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Design Thinking as a Teaching Approach for 21st Century Learning

By

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ABSTRACT:

This concept paper discusses a design thinking process and mindset for creatively resolving difficult challenges in education. Teachers nowadays encounter numerous challenges as they prepare to meet the demands of the education 4.0 requirement in the era of the industrial revolution 4.0. Teachers must develop students' skills to meet the demand for a highlyskilled and innovative workforce. The growth of the Fourth Industrial Revolution has had a significant impact on teachers' preparation for future students. Students who receive a well- rounded education are more likely to achieve academic and moral excellence, as well as responsibility and total well-being. Teachers should engage in activities such as Industrial Revolution 4.0 and be creative and imaginative in their approach, using various acceptable sources and media to create a more engaging teaching process for 21st-century learning. Teachers can use design thinking as a flexible educational technique to integrate 21st-century skills into their curriculum. Design-Thinking is a teaching approach established in this study to facilitate teachers in implementing Project-Based Learning. This concept paper aims to describe the current state of knowledge to promote research collaboration and discussion on recommended practice approaches and provide future research and practise opportunities.

KEYWORDS:

Design Thinking; 21st-Century Learning; Design-Based Learning; Creative and Innovative Thinking; Education 4.0

Introduction

Education is changing in response of the Industrial Revolution 4.0's rapid expansion of information and communication technology. IR 4.0 is a technological revolution that fundamentally transforms human thought, the global economic system, and social roles (World Economic Forum, 2018). The economic, social, and political systems are changing due to IR 4.0 but so is the educational system. The learning landscape of the 21st century is shifting away from a teacher-centred approach toward a more learner-centred one. It is consistent with Malaysia's Education Blueprint 2013-2025, which intends to equipindividuals to enter the workforce based on labour market needs.

New knowledge and practices in education have been developed due to the globalization era, which has prompted rapid growth. An important role is played by technology-integrated education in meeting the technological needs of society as well as preparing students for the future workforce (Sahin & Yilmaz, 2020; Salar et al., 2020). Analytical thinking and innovation, active learning, complex problem solving, critical thinking, and creativity are the top five skills needed by 2025, according to the World Economic Forum's 2020 Future of EmploymentReport.AreportbyWEF, 2020, shows that many jobs by 2025require technology, computational thinking, data analysis, software development, and innovation.The push for service automation and manufacturing implementation causes the skills requirements for future job markets to need to be assessed and reviewed. Therefore, the education system needs to make changes and paradigm shifts in addressing these global concerns. (Bellanca et al., 2010; Kelly, 2009; Lin & Long, 2020; Tight, 2021). Teachers should no longer rely on the traditional technique of conducting classroom activities. Due to the increasing prevalence of technology in all aspects of life, students must understand howto incorporate technology best to enhance their quality of life. Teachers must accordingly equip themselves with the required knowledge and teaching abilities to prepare students.

On the other hand, students will be unable to improve their abilities if their teachers lack the necessary expertise in instructing them. The teaching and learning methods of the 21st centuryare critical in the development of instructors' abilities to provide students with a solid grounding in technology. This concept paper proposes knowledge for developing teachers' creativity and innovation skills through the design thinking perspective.

LITERATURE REVIEW

To provide a clearer image of the topics to be explored in this concept paper, literature reviews based on Design Thinking principles were conducted. The researchers discuss the literature review on stages in design thinking in this session.

DESIGN THINKING

Design Thinking is an inventive, creative, and human-centred approach and mindset that involves collaborating with interdisciplinaryteams to create goods, services, and experiences focused on the user (Lor, 2017). As a dynamic and non-linear framework (Scheer et al., 2012), Design Thinking follow saniterative process comprised of five stages :(1) Empathize, (2) Define, (3) Ideate, (4) Prototype, and (5) Test.

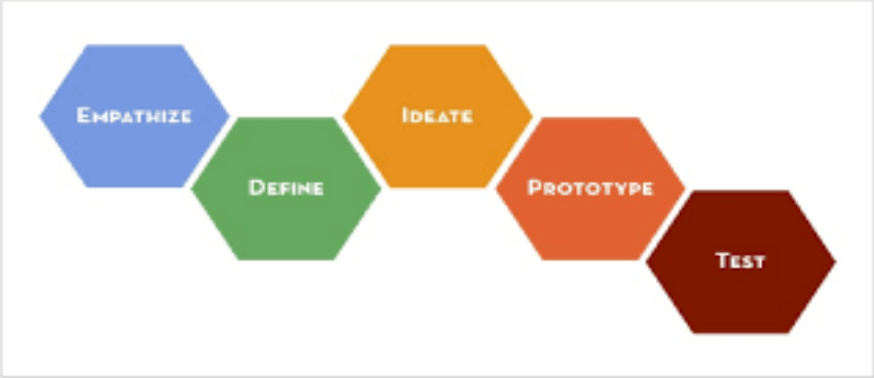

Figure1: Design Thinking Process (D.School, 2015)

i. Stage 1: Emphaty

Empathy requires designers to know the people and context in which they engage. This human-centredapproachenablesdesignerstoappreciatethephysicalandemotional requirements of those touched by the design issue, as well as the relevance of those requirements (Brown, 2008; Carroll et al., 2010; Kwek, 2011; Hasso Plattner Institute of Design, 2017). Kwek (2011) indicated in a middle school study that practising designthinking requires empathy and understanding others' needs. Designers spend as much time as possible monitoring consumers and their behaviour in contexts to stimulate the development of empathy. Designers engage in conversation with consumers to elicit experiences and illuminate hidden meanings. Additionally, they observe and listen by guiding users through normal chores or anything else that may elicit deeper questions to foster empathy (Hasso Plattner Institute of Design, 2017).

ii. Stage 2: Define

"Defining and focusing" the design space is what Define is all about (Hasso Plattner Institute ofDesign, 2017, p.3).Designersusewhattheylearnedfromthepreviousstagetounderstand a problem better. The design challenge was developed as an actionable problem statement based on user and context insights by Noweski et al. (2012) and Scheer et al. (2012). Design thinking refers to this process as "acquiring a point of view" (Brown, 2008; Carroll et al., 2010; Goldman & Kabayadondo, 2016; Goldman et al., 2014; Hasso Plattner Institute of Design, 2017). In their research on design thinking in middle schools, Carroll et al. (2010) described a Point of View statement as defining the requirements and insights of the users. Designers examine anytrends, activities, or feelings that emerged throughout the earlystages of the project. Designers use this data to build a complete picture of their target market and the needs they have (Hasso Plattner Institute of Design, 2017).

iii. Stage3: Ideate

Designers 'ideate,' or come up with a variety of creative solutions to a design problem (Brown, 2008; Carroll et al., 2010; Goldman & Kabayadondo, 2017; Hasso Plattner Institute of Design, 2017; Scheer et al., 2012). Throughout this phase, designers and their designteams work together to produce concepts. Designers are encouraged to work together and display their individuality in their work. According to Goldman and Kabayadondo (2017), having fun and creativity is more important than being overly fantastical. Instead of identifying the proper solution, this stage aims to extend participants' perspectives (Rice, 2011; Scheer et al., 2012). Testing and comments allow us to arrive at the best solution afterwards (Hasso Plattner Institute of Design, 2010).

iv. Stage 4: Prototype

In order to get feedback from the people affected by the design problem, designers must construct a minimum prototype (Brown, 2008; Carroll et al., 2010; HassoPlattner Institute of Design, 2010; Scheer et al., 2012). Post-it notes, storyboards, and even actual devices can be used as prototypes (Hasso Plattner Institute of Design, 2010). Designers are instructed to get things done to avoid unduly fixated on a single prototype. During the prototype phase, it's preferable to "fail early and often," according to Carrol et al. (2010). (p. 41). Through collaboration with design teams, the goal is to build a mental representation of the notion or concepts (Scheer et al., 2012).

v. Stage 5: Test

In this stage, prototypes are put through their paces to get feedback from the public (Brown, 2008; Carroll et al., 2010; Hasso Plattner Institute of Design, 2017; Scheer et al., 2012). Prototypes and solutions can be improved by iterative testing, which helps designers learn more about their users and create a perspective on the design challenge (Hasso Plattner Institute of Design, 2017). During testing, designers send the prototype to users and observe how they engage. Testing should be an experience, not just a demonstration of a prototype, which is the designer's goal (Hasso Plattner Institute of Design, 2017).

METHADOLOGY

This concept paper reviews the need of implementing design thinking into instructional strategies. The main objective of this study is to summarise the current state of knowledge to foster a better understanding of the role of design thinking in education. This study does not involve any participants, and the findings will be discussed based on the literature reviews.

FINDINGS

The researchers discuss the findings based on numerous previous reviews of the literature in the field of design thinking:

SCHOLARS	METHADOLOGY	FINDINGS
RazzoukandShute (2012)	Asystematicreviewof45 documents	Theauthorshighlightthefollowing design-thinker characteristics: 1) human-andenvironment-centered concern 2) abilitytovisualize 3) predispositiontowar d multifunctionality 4) systemicvision 5) abilitytouselanguageasa tool 6) affinityfor teamwork 7) avoidingthenecessityof choice

Johansson-Sköldberg, Woodilla, and Çetinkaya (2013)	Literaturereviewbasedon the research consisted of 168 items, comprised of academic articles, books and blogs / other social media	The 3 main ways design thinking is characterizedinthebusinesscontext are, according to the authors, 1) IDEO's Way of Working withDesignandInnovation 2) Way to Approach IndeterminateOrganizationa l Problems, and a Necessary SkillforPracticingManagers 3) PartofManagement Theory

Lor (2017)	Areview andanalysisof 68journalarticles,books and reports	Design thinking as applied in educationcanbenarroweddownto3 dimensions: 1) Design thinking in curriculum design 2) Design thinking as a teaching-learning approach 3) Teachertraining&support fordesignthinking.

ElsbachandStigliani (2018)	Asystematicreview	3 insights about the relationship between design thinking tools and organizational cultures. (1) the effective use of design thinking tools in organizations had a profound effect on organizational culture. (2) organizational culture s influenced (both positively and negatively) the use of design thinking tools. (3) using design thinking tools produced both physical artifacts (e.g., prototypes, drawings, design spaces) and emotional experiences (e.g., the experience of empathy or surprise/delight).
Micheli,Wilner,Bhatti, Mura and Beverland (2018)	Asystematicreviewof 104 articles	Theauthorsidentified10principal attributesofdesignthinkinginthe management context: 1) User-centerednessand involvement, 2) Problem solving, 3) Iteration and experimentatio n, 4) Interdisciplinar y collaboration, 5) Abilitytovisualize, 6) Gestalt view, 7) Abductivereasoning, 8) Blendinganalysisand intuition,

		9) Toleranceofambiguityand failure 10) CreativityandInnovation
McLaughlin, Wolcott, Hubbard,Umsteadand Rider (2019)	AQualitativereviewof15 articles	They identified 2 purposes for theuse in education 1) enhancing creativity and innovative thinking skills of individuals, 2) informingcurriculaand programs.
Carlgrenetal.(2016)	Interviewstudyin6large companies	5 themes characterizing design thinkingpracticein businesses: 1) User focus, 2) Problem framing, 3) Visualization, 4) Experimentation 5) Diversity
Rauthetal. (2010)	17semi-structured interview	Their analysis identified different competencies as a result of design thinking education, such as prototypingskills,emotionalskills, capabilityof adoptingperspectives, empathyanda certainmindset.
Camacho(2018)	AQualitativeinterview	3basictraitsofdesignthinkingas system-oriented,human-centered, and creation-based.

Table1: Table Findings from Selected Scholars

DISCUSSION AND CONCLUSION

Teachers' professional development in 21st-century learning is related to expertise in instructional planning in this concept paper. In the context of education 4.0, this conceptpaper tries to fill the gap generated by other studies on 21st-century education. Exposure to design thinking mayhelp students succeed since it fosters creativity and innovation, essential for the Industrial Revolution 4.0's future workforce. For education 4.0, this concept paper is intended to guide Malaysian teachers interested in incorporating design thinking into the lesson in to foster student creativity and innovation. Carroll (2014) found that children need instruction to become self-directed learners. Additional research is needed to determine how guidance might promote in the development of design thinking skills. Teachers need to be mentored properlybefore incorporating design thinking in the classroom. Teachers interested in encouraging children to express their ability to think creatively and innovatively can benefit from this study.The authors hope this will raise their level of understanding and awareness.

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