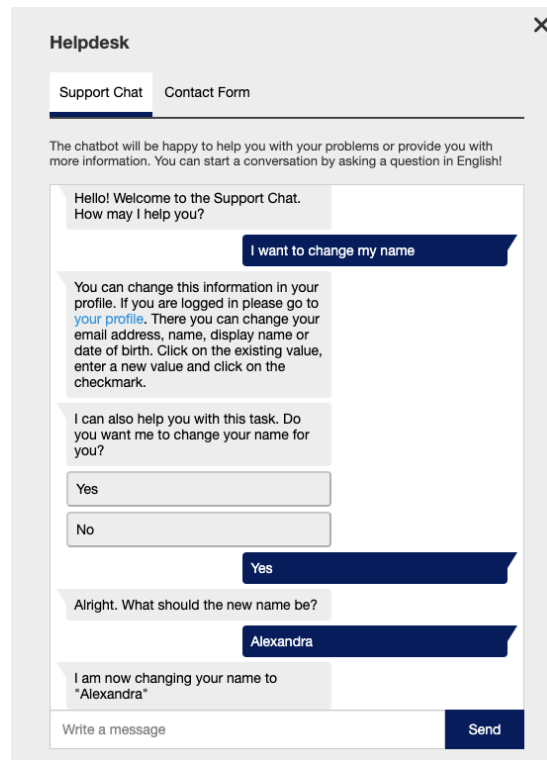


Figure 1: This figure shows the current status of the smart assistant integrated into one of the MOOC platforms. Here, the chatbot assists the user in changing their name.

5. Applied Research Methodology

The applied research methodology follows a systematic and iterative process to develop and evaluate the smart assistant.

The first phase of the research methodology included requirements gathering. Surveys and workshops were conducted to understand the needs, expectations, and problems of MOOC learners. This step helped identify the specific functionalities and features that the chatbot should include to support learners and effectively improve accessibility.

Based on the collected requirements, the design and development phase was started. The conversation flow of the chatbot was designed considering the natural language processing capabilities and the user-friendly in-

terface. The integration of relevant modules, such as the FAQs, course progress tracking, content search, and recommendation systems, was implemented to provide a comprehensive and personalized learning experience.

User testing is conducted to evaluate the performance and usability of the chatbot. Learners are invited to interact with the chatbot, and their feedback is collected through surveys and observation. Thematic analysis methods is used to analyze the data and gain insights into the effectiveness of the chatbot and areas for improvement.

Based on the feedback received, iterative improvements will be made to improve the functionality of the chatbot and the user experience. During this iterative development process, user suggestions and issues are considered to ensure that the chatbot effectively meets the needs of learners. The iterative nature of the methodology allows for continuous refinement and optimization of the chatbot's features.

Throughout the research process, the focus is on maintaining a user-centered approach. Learner perspectives and feedback are prioritized to ensure that the design and features of the chatbot aligned with their expectations and requirements.

The research methodology also involves collaboration with MOOC platform providers and experts in the field of TEL. Their expertise and insights contribute to the development and evaluation of the chatbot and ensure that it is in line with current trends and best practices in the TEL field.

The applied research methodology in this project enables the systematic development, evaluation, and improvement of the smart assistant.

6. Contribution to the TEL Domain

The main contribution is to improve learner support and accessibility. The chatbot acts as a virtual learning companion, offering personalized help, answering questions and providing timely support throughout the learning process. By answering FAQs, updating course progress, searching for content, and providing recommendations, the chatbot bridges the gap between learners and the information they need, fostering a sense of personalized support.

In addition, the integration of the recommendation module enhances the chatbot's ability to suggest relevant courses based on learners' preferences and interests, further increasing their learning experience and engagement. This personalized recommendation feature contributes to a customized and meaningful learning journey for MOOC learners.

In addition, the research project will explore future ideas such as integrating a quiz module for review questions and providing recommendations for further reading material. These ideas aim to increase learner engagement, reinforce learning outcomes, and provide additional resources to support learner knowledge acquisition and application.

By developing and evaluating the intelligent assistant in a MOOC context, this research project adds to the existing body of knowledge in TEL. It provides insights into the design, implementation, and evaluation of intelligent chatbot systems to improve learner support and accessibility in online learning environments.

Overall, the proposed research project provides an effective and innovative solution to the challenges faced by MOOC learners. Through the use of chatbot technology, the project enhances learner support, promotes engagement, and provides personalized support, ultimately improving the overall learning experience and outcomes in the MOOC context.

7. Discussion

One key aspect is the effectiveness of the chatbot in terms of learner support and accessibility. Preliminary results have shown that the chatbot provides quick and accurate answers to FAQs and offers personalized support. However, it is important to conduct further research to evaluate the chatbot's performance on a larger scale and gather more comprehensive user feedback. This would help refine the chatbot's capabilities and ensure that it is responsive to the diverse needs of MOOC learners.

Another point is the impact of the chatbot on learner engagement and motivation. By providing personalized support, access to course information, and interactive features, the chatbot is expected to increase learner engagement. However, it is critical to explore the long-term impact of using a chatbot in MOOCs and how it affects learner motivation and persistence. Future studies could investigate the impact of the chatbot on learner self-efficacy, satisfaction, and overall learning outcomes.

In addition, the potential of integrating a quiz module and providing recommendations for further reading material represents an exciting direction for future research. Investigating the impact of quizzes on learner retention and knowledge consolidation, as well as exploring the benefits of additional reading recommendations, could provide valuable insights for improving the learning experience in MOOCs.

Another important point to focus on are the limitations and challenges of implementing a smart assistant in a MOOC context. Factors such as language barriers, technical limitations, and user acceptance need to be considered to ensure the successful implementation and

adoption of the chatbot. Future research should address these challenges and propose strategies to effectively overcome them.

8. Conclusion

The proposed approach in this PhD research project focuses on the development of an intelligent assistant specifically tailored for MOOCs to improve learner support and accessibility.

By applying a systematic research methodology, including requirements gathering, design and development, user testing, and iterative improvements, preliminary results have demonstrated the chatbot's effectiveness in answering learners' questions and providing timely assistance. The integration of the recommendation module and future ideas such as integrating a quiz module and providing more reading recommendations are promising to improve learner engagement and the overall learning experience.

The contribution of this research project is to advance the field of technology enhanced learning by developing an innovative solution that addresses the identified problems in MOOCs. By providing personalized support, encouraging learner engagement, and improving accessibility, the chatbot helps improve the overall learning experience for MOOC learners.

In terms of future work, several paths can be taken. First, further evaluation of the chatbot's performance and usability on a larger scale would provide more comprehensive insights into its effectiveness and highlight areas for improvement. Examining the chatbot's long-term impact on learner motivation, self-efficacy, and learning outcomes would be valuable in evaluating its impact.

In addition, enhancing the capabilities of the chatbot by integrating the quiz module and additional reading recommendations would improve its functionality and provide additional learning opportunities for MOOC learners. Evaluating the impact of these additions on learner engagement, retention, and reinforcement would contribute to ongoing research in this area.

In addition, overcoming the challenges of accessibility in terms of language barriers, technical limitations, and user acceptance would be critical to the successful use of the chatbot in various educational contexts.

References

- [1] D. Wong, A critical literature review on e-learning limitations, *Journal for the Advancement of Science and Arts* (2007).
- [2] P. Diver, I. Martinez, *Moocs as a massive research laboratory: opportunities and challenges*,

- Distance Education 36 (2015). doi:10.1080/01587919.2015.1019968.
- [3] D. F. O. Onah, J. Sinclair, R. Boyatt, Exploring the use of mooc discussion forums, in: Proceedings of London International Conference on Education, 2014.
 - [4] M. L. Urrutia, S. White, K. Dickens, S. White, Mentoring at scale: Mooc mentor interventions towards a connected learning community, in: EMOCs 2015 European MOOC Stakeholders Summit (18/05/15 - 20/05/15), 2015.
 - [5] L. Urrutia, A. Yousef, S. White, Learning from moocs: the role of mentor qualities., in: Web Science Education Workshop Conference. 2015, 2015.