ISSN 1870-4069

Responsible Use of AI as a Transversal Theme in an Interaction Design Course: A Report on Participation in the Instructional Co-Design Process

Scarlett Itzel Xochicale Flores[1], Angelica Rodríguez Vallejo[1], Soraia Silva Prietch[2], Josefina Guerrero García[1], Juan Manuel González Calleros[1]

[1] Benemérita Universidad Autónoma de Puebla, Facultad de Ciencias de la Computación, Mexico

[2] Benemérita Universidad Autónoma de Puebla, Facultad de Ciencias de la Electrónica, Mexico

{scarlett.xochicalef, angelica.rodriguezval}@alumno.buap.mx, sp223570639@alm.buap.mx, {josefina.guerrero, juanmanuel.gonzalez}@correo.buap.mx

Abstract. The goal with this paper is to present the experience of one of the participating teams in a study carried out with students of the "Interaction Design" course to identify the advantages and disadvantages of using an adapted version of the card sorting technique in the instructional co-design process of lesson plans that aim to combine course content with the discussion on the responsible use of AI tools in higher education. In many situations, the voices of undergraduate students are not heard during the curriculum or lesson plan design process. The intention of conducting the study with them was to give them the opportunity to design and co-create classes tailored to their needs and learning style. In order to achieve this goal, three workshop sessions were held to discuss the principles of responsible use of AI, collaborative lesson planning, and implementation and evaluation of a co-designed lesson plan. As a result, the codesign activities are instantiated with the perceptions of the team that agreed to share their participation experience. A list of takeaway recommendations that can be useful for this research group (or others) is presented as the main contribution of this paper.

Keywords: Codesigned lesson plans, card sorting, artificial intelligence in higher education, AIED.

1 Introduction

With the widespread use of generative Artificial Intelligence (AI) tools by students in higher education reported in different publications (Digital Education Council, 2024; Freeman, 2025), there is a need to promote discussions on their responsible use and to co-design lesson plans for courses in any discipline or major that include the "responsible use of AI tools in higher education" as a transversal subject, and for this

process to be carried out collaboratively with higher education (HE) actors (e.g., professors, students, industry professionals). The rationale for including students in the process is that they are considered "primary users" of the system referred to as education. As such, integrating the students into the instructional co-design process contributes to an equitable process for a group of HE actors whose voices, in many cases, remain unheard (Hidalgo and Perines, 2018). This work is part of a broader doctoral research project, in the context of which the study reported in this paper was conducted.

This larger project is supported by an epistemological framework that blends the following paradigms: Social Constructivism (Kim, 2001), Critical-Reflective (Freire, 1967, 2028) and Transformative (Creswell and Creswell, 2018), a theoretical framework that includes: Instructional Design (Branch, 2009), Active Learning Methods (Bonwell and Eison, 1991; Tharwat and Schenck, 2023), Co-design (Schuler and Namioka, 1993; Muller et al., 1997; Baranauskas et al., 2013), Artificial Intelligence in Education (AIED) and Principles of the Responsible Use of AI (Floridi and Cowls, 2019; UNESCO, 2021; Alam, 2023; Kosslyn, 2023; Nguyen et al., 2023; Aler-Tubella et al., 2024), a methodological framework guided by qualitative research methods (Flick, 2015; Creswell and Creswell, 2018), Critical Participatory Action Research (Kemmis, McTaggart and Nixon, 2014), and Instructional Co-design (Drajati et al., 2023; Barton and Fanshawe, 2024).

In our previous work, a systematic literature review was carried out and a related study has been conducted, both of which support the present study decisions (Prietch *et al*., 2024; Prietch, Guerrero and González, 2024). In this previous study a more diverse group participated, including faculty members, graduate students, an undergraduate student, and an industry professional. Some takeaway lessons included: (a) the possibility of power dynamics evidenced by the interaction between a faculty member and an undergraduate student, as well as follow-up interviews with participants, which motivated us to conduct separate workshop sessions involving groups with similar educational levels; (b) a more focused way to co-design a single class instead of an entire curriculum to include de use of generative AI tools and the discussion of the responsible use of AI in education; and, finally, (c) the possibility to co-design a transversal theme class contextualized into a real course, which could play an important role in the collaborative design of lessons in a more concrete way for participants.

The study reported in this paper refers to an intervention within the larger research project carried out with undergraduate students of the "Interaction Design" course in an information technology program at a Mexican public university. As stated by (Preece, Rogers and Sharp (2015, p. 23), "Interaction is the process by which two or more entities, whether people or systems, exchange information, influencing each other through various communication and response channels".

Both concepts are integrated to create the term interaction design, which focuses on facilitating intuitive, efficient, and satisfactory interaction between people and a product, a system, whether digital or physical, taking on singular importance. In this context, to Muñoz Arteaga et al., (2014, p. 32), "the goal of interaction design [is] to create systems that satisfy the needs of the people who use them, in a way that is spontaneous and satisfying.".

The overall objective of this particular study was to identify the advantages and disadvantages of using an adapted version of the card sorting technique[1] in the instructional co-design of lesson plans that combined course's content with the transversal theme (the responsible use of AI tools in higher education). Specifically, this paper presents the experience of one of the student teams participating in the study, called "Pancitos" (and in a later session renamed as "Umizumi").

This paper is organized into the following sections: Sections 2 and 3 summarize salient references related to our study, Section 4 describes the methodology used, Section 5 reports the lesson plan co-designed by the "Pancitos" team, Section 6 presents the discussion of the results, and finally, Section 7 presents the conclusions.

2 Principles for the Responsible Use of AI

With the intention of discussing real-world cases from the perspective of humans (users), this study took into consideration nine principles of responsible use of AI systems (for easier reference, "AI" is used in the paper). This section presents definitions of the principles identified in specialized references (Floridi and Cowls, 2019; UNESCO, 2021; Alam, 2023; Nguyen et al., 2023; Aler-Tubella et al., 2024): (1) Human-centered AI, (2) Social and environmental well-being, (3) Bioethics and ethics, (4) Justice, (5) Explainability, (6) Privacy, (7) Accountability, (8) Security and (9) Transparency.

Principle 1 (Human-centered AI) concerns placing humans in the loop, being in control of decisions, responsible for the design, use, evaluation, tracking and impact assessment of AI. Principle 2 (Social and environmental well-being) states that critical thinking should be applied in the way to avoid negative impacts on society, the environment, or the global economy. Principle 3 (Bioethics and ethics) refers to four basic aspects: non-maleficence (not causing harm to others); beneficence (promoting and doing good); autonomy (respecting people's self-determination); and justice (seeking and promoting equitable access). The definition of Principle 4 (Justice) indicates that existing biases may be reinforced and even magnified in society if concerns about justice and equity in the way we interact with AI are not taken into consideration. Principle 5 (Explainability) seeks to improve the interpretability and transparency of AI; in this sense humans should be aware of and understand their responses to be in control of their own actions. Principle 6 (Privacy) indicates the awareness of informed users consent to make decisions on how to protect their personal or professional data. Principle 7 (Accountability) is about clearly stating each stakeholder's acknowledgement and responsibility for their actions. Principle 8 (Security) states that generative AI must be used with safety in mind, considering oneself and others; they should not be utilized to harm or endanger people. Finally, Principle 9 (Transparency) states that humans should be transparent in their actions, for instance, to disclose what and how generative AI responses were used in academic

[1] The *card sorting* technique allows for gathering perspectives on the mental models of diverse participants and can be applied in three different ways: open, close and hybrid card sorting (Preece, Rogers and Sharp, 2015). In this study, the closed method was used in the lesson plan template (printed in a poster format), since its fields were previously defined, and the three stack of cards provided to the participants included concepts related to each of them.

work. These nine principles take us to a broader discussion on academic integrity (Yusuf et al., 2024) that go beyond plagiarism issues; however, this discussion is not addressed in this paper.

3 GenAI in Education

The use of generative artificial intelligence (GenAI) has escalated in recent years, particularly in higher education, generating a broad debate within the academic community. Thus, for instance, Sánchez and Carbajal (2023) emphasize the need to design appropriate pedagogical strategies for their integration into the classroom and warns about the potential risks associated with the use of these tools. Mollick and Mollick (2023) analyzed how AI can facilitate the implementation of evidence-based teaching strategies using tools that implement large-scale language models (LLMs). In addition, their work demonstrates how ChatGPT can support the rapid and personalized generation of teaching materials, as well as of evaluations and explanations adapted to diverse students.

Moreover, the integration of participatory methodologies into teaching has proven effective in improving classroom learning. This is the case of card sorting, which is used to organize information and design interactive activities. In this area, López and Albar (2024) analyzed and concluded that card sorting in the classroom increases the motivation and participation of students, allowing them to be active during their learning process. Likewise, this technique facilitates information structuring, as students organize concepts in a logical way. Bivens and Welhausen (2021) highlighted that the use of open card sorting serves as a cognitive support strategy that helps students develop analytical skills. Also, the authors structured learning activities into different levels of complexity using Bloom's Taxonomy.

The studies described throughout this section provide the theoretical and methodological framework that supports the approach used in the work presented in this paper. As highlighted by Sánchez and Carbajal (2023), and Mollick and Mollick (2023), the use of AI tools in education has been emphasized, while López and Albar (2024), and Bivens and Welhausen (2021) demonstrate that card sorting can improve the active structuring of learning content. These references reinforce the approaches used in the study reported in this paper, since instructional co-design allowed students to develop progressive skills, motivating them to organize content in a reflective way.

4 Methodology

The study was conducted in the “Interaction Design” course with the collaboration of a professor and a doctoral researcher. It took place in February 2025 in three 90-minute workshop sessions, totaling 4.5 hours. The group consists of 30 enrolled students; however, a few did not participate in all sessions (26 students in sessions 1 and 2; 25 in Session 3).

The sessions were organized as follows. In Session 1, topics related to the responsible use of AI were presented and discussed. The materials used included slides, a brainstorming poster, sticky notes, and colored markers to encourage oral and written

participation. In Session 2, the hands-on activity session of instructional co-design of lesson plans was conducted using an adapted card sorting technique. For this session, posters were distributed with a large template for co-design[2] with areas to be occupied by cards, an envelope with three stacks of cards[3], as well as sticky notes and markers. The co-design template included five areas (fields) to be filled out: (1) Student profile (considering team data), (2) Principles of the responsible use of AI, (3) Course Content, (4) Objective and Methodology, and (5) 7-Step Class Activity Details. The envelopes included sets of cards for Field 2 (with 9 cards), Field 3 (with 5 cards), and Field 4 (with 13 cards) of the template. Fields 1 and 5 were designed to be filled out using sticky notes. Field 5 organized the class moments according to Bloom's Taxonomy to define activities and its learning goals. Each stack of cards had different colors matching the fields in the poster template. The cards were designed with the following information: section title and logo, topic title (thematic unit, principle of the responsible use of AI, or objective and methodology number), descriptive content according to its title, and references.

At the end of Session 2, a vote was held to choose which team would implement the co-designed lesson at the next session. A team named "Justice for AI" received the most votes. In Session 3, the "Justice for AI" team implemented and evaluated their co-designed lesson, and members of the "Pancitos" (now "Umizumi") team and other teams participated as peer students. The lesson co-designed by the team with the most votes required some adjustments before implementation, which was done in collaboration with the session moderator during the period between Session 2 and Session 3.

As previously mentioned, this paper reports on the experience of one of the participating teams during the study. The following section provides details of this experience.

5 A Team's Experience Report

The results of the three sessions discussed in Section 4 are described in the following subsections.

5.1. Session 1: Participation in the Initial Discussion

As mentioned in the methodology section, this first session focused on the presentation and discussion of the responsible use of artificial intelligence (AI). From the perspective of some students, the session was informative and enriching, as it allowed them to reflect on a topic that, while used in their daily lives to optimize time, they had not yet analyzed in depth.

[2] Poster - Template for the instructional co-design of lesson plans, https://bit.ly/4iBLA4O

[3] Three stacks of cards, https://bit.ly/3DHUij5

(a) (b) (c)

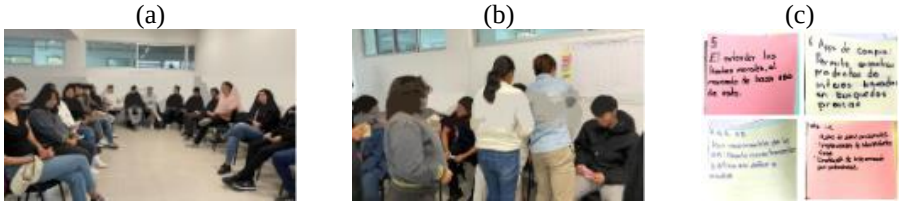

Fig. 1. Pictures of (a) group discussion, (b) opinions posting and (c) sample reflections.

One of the most valuable aspects was the distinction between responsible use of AI and the concept of responsible AI, which led them to consider its implications in various fields, especially in education and professional settings. During this session, student participation focused on active listening and discussion, paying attention to the ideas shared by their classmates and the moderator. Subsequently, the students contributed to the brainstorming session, recording reflections on sticky notes and posting them on the collective poster. Figure 1 illustrates the group discussion (a), sticky notes posting (b), and some sample reflections (c).

As a result of the question "What does 'responsible use of AI' mean to you?", 24 responses were identified on the sticky notes, among which the following reflections were presented: "Understanding the moral limits when using it [AI]"; "Using it [AI] correctly and ethically without harming anyone"; "Knowing how to use AI with a responsible objective, i.e., ethical, academic, etc. With a good purpose and not excessively because it wastes/occupies a lot of resources." In the responses, a frequent association between responsible use and ethical use is noted, with at least thirteen sticky notes including the prefix "ethic*" or related words.

For the question "What are the positive or negative aspects of using predictive AI in social media or other web-based systems?", 28 responses were obtained on sticky notes. Here are some of the reflections: "Shopping apps: Allow you to find products of interest based on previous searches"; "Polarization of ideas, which prevents dialogue and discussion of opinions"; "They increase screen time, using user preference algorithms"; "Theft of personal data, identity theft, restriction of information based on preferences". Different types of examples were cited, evidencing that students are aware of a variety of web-based systems that may embed predictive AI algorithms and some of their implications.

This space for dialogue and analysis allowed for the expression of different perspectives, with the discussion of the ethical implications and challenges of integrating AI into academic training and professional futures being particularly relevant. In this sense, it is essential to establish clear principles that regulate its appropriate use, ensuring a positive impact on education and professional practice.

5.2. Session 2: Co-designed Lesson Plan

In this second session, a team of four women worked together to develop an instructional co-design lesson plan using an adapted version of the card sorting technique. The teamwork strategy was carried out collaboratively, beginning with a

(a) (b) (c)

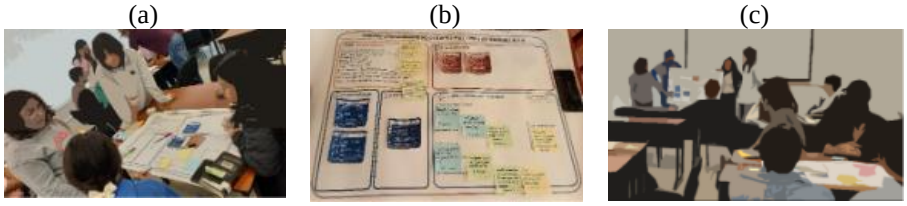

Fig. 2. Pictures of the: (a) team in the co-design process, (b) co-designed lesson plan, and (c) "Pancitos" team presentation

general exploration of the materials provided, particularly in reading and selecting from the card sets.

For the first field of the template, called "Student Profile", general team information was shared, including an average age of 22. Additionally, a brief internal survey was conducted to answer questions about the use of generative AI, identifying the most used tools within the team: ChatGPT, DeepSeek, Gemini, Copilot, and Meta, with a usage frequency of five business days per week. A vote was then held to describe prior knowledge about the responsible use of AI from the individual team perspective, highlighting its misuse for legal purposes, environmental impact, transparency, and ethics.

In the next field of the template, "Principles of the Responsible Use of AI", a new vote was held to select the two most important principles for our proposal; in this case, the following were chosen: (1) Human-Centered AI and (2) Responsibility. The cards were moderately supportive in the choice of principles, since, although they served as a reminder of Session 1, in the end the group discussion influenced decision making.

For the "Course Content" field, each member received a card corresponding to a thematic unit, read it in depth, and shared their opinions with the team. Based on these discussions, a vote was held again to discard the topics that interested us the least, leaving "Unit 3: Interaction Design Process". Within this unit, the topic "3.5 Usability and User Experience" was selected, as everyone agreed that it would be new and interesting content to teach in class if the team were selected to lead Session 3. It is worth mentioning that the group had access to the course syllabus at any time. This syllabus is on the official website of the academic secretariat. Complementarily, lecturers must present their course syllabus at the beginning of each semester, as part of university protocol. From our point of view, we considered important to remember the topics of the course through the cards. In this sense, the cards "Course Content" were of great support, since they facilitated the identification and comparison of their contents, allowing for a more structured and informed decision making.

In the "Objective and Methodology" field, a similar process was followed: each member received a card with different pedagogical strategies, and, after a vote, it was decided to combine two approaches based on the theory of behaviorism: "*Positive reinforcement*: to shape behaviors" and "*Programmed teaching*: structured learning sequence with immediate feedback". The main reason for choosing behaviorism was the description on the cards, given that when all participants read that the pedagogical strategy was based on positive reinforcement, and its operationalization in gamification, the team understood that people are motivated by winning or being rewarded for an action.

Figure 2 shows photos of the team during the co-design process, the co-designed lesson plan, and the presentation of the co-designed lesson to the group members.

For the last field, "7-Step Class Activity Details", each team member conducted a ChatGPT consultation using descriptive prompts. The team members then wrote their responses individually on sticky notes and held a vote to select the overall seven best steps to be used in the co-designed class. The selected prompt was: *"Hello, please help me create an hour and a half class on Usability and User Experience, while also covering two other topics: Human-Centered AI and Accountability in the Use of AI with Behaviorism Methodologies: Positive Reinforcement and Programmed Teaching, complying with the 7 levels of Bloom's Taxonomy, distributed over specific times"*.

The full result from ChatGPT for the prompt can be found at https://bit.ly/3DLgRUe.

However, due to the limited space for notes, the result was summarized. In Step 1, "Quick knowledge questions" (5 minutes) activate initial interest and prepare students for the content that will be seen during the class. In Step 2, with the "Explanation of concepts (examples)" (10 minutes), it facilitates the understanding of the information at the time of exemplification, thus ensuring that students understand the basics before applying them. As observed in Step 3, "Analysis of a given interface and proposal for improvement" (15 minutes), which includes an analysis of an interface and its improvements, this allows us to put into practice the concepts previously learned, thus reinforcing the connection between theory and practice. In Step 4, "Analyze AI cases and their impact on UX" (20 minutes), critical thinking is promoted to evaluate how AI influences the user experience, and to improve the discussion among students, positive reinforcement [*giving away candies*] is implemented to reward interventions or moments where students contribute well-founded ideas. In Step 5, "Compare cases of good and bad UX design" (15 minutes), it is proposed that students perform a structured comparison of real examples (experiences) that help to consolidate the topic. In this way it is observed that the programmed teaching allows students to identify design patterns through the logical sequence of analysis with the examples of the previous stages. Subsequently, for Step 6 –"Conceptual design of an interface with UX principles and AI ethics" (15 minutes) and "Create/Design a UX proposal with responsible AI" (15 minutes)-, as in Step 4, we proposed to implement positive reinforcement to encourage creativity and initiative for students to design innovative solutions, when assigning them a task of developing a proposal that is focused on accessibility and ethics. As for positive reinforcement, we relate it more to stage 7, "Reflect on responsibility in UX design with AI + Questions (Kahoot)" (10 minutes), where a Kahoot quiz is provided to evaluate learning in a dynamic way, in addition to creating an environment of participation, motivation and interest by rewarding interaction as well as student performance. Additionally, the programmed teaching provides immediate feedback on the answers, reinforcing the knowledge acquired in previous stages. Finally, the lesson co-design was presented to the rest of the group.

5.3. Session 3: Participation in the classmates' co-designed class

In the third session, the "Justice for AI" team implemented and evaluated the lesson they co-designed, while the "Pancitos" (now "Umizumi") team members and other members of the group took on the role of students. The group's participation was characterized by an atmosphere of respect and collaboration, as the presentation team

(a) (b)

Fig. 3. Pictures of the: (a) teams presenting their interface proposals and (b) interface proposal of the "Umizumi" team.

consistently emphasized the use of illustrative examples to facilitate understanding of the content on the topic of "Types of Interaction".

As the next step, the team proposed the development of an inclusive ATM powered by AI, designed to serve people with various disabilities. In this way, the ATM included a soundproof booth that provides privacy and security, incorporating an AI voice assistant that personalizes the interface according to the user's needs. Among its main features of AI voice assistance, it is based on asking the user about specific needs and thus being able to adjust its interface in response to the user's needs. Furthermore, the team proposed implementing Braille buttons to facilitate navigation for people with visual impairments. The proposal also included automatic screen adjustment, which adjusts the device's height based on the user's height or wheelchair users. Finally, an on-screen sign language interpreter was added, allowing interaction for people who are Deaf. Thus, the proposal integrated the principles of accessibility and inclusion using AI, aligned with the objectives of the practice and highlighting the importance of designing technologies that correspond to the interaction needs of diverse users.

At the end of the class, three teams had the opportunity to present their proposals and receive feedback from the lecturers. As for the perspective as a team, we think we did not necessarily consider presenting our work because we noticed that, among the first teams, the ideas explained in their proposals did not differ much in terms of our own proposal. At the time we noticed that the team responsible for the class first provided an example that covered all the points that were requested in the activity.

Although this session was perceived as well structured following the instructional co-design steps, "Umizumi" team considered that, due to the time required for presentations, thorough feedback was missing to all teams. Feedback was provided by the professor and the moderator, exploring ideas that could be improved or further investigated such as privacy, security, human factors and user experience.

5.4. Sessions' Evaluation

After we ran the three workshop sessions, an online questionnaire was made available to students (participants). Fourteen out of 26 participants responded to the closed and open questions regarding self-evaluation and workshop sessions evaluation. All respondents participated in the three sessions and indicated their responses as follows:

— *My greatest strengths in the sessions were:* attentiveness, willingness to participate, active listening and participating in small team projects, prior knowledge of AI, team communication, contributing with ideas during team activities, active and inclusive participation, patience and detailed explanations, critical thinking and understanding and analyzing the themes.

— *I am aware that I can improve in the following personal aspects in future similar activities:* punctuality, previous knowledge of AI, actively participating in group activities, clarifying ideas and sharing them, improving the ability to write texts, managing time, creativity, empathy and learning about ethics applied to AI use.

— *In the activities developed in the three sessions I learned:* Types of interaction (1), Learning techniques (1), Proper use of AI to benefit the local community and systems' design (2), Methods of working and analyzing information (2), Teamwork (2), Application to various areas (3), Methodologies for class design (3), IA and its importance and risks (3), and The responsible use of IA and its contextualized principles, and awareness of these aspects (9).

— *Session 1 - Content and Duration:* the content was very good (12), ideal duration (7), duration was not enough (5), and the content was good, and the duration was sufficient (2). Participants added that it was entertaining, gained a lot of experience and learning, easy to understand, interactive, "There were several points about AI that were missing; I think it only covered half of it" (P8), and "It was the session I enjoyed the most because we discussed the use of AI and its ethical implications" (P9). Overall, many respondents expressed that more time should be spent on this activity to calmly discuss the topics and to share everyone's ideas.

— *Session 2 - Content and Duration:* the content was very good (10) with ideal duration (8) and duration not sufficient (2), the content was good and the duration sufficient (3), and neither one was well planned (1). Some participants added: "I liked the dynamics" (P1), "[…] we didn't have time to produce our ideal results" (P7), "[…] we were able to see how we can apply AI to develop a lesson" (P9) and "Some content was too complex for our educational level" (P13).

— *Session 2 - Please provide your critical feedback on the printed materials used and their instructions for use:* some of the comments were: "the possibility of choosing the methodology gave greater freedom" (P6), "I really liked […] they can be shared with team members" (P7), "[…] I found it very convenient to work with cards and not have to think and search what to include in each part of the preparation; we just chose the various options" (P9), "A little confusing in some concepts, however with the support of the moderator it was easy to do it" (P11), very didactic (P12, P13), quality materials, not too expensive and reusable (P14).

— *Session 3 - Content and Duration:* overall the content was considered good or very good (13), and the duration was considered ideal or sufficient (11). Two comments that express some of the respondents' perceptions were: "I think they spent too much time on the introduction and not enough time on the activity, which didn't allow us to really come up with a good proposal" (P6), and "It was good because we were able to observe the implementation of all the steps outlined in our colleagues' previous activity" (P9).

6 Discussion

The instructional co-design process of the lesson plan, using the adapted card sorting technique, allowed for collaborative structuring and organization of class content. This process encouraged active participation among team members who participated in the sessions, in addition to developing the students' critical thinking. Specifically, Session 2 focused on the classification and selection of elements for the lesson plan, proved to be a practical and interactive way to facilitate decision-making regarding content, methodologies and objectives among the wide range of student opinions. Some of the students evaluated these contents are too complex for their educational level, they needed more time to discuss them, or further explanation could clarify.

Concerning the instructional co-design template given to students, in a positive way, the template composes a valuable tool for educational planning, as it allows structuring in an organized way the specific contents of interest, in the context of integrating the "Principles of the Responsible Use of AI" as a transversal theme into the "Interaction Design" course. Its design facilitates the creation of a detailed outline that guides the development of the class session, promoting a clear and efficient methodological approach. The use of this template has multiple advantages, firstly, it provides a clear, delimited, organized and systematic structure, in specific fields allowing a better structuring. It also encourages collaboration between teams by providing several options, which at the same time leave small room for participants to move away from the central themes, promoting attention maintenance, reflection and critical analysis.

Moreover, after participating in the class taught by their classmates, the "Umizumi" team considered improvements to the co-designed lesson plan, specifically in the "7-Step Class Activity Details" section, including better-structured activities to measure meaningful student learning. Furthermore, they identified the importance of conducting pilot tests to anticipate potential difficulties and thus improve their learning experience.

6.1. Takeaway recommendations

From this study, we have structured a list of recommendations from which we can move forward in our broader research project and provide some takeaways to other researchers who work on related topics:

— *Responsible use of AI as a Transversal theme in Higher Education (HE) Courses.* In this study, the instructional co-design of lesson plans was meant to integrate the transversal theme into the Interaction Design course; however, as GenAI is being used by many, with no distinction about their occupation, any other course in any knowledge field can benefit from this discussion. Also, this instructional co-design process can be an opportunity for HE actors to introduce social themes in computing or engineering career courses (Garrett *et al*., 2020).

— *Real-life examples considering a set of the principles of responsible use of AI*. These are useful for showing what is currently happening around the world regarding the topic, for uncovering critical thinking on positive and negative aspects considering presented examples, and for providing a previously (but recently) reflected transversal topic for participants to be able to integrate it into a main course content unit. It is recommended that the examples presented for

discussion are of interest to participants, of their life contexts to generate a sense of relevance and critical thinking among the group (Freire, 1967, 2018). Furthermore, according to students' evaluation, the size of the group should be considered so everyone can disclose their ideas and discuss them in depth with no rush.

— *Written and verbal opinions*. Allowing participants to provide written and verbal opinions contribute to maintaining a safe environment for those who are shy or do not want to express their opinions publicly. Also, the use of illustrative examples on a slideshow, a brainstorming poster, sticky notes and colored markers can function as a visual, auditory and motor stimulation activity.

— *Template improvements (printed poster for the instructional co-design).* A wider design area for the "Student Profile" field is needed, as multiple sticky notes can be visually overloading and can obstruct information, hindering quick reading comprehension. Some fields may require descriptions so as to facilitate the understanding of the students who participate, to avoid delays due to clarifications, or so students can optimize work by clarifying their main questions. A guide would be helpful in completing the fields where small descriptions of the expected answer format are placed in each field of the template.

— *Adapted card sorting integrated into the instructional codesign process*. The closed card sorting technique was chosen to provide pre-defined cards to participants of specific fields on the template. This choice was made considering the potential need to retrieve information or to introduce new concepts. The principles of the responsible use of AI were topics of a recent discussion and course content was disclosed to students at the beginning of the semester; however, a quick reminder of the topics could help in recalling them. Learning theories, pedagogical strategies and their objectives are not information technology course contents, so those cards can be new information to support choices on these matters. From some students' perspective choosing options from cards can be easier than searching for new information, and cards were considered of quality, very didactic, and reusable.

— *Learning taxonomy as a new stack of cards.* During Session 2 we realized that we could also have provided a set of learning taxonomy cards, not only Bloom's Taxonomy, but providing others such as Marzano's, Dave's, Fink's (BUAP, 2020), and letting participants decide freely on activities according to their chosen learning goals, instead of deciding for them (a 7-step class). This can be applied to other theoretical frameworks researchers wish to include in the instructional co-design process (e.g., topics related to informal training content).

— *Human-Human Collaboration and Human-AI Collaboration*. Human-AI collaboration was planned to be used in all fields if teams so wished. The intention was that students could have the experience of responsibly using GenAI in education and could gather new information for wild cards and generate ideas to organize learning activities according Bloom's Taxonomy. Some students' positive perception was that towards the use of IA to create lessons, meaning that a guided learning activity using AI in the classroom can support students to be

aware of responsible ways to do it. We observed that both types of collaboration can enrich learning experiences if appropriately planned and moderated.

— *Time and criteria for evaluating co-designed lessons plans*. The only co-designed lesson plan fully and deeply evaluated between sessions 2 and 3 was the most voted one ("Justice for AI" team) since they had the opportunity to implement it in a real classroom setting. The other teams did not receive specific feedback because of time constraints. This is an important activity; one alternative could be a shorter class co-design to give all the same opportunity to implement their proposals, especially if participants rely too much on GenAI's suggestions and they do not have much experience of evaluating whether the activities' durations are appropriate. Also, this alternative might lead to biased voting for teams with popular students. The same recommendation is valid for presenting activity results during the implemented co-designed class, which in Session 3 fell short in time and criteria for a small number of teams who did not have the opportunity to present their proposals.

— *Additional suggestions for equitable strategies to gather feedback*. For an equitable strategy where all teams would have the opportunity to present their proposals, we present two ideas: the first would be an art gallery style, where each team places the proposed interface in a shared space, resembling posters on a wall, slides or interactive whiteboards (e.g., Miro), so that later students can walk through the gallery and peruse the other teams' ideas, and leave comments on each of the proposals. The second alternative is to brainstorm ideas, with each team presenting one or more key points of their proposal, i.e. a distinctive or innovative aspect of their design. Similarly, sticky notes can be used to paste them on the blackboard or a collaborative digital tool to visualize and organize ideas. Afterwards, an open discussion could be held to compile the ideas, perhaps grouping them by themes and discussing the best (innovative or interesting) elements of each solution.

7 Conclusions

We posit that the objective of the study - *to test the use of an adapted version of the card sorting technique in the instructional co-design process of lesson plans that combined subject content with the discussion on the responsible use of AI tools in higher education* - was achieved, since participants were able to carry out, conclude and present their co-designed lesson plans, and at least one team had the opportunity to implement and evaluate their proposal.

As a positive point, the set of delivered artifacts (poster, cards, and sticky notes) was easy to understand and encouraged collaboration among participants. On the downside, the co-design time was considered short, and the results (co-designed lesson plans) consisted only of posters, cards, and sticky notes. For a reusable and implementable lesson plan, these would need to be converted into text in a more descriptive and detailed manner. This became apparent when the "Justice for AI" team needed to design the slides and activities to implement their co-designed lesson plan. The moderator raised many questions during their online meetings that remained unanswered at the conclusion of the co-design. To answer these questions and increase the chances of

successful implementation of the co-designed lesson, extra adjustment sessions were held.

The experience of the "Pancitos" team presented in this paper provides a snapshot of the activities carried out during the three workshop sessions, including photos and details about their perceptions. We understand that including the point of view of a single team may be considered a limitation of our work. It should be noted, however, that other student teams produced interesting results. The paper focuses on the impressions of the one team that was eager to collaborate in sharing and writing about their experience when the invitation was made to all participants. Fourteen participants collaborated also with their responses to a final evaluation questionnaire.

Acknowledgments. We thank SECIHTI (Secretaria de Ciencia, Humanidades, Tecnología e Innovación) for the doctoral scholarship of Soraia Prietch. We appreciate the collaboration with the professor (responsible for the Interaction Design course) and the participation of all students involved in this study. We also would like to thank the anonymous reviewers whose insightful comments greatly helped to improve an earlier version of this paper.

References

1. Alam, A.: Developing a Curriculum for Ethical and Responsible AI: A University Course on Safety, Fairness, Privacy, and Ethics to Prepare Next Generation of AI Professionals. In: Rajakumar, G., Du, KL., Rocha, Á.: Intelligent Communication Technologies and Virtual Mobile Networks. Lecture Notes, 171 (2023)
2. Aler Tubella, A., Mora-Cantallops, M. Nieves, J.C.: How to Teach Responsible AI in Higher Education: Challenges and Opportunities. Ethics Inf Technol, 26(3) (2024) doi: 10.1007/s10676-023-09733-7.
3. Baranauskas, M.C.C., Martins, M.C., Valente, J.A: Codesign de Redes Digitais: Tecnologia e Educação a Serviço da Inclusão Social. Penso, Porto Alegre (2013)
4. Barton, G., Fanshawe, M.: The LAB School Project: A Socio-Ecological Investigation Into the Intersection Between Literacy, The Arts and Wellbeing in a Rural Early Years Classroom Setting. The Australian Journal of Language and Literacy, 47(3), pp. 403–426 (2024) doi: 10.1007/s44020-024-00070-w.
5. Bivens, K.M., Welhausen, C.A.: Using a Hybrid Card Sorting-Affinity Diagramming Method to Teach Content Analysis. Communication Design Quarterly, 9(3), pp. 4–13 (2021) doi: 10.1145/3468859.3468860.
6. Bonwell, C., Eison, J.: Active Learning: Creating Excitement in the Classroom. AEHE-ERIC Higher Education Report. No.1. ED340272. Washington, DC: Jossey-Bass (1991)
7. Branch, R.M.: Instructional Design: The ADDIE Approach. Textbook, Springer, eBook (2009) ISBN: 978-0-387-09506-6.
8. BUAP - Benemérita Universidad Autónoma de Puebla.: Módulo II. Taxonomías del aprendizaje. Diplomado: Evaluación de los Aprendizajes (2020)
9. Creswell, J.W., Creswell, J.D.: Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Sage publications, 5th ed (2018)
10. Digital Education Council.: Digital Education Council, 2024 https://www.digitaleducationcouncil.com/post/digital-education-council-global-ai-student-survey-2024.
11. Drajati, N.A., So, H.J., Rakerda, H.: Exploring the Impact of TPACK-Based Teacher Professional Development (TPD) Program on EFL Teachers' TPACK Confidence and

Beliefs. Journal of Asia TEFL, 20(2), pp. 300–315 (2023) doi: 10.18823/ASIATEFL.2023.20.2.5.300.
12. Flick, U.: El diseño de investigación cualitativa. Ediciones Morata SL (2015) doi: 10.23935/2016/01018.
13. Floridi, L., Cowls, J.: A Unified Framework of Five Principles for AI in Society. Harvard Data Science Review, 1(1) (2019) doi: https://doi.org/10.1162/99608f92.8cd550d1.
14. Freeman, J.: Student Generative AI Survey 2025. HEPI. Homepage. http://bit.ly/3Ynh72V (2025)
15. Freire, P.: Educação como prática da liberdade. Rio de Janeiro: Paz e Terra (1967)
16. Freire, P.: Pedagogia do oprimido. Rio de Janeiro: Paz e Terra (2018)
17. Garrett, N., Beard, N., Fiesler, C.: More Than "If Time Allows" the Role of Ethics in AI Education. In Proceedings of the AAAI/ACM. In: Conference on AI, Ethics, and Society, pp. 272–278 (2020) doi: 10.1145/3375627.3375868.
18. Hidalgo, N., Perines, H.: Dar voz a los protagonistas: La participación estudiantil en el proceso de enseñanza-aprendizaje. Revista Educación, pp. 438–464 (2018) doi: 10.15517/revedu.v42i2.27567.
19. Kim, B.: Social Constructivism. In: Orey, M.: Emerging Perspectives on Learning, Teaching, and Technology, pp. 1–8 (2001)
20. Kosslyn, S.M.: Active Learning with AI: A Practical Guide. Alinea Learning (2023)
21. López, L.M., Albar, J.M.: El Card Sorting como metodología de diseño experiencial en el aprendizaje de la Programación didáctica con alumnos de Bellas Artes. Dialnet (2024)
22. Mollick, E.R., Mollick, L.: Using AI to Implement Effective Teaching Strategies in Classrooms: Five Strategies, Including Prompts. SSRN Electronic Journal (2023) doi: 10.2139/ssrn.4391243.
23. Muller, M. J., Haslwanter, J. H., Dayton, T.: Participatory Practices in the Software Lifecycle. In: Helander, M.G., Landauer, T.K., Prabhu, P.V.: Handbook of Human-Computer Interaction, 2nd ed., pp. 255–297 (1997) doi: 10.1016/B978-044481862-1/50077-7.
24. Muñoz Arteaga, J., Céspedes Hernández, D.: Temas de diseño en Interacción Humano-Computadora. Iniciativa Latinoamericana de Libros de Texto Abiertos (LATIn) (2014)
25. Nguyen, A., Ngo, H.N., Hong, Y.: Ethical Principles for Artificial Intelligence in Education. Educ Inf Technol, 28, pp. 4221–4241 (2023) doi: 10.1007/s10639-022-11316-w.
26. Preece, J., Rogers, Y., Sharp, H.: Interaction design: Beyond Human-Computer Interaction, 4th ed., Wiley (2015)
27. Prietch, S.S., Aguilar-González, G., Cordero-Cid, L.A.: Interdisciplinary Co-Design Process of Instructional Lesson Plans for Promoting the Responsible Use of AI. Avances En Interacción Humano-Computadora, 9(1), pp. 223–228 (2024) doi: 10.47756/aihc.y9i1.172.
28. Prietch, S.S., Guerrero, J.G., González, J.M.C.: Una investigación acción participativa crítica para promover el uso responsable de herramientas de IA con actores de la educación superior. In: Cervantes, E.E.V., García, J.G., Rangel, Y.N.: Metodologías para el aprendizaje y la inteligencia artificial . United Academic Journals, pp. 136–152 (2024)
29. Sánchez Mendiola, M.S., Carbajal Degante, E.C.: La inteligencia artificial generativa y la educación universitaria. Perfiles Educativos, 45(Especial), pp. 70–86 (2023) doi: 10.22201/iisue.24486167e.2023.Especial.61692.
30. Schuler, D., Namioka, A.: Participatory Design: Principles and Practices. Lawrence Erlbaum Associates (1993) doi: 10.1201/9780203744338.
31. Tharwat, A., Schenck, W.: A Survey on Active Learning: State-of-the-Art, Practical Challenges and Research Directions. Mathematics, 11(4), 820 (2023) doi: 10.3390/math11040820.
32. UNESCO, D.: Recomendación sobre la ética de la inteligencia artificial (2021) https://unesdoc.unesco.org/ark:/48223/pf0000381137_spa.
33. Yusuf, A., Pervin, N., Román-González, M.: Generative AI and the Future of Higher Education: A Threat to Academic Integrity or Reformation Evidence from Multicultural

Perspectives. International Journal of Educational Technology in Higher Education, 21(21) (2024) doi: 10.1186/s41239-024-00453-6.