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Design Thinking in Education: Developing a Cross-Subject Teacher Collaboration Platform for Creativity Assessment

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ABSTRACT
This study reports on the development of a digital platform designed to facilitate cross-subject collaboration among secondary school teachers in Indonesia for assessing students' creative works. Grounded in the Design Thinking methodology, the project progressed through the stages of Empathise, Define, Ideate, and Prototype. The platform addresses the gap in current assessment practices where creativity is undervalued due to limitations in teacher expertise and evaluation tools. By adopting a user-centred and co-design approach, involving teachers as active collaborators, the platform integrates principles of collaborative learning and computer-mediated communication. The article outlines the design process in detail, highlighting how Design Thinking guided the iterative development up to the prototyping phase, which produced a high-fidelity design ready for future testing.

Keywords: User-centered design; Design Thinking; Collaborative learning; Creativity assessment; Educational technology; Teacher collaboration.

INTRODUCTION
The universally designed assessment limits students' ability to demonstrate their understanding (Ofies et al. 2006). It causes some of the potential to be unrecognised (Stenberg, 2003). A study found that among schools' dropouts are gifted children, and among the causes is the standardise test (Alvino and Wieler, 1979). Besides, Briška and Kalēja-Gasparoviča (2017) contended that inappropriate assessment methods could be a barrier to creativity. In the Indonesian context, based on my experience during high school, I witnessed my talented peers did not get enough credit for their creative works. The practice was still the same until I became a student-teacher. During my internship as a teacher, I found that students are enthusiastic and perform well in role-play activities I assigned in class, but they tend not to have good results in the end-term examination. However, the main contribution to the final mark is from the examination. A varied assessment to accommodate creative students is needed, Brownhill and Godfrey (2022) believed that creative assessment gives the student more flexibility.

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Currently, the Indonesian government has included creativity in the assessment criteria, but teachers find it hard to assess it. Having varied types of evaluation will affect students' learning motivation (Seale, 2000). Based on Indonesian newest assessment guidance, three aspects are being assessed in students' learning: 1) affective, 2) cognitive, and 3) creativity (Kemdikbud, 2017). However, Teachers find it hard to implement the assessment guidance (Setiadi, 2016). Based on the conversation with one of the Indonesian teachers, they realize that they need to include creativity in assessment but are unable to assess it; for example, when an English teacher assigns their students to perform in front of the class, they will only focus on English part such as pronunciation. This issue might happen because teachers have limited capabilities to assess students' creative work, while as Lai et al. (2017) stated, experts in specific areas are needed to evaluate creativity. Thus, the teacher needs help to assess the creative part of the assessment.

The possible solution to the problem is to provide a platform to meet the teachers with experts. The idea is derived from the creative partnership in teaching, where there is a collaboration between teachers and artists or creative practitioners (Griffiths and Woolf, 2009). In the Indonesian context, based on the observation through interviewing teachers, there is a possibility for creative partnership by connecting teachers all over the country, realizing the prospect of teachers in Indonesia that range from diverse expertise. Thus, the final idea is to develop a platform for cross- subject teachers' collaboration to assess students' creative work. For example, in English lesson, the English teacher can ask students to create drama or songs. The English teacher will find an Art teacher on the platform and work together to evaluate the assignments.

The role of assessment in education has long been contested, with traditional standardised testing criticised for its inability to capture students' diverse talents, particularly creativity (Sternberg, 2003; Alvino & Wieler, 1979). Scholars such as Barbot, Besançon, and Lubart (2011) argue that assessment practices must evolve to recognise creativity as a multidimensional construct involving originality, flexibility, and elaboration. In the Indonesian context, the government has mandated creativity as one of three pillars of assessment—alongside cognitive and affective dimensions (Kemdikbud, 2017). However, studies indicate persistent difficulties among teachers in operationalising these expectations (Setiadi, 2016), reflecting global challenges in aligning assessment policy with classroom practice (Torrance, 2018).

Collaborative learning has emerged as a valuable framework for addressing these challenges. The definition of collaborative learning has been evolving for decades. Bruffee (1981) stated that collaborative learning aims to communicate the idea to peers; It is more like socialising and making others make sense of the idea. Alavi (1994) contended that collaborative learning is more of two- way communication where there is a problem-solving activity that allows discussion and information sharing. The definition that suits the platform comes from Redmond and Lock (2006), which defined collaborative learning as knowledge construction from different expertise and perspectives that include collaborative activities like 'sharing', 'discussing', and 'constructing and negotiating meaning'. The collaboration also provides a chance for teachers' professional development as they can learn from each other through the 'what's up' feature. The objective aligns with Slotte and Tynjälä (2005, cited in Reymond and Lock 2006) assertion that constructive learning also leads to professional development through the "mutual learning process".

Bruffee (1981) conceptualised collaboration as peer interaction that supports knowledge construction, while Redmond and Lock (2006) highlight the value of collaboration among individuals with diverse expertise. This aligns with Vygotsky's (1978) socio-cultural theory, which emphasises the role of social interaction in advancing learning. In professional contexts,

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collaborative learning also enhances teachers' reflective practice and professional development (Slotte & Tynjälä, 2005).

Digital technology expands these opportunities by enabling computer-mediated collaboration. Warschauer (1997) and Resta and Laferrière (2007) observed that technology can transcend geographical and temporal constraints, facilitating both synchronous and asynchronous communication. This resonates with theories of networked learning, where teachers' professional learning is enriched through online communities of practice (Goodyear, 2005; Lave & Wenger, 1991). However, existing Indonesian platforms such as Guru Berbagi and Merdeka Mengajar focus primarily on resource sharing rather than sustained collaboration, revealing a gap in digital infrastructures for cross-subject assessment.

Warschauer (1997) emphasises that technology can be beneficial for collaborative learning. In the same way, Redmond and Lock (2006) added that technology enables interaction between the stakeholders in learning which was previously unavailable. Specifically, the technology enables collaboration between experts through peer interaction and group learning processes (Resta and Laferrière, 2007). This platform provides peer and group communication and collaboration. Group collaboration happened in the 'what's up' feature, where teachers can ask questions and share experiences with a group. Thomson and Ku (2006) believed that group collaboration would lead to more satisfactory quality projects. Lastly, the platform provides flexibility to the teacher as it does not demand the teacher to be present at the same time. Technology provides synchronous and asynchronous communication even when the participant is 'geographically distributed' (Redmond and Lock 2006).form was developed through the Design Thinking framework (Plattner, Stanford d.school), consisting of the following stages: Empathise, Define, Ideate, and Prototype. During the Empathise stage, teacher interviews and literature reviews were conducted to identify challenges in assessing creativity. The Define stage distilled these findings into the central problem statement: teachers lack capacity to assess creative outputs beyond their own subject expertise. In the Ideate stage, co-design workshops with teachers generated ideas for cross-subject collaboration mechanisms, such as rubric co-construction and peer input. Market research confirmed the absence of comparable digital platforms in Indonesia. Prototype stage, both low-fidelity sketches and a high-fidelity digital prototype were created to visualise the platform's main features and functionalities. This prototype provides the foundation for future usability testing but was not tested within the scope of this study.

Finally, the methodological foundation of this study lies in Design Thinking, which has been increasingly applied in educational contexts to support innovation (Noel & Liub, 2017; Razzouk & Shute, 2012). Design Thinking emphasises empathy with users, iterative prototyping, and co-design with stakeholders (Plattner, 2010). Prior research demonstrates that involving teachers in co-design enhances both ownership of and alignment with classroom realities (Roschelle et al., 2006; Cviko, McKenney & Voogt, 2014). This study situates itself at the intersection of these literatures by applying Design Thinking to create a prototype digital platform that addresses teachers' assessment challenges through collaborative, cross-subject partnerships.

METHOD

This study employed the Design Thinking methodology, a human-centred approach that emphasises empathy, creativity, and iteration (Plattner, 2010; Razzouk & Shute, 2012). The process began with the Empathise stage, which involved exploring the context of teachers' experiences through interviews and a review of literature. This was followed by the Define stage, where the insights gathered were synthesised into a problem statement that would guide subsequent design decisions.

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The next phase, Ideate, focused on generating potential solutions through co-design workshops that engaged teachers as active collaborators. This stage was supported by Market Research to review existing platforms and ensure the novelty of the design. To further refine the design, Persona development was used to represent typical users, while Affordances and Scenarios were considered to anticipate user interactions and potential challenges. The process concluded with the Prototype stage, where initial low-fidelity sketches were developed and refined into a high-fidelity prototype ready for future evaluation.

RESULT AND DISCUSSION

Empathise

This part focused on exploring the context of the target area. The Empathise phase helped to understand the context in many areas, including education (Noel and Liub, 2017). The design idea initially came from my previous experience as a student and during an internship as a teacher. Further actions were needed to understand the context of the issue.

Two of Plattner's proposed activities in the Empathise stage were used in this design process:

1) Engage: Interviews were conducted with teachers to understand their points of view and their opinions about government guidelines regarding assessment criteria.
2) Observe: The observation took the form of a literature review on the need to include creativity in assessment and to examine teachers' practices in assessing students' creative works.

Transition: Empathise to Define

In this phase, the designer mapped and concluded the information obtained from the empathising stage. The takeaways from the interview and observation were:

1) The Indonesian government had included creativity as an assessment criterion (Kemdikbud, 2017).
2) Teachers were unable to assess students' creative works (Interview).

Define

In this stage, the designer framed the problem faced by teachers. Framing was an essential element in the problem-solving design process (Dorst, 2011). Based on the takeaways from the observations, the core problem identified was that teachers had limited capability to assess students' creative work, which made it difficult for them to implement government assessment guidance.

Ideate

The ideal design used the co-design process. Co-design was an activity in which the designer and end-user worked together to address the stated problem (Facer and Williamson, 2004). In the educational context, Roschelle et al. (2006) defined co-design as:

"a highly-facilitated, team-based process in which teachers, researchers, and developers work together in defined roles to design an educational innovation..." (p.606)

The reason for involving the teacher as a co-designer was to make it more user-centred. Cviko et al. (2014) stated that teachers developed a greater sense of co-ownership when they were involved in the design process compared to when they were merely users.

Idea Development

The designer and teachers worked together to find solutions to the stated problem. In co-designing, the designer acted as a facilitator (Sanders and Stappers, 2008). In this context, the designer proposed the idea of providing a platform for collaboration among cross-subject teachers. The teachers, in co-designing, acted as experts with their professional expertise in idea generation and development (Sanders and Stappers, 2008). The role of teachers was to evaluate the practicality of the proposed idea and to develop the cross-subject assessment prospects. For example, English and Art teachers jointly formulated activities that involved

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both cognitive and creative aspects. At this stage, the designer and teachers also discussed the learning theories underlying the platform's design.

Market Research

Market research was conducted to identify existing solutions to the problem statement. The designer carried out a literature review and app search regarding teachers' collaborative platforms. During the market research, the designer found existing platforms as follows:

1) MGMP: the Indonesian subject-based teacher collaboration at the regional level, usually held offline. There was no online platform for this organisation.
2) Guru Berbagi: an Indonesian teacher-sharing platform facilitated by the government. However, there was no collaboration feature, as it only provided a 'like' option without a comment section.
3) Merdeka Mengajar: a newly released teacher collaboration platform, but it did not support cross-subject collaboration.

Based on this market research, the designer concluded that the proposed idea had not been developed before. Therefore, the designer proceeded to develop the idea.

Persona

In user-centred design, personas played an essential role as they limited the possibility of 'self-referential design' (Miaskiewicz and Kozar, 2011). Similarly, Pruitt and Adlin (2010, p.11) noted that personas helped user-centred design by taking the user perspective seriously. A persona was a fictitious illustration of the targeted user and provided the precise context of where the technology would be used (Miaskiewicz and Kozar, 2011). In the ideal design process of this platform, persona creation followed the market research stage, as the designers had already collected extensive information about the target user through observations, interviews, and market research. Grudin and Pruitt (2002) indicated that personas were best created after comprehending the user through deep research, such as studies, focus groups, interviews, and market research.

Affordances

In this stage, the design process involved thinking through the applicability of the platform. The designer considered the platform's functions and possible barriers under specific conditions, which were defined as affordances (Davis and Chouinard, 2017). This was important because Indonesian teachers varied in digital literacy, infrastructure, and geographical location. The designer needed to anticipate how target users would interact with the platform in specific situations (Gero and Kannengiesser, 2012).

Based on Davis and Chouinard's (2017) theory of affordances, the following were identified as central to the platform's design:

1) Request: The platform requested the user to complete the profile section. However, the user could still use the app even if they did not upload a profile picture.
2) Demand: The platform demanded the input of a national teacher registration number to ensure all users were verified teachers. Without it, registration was not possible.

Scenarios

Carroll (1999, p.2) defined scenarios as "stories about people and their activities." In this design process, scenarios were used before prototyping as a means to promote reflection. The designer created both best-case and worst-case scenarios in the design implementation. Each scenario contained a setting, actor, and objective, illustrating detailed user experiences and highlighting potential issues in the design (Carroll et al., 1998; Carroll, 1999; Bødker, 1999).

Prototype

Design Workshop

At this stage, the prototype was used to communicate the well-formulated idea to the

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users. The designer conducted a design workshop attended by teacher representatives and fellow designers.

The designer presented low-fidelity prototypes through sketches. According to Hourcade (2015), low-fi prototypes were beneficial in saving time and budget while enabling reflection and early identification of potential issues. Expert review, as suggested by Hourcade (2015), was employed to detect early usability problems. The workshop was conducted as a two-way communication process, allowing for open discussion, questions, and suggestions. Feedback from the workshop was then used to develop a high-fidelity prototype.

Discussion

The findings of this study highlight the value of Design Thinking as a methodology for addressing complex educational challenges such as creativity assessment. By progressing through stages of empathy, problem definition, ideation, and prototyping, the design process ensured that teachers' perspectives and needs were central throughout. This reflects broader arguments that user-centred design in education is most effective when practitioners are positioned as experts in their own contexts (Abras et al., 2004; Sanders & Stappers, 2008). The involvement of teachers in co-design activities also aligns with research showing that co-development fosters ownership and practical applicability (Cviko et al., 2014).

The prototype itself embodies theoretical principles of collaborative learning and computer-mediated communication, offering a concrete example of how digital technologies can support professional collaboration across disciplinary boundaries. By enabling teachers to connect, co-develop rubrics, and exchange resources, the platform has the potential to address the long-standing challenge of assessing creativity across subjects. This resonates with earlier claims by Redmond and Lock (2006) that collaboration across diverse expertise enriches educational practices, as well as Resta and Laferrière's (2007) emphasis on the role of technology in supporting distributed collaboration.

Pedagogically, the platform may contribute to shifting assessment practices towards more holistic models that value creativity alongside cognitive and affective dimensions. Such an approach aligns with contemporary calls for assessment systems that foster—not stifle—creativity (Torrance, 2018; Sternberg, 2003). At the same time, the study underscores the challenges of educational innovation in contexts characterised by disparities in digital literacy and infrastructure. These issues echo wider debates on equity and access in educational technology (Selwyn, 2016).

While the prototype provides a promising foundation, its effectiveness remains to be evaluated through empirical testing with teachers and students in authentic classroom settings. Future work should focus on piloting the platform, assessing usability and impact, and exploring its scalability across diverse Indonesian schools. Nonetheless, this study contributes to the literature by demonstrating how Design Thinking can be applied to bridge the gap between policy aspirations and classroom realities, offering both theoretical and practical insights into the design of educational technologies for creativity assessment.

CONCLUSION

This study applied a user-centred, Design Thinking methodology to develop a prototype platform aimed at supporting cross-subject teacher collaboration for creativity assessment in Indonesian secondary schools. By engaging teachers throughout the stages of empathising, defining, ideating, and prototyping, the design process ensured that the resulting solution was rooted in authentic classroom realities. The platform embodies theoretical principles of collaborative learning and computer-mediated communication, offering teachers structured opportunities to co-develop rubrics, share expertise, and exchange resources across disciplinary boundaries.

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The study contributes to the growing literature on educational innovation by demonstrating how Design Thinking can be effectively operationalised in pedagogical contexts. While the work concluded at the prototyping phase, it establishes a foundation for future research on usability testing, piloting in schools, and exploring scalability in diverse educational settings. Importantly, the findings reinforce the potential of co-design with teachers not only to create relevant digital tools but also to foster professional development and strengthen collaborative practices in assessment. This suggests a pathway towards more holistic and equitable models of assessment that better recognise and nurture students' creativity.

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