1. RESUM: 400-500 caràcters AMB espais en l’ idioma de la proposta

This paper investigates whether Apple Siri and Google Assistant, two of the most used Voice Assistants, can become good learning companions of Generation-Z students of Computer Science. Based on a participant observational study conducted over a semester in two courses, we show that beyond cheering students up by adding fun to exercises, Siri and Assistant were not useful learning companions, as they did not behave as competent human tutors, and were seldom used by our students in class.

2. ABSTRACT: 400-500 characters WITH spaces in English

This paper investigates whether Apple Siri and Google Assistant, two of the most used Voice Assistants, can become good learning companions of Generation-Z students of Computer Science. Based on a participant observational study conducted over a semester in two courses, we show that beyond cheering students up by adding fun to exercises, Siri and Assistant were not useful learning companions, as they did not behave as competent human tutors, and were seldom used by our students in class.

3. PARAULES CLAU: 4-6 (en l’ idioma de la proposta)

Voice assistants, Apple Siri, Generation-Z students, Voice-activated classrooms
1. Introduction

The present and future of higher education is intertwined with digital technologies (Bowen, 2012). Learning analytics (Ferguson, 2012), Virtual and Augmented Reality (Jing, 2019), Smart Learning Environments (Spector, 2016), Gamification (with digital support) (Dicheva et al., 2015), Massive Open Online Courses (MOOCs), M-learning (Zhang et al., 2019) and Pedagogical Agents (Johnson & Lester, 2016) are some examples of the potential of digital technologies to transform learning and teaching. We focus on Voice Assistants (VAs), like Apple Siri and Google Assistant, which are an increasingly popular way of interacting with a range of applications (McTear et al., 2016), are experiencing huge growth worldwide (Olson & Kemery, 2019), and can revolutionize traditional classrooms, turning them into ‘voice-activated’ ones (Horn, 2018).

Are VAs good learning companions of Generation-Z students of Computer Science in the classroom? Learning companions are a kind of educational (computer-based) agent, which plays a non-authoritative role (e.g. collaborator, competitor) in a social learning environment (Chou et al., 2003). Generation-Z students are used to digital technologies (Seemiller & Grace, 2019) and VAs are good learning companions to study a second
Why not in CS? This paper addresses this under-studied issue by presenting the results of a pilot study, based on participant observation (DeWalt & DeWalt, 2011), aimed to explore the extent to which whether (and how) Apple Siri and Google Assistant, two of the most used VAs, according to (Olson & Kemery, 2019), can become good learning companions of Generation-Z students (N=18) of Computer Science.

We chose participant observation because this method helps us understand the numerous and context-dependent meanings and nature of our interactions with digital technologies. We address ‘in the classroom’ because with so many contents and courses available online, much of the value of universities, we believe, will remain in its face-to-face interaction between faculty and students.

2. Related Work

While learning with (Embodied) Conversational Agents and robots has received a great deal of research attention (Tarauco et al., 2018; Johnson & Lester, 2016), previous research on education with VAs is much scarcer. (Haryanto & Ali, 2018) focuses on Apple Siri and second language learning at university. (Metatla et al., 2018) explores VAs with visually impaired students in schools. (Winkler et al., 2019) examines how conversations with Amazon Alexa increase task group outcomes. (Neiffer, 2018) addresses Apple Siri and student engagement in upper elementary and middle school science classrooms, finding very little empirical evidence of engagement. Opinion pieces also discuss the potential and dangers of VAs in education, mostly in schools, e.g., helping children learn a second language and cheating in mathematics (Ellis, 2017; Clark, 2017). None of them have explored VAs in the Computer Science (CS) classrooms of universities.

2. The study

Over the course of a semester, we introduced Apple Siri and Google Assistant in the laboratory and theory sessions of Data Structures and Databases, which we coordinate. Both courses are held in the second year of the new (starting in 2018/19) 3-year Degree of Digital and Computing Interaction Techniques at the Campus Universitari d’Igualada - Universitat de Lleida. The courses are highly technical and involve programming.

We used Apple Siri and Google Assistant (in Spanish), because all our students (and lecturers) owned either iPhone or Android phones with these VAs built in. Some of our students also brought to class MacBooks with Siri. Thus, the introduction of VAs in the classroom was somewhat less artificial or experimental than if we had Amazon Echo, which is mostly used in home settings, installed in the classroom.

In theory sessions, we asked Apple Siri and Google Assistant questions related to some of the topics discussed to see the reaction of the students and encourage them to use the
VAs in class. Examples are ‘What is a relational database?’ and ‘What is a double-linked list’. In laboratory sessions, we had students use Apple Siri and Google Assistant while working on exercises. Students (the same in both courses) asked them questions related to their doubts, such as ‘show me an example of a natural join in SQL with three tables’ The VAs acted as expert tutors and collaborators.

We took paper-based notes of our observations and conversations with the students in the classroom. We analyzed these notes by conducting thematic analysis (Braun & Clarke, 2006).

3. Findings

The initial reaction of our students was enthusiastic; “(...) we’re going to use Siri in class, cool!” All reported using Amazon Echo or Google Dot at home, Apple Siri or Google Assistant on the go, for having fun and killing time.

After the first three or four weeks of using Siri and Assistant in the courses, that initial excitement disappeared. No student used the VAs in class. Siri (or Assistant) were not useful learning companions; “You can’t ask Siri about databases or data structures. She won’t know the answer”. Siri provided useful responses only when it was asked “who is X?” type of questions. The answer was useful because it answered the question like an expert. When Siri (or Assistant) was involved in a technical conversation, it answered with a list of links to websites, which, in the students’ opinion, was not useful at all, as they expected a more competent, voice-based answer “You’ve got a list of links. What’s the difference with Google? Not much I would say. Siri isn’t a good teacher”.

Some communication issues hindered the use of these VAs. For example, Siri understood “Postgres”, a widely used Database Management System, as “postres” (in Spanish, dessert). These communication issues added a fun touch to the classroom, which was welcome by our students, especially when they were working on difficult activities, “Siri made me laugh, like him (his friend). This is great, because I was struggling with this exercise. She cheered me up!” Hence, we disregarded Google Assistant. Instead, we used Siri as a collaborator to motivate our students.

4. Reflection

By using our voice to interact with digital devices, VAs are changing the way we interact with them. High expectations are set for VAs (Camber et al., 2019); with a simple voice command, we can do almost everything. This, along with the fact that Gen-Z students are used to digital technologies and growing up in a world wherein talking to devices is no longer science fiction, might lead us to assume that VAs can be good learning companions. Our results call that assumption into question, deconstructing definitive definitions (Woolgar, 1991) of what technology (in this case, VAs) can do in higher
education.

Our results show that, beyond cheering students up, which is important in learning, neither Siri nor Assistant had the qualities our students look for good voice-activated learning companions. Students expected VAs to behave like competent, human tutors, and to be able to ‘talk to them’. Yet, VAs are at an early stage of development and ill-prepared to deal with highly specialized and technical questions. The results resonate with others which claim that much of the potential of VAs has yet to be realized, as after the initial excitement and exploration (Sciuto et al., 2018), people use VAs to perform basic tasks (Luger & Sellen, 2016; Abdolrahmani et al., 2018; Camber et al., 2019), and experience communication issues (Beneteau et al., 2019; Clark et al., 2019) that hinder their use.

Overall, the results encourage the academic community to examine the qualities of voice-activated learning companions in order to understand the extent to which VAs are an improvement over the digital technologies we have today in the classrooms of universities. Are specialized VAs a way forward?
8.1. FIGURA O IMATGE 1

8.2. FIGURA O IMATGE 2
MÉS ENLLÀ DE LES COMPETÈNCIES: NOUS REPTES EN LA SOCIETAT DIGITAL

8.3. FIGURA O IMATGE 3

8.4. FIGURA O IMATGE 4
MÉS ENLLÀ DE LES COMPETÈNCIES: NOUS REPTES EN LA SOCIETAT DIGITAL

8.5. FIGURA O IMATGE 5

8.6. FIGURA O IMATGE 6
9. REFERÈNCIES BIBLIOGRÀFIQUES (segons normativa APA)

https://apastyle.apa.org/style-grammar-guidelines/references/


Horn, M. (2018). “Hey Alexa, can you help kids learn more?” Education Next, 82-83


