

Pre-Conference Workshop—Chatbot Tutors for Blended Learning: Why Bother? And Where to Start?

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Abstract—Creating a pedagogical agent requires complex computer programming skills and it is usually built from scratch to fit the intended educational purpose. This makes it difficult for teachers to adapt existing systems or to attempt in creating a similar version. Recently, we have leveraged the IBM Watson Assistant chatbot engine to develop some chatbots. These chatbots have been adopted in a common core (general education) course for inquiry-based learning, with a promising outcome. In this workshop, we would like to share our experience gained from developing a set of chatbots for an online blended learning environment. Through the workshop, attendees will identify what and how chatbots can be designed for their own blended or fully online courses. They will also develop a simple chatbot system that can responses to some assessment inquiries.

Keywords—*chatbot, inquiry-based learning, flipped classroom, educational technologies*

I. INTRODUCTION

Flipped classroom and other blended learning approaches had been more frequently adopted in the higher education field due to the more convenient access to online videos and other learning resources [1]–[3]. However, designing an blended learning experience for teaching and learning (T&L) can be challenging. For example, teachers have to provide adequate and relevant feedback to students during online learning sessions. However, providing meaningful and prompt feedback requires teachers' time and attention to their students. Despite that, there are a number of tools available for teachers to use to overcome these challenges. One of the popular tools that can be used to address these challenges is the intelligent tutoring system (ITS). These systems provide 24/7 support for multiple learners at the same time, with personalized feedback and guide them in an engaging way throughout the virtual environment.

However, creating a pedagogical agent requires complex computer programming skills and it is usually built from scratch to fit the intended educational purpose [4]–[8]. This makes it difficult for teachers to adapt existing systems or to attempt in creating a similar version. But with the recent AI developments, technology companies offer coding-free platforms that can enable a non-/less-technical teachers to create a chatbot for enhancing the learning experience of the students. Recently, we have leveraged the IBM Watson Assistant chatbot engine to develop some chatbots. These chatbots have been adopted in a general education course for inquiry-based learning, with a promising outcome.

II. AIMS AND OBJECTIVES

In this workshop, we would like to share our experience gained from developing a set of chatbots, through adopting the IBM Watson Assistant chatbot engine, for an online blended learning environment. In particular, we will address the following issues:

- How can we design chatbots without a strong technical background?
- What are the processes involved in developing a chatbot (i.e. intents, entities, and dialogs)?
- How can chatbots be used for facilitating course operations and inquiry-based learning?
- What teaching and learning situations can chatbots be adopted?

Through the workshop, attendees will identify what and how chatbots can be designed for their own blended or fully online courses. They will also develop a simple chatbot system that can responses to some assessment inquiries.

III. KEY WORKSHOP ACTIVITIES

- Introduction (45 minutes)
 - Why chatbot can be used in T&L?
 - How chatbot can be used in T&L?
 - Architecture of a chatbot system
 - What is a conversation/dialog?
- Hands-on chatbot implementation (45 minutes)
 - Edit a dialog
 - Add an intent
 - Add an entity
 - Add a node
 - Test and revise the chatbot system
- Hands-on chatbot implementation (30 minutes)
 - Application programming interface
 - Frontend design

- Backend design
- Discussions and wrap-up (30 minutes)
 - How chatbot can be used in T&L? (Revisited)

IV. INTENDED PARTICIPANTS

The maximum number of attendants is 25. Intended participants includes:

- People who are planning to develop chatbot as AI tutors for blended or fully online courses: They can leverage chatbots for providing 24/7 support and instant feedback to students in asynchronous learning. Furthermore, students are also more willing to raise questions to the teacher via the chatbot system.
- People who are interested in chatbot engine development: They may want to know how chatbot engine should be designed for suiting teaching and learning proposes. In particular, they are interested to know what learning data could be imported to the chatbot system and what responses should be exported from the chatbot system.

V. REQUIRED EQUIPMENT

We need to use the following equipment:

- Projector with a connected computer
- Reliable Wi-Fi connections
- Computers (One per participant)

We also recommend participants can bring their own computers and register an IBM Cloud account in advance.

VI. ALIGNMENT WITH TALE

This workshop aims to serve as a venue for practitioners the design and adoption of interactive pedagogical agents that promote metacognition. We hope we can delve deeper into the topics presented and to provide a collaborative, active learning environment for the attendees.

VII. INTENDED PARTICIPANTS

Mr. Donn Gonda is an Assistant Instructional Designer at the Technology-Enriched Learning Initiative (TELI). He is an expert in Chatbot development and learning analytics, and his specialties cover both instructional design and educational technology. He has led several e-learning projects including MOOC, SPOC, blended learning and flipped classroom. He is also one of the designers and instructors of Interactive Online Learning (IOL), an online professional development program on e-learning adoption. His research interest is in technology-enhanced learning, learning analytics and gamification.

Dr. Chi-Un Lei, Leon is an E-learning Technologist at TELI. He is also an Honorary Assistant Professor at the Department of Electrical and Electronic Engineering in HKU. His research interests include learning analytics and learner

acquisition/retention/conversion. He received the best paper award in IEEE International Conference on Teaching, Assessment, and Learning for Engineering 2014 and 2017. He is an IEEE Senior Member and the current Vice Chairman of IEEE Hong Kong Education Chapter.

Ms. Yuqian Chai is a research assistant in TELI. She is also working toward the Ph.D. degree at the Department of Electrical and Electronic Engineering in HKU. She is in charge of MOOC data analysis, Open edX XBlock building, web development and edX course management in TELI. Her research interests include learning analytics, educational data mining and dropout prediction.

Mr. Xiangyu Hou is an E-Learning Technology Assistant at TELI. He is responsible for data analysis, data visualization and text mining using machine learning approaches for HKU MOOCs and SPOCs. He has also developed several advanced features for HKU e-learning platform including dashboard, badge system, chatbot etc. His research interest is in machine learning, data mining and natural language processing for online learning.

Dr. Vincent Tam is a Principal Lecturer and Honorary Associate Professor in the Department of Electrical and Electronic Engineering. He actively participated in various teaching development projects in the areas of mobile learning, computational intelligence, cloud computing and learning analytics, including E-learning Games for High Performance Computing on the Azure Cloud Platform (PI, supported by Microsoft Research Asia, 2012-2013).

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