A Participatory Method to Business Model Innovation for Students

Anthea Venter and Marné de Vries
University of Pretoria, South Africa

anthea.venter@up.ac.za
marne.devries@up.ac.za

Abstract: The past few years have been a period of intense transformation. Pandemics, innovative technology like chatbots, and the ever-evolving needs of society serve as a powerful illustration of the world's constant evolution. Equipping students with business model innovation (BMI) skills across disciplines is crucial as it fosters their ability to innovate not just products and processes, but entire businesses, which is essential in an everchanging environment. Furthermore, integrating remote participative modelling (PM) into the curriculum is essential as it enhances students' online collaboration skills, vital in today's modern team dynamics. A previous study at a research-intensive university explored the usability of online platforms during BMI within a Business Engineering module focused on entrepreneurship and innovation. MURAL, a virtual whiteboard software application, was used in this study to facilitate remote PM sessions utilising the Business Model Canvas (BMC). While this study found that MURAL is easy-to-use within this specific context, a key limitation emerged. The built-in BMC template within MURAL was found to be insufficient for guiding students through a systematic transformation of a traditional business model into a new iteration. To address this limitation, this current study focuses on enhancing a well-established Business Model Development Tool (BMDT), the BMC, within the context of undergraduate engineering education. We propose a method, called EDU-BMI, specifically designed to support students during PM sessions focused on BMI activities within the MURAL platform. Drawing inspiration from PICO, an educational personal ideation companion, EDU-BMI incorporates features that address educational, social, and motivational aspects. The method is embedded within MURAL and validated through a two-group participant study. Observations of the modelling sessions were used to gather valuable insights into the method's effectiveness and will inform future teaching practices. Integrating EDU-BMI into MURAL has the potential to improve the effectiveness of remote PM sessions for students engaged in BMI activities. Accessibility for modellers will also be ensured by leveraging a free, online tool like MURAL. Future research will focus on evaluating the method in an undergraduate engineering education context, refining EDU-BMI based on the feedback received from participants.

Keywords: Business engineering, Business model development tools, Engineering education, Entrepreneurship, participative modelling

1. Introduction

Our world is continuously changing. According to Shah et al. (2022), among the transformational forces shaping our world are two concurrent trends that continue to change how we look at and approach problems: (1) A surge in user-friendly and widely available technologies that cater to a digitally savvy generation and (2) A growing need for businesses to develop solutions for problems confronting society. This changing landscape confronts educators with significant challenges, but also opportunities to explore innovative teaching methods.

Entrepreneurship can bring change in the society and the economy of a country (Hameed & Irfan, 2019). Supported by the belief that entrepreneurship can serve as a catalyst for economic growth and development, *entrepreneurship education* is becoming increasingly established and prominent (Bell & Bell, 2023) and is considered an important skill for engineering students (Chikasha et al., 2021). The importance of idea generation (Schlimbach et al., 2024) and developing methods to guide and practice the relevant skills, is therefore critical (Hameed & Irfan, 2019).

At a research-intensive university in South Africa, undergraduate engineering students explore entrepreneurship and innovation in a Business Engineering module. In a study by Venter and de Vries (2024), students used the virtual whiteboard software "MURAL" (Mural, 2023) for remote participative modelling (PM) of a Business Model Canvas (BMC). MURAL is freely available and provides other useful templates, making it a versatile tool well-suited for achieving multiple educational objectives. The study by Venter and de Vries (2024) found that the BMC templates within MURAL were insufficient for the systematic transformation of a traditional Business Model (BM) into a new iteration. This is not surprising as, according to Szopinski et al. (2020), the usefulness of a Business Model Development Tool (BMDT) depends on several factors, which include a user's prior knowledge, the number of users, team location, and the user's workload. As an example, beginners need more guidance whereas experts may find this restricting/frustrating. According to Gottschalk et al. (2022), various Business Model Development Methods (BMDMs) have been proposed, but do not cover the existing, constantly changing context.

The need was therefore identified to develop and validate a *method* that can be used to support Business Model Innovation (BMI) during PM on the MURAL platform. In a literature review of methods used to support BMI in digital learning environments, a promising recent development by Schlimbach et al. (2024) was identified. Their novel artefact, referred to as the personal ideation companion (PICO), assists students as they navigate through five common ideation phases (Schlimbach et al., 2024). Limitations of PICO include its web-based construction, not being easily accessible, and inability to embed it within a free PM platform like MURAL, which is an important requirement in our teaching context.

2. Literature Review

This section provides an overview of important concepts and literature.

2.1 Business Model Innovation

Business Models (BM) pose a valuable unit for analysing a current business as well as providing a starting point for innovation (Schlimbach et al., 2024), defined as "the blueprint of an organisation's logic for value creation, delivery, and capture" (Schwarz & Legner, 2020). The development of BMs is a complex and creative activity that consists of different phases (Gottschalk et al., 2022) with terms such as "innovation", "adaptation", and "evolution" mostly being used to identify BM dynamics (Vatankhah et al., 2023), in some cases, with overlapping meaning (Balboni et al., 2019).

Business Model Innovation (BMI) can be defined as the process of designing a new or modifying an existing way of doing business (Schneider & Spieth, 2013) and consists of four generic phases (Frankenberger et al., 2013), i.e. initiation, ideation, integration, and implementation. In the *initiation* phase, the ecosystem is analysed to understand the environment, followed by the *ideation* phase, where new ideas or solutions are generated. Research often focuses on advanced phases of BM innovation, i.e. integration and implementation, leading to a need for investigating the early phases which are relevant to prepare future innovators and entrepreneurs to develop, refine, and validate ideas (Schlimbach et al., 2024).

2.2 Business Model Development Tools

Tasks that are creative and collaborative, such as process modelling and BMI, can benefit from the support of software tools (Szopinski et al., 2020). Bouwman et al. (2020, p. 413) define BM tooling as "the use of methods, frameworks or templates to facilitate communication and collaboration regarding BM analysis, (re-)design, adoption, implementation and exploitation". A number of software-based business model development tools (BMDTs) have been developed in research and practice and can support users during BMI. An example of a BMDT is the Business Model Canvas (BMC) (Szopinski et al., 2020), which consists of nine basic building blocks that summarise the main areas of a business (Osterwalder et al., 2010). Despite the growing availability of BMDTs, there is limited research on their abilities in educational settings (Schlimbach et al., 2024).

2.3 BMI in Engineering Education

Building on theoretical foundations like Bloom's taxonomy (Bloom & Krathwohl, 1956) and Flow Theory (Csikszentmihalyi, 1975), Schlimbach et al. (2024) designed a novel artefact, referred to as the PICO, for teaching BMI in digital learning environments. Their web-based educational BMDT aims to provide a user-centred and engaging experience, by considering the interplay of educational, social, and motivational layers (Schlimbach et al., 2024). Within these three layers, five design requirements were identified. In the *educational* layer: (1) A common base of knowledge on business model (ideation) needs to be provided, (2) Learners should be guided through the ideation process and thinking modes, and (3) Learners should be prompted to connect and recombine ideas. In the *social* layer: (4) Learners should be enabled to interact and collaborate with real/digital entities, and in the *motivational* layer, (5) Different types of learners and their drivers for motivation should be considered. Each of these design *requirements* have been translated into design *features* by Schlimbach et al. (2024) to help meet the requirements.

2.4 Design Science Research

According to Hevner and Chatterjee (2010), Design Science Research (DSR) creates an innovative solution to the problem, which often builds on existing parts of a solution and combines, revises, and extends extant design knowledge. The objective of DSR is not necessarily to develop an optimal solution, but a satisfactory solution compared to existing ones that is capable of generalisation to a certain class of problems (Collatto et al., 2018). Peffers et al. (2018, p. 131) indicate that a DSR effort may start in many different ways, including "a

research problem, with a client request, or even with an already designed version of an artefact". The DSR cycle's explicit stages according to Peffers et al. (2007), are to (1) Identify a problem, (2) Suggest a solution, (3) Develop the artefact to satisfy intentions, (4) Demonstrate and (5) Evaluate the artefact against intentions, concerns, and/or criteria, and (6) Communicate the results.

3. Methodology

This section applies the first four stages of the DSR cycle to our study. *Evaluation* of the artefact is suggested as future work.

3.1 Identify a Problem

Our *problem* was that the previous BMDT used, i.e. the BMC, did not provide sufficient support for undergraduate engineering students when using PM to explore new BMs. Even though a recently developed BMDT that is relevant to our context (i.e. the PICO) is available, it is not easily accessible. The method used should be embedded within a free, online, modelling tool like MURAL, improving method accessibility. March and Smith (1995) define four types of prescriptive knowledge: constructs, models, methods, and instantiations, whereas a design theory can include a combination of these to convey knowledge (Gregor & Hevner, 2013). A *method* is a set of steps used to perform a task and are based on a set of underlying constructs (language) and a representation (model) of the solution space (March & Smith, 1995).

3.2 Suggest a Solution

Suggesting a solution, we propose a *method* as our solution. To define *intentions* of the solution, we extracted relevant design requirements and features from the educational BM ideation tool PICO presented by Schlimbach et al. (2024). Our method, referred to as *EDU-BMI,* adopted *twelve* of the *fourteen* design features included by Schlimbach et al. (2024), employing them in a similar manner to PICO. The EDU-BMI does not include a built-in chat interface (feature 4) or image generator (feature 10) as we acknowledge that students can leverage their preferred chat/artificial intelligence (AI) tools for assistance during the ideation process and thinking modes, regardless of the EDU-BMI's integration of these features.

3.3 Develop the Artefact

In this section, we discuss how the five *requirements* proposed by Schlimbach et al. (2024) are addressed as well as how the 14 *features* have been incorporated into the EDU-BMI.

A common base of knowledge on BM ideation (requirement 1) is provided via text and videos, e.g. a video created by Gassmann (2013) is included. Participants are guided through the ideation process and thinking modes (requirement 2) via the outline functionality in MURAL (Tactivos Inc DBA MURAL, 2021). Participants are prompted to connect and recombine ideas (requirement 3). This is done by encouraging participants to add their own ideas, using the similarity and confrontation principles of BMI, and then having them discuss and vote for the best ideas. Participants are also encouraged to combine ideas and motivate their suggestions ("If you have a strong argument for a different category, use an elevator pitch to convince the team!"). Participants are enabled to interact and collaborate with real/digital entities (requirement 4) as they can consult chatbots such as ChatGPT (Jiang et al., 2024) and also interact with their team members during the modelling process. Different types of participants and their drivers for motivation are considered (requirement 5) as participants reflect on what motivates them and are prompted to consider these motivations during the modelling. For the *educational* layer, introductory video tutorials (feature 1) are embedded into MURAL and groups work through examples together, defining BMs and applying the gained knowledge to a predefined company (feature 2). EDU-BMI presents participants with a predefined challenge, i.e. in this study, a fictitious public tertiary education institution facing enrolment decline and budget deficits. This eliminates the need for students to spend time identifying their own problem, as advised by Venter and de Vries (2024), allowing students to focus more on BM ideation. Additionally, by providing a standardised case study, we ensure that all participants work from the same foundation, minimising variability in the starting point and maximising comparability of the perceived usability of the BMDT and MURAL between groups.

The purpose and use of an innovation library (feature 3) is unclear in Schlimbach et al. (2024). We understand that students should be able to explore what other participants have submitted, and that ideas from all users create a common knowledge space. The EDU-BMI therefore leverages MURAL's "private mode" (Butler, 2023) for feature 3. This allows students to work collaboratively while keeping their individual work hidden until the private mode is ended. This fosters independent application of knowledge, followed by a valuable learning

experience of seeing and discussing others' ideas and suggestions. This learning takes place using real-life examples/case studies for Uber and Amazon (feature 6) before it is applied to the predefined company.

For the *social* layer, questions for each business logic's core dimension (what, who, how, why) are used to initiate discussions, and ideas are aligned with a BM's core elements to merge new ideas (feature 9). Depending on the selected BM patterns (Csik et al., 2014), individualised and more detailed examples help inspire creativity (Feature 11) and participants are prompted to interact with each other by evaluating their ideas using icons and templates available in MURAL (feature 12). For the *motivational* layer, different types of students and their drivers for motivation are considered. In an initial icebreaker, participants can add what motivates them as well as their "favourite little thing that brings them joy" (feature 13). Participants can also give each other badges/awards and rate each other's ideas. Lastly, participants can customise their profile pictures in MURAL (feature 14). Where possible, functions within MURAL were used to support the features identified, e.g. by using available templates and the aforementioned "private mode". As another example, advice is provided for each phase along the initiation and ideation process (feature 5) using the outline function in MURAL. Each step has been included to assist the participants, navigate them to the right place on the canvas, and provide a time estimate for each activity. The BM pattern cards (Csik et al., 2014) are included (feature 8) and unconsidered BM patterns are suggested via the outline, encouraging the use of identifiers (IDs) (feature 7). The EDU-BMI therefore consists of seven main sections: (1) An introduction to MURAL and how the outline functionality works, (2) An introduction to the participants (i.e. who the four team members are and what motivates them), (3) Background information on BMs and BMI, (4) Information on the initiation step, including examples (Uber and Amazon) and the fictitious public tertiary education case study (i.e. EduC), (5) Information on ideation, focusing on the business model pattern cards (Csik et al., 2014) and the similarity and confrontation principles (Gassmann et al., 2013) to innovate EduC, (6) Idea prioritisation, where the participants decide which idea is most relevant and how the idea impacts the current BM of EduC, and (7) Translating EduC's new business model onto the business model canvas. The EDU-BMI method is used as a learning tool and transfers the participants' *newly designed BM onto the BMC*, which is not currently included in the PICO. The EDU-BMI method embedded in MURAL is shown in Figure 1. The left side includes the workspace, and the right side includes the outline and steps. Clicking on a step takes you to that section, as shown in Figure 2. These figures are for illustration only, i.e. to demonstrate the core concepts and how they're applied in MURAL.

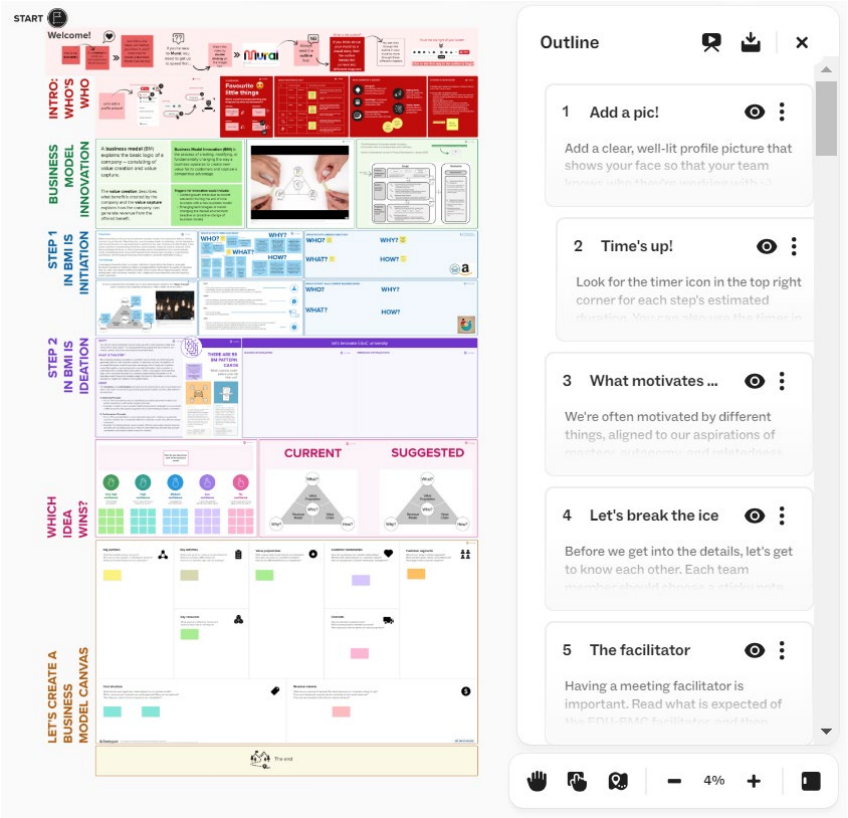

Figure 1: A visual overview of the method embedded in MURAL and the outline available on the right

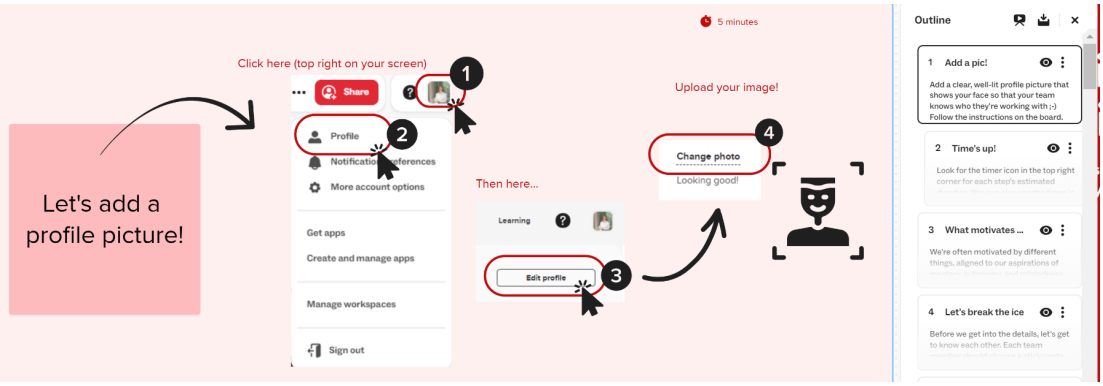

Figure 2: An extract of Step 1 and how one is navigated to a specific section on the canvas

3.4 Demonstrate

According to Peffers et al. (2007, p. 54), *demonstration* "could involve its use in experimentation, simulation, case study, proof, or other appropriate activity". Seven undergraduate engineering students agreed to participate in our study. The main researcher grouped these participants into two groups. Since one group only had three participants, the main researcher decided to participate in their modelling session as the fourth participant, enabling the researcher to witness issues and shortcomings first-hand. During the first cycle, the first group of participants used EDU-BMI to guide them during the BM ideation process, applying and simulating the steps of the new method, spending about 11 hours in total. The modelling sessions were recorded, using an application embedded within the web-based learning management system 'Blackboard' (Bradford et al., 2007), called Blackboard Collaborate.

The main researcher made notes of the issues/concerns identified during the modelling e.g. insufficient guidance on facilitation, confusion as a result of the layout, and some uncertainty in some steps' instructions. Other changes required included various formatting updates (e.g. improved colour coding to group steps and locking some of the items preventing their re-location), clearer instructions for users (e.g. changing the reading order and notifying users when to share their screens), and adjustments to specific steps (e.g. changes to the recommended time allowance per step). The participants also suggested that an additional video, explaining the "4I" concept (Frankenberger et al., 2013), is included, as well as a video summarising how EDU-BMI should be used.

A second cycle of *design* was therefore initiated, and the changes were incorporated into the method embedded on MURAL. The video explaining how to use EDU-BMI was not included yet. Instead, more instructions were added to the welcome section. Other changes included the removal of the Kudos wall as it did not add value and was not used in the first demonstration cycle, an added indication of where to start, and additional information on how the outline works. The updated method was *demonstrated* and this second group of four participants were asked to use the new version of the EDU-BMI, without the main researcher's presence. Their process of following EDU-BMI was also recorded and observing the recordings was useful to identify any issues or confusion that students experienced whilst following the method by themselves. The results of the *second* demonstration cycle is included in section 4 and are based on findings from observing and listening to the recording of the modelling session as well as some comments made by the participants after the modelling.

4. Results

The second group spent ten hours in total to complete the EDU-BMI. An extract from the introduction section is included in Figure 3. One of the steps from the outline is shown on the right of the image (Step 3: Let's break the ice), as well as the answers provided by the participants. Note that the names of participants have been blocked out for confidentiality. In Figure 3, you can also see that the facilitator, who added their answer on the bottom right, was awarded the 'Helping Hand' badge and 'Communication Champion' badge during the process (feature 13).

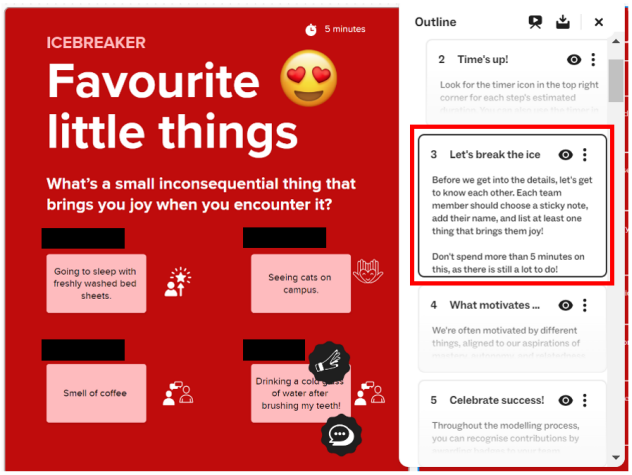

Figure 3: An extract from EDU-BMI to showcase the "Favourite little things" section

Even though changes were made to the initial outline to improve the flow and wording, there were still instances where the participants were not sure what to do. As an example, students struggled when applying the similarity and confrontation principles as there were long instructions included per step in the outline (shown in Figure 4). After completing the modelling session, one participant said "I think the outline guidelines really helped, especially with navigating to different sections on the board. Some of the more wordier instructions however, needed a little more time unpacking and weren't so intuitive. Had to reason what the exercise expected from us". Participants were also not always sure whether to conduct the activity for Uber or for EduC (the predefined case). It is therefore important to emphasise the difference between the examples and the case study at hand.

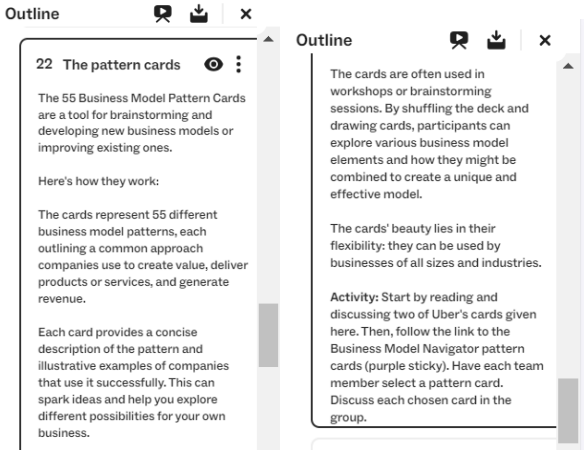

Figure 4: An extract from EDU-BMI to showcase one of the wordier instructions included in the outline

Participants indicated that the time allocated per step, was mostly sufficient to complete the step. One participant, however, mentioned that "It would be helpful to have more time to go through the business model patterns". When there was indeed time remaining, the participants read through the example again or tried to force additional discussion points. The voting process was also misunderstood by the participants. The outline states that ideas should be voted for by adding icons to the sticky notes (e.g. a thumbs-up icon). When the participants weren't able to figure out how to add icons, they easily pivoted, using the 'voting' functionality in MURAL instead, which served the same purpose. MURAL's voting functionality is shown in Figure 5, with the small circle at the top of certain sticky notes indicating the number of votes per idea.

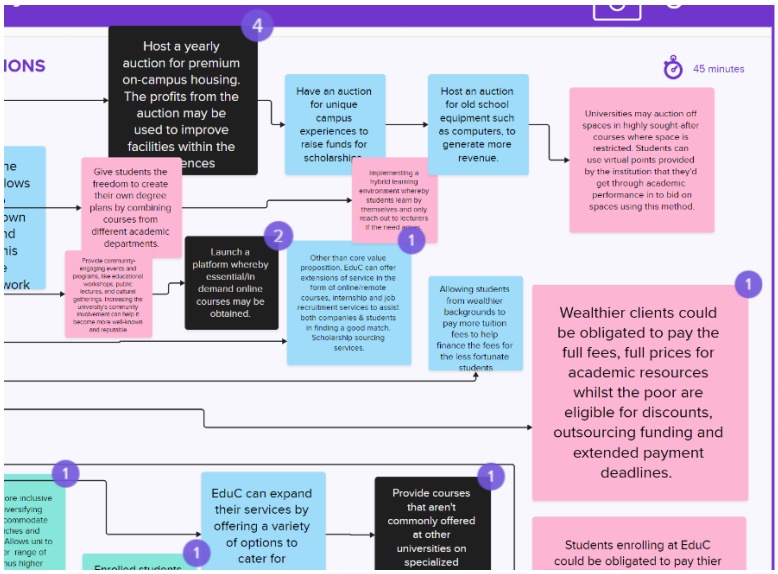

Figure 5: An extract from EDU-BMI to showcase how the voting was used to select the best idea

Participants connected and recombined ideas (i.e. requirement 3) at different points in the process and not just by using the similarity and confrontation principles as initially expected. As an example, by allowing the team members to discuss their learnings in a structured way with the help of the facilitator and prompts in the outline (such as Step 10 and Step 11 shown in Figure 6), they discussed the "4I" video. One participant said "Just to add on how I understood it from a different perspective…" and another responding "Oh that makes so much sense… I didn't know how to explain it, that's a great explanation". The participants also linked concepts from the EDU-BMI back to previous modules in the curriculum, commenting on how the learnings build on each other, i.e. they were able to see how BMI links to the Define, Measure, Analyse, Improve, and Control (DMAIC) process (BNP Media, 2014).

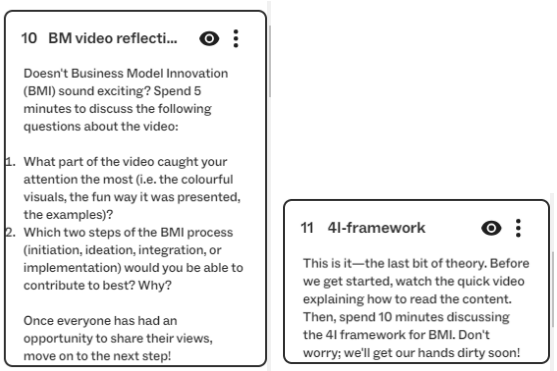

Figure 6: An extract from EDU-BMI to show how participants are prompted to discuss/reflect their learnings

Lastly, the participants in the second demonstration, similar to the participants in the first demonstration, expected the outline to follow a specific process. When the outline jumps too far down the MURAL, they are unsure what to do as they expect the outline to navigate them from left to right and then start from the left again, similar to how one would read. One participant however remembered that the outline should always be read first, and the group were able to continue with the process as expected.

5. Discussion

Even though the participants commented on the EDU-BMI afterwards saying, "It was interesting and fun" and "it was very engaging", one participant added "it was a lot of work". The modelling process took longer than expected to complete and it is suggested that more time and effort is spent on *training* the students how to use the concepts beforehand. The EDU-BMI could then be used as a *practical* application of the innovation process instead of a method to teach many/most of the concepts and individual processes. The EDU-BMI could be divided into more manageable sections to guide participants through the process and inform them of logical breaks where they could easily pick up again at a later point in time. Some steps could also benefit from

additional sub-steps to enhance comprehension and clarity. As an example, the first sub-step could include a summary, the next an example, and the last an activity that needs to be conducted.

The EDU-BMI method should be further refined based on the feedback received from the second demonstration cycle, e.g. participants should be informed that the timer only serves as a guideline and the expectation isn't that all of the time must be utilised per step. For future research, the latest version of the EDU-BMI should be evaluated with a larger group of undergraduate engineering students by providing them with a usability survey. The focus of the survey should be on the usability of the method *and* the tool (i.e. MURAL) as we want to develop a method suitable for the relevant educational context. We also suggest that the method is refined after each evaluation instance and should follow an iterative design process.

6. Conclusion

Our work contributes to research as well as educational and entrepreneurial practice by (1) Presenting a BMDT contextualised to engineering education, and (2) Advancing online formats for entrepreneurship education. EDU-BMI addresses the limitations of PICO, as it offers a flexible and accessible method. The method can easily be saved and imported as a template in MURAL and changes can be made without needing technical expertise.

Our study was subject to certain limitations. The researchers were not able to access the artefact used to inform our method directly (i.e. PICO) and only made use of the article in which PICO is described (Schlimbach et al., 2024). The possibility therefore exists that some requirements and/or design features were misinterpreted in our study. Considering that the students knew that the main researcher was involved in the modelling, reviewing their modelling sessions afterwards, their behaviour/suggestions during the modelling could have been impacted. The method was validated with seven participants that were grouped into two teams. A more representative sample is required to evaluate the method before any concrete conclusions about EDU-BMI can be made, including how usable/understandable it is within our context.

References

Balboni, B., Bortoluzzi, G., Pugliese, R., & Tracogna, A. (2019). Business model evolution, contextual ambidexterity and the growth performance of high-tech start-ups. *Journal of Business Research*, *99*, 115-124. https://doi.org/10.1016/j.jbusres.2019.02.029

Bell, R., & Bell, H. (2023). Entrepreneurship education in the era of generative artificial intelligence. *Entrepreneurship Education*, *6*(3), 229-244. https://doi.org/10.1007/s41959-023-00099-x

Bloom, B. S., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: the classification of educational goals* ([1st] ed.). Longmans, Green.

BNP Media. (2014). Take these steps to Six Sigma success Define, Measure, Analyze, Improve and Control your way to results. *QUALITY -ILLINOIS-*, *53*(6), 44-49.

Bouwman, H., de Reuver, M., Heikkilä, M., & Fielt, E. (2020). Business model tooling: where research and practice meet. *Electronic Markets : The International Journal on Networked Business*, *30*(3), 413-419. https://doi.org/10.1007/s12525-020-00424-5

Bradford, P., Porciello, M., Balkon, N., & Backus, D. (2007). The blackboard learning system: The be all and end all in educational instruction? *Journal of Educational Technology Systems*, *35*(3), 301-314. https://doi.org/10.2190/X137-X73L-5261-5656

Butler, J. (2023). *Private mode*. Retrieved 2 May 2024 from https://support.mural.co/s/article/private-mode

Chikasha, P. N., Ramdass, K., & Mokgohloa, K. (2021). Balancing employment and entrepreneurship requirements in industrial engineering education. *South African Journal of Industrial Engineering*, *32*(4), 1-12. https://doi.org/10.7166/32-4-2398

Collatto, D. C., Dresch, A., Lacerda, D. P., & Bentz, I. G. (2018). Is Action Design Research Indeed Necessary? Analysis and Synergies Between Action Research and Design Science Research. *Systemic practice and action research*, *31*(3), 239-267. https://doi.org/10.1007/s11213-017-9424-9

Csik, M., Frankenberger, K., & Gassmann, O. (2014). *55 pattern cards* FT Press.

Csikszentmihalyi, M. (1975). Play and Intrinsic Rewards. *Journal of Humanistic Psychology*, *15*(3), 41-63. https://doi.org/https://doi.org/10.1177/0022167875015003

Frankenberger, K., Weiblen, T., Csik, M., & Gassmann, O. (2013). The 4I-Framework of Business Model Innovation: A Structured View on Process Phases and Challenges. *International Journal of Product Development*, *18*(3-4), 249-273. https://doi.org/10.1504/IJPD.2013.055012

Gassmann, D. O. (2013). *Business Model Innovation* [Video on YouTube]. © University of St.Gallen (HSG). https://www.youtube.com/watch?v=B4ZSGQW0UMI

Gassmann, O., Frankenberger, K., & Csik, M. (2013). *St. Gallen Business Model Navigator*. BMI Lab AG.

Gottschalk, S., Yigitbas, E., Nowosad, A., & Engels, G. (2022). Continuous Situation-specific Development of Business Models: Knowledge Provision, Method Composition, and Method Enactment. *Software and Systems Modeling*, *22*(1), 47-73. https://doi.org/10.1007/s10270-022-01018-9

Gregor, S., & Hevner, A. R. (2013). Positioning and Presenting Design Science Research for Maximum Impact. *MIS Quarterly*, *37*(2), 337-355. https://doi.org/https://doi.org/10.25300/MISQ/2013/37.2.01

Hameed, I., & Irfan, Z. (2019). Entrepreneurship Education: A Review of Challenges, Characteristics and Opportunities. *Entrepreneurship Education*, *2*(3), 135-148. https://doi.org/10.1007/s41959-019-00018-z

Hevner, A., & Chatterjee, S. (2010). Introduction to Design Science Research. In *Design Research in Information Systems: Theory and Practice* (pp. 1-8). Boston, MA : Springer US : Springer. https://doi.org/10.1007/978-1-4419-5653-8_1

Jiang, Y., Xie, L., Lin, G., & Mo, F. (2024). Widen the Debate: What is the Academic Community's Perception on ChatGPT? *Education and Information Technologies: The Official Journal of the IFIP Technical Committee on Education*, 1-20. https://doi.org/10.1007/s10639-024-12677-0

March, S. T., & Smith, G. F. (1995). Design and Natural Science Research on Information Technology. *Decision Support Systems*, *15*(4), 251-266. https://doi.org/10.1016/0167-9236(94)00041-2

Mural. (2023). *Visual Collaboration Made Easy*. Retrieved 11 November 2023 from https://www.mural.co/features

Osterwalder, A., Pigneur, Y., Clark, T., & Smith, A. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Wiley.

Peffers, K., Tuunanen, T., & Niehaves, B. r. (2018). Design science research genres: introduction to the special issue on exemplars and criteria for applicable design science research. *European Journal of Information Systems*, *27*(2), 129-139. https://doi.org/10.1080/0960085X.2018.1458066

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, *24*(3), 45-77. https://doi.org/https://doi.org/10.2753/MIS0742-1222240302

Schlimbach, R., Lange, T. C., Wagner, F., Robra-Bissantz, S., & Schoormann, T. (2024). An Educational Business Model Ideation Tool – Insights from a Design Science Project. *Communications of the Association for Information Systems*, *54*, 642-661. https://doi.org/https://doi.org/10.17705/1CAIS.05423

Schneider, S., & Spieth, P. (2013). Business model innovation: Towards an integrated future research agenda. *International Journal of Innovation Management*, *17*(1). https://doi.org/10.1142/S136391961340001X

Schwarz, J. S., & Legner, C. (2020). Business model tools at the boundary: Exploring communities of practice and knowledge boundaries in business model innovation. *Electronic Markets*, *30*(3), 421-445. https://doi.org/10.1007/s12525-019-00379-2

Shah, F., Caraway, B., Ongvasith, P., McKeown, B., & Mackenzie, C. (2022). Experiential Learning Approaches for Enhancing Development Skills: A Review of the Social Business Canvas as a Pedagogical Tool. In P. Ray & R. Shaw (Eds.), *Technology Entrepreneurship and Sustainable Development* (pp. 13-39). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-2053-0_2

Szopinski, D., Schoormann, T., John, T., Knackstedt, R., & Kundisch, D. (2020). Software tools for business model innovation: current state and future challenges. *Electronic Markets : The International Journal on Networked Business*, *30*(3), 469-494. http://dx.doi.org/10.1007/s12525-018-0326-1

Tactivos Inc DBA MURAL. (2021). *Present and organize with outlines*. MURAL Retrieved 2 May 2024 from https://learning.mural.co/lessons/present-and-organize-with-outlines

Vatankhah, S., Bamshad, V., Altinay, L., & De Vita, G. (2023). Understanding business model development through the lens of complexity theory: Enablers and barriers. *Journal of Business Research*, *155*. https://doi.org/10.1016/j.jbusres.2022.113350

Venter, A., & de Vries, M. (2024). Evaluating the Usability of Online Tools During Participatory Enterprise Modelling, Using the Business Model Canvas. *HCI in Business, Government and Organizations*, 96-114. https://doi.org/10.1007/978-3-031-61318-0_8