

Towards an educational use of Intelligent Virtual Assistants in the University

Diana Pérez-Marín*, M. Cristina Ramos-Vega

Computer Science and Statistics Department, Universidad Rey Juan Carlos
Campus de Móstoles, Madrid, Spain

*Corresponding author: diana.perez@urjc.es

Abstract: This In the last years, there have been an increase in the research interest of generative Artificial Intelligence in education. Being able to chat to an intelligent agent has been a long-investigated domain goal of research in Pedagogic Conversational Agents. However, the limitations of Natural Language Processing restricted its use in class. The advent of more intelligent dialogues with systems such as Alexa or ChatGPT could be the key change to its real integration in the classroom if teachers and students learn how to use them. In this paper, it is proposed a model to integrate Alexa in the University classroom to assist students in the review of their subjects. The goal is to teach students to use these assistants to take advantage of its benefits. More research is necessary into how intelligent virtual assistants can be successfully integrated into the classrooms of all educational levels.

Key words: Alexa, ChatGPT, Intelligent Virtual Assistant, University Education.

1. Introduction

Pedagogic Conversational Agents (PCAs) can be defined as “lifelike autonomous characters that cohabite the learning environment creating a rich interface face-to-face with student” (Johnson et al., 2000).

This rich student-agent interface usually includes talking as long as gestures. If the dialogue is focused on the writing or speaking interaction the PCAs can be classified as intelligent virtual assistants such as Alexa¹ or ChatGPT². They can be used for many domains including the educational which is the focus of this paper. In this case, the dialogue with Alexa or ChatGPT is not about any topic, but to help students understand concepts or solve problems related to their subjects.

Intelligent assistants can be applied to many different educational levels, from Primary Education up to

university students. However, for a successful interaction, teachers and students should learn how to use the technology. The goal is not to generate a solution to the exercise and paste it for the teacher, or to generate content for the students without a critic mind to check whether the information provided is correct. Teachers and students should keep the common sense of checking what they are being told by the digital assistant and remember that as well as plagiarism from any other source is prohibited, it is also prohibited from a digital assistant.

In this paper, it is proposed a model to integrate Alexa in the University classroom to assist students in the review of their subjects. The goal is to teach students to use these assistants to take advantage of its benefits. As opposite of prohibiting its use, students learn how to integrate them into their daily study.

¹ <https://developer.amazon.com/es-ES/alexa>

² <https://chat.openai.com/auth/login>

2. Related work

The use of technology for education has proven to be useful. One of the possible assistive technologies for education are Pedagogic Conversational Agents (PCAs), which can be defined as “lifelike autonomous characters that cohabite the learning environment creating a rich interface face-to-face with student”. Some detailed reviews of PCAs can be found in Baylor (2001), Clarebout et al. (2002), Moreno (2004), Kerly et al. (2008) and Pérez-Marín (2021). Figure 1 shows one of the most investigated PCAs able to dialogue with the student as well as using gestures for Computer Science university students.

As can be seen in Figure 1, the PCA has a face and is looking at the student and simulating to breath. In this case, the agent has adopted a role teacher, and she is talking about Computer Science, but PCAs have been used to teach many other different domains from Primary Education with Math, Biology and other Sciences and Languages (Pérez-Marín, 2021).

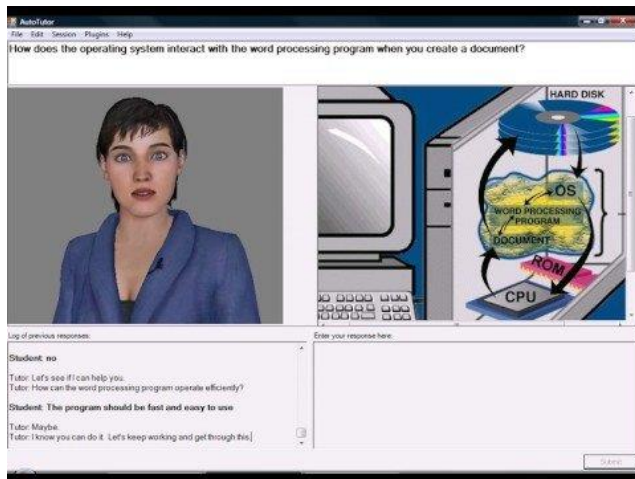


Figure 1. Sample screenshot of the PCA Autotutor (<https://www.youtube.com/watch?v=aPcoZPJL2G8>)

In some cases, PCAs are not only a face but a whole body with sophisticated hand and body gestures to help the communication. It is also possible to change the role of the agent should that they do not always adopt the role of owner of the knowledge but to serve as an emotional companion to help students (particularly, on-line students who could feel alone studying without other mates around) or as students

that need to learn from the student that become the teacher (Pérez-Marín, 2021).

Several benefits of the use of PCAs have been published such as: the Persona effect (Lester et al., 1997), according to which, just having the agent on the screen makes the learning experience better for the students; the Proteus effect (Yee & Bailenson, 2007), according to which students are motivated to become more like their agents; and, the Protégé effect (Chase et al., 2009), according to which students study more to teach their agents than to learn for themselves.

However, student-agent conversations were still less realistic than student-human teacher conversations (Angeli & Brahmam, 2008). Given that Natural Language Processing was still under research and there were not tools such as the new generative Artificial Intelligent assistants such as Alexa¹ or ChatGPT², students tend to insult the PCAs or just using it during the research project without a real integration into the classrooms (Tamayo-Moreno, 2017).

This situation can change now that the dialogue with assistants such as ChatGPT can be as real that some humans cannot distinguish whether the text have been written by a human or a computer. This powerful technology can be useful if teachers and students are taught how to use it, how to do that is currently under study with recent literature such as Şerban & Todericiu (2020) for the case of Alexa and Rasul et al. (2023) for the case of ChatGPT.

Some successful uses of Alexa to teach in pre-university levels can be found in Suárez Yagual (2020), Pacci Candia & Condori Vilcapuma (2022) and Pérez et al. (2020). More studies are necessary for university levels both for the use of Alexa and ChatGPT given its novelty.

3. Proposal

The proposed model to teach university teachers and students how to use Alexa for their review is illustrated in Figure 2. As can be seen, students are

¹ <https://developer.amazon.com/es-ES/alexa>

² <https://chat.openai.com/auth/login>

requested to create questions and their answers so not to copy the answers of Alexa but to create and think their own and later compare them with Alexa. On the other hand, teachers can also create more questions and answers, and check whether the material created with Alexa is adequate for the subject. During the review class, students can answer the questions with the ludic component that Alexa can provide taking advantage of gamification or with some games played by the teachers (Deterding et al., 2011).



Figure 2. Overview of the proposed model to integrate Alexa into the university classroom

The steps of the model are the following:

1. Students create the questions following a template provided. With a minimum of one question per student with its correct answer. The questions can have a short answer associated, or to have several options to choose one correct. The teacher can also create more questions if the number of questions provided by the students would not be enough or just to have a wider dataset.
2. Students must create a free Amazon account. It is not necessary that they use an Amazon device, just the account to log into the Amazon Alexa free app that they can download from Play Store or App Store.

3. Before class, students can review using Alexa at their own rhythm being told the correct answer whenever they fail to keep learning.
4. During the review class, teachers can choose the frequency in the semester to turn some classes into review classes. The review can be more motivating if the teacher chooses to use some Alexa multimedia options such as playing some song or clapping.
5. After the review class, students take their exam, and teachers can check the validity of the model by measuring the student's learning performance as well as asking students to take some satisfaction and motivation questionnaire.

4. Discussion

The advent of Intelligent Virtual Assistants can shape the future of education. Teachers can think of these assistants as harmful for education if students are not taught how to use them. It is the same case as when students had to search for information in libraries. If they just copy the information from the book to their report, they do not learn. Students must acquire a critic mind when interacting with this technology.

In this paper, it has been proposed that Alexa can be used as an assistant to review concepts for university subjects. It can be a complement to the teaching in class. Before class, students could create some questions and answers. It would be helpful not to directly assume that the answer provided by Alexa is correct and just copy it, but to think about the question and provide an answer written by the student according to the lesson studied in class.

Finally, it is considered that gamification could be a key element of the model to make the review more fun. Just to interact with Alexa could be a motivating element. However, it could be the case that it is not enough. In this case, it would be necessary to add some games or songs as chosen by the teacher to make the review class more engaging.

Acknowledgements

This research has been conducted under the innovation project “REPASO GAMIFICADO CON ASISTENTES VIRTUALES INTELIGENTES COMO ALEXA O CHATGPT EN LA URJC” of the CORES group belonging to Universidad Rey Juan Carlos.

References

- Angeli, A.D., & Brahmam, S. (2008). I hate you! Disinhibition with virtual partners. *Interacting with Computers*, 20(3), 302-310.
- Baylor, A. L. (2001). Permutations of control: Cognitive considerations for agent-based learning environments. *Journal of Interactive Learning Research* 12(4), 403–425.
- Chase, C., Chin, D., Oppezzo, M., & Schwartz, D. (2009). Teachable agents and the Protégé effect: increasing the effort towards learning. *Journal of Science Education and Technology* 18, 334-352.
- Clarebout, G., Elen, J., Johnson, W. & Shaw, E. (2002). Animated pedagogical agents. An opportunity to be grasped? *Journal of Educational Multimedia and Hypermedia* 11(3), 267–286.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: defining "gamification". In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* (pp. 9-15).
- Johnson, W., Rickel, J., & Lester, J. (2000). Animated Pedagogical Agents: Face-to-Face Interaction. In *Interactive Learning Environments, Journal of Artificial Intelligence in Education* 11, 47-78.
- Kerly, A., Ellis, R. & Bull, S. (2008). Conversational Agents in E-Learning. In T. Allen; R. Ellis & M. Petridis. (Ed.), *Applications and Innovations in Intelligent Systems XVI*. Proceedings of AI-2008, the Twenty-eighth SGAI International Conference on Innovative Techniques and Applications of Artificial Intelligence, Springer.
- Lester, J., Converse, S., Kahler, S., Barlow, S., Stone, B., & Bhogal, R. (1997). The persona effect: affective impact of animated pedagogical agents. *Proceedings of the SIGCHI conference on Human factors in computing systems*, ACM.
- Moreno, R. (2004). Animated pedagogical agents in educational technology. *Educational Technology* 44(6), 23–30.
- Pacsi Candia, G.H., Condori Vilcapuma, E.C. (2022). *Implementación de un software educativo para mejorar el aprendizaje de los estudiantes de Primaria en el curso de comunicación de la Institución Educativa Mariscal Cáceres de Tacna utilizando el asistente virtual de Amazon Alexa en el año 2022*. (Trabajo fin de grado). Universidad Privada de Tacna.
- Pérez, M. D. S., Guillén Perales, A., Baños Legrán, O., & Villalonga Palliser, C. (2020). Análisis del uso de asistentes virtuales en el aula como recurso complementario en la práctica docente. *Enseñanza y Aprendizaje de Ingeniería de Computadores*, 10, 61-67.
- Pérez-Marín, D. (2021). A review of the practical applications of pedagogic conversational agents to be used in school and university classrooms. *Digital*, 1(1), 18-33.
- Rasul, T., Nair, S., Kalendra, D., Robin, M., de Oliveira Santini, F., Ladeira, W. J., & Heathcote, L. (2023). The role of ChatGPT in higher education: Benefits, challenges, and future research directions. *Journal of Applied Learning and Teaching*, 6(1).
- Șerban, C., & Todericiu, I. A. (2020). Alexa, What classes do I have today? The use of Artificial Intelligence via Smart Speakers in Education. *Procedia Computer Science*, 176, 2849-2857.
- Suárez Yagual, C.J. (2020). *Propuesta para incentivar la práctica de pronunciación de inglés en los módulos de idiomas de los alumnos en la Universidad Estatal Península de Santa Elena a través de una aplicación creada en la plataforma*

- Amazon Alexa.* (Trabajo Fin de Grado).
Universidad Estatal Península de Santa Elena.
- Tamayo-Moreno, S. (2017). *Propuesta de Metodología para el Diseño e Integración en el Aula de un Agente Conversacional Pedagógico desde Educación Secundaria hasta Educación Infantil.* (Tesis Doctoral). Universidad Rey Juan Carlos.
- Yee, N., & Bailenson, J. (2007). The Proteus effect: The effect of transformed self-representation on behavior. *Human Communication Research* 33, 3, 271-290.