Innovation Canvas
"A Web Tool to Support Structured Student Brainstorming"

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ABSTRACT

This research proposes "Innovation Canvas," a web - based tool designed to enhance structured ideation for Sri Lankan higher education students. Drawing from extensive teaching experience in innovation education, this study addresses the critical gap in digital platforms supporting structured brainstorming using established frameworks including Lean Canvas, Social Innovation Canvas, and Digital Thinking Methodologies.

The research employees a Design-Based Research methodology with agile and User-Centred Design practices. The platform uses React Frontend and Firebase backend for Scalability and collaboration. Evaluation involves testing with 30 students and 5 educators using qualitative and quantitative assessments.

Expected outcomes includes enhanced student engagement, ideation structure, and insight into digital scaffolding effectiveness in creativity education. The research contributes to educational technology by demonstrating how structured digital platforms can make abstract innovation concepts accessible, particularly in educational settings that lacks resources.

Keywords – *Lean Canvas, Social Innovation Canvas, Design Thinking Methodologies, Innovation Education, Education Technology, User-Centred Design (UCD), Web-Based Learning Tools*

1. INTRODUCTION

Today's education system emphasizes 21st century skills, with innovation and entrepreneurship essential for professional success [1]. Higer education institutions worldwide increasingly integrate creativity, critical thinking. And problem-solving methodologies to prepare students for modern professional environment [2]. However, students frequently encounter challenges generating, structuring, and developing innovative product ideas.

Professional experience in Sri Lankan Higher education reveals that students process creative potential but lacks systematic framework to channel ideas effectively. This aligns with documented educational challenges where traditional brainstorming methodologies lacks systematic structure and digital accessibility for modern learnings [3].

2. PROBLEM STATEMENT

Today's innovation education faces several connected challenges that makes it hard for students to learn effectively and stay engaged. A major issue is that innovation frameworks are often abstract, making it difficult for students to apply theory in practical ways [6]. Famous methods such as **Lean Canvas, Business model canvas, Design thinking** work well in business but often lacks the step by step support the students need in educational settings.

Professional experience collected by conducting innovation workshops in Sri Lankan educational institutes has revealed that students consistently struggle with two primary challenges, first – the conceptual complexity of innovation framework that assumes prior business knowledge, and second – the lack of structured guidance during the ideation process.

Hybrid and online learning methodologies have highlighted conventional ideation limitations, particularly their inability to provide consistent support across diverse learning contexts. This challenge is especially relevant in resource-constrained educational environments where structured creativity support remains critically important [4][5].

This research proposes "Innovation Canvas," a web-based platform addressing these educational challenges through structured, technologically enhanced brainstorming. The system integrates established innovation frameworks with modern web technologies, creating an accessible tool supporting students throughout ideation and early-stage project development.

This research extends beyond tool development, exploring digital scaffolding in creativity education and technology-enhanced learning environments' potential to provide advanced innovation methods in resource-limited

educational settings.

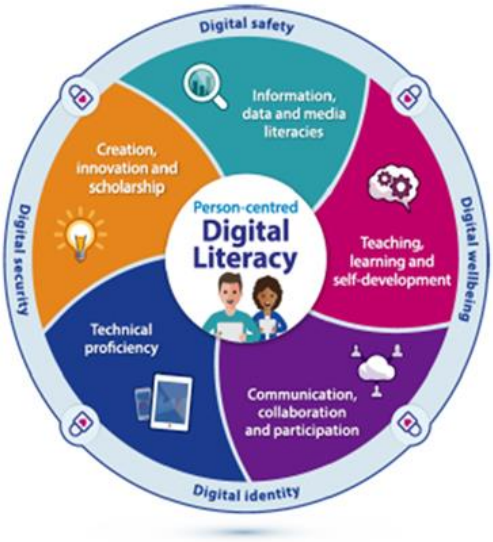


Figure 1 - Digital capabilities: the six domains, Jisc Digital Capacity Framework / Helen Beetham (2015)

Transitioning from hybrid and online learning systems has made these challenges further problematic by adding new barriers to teamwork and structured idea generation. Traditional classroom innovation activities usually depend on physical tools, in-person discussions, and quick feedback from teachers, things that are hard to recreate online without proper technological resources support [8].

Students often face creative blocks and feel unsure about their ability to come up with ideas, especially when dealing with new frameworks or complex innovation methods. Without clear guidance and regular feedback, they may only engage with innovation concepts on a surface level, missing chances for deeper understanding and learning [9].

3. LITERATURE REVIEW

A. Theoretical Foundation

This research is mainly based on **Constructivist Learning Theory**, especially the work of Vygotsky [10] and Piaget [11], which highlights how learners build knowledge through experience and interactions with other students. Vygotsky's idea of the **Zone of Proximal Development (ZPD)** is especially important here. It suggests that students can reach a deeper understanding when they receive the right level of support and guidance, often called **Scaffolding** [12].

Wood, Burner and Ross [13] introduced the idea of scaffolding in education, describing it as a temporary support that helps students complete their task that they couldn't on their own. This concept has been extensively applied into digital learning environments, with research demonstrating the effectiveness of technology-based scaffolding in complex educational settings.

According to brian and Andres, In innovation education, this approach is especially useful, the practitioners have found that the structured guidance helps student tackle complex idea development while remaining creative [14].

B. Innovation Education Frameworks.

Design thinking, Developed by Brown [1] and expanded by Liedtka [15], is a human centred innovation method that focuses on empathy, idea generation, prototyping, and testing. Its structured yet flexible design makes it suitable for education, especially when students are guided rather than working independently [16].

Razzouk and Shute [17] highlight that structured design thinking helps improve creative problem solving without limiting creativity. Similarly, the lean startup approach by Ávalos, A. Pérez [18] and the lean canvas offers step by step tools for developing business ideas. Though made for entrepreneurs, they've shown strong value in education when adapted with right support [19]. Recent research by Aransyah et al. [20] especially examines the integration of design thinking and lean canvas approaches in entrepreneurship education. Their study reveals that combining these methodologies with user centred scaffolding creates effective frameworks for student learning, particularly when supported digital tools that provide structured guidance throughout ideation process. This research directly supports the pedagogical foundation for the proposed DICG system.

C. Digital Tools and Educational Technology

M. Resnick [21] highlights the importance of creativity and play in educational technology, apps like MIT Scratch are a good example for this. Promoting tools that allow open-ended, project-based learning [22]. While platforms such as Miro, Canvanizer, and Ideanote supports idea generation, they often lack the scaffolding and simplicity needed for the students, as they are mainly designed for professional use. Gorshenin [23] show how educational IT has shifted from basic learning systems to advanced platforms with AI, offering new ways to support learning especially suited for innovation education where structure is key. Kowalski et al [24]. Provide evidence that digital tools, when combined with proper guidance, can support creativity and collaboration in STEM learning, complementing traditional teaching methods without replacing them.

D. AI in Educational Innovation.

Recent studies shows that AI support can support idea generation and brainstorming in education. Ning [25] How tools such as ChatGPT can help student build lean canvas models by reducing mental effort while keeping learning effective. Shaer et al [26] provide evidence that AI can boost creativity and evaluation in group brainstorming, acting as a thinking partner rather than replacing human input. Ayele and Juell Skielse [27] outline how AI methods like natural language processing and machine learning can be used for idea generation without losing focus on learning goals.

E. User Experience and Educational Technology Design

The Technology Acceptance Model (TAM) developed by Davis [1], explains how users adopt to technology based on how useful and user-friendly the technology is.

Venkatesh et al. [28] later added factors such as social influence and support systems to better understand tech use in education.

User Centred Design (UCD) focuses on creating educational tools through repeated testing, with the learner's needs and outcomes as priority, not just the technology itself [29]. This approach works well for complex cognitive tasks such as teaching innovation and creativity [30].

F. Requested Supervisor

A supervisor with expertise in educational technology, innovation pedagogy, and user-centred design would be ideal. Familiarity with digital learning tools and mixed-methods research would support the projects development and evaluation phase.

4. SMART OBJECTIVE

The research objectives have been formulated using SMART criteria to ensure clarity, measurability, and achievability within the given academic timeline.

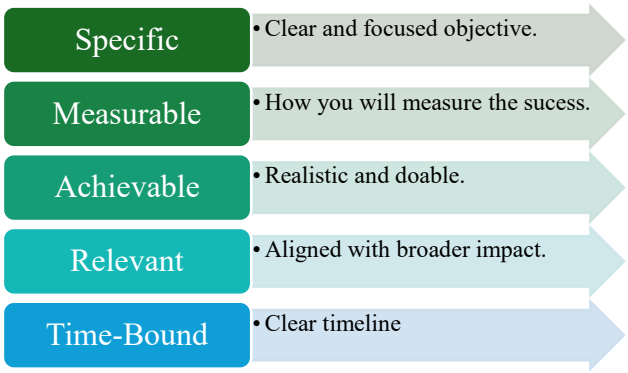


Figure 2 - Smart goals for this research created by Anjana Wijewardhana

- **Specific** – Design, build and evaluate a web-based Innovation Canvas to help higher education students to brainstorm innovation projects using frameworks such as Lean Canvas, Social Innovation Canvas, and Design Thinking.
- **Measurable** – Test the tool with 30 students and five educators using System Usability Scale (SUS) and qualitative methods to assess usability, engagement and learning impact.
- **Achievable** – Complete all the stages, such as need analysis, design, development, testing, and refinement, within the given timeline and using existing technical skills.
- **Relevant –** Provide insights into how digital scaffolding tools supports creativity and innovation learning, especially in educational settings that lacks resources.
- **Time-Bound** – Finish all the research activities, from development to final thesis submission within the given timeline, with set milestones for each stage.

5. METHODOLOGY

This research uses a **mixed methods approach,** combining **Design-Based Research (DBR)**. **Agile development,** and **User-Centred Design (UCD)**. The process involves continuous testing and refinement in real educational settings, based on prior experience in curriculum and edtech development.

A. Phase 1 – Needs Assessment

This phase includes interviews and surveys with students and educators from innovation related programs to identify key challenges and needs. Data collection tools will be adapted from education research. The focus is on what kind of scaffolding is required for the students based on their skill level. Existing tools will also be analysed to identify the gaps and set benchmarks. Project management will be done using **ClickUp** project management software.

B. Phase 2 – Design and Prototyping

User journeys and wireframes will be created using tools such as **Adobe XD**. Core templates such as Lean Canvas, Social Innovation Canvas, and Design Thinking will be adapted to for student use. The platforms front end will be built using **React** and for backend and real-time data **Firebase** will be used. And finally for storage **Firestore** is planned to be used. With a focus on scalability and security. It's noteworthy to mention that additional software's and help from external experts will be used in the process of development.

C. Phase 3 – Implementation and Testing

Development will follow agile sprint. A series of iterative testing will be conducted in the process of development. A formal usability testing and informal feedback from students and educators will be done. Both **quantitative data** like (SUS scores and task success rates) and **qualitative feedback** (via interviews and focused groups) will be collected as well.

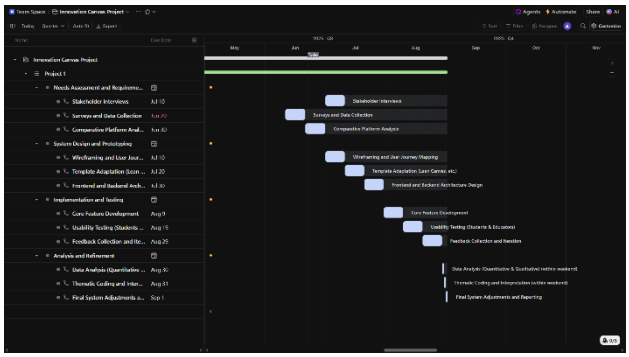
D. Phase 4 – Analysis and Refinement

Data will be analysed using statistical and thematic methods. Insights will guide design improvements. The final evaluation will measure the tool's impact on student engagement, idea quality, and learning outcomes. Especially in educational settings that lack resources.

GANTT CHART

The Gantt chart below outlines the structured timeline for the creation of the research project label as "Innovation Canvas"

[3 months starting from 2025-06-01 to 2025-09-01]



Important - Links to access the Gantt chart and Clickup Project Management dashboard are included in the appendix section.

6. ETHICS

This research will fully comply with **Wrexham University's Research Ethics policy** and all relevant legal and institutional guidelines, including the **UK Data Protection Act 2018.** A formal application for **ethical approval will be submitted and approved before any data collection begins,** in line with the university's policy. No data collected prior to the approval will be used.

The study will follow key ethical principles,

- **Informed Consent** – All participant will be informed of the research aims, methods, and potential risks. Written consent will be collected before participation.
- **Privacy and Confidentiality** – participants data will be anonymous and will be stored securely. No personally identifiable data will be published. Data handling will comply with data protection laws and university standards.
- **Data Security –** All research data will be stored in an encrypted Firebase server, with access restricted to authorised users only.
- **Voluntary Participation** – Participation is entirely voluntary. They can withdraw at any given time without any penalty, and withdrawal procedures will be clearly explained.
- **Participants Wellbeing** – The research is designed to maximise educational benefits and minimize any risks.
- **Compliance and Accountability –** The researcher understand that any breach of this policy or deviation from procedures is a serious matter. As per the university policy this may result in suspension or withdrawal. Any concerns can be reported to **Research Ethics Committee** at rescadmin@glyndwr.ac.uk email.

7. SCOPE AND LIMITATIONS

A. Research Scope

This study focus on **ideation and early project planning stage** of innovation, using structured canvas templates to guide student brainstorming. It targets **higher education students,** especially those involved in innovation, entrepreneurship, with attention to learning environments that lacks resources.

The evaluation will focus on **usability, student engagement,** and **perceived learning values**, than long-term project results. Research aims to show how **digital scaffolding** can support complex thinking in education, especially in **hybrid settings**.

B. Limitations

Some factors may affect the findings,

- **Sample Size –** Limited access to participants may reduce statistical strength.
- **Generalizability –** Results may not be applicable to educational systems, cultures, or levels of educational settings.
- **Technical Constrains –** The tool may not include advance feature like A.I due to time and resource limitations.
- **Short-Term Focus –** The study evaluates long term impact or sustained use.
- **Context-Specific** – Results may reflect specific institutions and cultures, through varied teaching experience will inform the design.

8. PERSONAL DEVELOPMENT GOALS

This research offers valuable opportunities such as for skill development across several areas,

- **Technical Skills** – Developing a full-stack web application using **React** and **Firebase** will advance current programming knowledge.
- **Research Methodology –** Leading a mixed method study will improve skills in data analysis, user evaluation, and academics research.
- **Educational Technology Expertise –** Working with innovation pedagogy and digital scaffolding will deepen the understanding of designing and implementing learning tools in STEM education.
- **Project Management –** Coordinating a multi-phase project enhances planning and execution skills.
- **User Experience (UX) Design –** Designing student focused interfaces improves the knowledge of UX principles.
- **Cross-Cultural Perspective** – Engaging with diverse set of learners and educators will expand the knowledge of how technology is adopted across different cultural and resources settings.

9. Future Improvements

The basic version of "Innovation Canvas" focuses on core functionality and educational usability but there's a potential for future improvements.

1) **AI Integration** – AI features such as real-time ideation support, content suggestion, automated feedback will improve the learning experience as shown in the studies [25] [26].

2) **LMS Integration** – Connecting this system with popular systems such as Moodle, Canvas, and Google classroom could streamline assignment management and improve classroom use.
3) **Custom templates** – Allowing educators to create and modify their own canvas could make the adaption easier and the system user-friendly.
4) **Mobile Optimization** – A mobile friendly version could improve access, especially in low educational resources settings.

10. Conclusion

This research aims to develop the "Innovation Canvas" a practical digital tool to support student brainstorming in innovation education. Built on hands-on experience and solid research methods, the tool will help students better engage with innovation concepts and provide useful insights for future educational technology design.

The project combines technical development with user testing to ensure real educational value, especially for students in hybrid or low-resource settings. The study also shows how real-world teaching experience can guide the creation of useful digital learning tools.

Overall, this research will benefit educators, developers, and researchers, who want to improve creativity and innovation learning in higher education.

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Appendix.

- **Gantt Chart Image Link –** https://drive.google.com/file/d/1Zx0-BugZUB4yyso6ogkQIHqae4gZ3Q0O/view?usp=sharing
- **ClickUp Project Management Dashboard Link -** https://app.clickup.com/90181357402/v/f/90185895228

Definitions.

1. **Lean Canvas** – A one page business plan template that helps startups or innovators quickly map key parts of their business idea such as (problem, solution, customer, cost, revenue).
2. **Social Innovation Canvas** – A template similar to lean canvas that helps innovators come up with solutions to social problems that helps communities.
3. **Design Thinking Methodologies** – This is a method that that focuses on understanding users

needs to create a user friendly and useful innovation by involving users in the design process.

4. **Innovation Education** – Teaching methods and learning activities that develops creative thinking, problem solving, and the ability to turn ideas into real world solutions or products in students.
5. **Education Technology** – The use of digital tools, platforms, and software to enhance teaching and learning process.
6. **User-Centred Design (UCD)** – A design approach that focuses on the needs, goals, and feedback, of end users throughout the development process to create more effective and user friendly products or systems.
7. **Web-Based Learning Tools** – Online platforms or applications that supports learning through internet.
8. Digital Scaffolding – Refers to the use of technology-based learning tools or features to guide, support, and enhance student learning.