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Skill-Building Strategies Complex Problem Solving for Generation Z

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ABSTRACT: In the ever-evolving digital era, complex problem-solving skills are essential for Generation Z to adapt and compete in the global job market. This article discusses various practical strategies that can be used to develop these skills, focusing on innovative approaches to education and training. This study uses a literature study of Sinta-accredited journal articles and reputable international journals. The results of the study show that several things need to be done in the process of developing complex problem-solving soft skills, namely, Attention to the uniqueness of Gen Z, The use of best practices from the latest approach through learning, and the use of technology in the development of complex problem-solving. The implications of this research on science are that it enriches the educational literature by providing practical guidance on effective strategies to develop complex problem-solving skills in Generation Z, improving the quality of education, the use of technology in education and the identification of best practices from the latest approaches to developing complex problem-solving skills that Gen Z needs to adapt and compete in the era of the Industrial revolution

Keywords: Generation Z, Complex Problem Solving, Innovative Education, Digital Technologies, Project-Based Learning

INTRODUCTION

Generation Z –born between the mid-1990s and early 2010s – has been the subject of significant Attention in today's rapidly evolving digital age. Apart from Generation Z and millennials, the largest segment of Indonesia's population today, it is also because Gen Z has started working and

has even filled several important positions in the government and business world. Thus, understanding Gen Z will be increasingly important and strategic.

Generation Z is a blessing for Indonesia. In addition to being blessed with technological capabilities, this generation is also quite spontaneous because it was born and grew up when political reforms took place in Indonesia in 1998 (Ismail & Nugroho, 2022). Gen Z is also a young person who grew up with an innovation instinct and intuition, which, if appropriately managed, can help organizations create a solid competitive advantage. Gen Z's sensitivity and passion for innovation have the potential to help organizations create fresh, original ideas that contribute to product development, marketing innovation, and breakthroughs in the production-to-distribution process (Sakitri, 2021). The author of Generation Z: Born for the Storm expresses the same view. The book's author praises Gen Z as a great generation because they have been equipped to rise from the global storm we are experiencing together. They are prepared and born for storms such as the worldwide pandemic, racial tensions, political upheavals, economic unrest, and social tensions that previous generations have not experienced. They live in a tumultuous sea of life where the waves are high, the winds are strong, the intensity is unrelenting, and the challenges feel insurmountable. They are also creative, entrepreneurial, and technologically advanced (Dr. Billy Wilson, 2021). Gen Z is ready for three digital skills: Collaboration Technology, Digital Administration, and Creative Design. However, they are not prepared for the skills of the Data Analytics and Productivity Program (Hermawan et al., 2023).

Although the experts above praise the uniqueness of Gen Z, few experts are apathetic and doubt Gen Z, especially in soft skills. Even though today's employers prefer workers with good hard skills and soft skills, Gen Z must have a more substantial balance between hard skills and soft skills to succeed in the world of work (Swanson, 2019). A similar view was conveyed by (Marin-Zapata et al., 2022), who said that in the last decade, individual competencies and soft skills have reached a significant position among scholars in various fields (Govender et al., 2022; Lane et al., 2022; Zimmer et al., 2017).

It can be concluded that soft skills in the era of the Industrial Revolution 4.0 today are indeed essential. However, there is still no consensus around the single meaning of soft skills. Soft skills refer to one of the many aspects of social behavior necessary to succeed at your job, be it a career in academia or industry. These attributes include communication skills, coaching, leadership abilities, and personal qualities such as friendliness, empathy, and optimism. Undoubtedly, all such soft skills are essential assets on the road to becoming a successful scientist. Many of these skills are difficult to acquire just by reading books. Instead, they can only be learned through practice (De Ridder et al., 2014). According to (Ismail et al., 2023), soft skills are Interpersonal and intrapersonal.

1. Interpersonal skills that refer to a person's ability to interact with others include a) motivational skills, b) leadership skills, c) negotiation skills, d) presentation skills, e) communication skills, f) relationship building, g) public speaking skills, and h) self-marketing skills, the ability to market products effectively and appropriately (McCourt, 2018; Zutshi et al., 2021).

2. Intrapersonal skills involving self-management, including: a) time management, the ability to effectively manage one's time for work efficiency; b) stress management, the ability to control oneself when faced with a demanding situation, person or event; c) change management, the ability

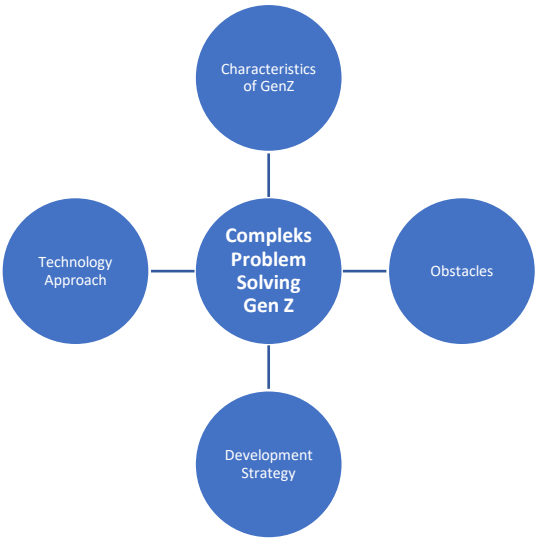
to adapt and accommodate change; d) transformation of character, the ability to shape one's mindset, attitudes, and behavior to build effective relationships with others; e) creative thinking, the ability to think innovatively and generate ideas; f) goal orientation, the ability to focus efforts on achieving goals, missions, or targets; and g) accelerated learning techniques, techniques for quick learning. Many research findings show that the individual's personality characteristics influence an individual's success in work. Soft skills are summed up as an individual's ability to interact with others (interpersonal skills) and manage themselves (intrapersonal skills) to maximize personal performance (Castellanos & De Gunther Delgado, 2022; Lambrechts & Sinha, 2019).

Still, according to (DR. JOKO NUGROHO & DR. DINGOT HAMONANGAN ISMAIL, M.SI YAHYA KUNCORO, S.T, MM.Tr, 2023), for Gen Z to be more successful in living a career in the world of work and society, soft skills are needed for Gen, including: 1. Complex Problem Solving, 2. Critical Thinking, 3. Creativity, 4. People Management, 5. Coordinating With Others, 6. Emotional Intelligence, 7. Judgment and Decision-Making Skills, 8. Service Orientation, 9. Negotiation, and 10. Cognitive Flexibility. With this rationale, in-depth elaboration of all these soft skills is needed so that Indonesian Gen Z can contribute optimally in the current Industrial Revolution era. However, due to limitations, the focus of this research will specifically discuss how we build complex problem-solving for Gen Z (Lu & Fan, 2023; Molina-Torres, 2022). The changing demands posed by increasingly complex workplaces in the 21st century have raised the importance of complex problem-solving skills (CPS) (Wüstenberg et al., 2016). Complex problem-solving has topped the list in the World Economic Forum's 2015 and 2020 reports presented in its five-year report on the most desirable performance skills. In addition, the study also found that contemporary life in the workplace is increasingly demanding. Newly graduated engineering graduates are to be able to work under heavy pressure and learn how to solve work problems (Rosales-Torres et al., 2022). The above opinion is shared by the following researchers, who say that Complex problem solving (CPS) is a new paradigm for solving problems and is one of the soft skills needed to face the Industrial Revolution 4.0 (Ulia et al., 2024).

Thus, the formulation of this research problem is:

1. What unique characteristics of Generation Z are needed to develop complex problem-solving skills?
2. What are Generation Z's main challenges in mastering complex problem-solving skills in today's education and work environment?
3. What are the effective strategies to teach Generation Z complex problem-solving skills?
4. What is the role of digital technology and online learning tools in supporting Generation Z's development of complex problem-solving skills?

If described, the research framework is as follows:



METHOD

This literature research aims to collect data from various library literature related to the research topic being investigated. The data collection method used is documentation, where researchers track and collect various written sources, including reputable international journals and SINTA-accredited journals that researchers have conducted before. The data obtained from the literature will be analyzed using descriptive methods to describe the findings found in the literature. The first step of this research is to conduct a careful literature review to study the results of previous research that are relevant to the research topic. To maintain the quality of the research, only literature from reliable sources related to the research topic will be included in the analysis. Using the keywords: "Teamwork", and "Complex problem solving for Gen Z", the author searched on Scopus.com and Google Scholar with the duration of the article from 2020 to 2024 and specifically for articles in English on Scopus .com and in English and Indonesian on Google Scholar. And Google Scholar. Then, the data obtained from the literature was selected, then interpreted, and used to support the findings of this research. This research is expected to provide in-depth and comprehensive insights related to the research topics discussed and make new contributions to the field.

Gen Z

Generation Z, often called Gen Z, includes individuals born between the mid-1990s and early 2010s. Gen Z is the first generation to grow up with unlimited internet and digital technology access from an early age. They are, therefore, known as "digital natives," who are naturally adept at using technological devices and social media platforms. In 2024, Generation Z, born around the mid-1990s to early 2010s, has ranged in age from about 10 to 28 years old. The force is currently in the school and campus, but some have worked and even occupied supervisory positions. In addition to many who are active in traditional jobs, Gen Z is also a lot of innovators and work in the field

of Technology and IT, such as being software developers, data analysts, IT technicians, and other roles in the technology sector; Digital Marketing and Social Media: Positions such as social media manager, SEO specialist, and digital content creator are popular; Creative and Art: Many Gen Z work as graphic designers, photographers, videographers, and other art workers; Startups and Entrepreneurship: Many of them are interested in starting their own business or working in startup companies; E-commerce and Retail: Some work in e-commerce, either as part of large corporations or as small entrepreneurs as well as being significant actors in the new types of work that is Freelance and Gig Economy: Many of them are choosing freelance work in various fields such as writing, design, and consulting, drivers and online motorcycle taxis. In short, Gen Z's unique characteristics, such as high digital literacy, multitasking ability, and desire for work flexibility, greatly influence their job choices.

Complex Problem Solving

Complex problem solving (CPS) is a new paradigm in solving problems and is one of the soft skills needed to face the Industrial Revolution 4.0. Complex problem-solving has become a capability measured in the Program for International. Student Assessment (PISA) is organized by the Organization for Economic Cooperation and Development (OECD). The OECD/PISA chose to describe the cognitive activities included in the competencies based on three competency groups: the reproductive group, the connection group, and the CPS reflection group included in the reflection cluster. CPS is in a reflection cluster where this group instills elements of reflectivity to students about the process needed to solve problems, namely the ability to plan situation-solving strategies and implement them that contain more elements and are more original, in contrast to other clusters (Ulia et al., 2024).

The widely accepted definition of CPS is that proposed by Buchner (1995), as quoted (Wu & Molnár, 2022) as saying, "CPS is "the successful interaction with task environments that are dynamic (i.e., change as a function of users' intervention and as a function of time) and in which some, if not all, of the environment's regularities can only be revealed by successful exploration and integration of the information gained in that process" (Buchner 1995, p. 14) means successful interaction with a dynamic task environment (i.e., change as a function of user intervention and as a function of time) and in which some, if not all, environmental regularities can only be revealed by successful exploration and integration of information obtained in that process. In addition to the above definitions, there are also the following definitions, namely:

Complex problem solving (CPS) can be interpreted as several psychological mechanisms that allow us to achieve our targets under challenging situations, which can be classified as complex, dynamic, non-transparent, interconnected, multilayered, and also polyphenolic (Kipman et al., 2022).

In the book (DR. JOKO NUGROHO & DR. DINGOT HAMONANGAN ISMAIL, M.SI YAHYA KUNCORO, S.T, MM.Tr, 2023) Quoting the opinions of two other experts about the definition of CPS as follows: "Complex problem solving includes activities to identify complex problems, evaluate, review factual information and build rational interpretations for the formation of effective solutions (Liu and Jiang, 2021). And then, Complex problem solving according to

Maisya, is a skill in solving complex problems starting from the process of identifying, determining the main elements of a problem, then predicting various possible options as solutions, taking actions / actions to menyelesaikan masalah, serta menemukan pelajaran yang dapat dipelajari untuk menyelesaikan masalah tersebut, (Maisya et al., 2020; Nusantara, 2021)".

From the above understanding, it can be concluded that Complex problem solving (CPS) is the ability to face, analyze, and solve problems characterized by complexity, uncertainty, and the interrelation of various factors. CPS involves excellent cognitive skills and often requires a systematic approach to identifying, understanding, and addressing problems with many interacting variables. M. Husein Syarbini (2020) offers six stages to build complex problem-solving capabilities: a. Recognize the Problem b. Find possible causes of the problem c. Develop alternative solutions d. I am choosing the best solution or solution, e—implementation of the solution f. Evaluate the results.

Still, according to M. Husein Syarbini (2020), having complex Problem solving has three advantages: 1. It can solve complex problems; 2. Able to make decisions or steps that have never been done before; and 3. Have a comparative advantage in thinking over individuals who do not have these skills. In addition, complex problem-solving is an essential source of empirical knowledge. Learners can acquire and consolidate their empirical knowledge based on practical experience in complex problem-solving. (Liu & Jiang, 2021).

RESULT AND DISCUSSION

In this discussion, the importance of teaching critical thinking skills to Generation Z, how effective strategies are to teach critical thinking skills to Generation Z, and what models have been tested in developing Gen Z soft skills.

1. How do the unique characteristics of Generation Z influence the approach required to develop complex problem-solving skills?

Generation Z, known as "digital natives," has unique characteristics that greatly influence the approach required to develop complex problem-solving skills. They grew up in the digital age with almost unlimited access to information and technology early on. As a result, they tend to have high multitasking skills and good technological proficiency. However, they also often face challenges in interpersonal skills and face-to-face communication. Practical approaches to developing complex problem-solving skills in this generation should consider integrating technology into learning, utilizing digital platforms for simulation and problem-solving practice, and emphasizing digital collaboration. In addition, developing soft skills such as communication and teamwork in a digital context is also very important to complement their expertise.

Their experience shaped his generation. Generation Z is much less interested in face-to-face communication. Still, they are good at communicating with through text, emojis, and videos. They are very sociable and want to connect socially with everyone, even with their bosses, and they also need regular feedback (Gabrielova & Buchko, 2021)

Gen Z loves flexible work practices, rewards and recognition, and direct feedback on their performance. The uniqueness of Gen Z needs to be understood by business management. The ability of Generation Z to adapt to rapid changes and a dynamic environment, as well as Flexibility, is very useful in facing and solving complex problems in various situations (Aggarwal et al., 2022) In addition to this opinion, other uniqueness of Gen Z in terms of multitasking, critical, independent, and innovative learning skills can be considered in the development process of complex Problem solving from Gen Z.

2. What are Generation Z's main challenges in mastering complex Problem-solving skills in today's education and work environment?

Generation Z faces several significant challenges in mastering complex Problem-solving skills in education and work environments. Where there is a gap between traditional educational curricula and 21st-century skills needs. Many educational institutions have not fully adapted to rapid technological changes and the job market dynamics. On the other hand, high academic and social pressure can cause stress and anxiety, which hinders their ability to focus and think critically. Last, practical experience in complex problem-solving is limited due to a more theoretical than practical educational environment. Lastly, in the workplace, they often face a work culture that is less flexible and less supportive of the collaborative and innovative approaches they prefer. This complex Problem-solving skill naturally comes with hard work and life experience. No specific rules or frameworks exist to master this skill (Prayoga & Lajira, 2021).

In addition to the above factors, there are still many challenges in developing complex Problem-solving for Gen Z, such as the gap between the Traditional and Modern Curriculum. Instant Technological Disruptions can also kill Gen Z's critical and reflective power, which is urgently needed to develop complex problem-solving. There has also been a decrease in social skills and a lack of practical experience due to instant and online living habits and rapid changes in the world of work. Regarding this, experts say the following. Research shows that Gen Z brings unique characteristics to the workplace, such as being more open to diversity, individualistic, and technology-driven than other generations (Pichler et al., 2021).

3. Effective strategies to teach complex Problem-solving skills to Generation Z?

Practical strategies for teaching complex Problem-solving skills to Generation Z include project-based learning and problem-based learning approaches. This approach allows students to be directly involved in projects requiring complex and collaborative problem-solving. PBL: problem-based learning (PBL) about real problems in life, which can be used as discussion and training material to improve students' technical knowledge in solving complex problems. They are asked to understand the root of the Problem or propose a solution to the Problem. This training also strengthens students' commitment, confidence, and self-esteem and promotes cooperation and creativity (Tell & Hoveskog, 2022).

In addition to the above opinions, other effective strategies to teach complex problem-solving skills to Generation Z are through Project-Based Learning, Collaborative Learning, Gamification

and Simulation, Problem-Based Learning, Adaptive and Personalized Learning, and leadership learning, as well as mentoring and other coaching guidance (Larasatie et al., 2020)

A study that investigated students' perceptions of learning strategies based on the four stages of the Tuckman Model, which includes the forming, storming, norming, and performing stages, showed beneficial results in increasing the effectiveness of group work and complex Problem solving from participants (Sokman et al., 2023). The same view was conveyed by the following experts who said that football players must continue to think to solve the problems they face as quickly as possible in specific situations. Through the game insight component, mental skills that can be recognized and considered necessary for a football player to master are the ability to collect and organize information or cognitive abilities. A mental exercise related to cognitive skills and is already known in general is imagery. This skill is highly relevant to game insights because it stimulates the mind to gather and manage information useful in player decision-making when facing game situations. Thus, one of the functions of exercise in the mental aspect is to stimulate cognitive abilities that facilitate the occurrence of this mechanism (Ardiyanto, 2021) This means that the development of complex problem-solving for Gen Z can be done holistically, not following its uniqueness.

In addition, gamification in education can increase their involvement and motivation in solving problems. Likewise, mentoring and coaching programs that utilize digital technology can also help students get direct guidance and constructive feedback.

Case study-based learning & Creative problem-solving

We found that having students engage in easy, simple problem-solving learning activities alone can provide them with benefits for improving self-control and self-regulation. Then, we also found that teaching students to organize their learning process by considering their performance and the mental effort invested in the task can improve their achievement of learning outcomes (Gog et al., 2020). The effectiveness of creative Problem-solving in enhancing students' problem-solving abilities is in line with the following results, which show that students' problem-solving skills increase significantly due to CPS-based learning. He emphasized the importance of the role of teachers in improving complex problem-solving skills. Teachers must be able to guide students to achieve high levels of competence through developing divergent and critical thinking skills and by giving students higher assignments that require students to think differently, critically, and creatively. (Hobri et al., 2020).

4. What is the role of digital technology and online learning tools in supporting the development of complex Problem-solving skills for Generation Z?

Digital technologies and online learning tools are essential in supporting the development of complex problem-solving skills for Generation Z. Online learning platforms provide access to rich and diverse educational resources, allowing students to learn independently and at their own pace. Collaborative technologies such as online project management tools, discussion forums, and virtual workspaces support teamwork and collaboration, essential aspects of complex problem-solving. In addition, data analytics and adaptive learning can provide personalized feedback, helping students identify their strengths and weaknesses and provide appropriate recommendations for improvement. This integration of technologies not only facilitates more

efficient learning and prepares Generation Z for the high-tech demands of the future workplace (Caeiro-rodríguez et al., 2021). Digital technology and online learning tools also play an essential role in supporting the development of complex Problem-solving skills through online learning platforms, simulation tools, interactive applications, data analytics, and other adaptive learning based on digital technology (Helmlinger et al., 2020) & (Hollenstein et al., 2022).

Interactive e-learning systems such as the OECD PISA 2012 computer-based assessment database containing rich problem-solving datasets can be used to practice problem-solving skills (Pejić & Molcer, 2021). Educational games, educational tools, and online career counseling can also prepare Gen Z youth to overcome complex problems in daily life and work (Lau et al., 2020) Provide relevant previous research results according to the keywords specified in the Methods chapter.

CONCLUSION

Based on the above discussion, it can be concluded that the strategy in empowering complex Problem-solving for Generation Z as "digital natives" requires various approaches, including not only based on the unique uniqueness of Gen Z but also a variety of proven scientific methods such as problem-solving-based methods, project-based methods, coaching methods, leadership training, and also through complex problem-solving based on the help of technology simulations and gamification. Further Research Recommendations: More research is needed to examine ways to bridge the gap between traditional curricula and 21st-century skills needs. This research should involve collaboration between educators, curriculum developers, and industry to create relevant and responsive programs to changing job market needs so that Generation Z is better prepared to face the challenges and seize future opportunities.

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