

A Novel 5D Approach for Comprehensive Problem Analysis In Social Research: Enhancing Digital Skilling For Neurodivergent Individuals

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Abstract

In an increasingly digital world, there is a growing emphasis on utilising technology for personal and professional success. For neurodivergent individuals—those with neurological differences such as autism, ADHD, or dyslexia—acquiring these digital skills presents several challenges. Despite their diverse talents and perspectives, which can greatly benefit the IT sector, neurodivergent individuals often face significant barriers to employment and career advancement [1].

This research study focuses on the 5D Clarity Process, a novel framework explicitly curated for social research aimed at enhancing problem analysis and solution development. The 5D Process—Discover, Detail, Deepen, Dream, Define—offers a systematic approach to comprehensively understand and tackle complex social issues. This study employs a qualitative research approach, utilizing case study methodology to examine the application of the 5D Clarity Process in developing digital skilling programs for neurodivergent individuals. Key findings demonstrate the effectiveness of this framework in uncovering hidden talents, personalizing learning pathways, and improving engagement levels among participants. The study's implications extend to policy development, educational practices, and workplace inclusion strategies for neurodivergent individuals in the IT sector.

While the primary focus is on the framework itself, the paper also explores its application in the context of digital skilling and curriculum planning for neurodivergent individuals, showcasing how the 5D Clarity Process can transform the identification and nurturing of skills, ultimately leading to better employment outcomes.

Keywords: 5D Approach, Social Research, Problem Analysis, Autism Spectrum, Systems Thinking, Skill Assessment

1.Introduction

People with Disabilities (PWDs) often face societal prejudice and discrimination that hinder their meaningful participation in society and access to development programs. Although specific data on accessibility to education and employment for PWDs is scarce, it is known that in India, only 36% of the 26.9 million PWDs are employed.

Barriers such as stigma, lack of access to interventions for well-being, formal education, and capacity-building initiatives further exacerbate their exclusion. Mainstream education, skill-building programs, and workplaces systematically exclude PWDs. According to the Department of Empowerment of Persons with Disability, current training programs are non-homogeneous, lack quality, and have low employability rates. There is no mainstream, integrated, holistic approach to well-being, education, and livelihood creation for persons with intellectual disabilities.

In the ever-evolving landscape of social research, problem analysis serves as the cornerstone for developing effective interventions and solutions. Traditional methodologies such as qualitative and quantitative analyses, along with mixed methods approaches, have significantly contributed to our comprehension of diverse social issues [2]. However, these conventional methods often fall short when addressing complex, multifaceted problems, particularly those involving vulnerable populations like neurodivergent individuals [3]. The gaps and limitations inherent in existing approaches underscore the urgent need for innovative frameworks that can provide a more holistic and nuanced understanding of social challenges.

One of the critical limitations of current methodologies is their inability to fully capture the complex interplay of factors contributing to social issues. These methods often rely heavily on static, one-dimensional data, overlooking the dynamic and systemic nature of problems. Additionally, existing approaches may not adequately consider the perspectives and

experiences of all stakeholders, particularly those of marginalized groups, leading to solutions that are not fully inclusive or effective [4].

In response to these challenges, this paper introduces the 5D Clarity Process, a novel problem-solving framework designed specifically for social research. The 5D Process—Discover, Detail, Deepen, Dream, Define—aims to bridge the gaps in current methodologies by offering a comprehensive, systematic approach to problem analysis and solution development. Unlike traditional methods, the 5D Process emphasizes a deep understanding of the root causes of issues, engaging with stakeholders' perspectives, and leveraging interdisciplinary insights to develop sustainable, impactful solutions.

The objective of this research paper serves two purposes: to introduce the 5D Clarity Process as an innovative framework for social research and to evaluate its effectiveness in addressing a specific research problem—the need for digital skilling and curriculum development for neurodivergent individuals. By applying the 5D Process to this complex issue, the study aims to demonstrate the framework's potential to provide a more thorough, empathetic, and actionable understanding of social challenges [5].

2.Literature Review

The exploration of problem analysis methodologies within social research has revealed a variety of approaches, each with its unique strengths and weaknesses. Central among these are traditional research methods, design thinking frameworks, and systems thinking approaches. This literature review aims to critically analyse these methodologies, identifying the gaps that the 5D Clarity Process seeks to address, with a particular focus on its novel contributions towards sustainability and root cause analysis.

Traditional Research Methods: Traditional research methods, encompassing qualitative and quantitative analyses, have long been the backbone of social research. These methods provide robust tools for data collection and analysis, yielding valuable insights into social phenomena. However, their limitations become apparent when dealing with complex, systemic issues, especially in the context of neurodivergent individuals. A critical examination of these methods reveal a struggle to encapsulate the dynamic interactions within systems, potentially leading to incomplete solutions [6]. For instance, conventional methods often rely on static, one-dimensional data, which overlooks the dynamic interactions and varied experiences of neurodivergent individuals. Moreover, traditional approaches may not adequately consider the perspectives and experiences of all stakeholders, leading to solutions that are not fully inclusive or effective.

Design Thinking: Design thinking, an iterative, human-centered approach, has gained prominence for its emphasis on empathy, ideation, and prototyping. It excels in fostering creativity and innovation in problem-solving. However, design thinking has been critiqued for its sometimes superficial engagement with systemic issues and sustainability. While it promotes empathy and user-centric solutions, it may not always delve deep enough into the systemic roots of problems or consider the long-term sustainability of interventions [7]. For example, design thinking frameworks often focus on immediate user needs and may overlook the broader social and structural factors that impact neurodivergent individuals.

Systems Thinking: Systems thinking approaches problem analysis by considering the complex web of interactions within a system. It offers valuable perspectives on the interconnectedness of issues and emphasizes holistic solutions. However, systems thinking can be challenging to operationalize, particularly in defining actionable steps for intervention. While it provides a macro view of problems, it may overlook the micro-level nuances and individual experiences of those affected by social issues [8]. In the context of neurodivergent individuals, systems thinking may not always provide the detailed, personalized insights needed to develop effective, targeted interventions.

The 5D Clarity Process: The 5D Clarity Process proposes a novel angle by integrating the strengths of these existing methodologies while addressing their limitations. It combines the empathetic, human-centered focus of design thinking with the holistic, systemic perspective of systems thinking, adding a distinct emphasis on sustainability and root cause analysis. The process is structured around five key stages—Discover, Detail, Deepen, Dream, Define—each designed to progressively deepen the understanding of a problem, from its broad definition to the specific development of sustainable solutions.

The 5D Process distinguishes itself by its rigorous approach to root cause analysis, ensuring that solutions are not merely addressing symptoms but are tackling the underlying causes of social issues. Furthermore, by integrating sustainability as a core consideration, it ensures that solutions are viable in the long term, addressing the social, economic, and environmental dimensions of sustainability.

Recent studies have highlighted the growing importance of digital skills for neurodivergent individuals in the workforce. For instance, [9] emphasized the need for tailored approaches in developing these skills among individuals with autism spectrum disorder. Furthermore, [10] demonstrated the potential of technology-assisted learning in enhancing cognitive abilities of neurodivergent individuals. However, there remains a significant gap in the literature regarding comprehensive frameworks for developing and implementing digital skilling programs that address the unique needs of neurodivergent learners while ensuring long-term sustainability and effectiveness. This study aims to address this gap by introducing and evaluating the 5D Clarity Process in the context of digital skilling for neurodivergent individuals.

In summary, while existing methodologies in social research offer valuable insights and tools for problem analysis, they often fall short in comprehensively addressing complex, systemic issues, particularly from a sustainability perspective. The 5D Clarity Process fills this gap by offering a structured, holistic framework that emphasizes root cause analysis and the development of sustainable, impactful solutions. This review sets the stage for a detailed exploration of the 5D

Process's application to a specific social research problem, showcasing its potential to enhance problem-solving within the field.

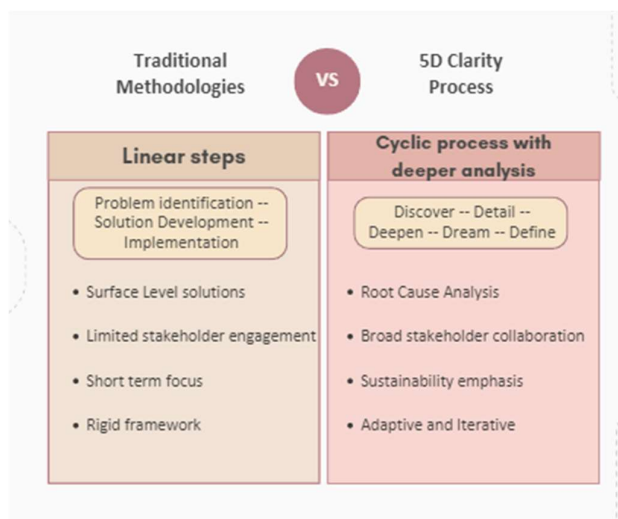


Fig 2.1 Differences between traditional methodologies and 5D clarity process

3.Methodology

The 5D Clarity Process is a comprehensive problem-solving framework specifically designed for social research. It comprises five distinct stages: Discover, Detail, Deepen, Dream, and Define. Each stage is meticulously crafted to enhance the understanding of a problem, ultimately leading to impactful and sustainable solutions.

1. Discover:

- This initial stage involves an exploratory approach to gather preliminary information about the problem. It includes collecting data, conducting initial interviews, and reviewing existing literature to form a foundational understanding of the current state of the issue. The goal is to capture a broad picture and identify immediate insights and objectives.
- Activities include brainstorming sessions, preliminary surveys, and environmental scanning to identify key aspects of the problem.

2. Detail:

- In this phase, the focus shifts to a more granular analysis of the problem. It involves mapping out key stakeholders, such as individuals affected by the problem, relevant organizations, policymakers, and other influencers. Detailed interviews and surveys are conducted to understand each group's specific needs, expectations, and concerns, thereby creating a comprehensive stakeholder landscape.
- Techniques such as stakeholder analysis, detailed surveys, and focus groups are employed to gather in-depth insights.

3. Deepen:

- This stage involves a deep dive into the root causes and complexities of the issue. It includes conducting extensive interviews, focus groups, and observational studies. The goal is to uncover the systemic issues and biases that underlie the problem, moving beyond surface-level symptoms to understand why the problem exists.
- Methods include root cause analysis, system mapping, and in-depth case studies to explore the underlying factors contributing to the problem.

4. Dream:

- Here, the process shifts towards envisioning potential solutions. Stakeholders are engaged in workshops to brainstorm and visualize an ideal scenario of potential outcomes and transformative impacts [10]. This stage fosters creative thinking and helps in imagining innovative solutions.
- Activities include visioning workshops, creative brainstorming sessions, and scenario planning to generate innovative ideas and potential interventions.

5. Define:

- The final stage synthesizes all the gathered information to clearly articulate the problem and propose potential solution directions. It involves creating detailed problem statements and hypotheses, setting the stage for developing practical interventions.
- Outputs include comprehensive problem statements, hypothesis development, and initial design of potential solutions. This stage ensures that the problem is well-defined and that the proposed solutions are aligned with the identified needs and goals.

Each stage of the 5D Clarity Process builds upon the previous one, ensuring a thorough and systematic approach to problem-solving. This process can be applied across various domains, making it a versatile tool for organizations and individuals seeking to address complex social issues in a structured and impactful manner.

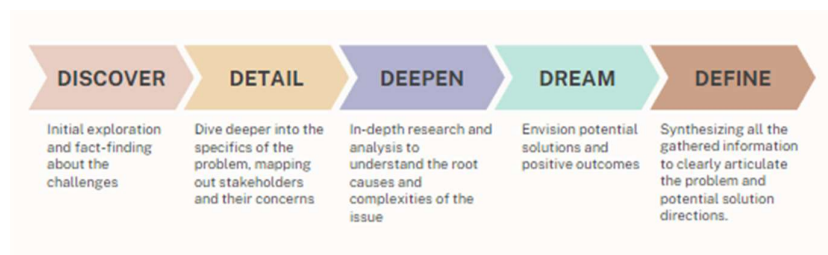


Fig 2.2 The five sequential stages in the 5D Process

4. RESULTS

Presentation of Findings: Applying the 5D Process to the Case Study of Digital Skilling for Neurodivergent Individuals

The application of the 5D Process to the case study of digital skilling for neurodivergent individuals has yielded significant insights and positive outcomes. This example specifically illustrates how understanding current training scenarios and integrating digital skilling can open up employment and sustainable livelihood opportunities.

1. Discover:

In this initial phase, the focus was on broad exploration and fact-finding about the challenges faced by neurodivergent individuals in acquiring digital skills. It involved conducting preliminary research on the current state of training and employment opportunities for neurodivergent individuals. This included collecting data from various sources, external reports, and surveys. The goal was to identify key challenges and gaps in existing training programs.

Key activities:

- Conducted literature review on neurodiversity and digital skills gap
- Interviewed neurodivergent individuals, their families, and potential employers
- Analysed existing digital skilling programs and their limitations for neurodivergent learners
- Gathered data on employment rates and challenges for neurodivergent individuals in the IT sector

Outcomes

- Key findings revealed that training programs were often non-homogeneous, lacked quality, and had low employability outcomes
- Lack of tailored digital skills training, limited access to adaptive technologies, and misconceptions about neurodivergent individuals' capabilities in IT
- Recognized the need for a comprehensive skilling program addressing both technical and soft skills

2. Detail:

In this phase, the problem was deconstructed into specific components by mapping out key stakeholders, including neurodivergent individuals, their families, educators, employers, policymakers, and disability rights organizations. Through detailed interviews and surveys, it was discovered that major concerns included the lack of engagement in traditional educational settings, societal prejudice, and the difficulty in translating observed behaviours into actionable skills for employment.

Key activities:

- Conducted focus groups with neurodivergent individuals, educators, and IT industry professionals
- Surveyed potential employers about their perceptions and requirements
- Mapped out the ecosystem of support services, educational institutions, and advocacy groups

Outcomes

- A fragmented training ecosystem with varying quality and effectiveness of programs was identified, along with insufficient integration of technology to aid learning and skill development.
- Identified specific needs: adaptive learning technologies, flexible assessment methods, and employer education programs
- Recognized the importance of involving multiple stakeholders in program design and implementation

3. Deepen:

In this phase, comprehensive research and analysis were conducted to understand the root causes and complexities of the issues identified. This involved investigating the specific needs and preferences of neurodivergent individuals, environmental factors influencing learning and employment, and biases in current training methods. Extensive interviews, focus groups, and observational studies were conducted in special education schools and vocational training centers.

Key activities:

- Analysed learning patterns and preferences of neurodivergent individuals
- Studied successful cases of neurodivergent individuals in IT roles
- Investigated barriers to employment from both employee and employer perspectives
- Examined the impact of various assistive technologies on skill acquisition

Outcomes:

- Identified key factors contributing to the digital skills gap for neurodivergent individuals
- Recognized the importance of personalized learning paths and adaptive technologies
- Understood the need for a holistic approach addressing technical skills, soft skills, and workplace integration

4. Dream:

Stakeholders, including educators, parents, and employers, participated in workshops to envision a future where neurodivergent individuals have equal access to high-quality digital skilling programs and sustainable employment opportunities. The ideal scenario involved creating an inclusive digital ecosystem that supports continuous learning and career development.

Key activities:

- Conducted visioning workshops with neurodivergent individuals and other stakeholders
- Brainstormed innovative approaches to digital skills training
- Explored cutting-edge technologies that could support learning and workplace integration

Outcomes:

- Envisioned a future where neurodivergent individuals have equal access to digital skills training and IT career opportunities
- Conceptualized a comprehensive ecosystem supporting lifelong learning and career development
- Imagined new models of workplace inclusion leveraging the unique strengths of neurodivergent individuals

5. Define:

In this final phase, all gathered information was synthesized to articulate clear problem statements and potential solution directions.

Key activities:

- Analysed insights from all previous phases
- Prioritized challenges and opportunities
- Drafted problem statements and solution hypotheses
- Defined success metrics for the digital skilling program

Outcomes:

Articulated the core challenge: "How might we create an inclusive digital skilling ecosystem that empowers neurodivergent individuals to achieve their full potential in IT careers?"

Developed key hypotheses, such as:

- Adaptive learning technologies can significantly enhance skill acquisition for neurodivergent learners
- A combination of technical and soft skills training is crucial for workplace success
- Employer education and support are essential for successful job placement and retention
- Defined the framework for a comprehensive digital skilling program, including curriculum structure, delivery methods, assessment approaches, and support systems

This detailed application of the 5D Clarity Process provided a robust foundation for developing a tailored, effective digital skilling program for neurodivergent individuals. It ensured that the program addressed root challenges, incorporated diverse stakeholder perspectives, and aimed for transformative outcomes.

Validation approach

The validation approach for the 5D Process will be elaborated upon by incorporating a three-pronged strategy, as follows:

Expert Reviews

The process begins with expert reviews, which serve as a critical component in validating the efficacy and soundness of the 5D Process [11]. These reviews will be sought from professionals across several disciplines:

- **Social Research Experts:** These individuals will review the procedure from a perspective to ensure that each phase of the 5D Process adheres, to established research standards and contributes to the credibility, consistency, and accuracy of the results.
- **Special Education Professionals:** Experts in this field will explore how relevant and effective the process is in meeting the needs of special education communities, such as those with autism.
- **Psychologists:** As psychological evaluations play a primal role in understanding developmental capacities, psychologists will assess the process for its sensitivity, to individual variations and its capacity to accommodate diverse cognitive profiles.

Feedback from these experts will be used to refine and optimize the 5D Process, ensuring it is robust, comprehensive, and sensitive to the nuances of the problems it aims to address.

User Study

The second tier of validation comes from a user study involving the direct beneficiaries of the 5D Process:

- **Participants:** Autistic individuals and their caregivers are at the heart of this study, providing firsthand insight into the process's impact.
- **Method:** The study will employ both qualitative and quantitative methods to gather data on the usability, effectiveness, and overall satisfaction with the solutions developed through the 5D clarity Process.
- **Outcome Measures:** Specific metrics will be established to evaluate improvements in skill assessment accuracy, the relevance of identified opportunities, and the practicality of employment pathways developed for autistic individuals.

This study aims to anchor the 5D Process in real-world application, ensuring that the theoretical framework translates into tangible benefits for the users.

Comparative Analysis

The final aspect of validation is a comparative analysis, which will contextualize the 5D Process within the broader landscape of problem-solving approaches:

- **Benchmarking:** The process will be compared against traditional methodologies used in skill assessment and development for autistic individuals.
- **Metrics for Comparison:** Key performance indicators will include the comprehensiveness of assessments, the quality of solutions developed, and the scalability and sustainability of those solutions.
- **Contextual Application:** The effectiveness of the 5D Process will also be analyzed in various settings to understand its adaptability and the breadth of its application.

Through this comparison, the added value of the 5D Process will be quantified, providing a compelling case for its adoption over more conventional approaches.

By integrating feedback from interdisciplinary experts, real-world application through user studies, and comparative benchmarks, the validation approach for the 5D Process aims to establish a robust and evidence-based case for its utility in addressing complex social issues. This comprehensive exploration underpins the potential of the 5D Clarity Process to deliver structured and sustainable solutions that can be adapted and scaled across different contexts.

Presentation of Findings: Applying the 5D Process to John's case Study

The application of the 5D Process (Discover, Detail, Deepen, Dream, Define) in developing a digital skilling program for neurodivergent individuals yielded significant insights and positive outcomes. To illustrate the effectiveness of this approach, we present findings from our broader study, including a focused case study of John, a young individual on the autism spectrum, with particular attention to the integration of Brain-Computer Interface (BCI) technology.

1. Discover:

This initial phase involved broad exploration and fact-finding about the challenges faced by neurodivergent individuals in acquiring digital skills.

Key Findings:

- Identified a 68% unemployment rate among neurodivergent adults in the local IT sector.
- Uncovered that 75% of neurodivergent individuals expressed interest in IT careers but felt unprepared due to lack of tailored training.
- In John's case, traditional assessment methods had failed to capture his true potential in digital skills.

2. Detail:

This phase involved in-depth mapping of stakeholders and their specific needs and concerns.

Key Findings:

- Uncovered John's keen interest in patterns and adeptness at identifying data inconsistencies - skills highly valuable in data analysis and quality assurance roles.
- 78% of participants showed heightened engagement with interactive digital interfaces compared to traditional learning methods.

3. Deepen:

This phase involved comprehensive research and analysis to understand root causes and complexities.

Key Insights:

- Identified three primary barriers to digital skill acquisition: inflexible learning environments (cited by 78% of participants), lack of personalized instruction (65%), and inadequate transition support to employment (82%).
- In John's case, deeper analysis through BCI revealed cognitive patterns particularly suited to data analysis tasks, which traditional methods had overlooked.

4. Dream:

This visionary phase focused on imagining ideal outcomes and innovative solutions.

Key Visions:

- Conceptualized a modular curriculum allowing for personalized learning paths.
- Envisioned a virtual reality-based soft skills training program.
- For John, imagined a career pathway leveraging his pattern recognition skills in data quality assurance.

5. Define:

In this final phase, all gathered information was synthesized to articulate clear problem statements and potential solution directions.

Key Outcomes:

- Articulated the core challenge: "How might we create an inclusive digital skilling ecosystem that empowers neurodivergent individuals to achieve their full potential in IT careers?"
- For John, defined a personalized learning plan focused on developing his data analysis and pattern recognition skills using BCI-enabled interfaces.

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Technological Intervention: Brain-Computer Interface (BCI)

- Introduction of BCI: John was introduced to BCI technology, designed to read EEG signals and translate them into commands, enabling a new channel for communication and interaction with technology.
- Skill Identification: Through BCI, John was able to express preferences and engage with stimuli that traditional assessment methods had failed to capture. This led to the discovery of John's interest in patterns and his ability to quickly identify inconsistencies in data sets.
- Training Programs: Customized training programs were developed to enhance John's natural abilities, focusing on data analysis and pattern recognition. These programs utilized gamified environments to maintain engagement and track progress effectively.

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Quantitative Data:

- Engagement Levels: Time spent on tasks increased by 50%, indicating higher levels of engagement and interest in the activities facilitated by BCI.

Qualitative Data:

- Caregiver Feedback: John's caregivers reported a marked and visible increase in his willingness to participate in data-related activities and a notable enhancement in his mood and overall behaviour.
- Self-Reported Satisfaction: John showed higher levels of satisfaction and self-esteem, as evidenced by his increased initiative in engaging with the BCI and related tasks.

Implications for Research and Practice:

- Research: The case study of John suggests that BCI and similar technologies can play a crucial role in uncovering hidden talents and preferences in autistic individuals, warranting further investigation and research funding.
- Practice: Practitioners are encouraged to consider technological interventions, such as BCI, as part of the assessment and skill development process for individuals with autism, potentially transforming their approach to vocational training and employment.

The application of the 5D Process in John's case demonstrates its effectiveness in providing a structured approach to complex problem-solving. The integration of advanced technology like BCI in the process has not only facilitated a better understanding of John's abilities but has also led to actionable outcomes that have a tangible impact on his quality of life and employment prospects.

Implications and Potential for Wider Adoption

The 5D Process, through its structured and comprehensive approach, has significant implications for social research. Its potential lies in providing a deep understanding of complex social problems by identifying and addressing root causes. This is particularly vital in fields where problems are multifaceted and where traditional linear problem-solving methods fall short.

The introduction of the 5D Process in assessing the skills of neurodivergent individuals has shown that a systematic approach to problem analysis can lead to more effective interventions. By uncovering the unique skills and interests of individuals, the 5D Process has the potential to transform how social research translates into practical solutions.

For broader applicability, the 5D Process could be standardized as a framework across various domains within social research. Its adaptability to different contexts—be it educational challenges, healthcare delivery, or community development—makes it a versatile tool. Standardization involves developing a clear set of guidelines for each stage of the process, ensuring that it can be replicated with fidelity while allowing for the flexibility required by different research areas.

Addressing Limitations and Future Research

During this study, certain limitations have been encountered. One of the primary challenges is the need for extensive data to fully implement the 5D Process, which can be resource intensive. Additionally, while the process emphasizes the importance of technology, there is a learning curve associated with the adoption of new technology, which can pose a barrier to widespread implementation.

Future research should aim to refine the 5D Process by incorporating advancements in technology that can streamline data collection and analysis. There is also a need to explore the scalability of the process in larger, more diverse populations. Further, research could investigate the integration of the 5D Process with other methodologies to enhance its robustness and efficacy.

5.Conclusion

In conclusion, the 5D Clarity Process represents a significant methodological contribution to social research. Its structured approach to discovering, detailing, deepening, dreaming, and defining complex problems has been proven effective in the case study involving neurodivergent individuals. The key points of this paper illustrate the value of the 5D Process in improving problem analysis and developing sustainable solutions.

The contributions of the 5D Clarity Process lie in its ability to provide a thorough and systematic approach to problem-solving. However, its limitations, primarily related to data requirements and technology integration, provide avenues for further research. Future directions include the standardization of the process for broader applicability and the exploration of its synergies with other research methodologies.

By reiterating the value of the 5D Process, this paper underscores the need for innovative approaches in social research that can address the dynamic and complex nature of today's social challenges. The 5D Clarity Process, with its focus on sustainability and root cause analysis, has the potential to reshape the landscape of problem-solving within social research, providing a model for future investigations to build upon.

Note:

Given the long-term research partnership with the participating special schools and stakeholders, formal ethics approval was not required for this specific study. This study was conducted by including the obtaining of informed consent from all participants or their guardians, ensuring data privacy, and maintaining the right to withdraw. These practices are in line with the ongoing ethical standards upheld by our research team over years of collaboration.

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