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Changing student attitudes and behaviours to Academic Integrity through reflection with a conversational agent

Research-in-progress

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Abstract

Facilitated by technology, breaches of academic integrity take many different forms such as using the information *as it is*, collusion, fabricating information, and contract cheating. To counteract, universities offer academic integrity modules, policies, and procedures for students to follow on their websites. However, academic misconduct is still rampant. With advancements in technology, higher education institutions have an opportunity to promote ethical principles in innovative ways. In this paper, we present a work-in-progress collaborative project that proposes use of an artificially intelligent pedagogical conversational agent. The approach seeks to augment existing ways of educating students about academic integrity concepts by seeking to change their underlying motivations and beliefs about academic integrity and the consequences of misconduct through reflective review and discussion of the reasons why, consequences of and alternatives to committing academic misconduct.

Keywords artificial intelligence, academic integrity, higher education, pedagogical conversational agent.

1 Introduction

Academic integrity is the basis of ethical academic practice. The International Centre for Academic Integrity (ICAI) (academicintegrity.org) describes six fundamental core values to put into practice in educational institutions. ICAI define academic integrity as, “*a commitment, even in the face of adversity, to six fundamental values: honesty, trust, fairness, respect, responsibility, and courage. From these values flow principles of behaviour that enable academic communities to translate ideals to action*”¹. For the Australian Higher Education Standards Framework² (Threshold Standards) 2021 (Section 5.2 on academic and research integrity), Universities Australia (UA) articulates the concept as, “*Academic integrity means acting with the values of honesty, trust, fairness, respect and responsibility in learning, teaching and research*” (Australia 2018, p. 4). A substantial amount of research has been conducted on issues related to academic integrity in the past few decades (Bretag et al. 2011; Cole and McCabe 1996; McCabe et al. 2001; Olafson et al. 2013; Yorke et al. 2020). There is a range of student behaviours that threatens academic integrity e.g. plagiarism, recycling or resubmitting work, exam cheating, contract cheating, collusion, fabricating information, and impersonation. For contextual purposes, we interpret these definitions as defined by the Australian Tertiary Education Quality and Standards Agency (TEQSA)³.

Bretag’s et al. (2014) survey provided an opportunity to show how to inform the higher education sector in relation to communicating with and educating students about academic integrity. To assure academic integrity, many steps have been taken by the higher education sector starting from authentic assessments (Ellis et al. 2020); honour codes (Richards et al. 2016; Tatum and Schwartz 2017); to building policies and procedures for students, and academic staff and posting on individual universities websites (Bretag et al. 2011). McCabe’s Academic Integrity Survey (DuPree and Sattler 2010) has found that the average student’s understanding of University’s policies concerning cheating are very low. They have suggested 3.9% for students and 14.8% for staff. TEQSA (2019/2020) has conducted a series of workshops led by Tracey Bretag on Academic integrity in Australian higher education and have considered it as a national priority.

Students can fall into the trap of academic misconduct because of many reasons. There is voluminous research on why students plagiarise and cheat. It can be categorised into two groups. One according to the controllable factors that are strongly associated with plagiarism and cheating. For example, lack of language proficiency (Bretag et al. 2019), opportunities to cheat (Baird and Clare 2017; Bretag et al. 2019), perceived norms (e.g. peer pressure) (Curtis and Clare 2017), dissatisfaction with the teaching and learning environment, not knowing the universities policy and/or lack of institutional support for academic integrity and cheating, student perception of staff apathy, knowledge, and dedication (Husain et al. 2017), lack of understanding (Curtis and Vardanega 2016), other pressures and life complexity (e.g. family issues) (Brimble 2016), and poor time management and procrastination (Wallace and Newton 2014). Secondly, students may plagiarise according to psychological states and traits, due to, for example, competitive mindset/trying to get the best score (Barbaranelli et al. 2018), impulsivity, low confidence, or poor resilience (Moss et al. 2018), and low self-control or anxiety (Curtis et al. 2018).

Higher education institutions are using strategies for preventing academic misconduct, such as providing them with compulsory quiz/modules when they enrol, resources for studying with integrity, referencing and citation, academic integrity checklists, in-class activities where students work through real-life Turnitin examples that show different types of plagiarism, celebrating academic integrity week, and academic integrity FAQs. There has also been growing interest on interactive approaches to academic integrity to educate students using gamification (Brown and Ballinger 2017; Kier 2019; White 2020). Some institutions are using sophisticated software^{4,5} to combat academic misconducts. However, there are concerns that can lead to a never-ending ‘arms-race’ between the students and the institution (Cole and Kiss 2000). Dawson (2020) suggests to engage with the cybersecurity literature to study student experience of technologies designed to safeguard integrity.

Despite the development of many resources and mandatory training on academic integrity, it does not seem the battle is being won. We recommend fundamentally changing the motivators and underlying beliefs that drive student academic misconduct. Zhou et al. (2018) suggest that Intelligent Virtual Agents

¹ <https://academicintegrity.org/resources/fundamental-values>

² <https://www.teqsa.gov.au/higher-education-standards-framework-2021>

³ <https://www.teqsa.gov.au/what-academic-integrity>

⁴ <https://www.smh.com.au/education/how-unis-can-beat-the-cheats-by-finding-fingerprints-in-their-essays-20180626-p4znr1.html>

⁵ <https://umsu.unimelb.edu.au/cadmus-what-is-it/>

(IVAs) can act as a valuable assistant and can be customised according to the needs of each case through specialised datasets. Thus, we propose a technology-based solution using IVAs from the field of artificial intelligence (AI) that have been shown to deliver behaviour change (Abdulrahman et al. 2021). In this paper we present the design and planned evaluation of our PCA in three different Australian universities. The contributions of this paper include:

- Design of an academic integrity module using AI-driven pedagogical conversational agents
- An alternative solution to academic integrity education for students that seeks to go beyond just education to challenging motivations and beliefs

The remainder of the paper is organised as follows. Section 2 provides literature review on the benefits and use of conversational agent in education, followed by our research plan in Section 3. Section 4 provides brief discussion, conclusion, and future work.

2 Benefits and use of Conversational Agent in Education

Conversational agents take different forms and have been classified as virtual companions, intelligent assistants or task-focused chatbots, depending on whether the focus is broad, deep, narrow or shallow (Grudin and Jacques 2019). They typically use methods from AI such as natural language processing (NLP) and/or agent architectures to create what is known as a pedagogical agents, peer learning agents or demonstrating agents. In general, they are often called embodied conversational agents (ECAs) that have humanlike appearance, voice, verbal, and non-verbal behaviours (Cassell et al. 2000). The research literature reports many pedagogical agents used in teaching and learning; see examples and uses in Johnson and Lester (2016) who report that PCAs increase positive perception of the learning experience, particularly in learning environments for interactive demonstrations, and navigational guidance. Furthermore, a PCA can improve motivation, knowledge retention and transfer (Domagk 2010).

Looking into the benefits PCAs provide, and to foster meaningful interactions with academic integrity resources, we propose educating students on academic integrity using PCAs to provide a medium of interaction with students in an engaging and personalised manner. However, the use of such agents is limited in real-world educational environments (say hello, A Systematic Identification of Pedagogical Conversational Agents). The examples publicly available are mostly used for non-formal and isolated learning such as a personal assistant to help with the study⁶, help with the unit guide/subject outlines (Atif et al. 2021), and for collaborative learning in MOOCs (Santi 2018).

To foster academic integrity and encourage meaningful interaction with students, researchers have cited important things academic staff should do, such as make students feel comfortable and important, to make them honest in the pursuit of knowledge, to develop a sense of personal responsibility, and supporting learner communities and individuals with professional practices (Mathrani et al. 2021). In the context of discussing a topic such as academic misconduct and why someone might decide to engage in such behaviour, students may feel more inclined to talk to a humanlike character, instead of an actual human being. PCAs have provided sense of ease and comfort in the education and enhanced flow of information and communication to students (Unal-Colak and Ozan 2012).

Since we are seeking to change student behaviour, we can draw on the work of ECAs for behaviour change. Abdulrahman et al. (2021) found that a virtual advisor who first learns the goals (wants) and belief (thoughts) of students about certain behaviours and then refers to these goals and beliefs in the recommendations provided was able to change students' intentions to follow the recommended behaviours to reduce their study stress, such as healthy eating, exercise, and social contact. Similarly, we propose that to change students' academic integrity behaviour we need to change their goals and beliefs concerning academic integrity. By engaging in a non-threatening and non-judgemental conversation with a PCA allows the student to reflect on the knowledge gaps, problems and pressures they might face that might contribute to misconduct and reinforce their choices and ramifications.

3 Research Plan

This research involves two phases. First, the design of the conversational agent, which is described in the following subsections. The second phase involves a pilot study at three Australian universities to explore the use of the proposed agent in educating students with academic integrity is future work. If the PCA is adopted by certain courses within a university, we can compare the number of AI cases before and after the use of PCA. At this stage of the project, we are unable to provide any more information.

⁶ <https://www.deakin.edu.au/student-life-and-services/support-services/digital-deakin>

3.1 Conversational Agent Design

The four authors of this manuscript, who collectively have approximately 75 years of academic teaching experience, participated in a series of discussions looking at literature, resources and current approaches to teach students about academic integrity. We sought to understand what might have been missing from current solutions but what might be more motivating, challenging and engaging to students.

One of the resources we came across that we found powerful and thought provoking was a video showing three Australian students from different disciplines engaging in academic misconduct. The video brought to life how such behaviour can happen and what can happen as result. We found it very relatable and contextually relevant for Australian students. We decided that the conversational agent would help the student reflect upon and apply personally what was in the video. While the video itself is an excellent tool, it does not allow any interaction or engage the student in conversation about the challenging material presented. We believe that a conversational agent provides a safe space for a student to be honest with themselves to explore these issues. The design is described in the subsections below.

3.1.1 Conversational Agent Role and Goals

The intention is to create an environment where students can comfortably, without fear of being judged communicate privately with the agent. Empathy and Empowerment are the key philosophies underlying the design of the dialogue. The dialogue seeks to be empowering by increasing competency, autonomy, self-efficacy through giving choices (Ginige et al. 2020), offering personalised recommendations and optional explanations (Abdulrahman et al. 2021) and asking students about motivators, consequences (including emotional impact) and the alternatives and options for help available to them. The pedagogical agent acts as a knowledgeable assistant, and thus introduces itself as the Student Academic integrity Mentor, SAM.

3.1.2 Conversational Agent Architecture

To implement the conversational agent, we used an authoring tool and avatars we developed in prior research projects, see Figure 1. The authoring tool takes a csv file as input that specifies the agents start state, next state, utterance, meaning, style and actions. Actions take into account the user's beliefs and goals indicates what you want to happen at the end of this dialog state. The dialogue engine interprets the csv file to create an executable game in the Unity3d game engine.

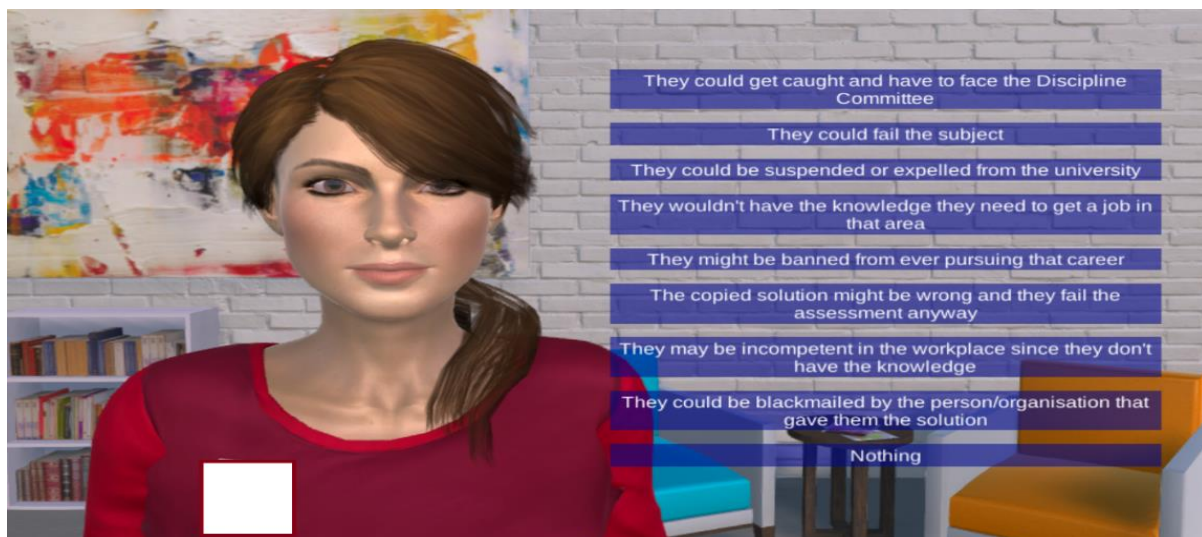


Figure 1: Student options in responses to SAM's question, "what do you think would be the worst thing that can go wrong if someone uses someone else's work?"

The agent is able to adapt the dialogue by reasoning about the responses of the student and choosing the appropriate response. The choices selected by the student are written into a database to allow analysis of options. Interaction involves selection from options. The options provided are based on the literature and team's experience. Each set of options also allow the student to enter their own free text options and these can be used to revise the set of options. The intention is that the student will reflect on the common reasons given to consider if that applies to themselves, if not, they are invited to give their own reasons. Affirming statements are provided by the conversational agent to most of the student's responses. The conversational agent never tells the student they are wrong or invalidates their

choice or response in any way. If compared to the taxonomy of human-bot hybrids proposed by Grudin and Jacques (2019), our character is not a chatbot as it is not driven by NLP but uses a cognitive agent architecture (Sklar and Richards 2010) and multi-choice input. Unlike computer-based training, it is not about gaining knowledge or learning a skill or task. The PCA aims to challenge attitudes and behaviours through conversation and reflection as presented in 3.1.3.

3.1.3 Dialogue Flows

The agent's dialogue was designed based on information identified in the literature and supplemented with our own academic experience. Table 1 shows the dialogue flow with annotations explaining our reasoning.

Dialogue Snippets and Flow	Aim of the Conversation Snippet
Introduction of SAM	Introduces role and aims of the conversation
Have you heard of Academic Integrity? Write 3 words that come to mind	Establishes students current basic understanding and provides institutional definition
Discusses types of misconduct/breaches (Plagiarism, Contract Cheating, Collusion, Deception, Fabrication, Impersonation, Obstruction, and Sabotage)	Student can choose to receive or skip definitions/explanations
Why do you think people copy other people's work, pretend it is their own or lie about their work?	Tries to engage the student to think about the possible motivators
Have you ever felt any of those pressures to use someone else's work?	The conversation becomes more personal, empathic responses are provided e.g. "Being a student can be very stressful. Each person has to decide how they will respond to the pressures they face."
What do you think would be the worst thing that can go wrong if someone uses someone else's work?	Challenges the student to think about possible consequences
I'd like you to watch this short video and let me know what you think afterwards	A shared activity, that breaks up the conversation with 3 realistic scenarios with real students like them
Discuss reasons for the behaviour of person 1, person 2, person 3	Seeks to help the student put themselves in that student's shoes and realise how easily a student can make a poor choice
Now let's see what happened to these three students	Seeks to bring home the gravity of the possible consequences
How do you think they felt when they were discovered? <ul style="list-style-type: none"> • worried about damaged reputation • embarrassed and feeling they have let their family, friends, academics or community down • remorse and regret • anger, feeling wrongly accused or that it was unfair they were caught • shock and confusion, they didn't expect this would happen • severe decline in confidence, self-efficacy, loss of hope for the future 	
Fear of what the future might hold and what others will think of them	Again, seeks to build empathy and possibly trigger realisation at an emotional level the seriousness of the possible consequences
Have you ever felt you weren't able to do an assessment yourself? Why not?	Seeks to understand what help they need
What options could a student take if they don't understand the material	Seeks to understand if they know what options are available and point them to the institution specific support
Wrap-up: watch outcome when the three students make the right choice to do the work themselves; get feedback on helpfulness of discussion; farewell	Seeks to finish on a positive note with resolve and helpful alternative to ensure they do not

Table 1. Dialogue Flow between SAM and a student

The full dialogue and student response sets to question are not included, except in one example in Figure 1 and another in Table 1, where students consider what could go wrong if they use other people's work and how would one feel if caught. The content and structure follow the patterns used in other behaviour change work that provides affirming and empathic responses from the conversational agent and educational and empowering options to the user, by allowing the user to reflect on common academic integrity/misconduct motivators, barriers, outcomes and definitions, and also to add their own.

4 Discussion, Conclusion, and Future Work

Academic Integrity modules, documents, policies, and procedures on university websites provide resources to all students and staff and serves as a foundation for all academic staff and students about what academic integrity is, why it is important and where to find help if needed. However, moving to online delivery and heavy use of technology warrants a different way to educate academic staff and students about academic integrity. Teaching has become more student-centered, and students requires active support outside the classroom, instead of having passive support. The academic integrity resources hosted on the website makes information available to the learner but does not permit any interaction. PCAs overcome this limitation by engaging actively with learning community and empowering them to take decisions on conducting the activities of unlawful activities such as academic misconduct. With an advancement in technology, higher education institutions have the opportunity to promote ethical principles in innovative ways.

In this paper, we have reported on a work-in-progress proposal for designing an academic integrity module using AI-driven pedagogical agents and providing this as an alternate solution to academic integrity education for students that seeks to go beyond just education to challenging motivations and beliefs. The next step in the project is to test the conceptual design of our proposed conversational agent. A pilot will be conducted at three Australian universities. The purpose is to view it as an iterative process to improve the design of the proposed conversational agent. As a designer we will test aspects of the proposed conversational agent, or whether the proposed conversational agent as conceived has achieved its goal. Once the design has been achieved, we will test our proposed conversational agent to collect feedback about the success of the design and the validity of the theoretical propositions. It will tell us whether the design has achieved its practical and theoretical goals. Outside our scope, but future work could investigate the potential use of PCAs educate academics in academic integrity.

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