



Disciplinary Dream-Drawings

An Innovative Methodology to Uncover Students' Emotional Bottlenecks

LIEZEL NEL

Abstract

Emotional bottlenecks significantly impede learning but are often overlooked in higher education. This paper explores the use of the Disciplinary Dream-Drawings (DDD) methodology, an adaptation of Mersky's Social Dream-Drawing, within the Decoding the Disciplines framework to uncover these hidden emotional challenges among first-year Computer Science students. Through a pilot study at a South African university, students created dream drawings and narratives reflecting their academic experiences. Analysis of the visual and narrative data revealed eleven primary emotional bottlenecks, including family and financial pressures, self-imposed expectations, feelings of inferiority, and stress related to coding activities. The findings highlight the complex interplay between personal and academic spheres and underscore the need for educators to address emotional barriers proactively. The paper discusses the potential pedagogical implications of implementing the DDD methodology and offers reflections on its execution, emphasizing how it can be utilised by educators to better support their students' emotional and academic development.

Keywords: Emotional Bottlenecks; Disciplinary Dream-Drawings; Social Dream-Drawing; Computer Science Education; Decoding the Disciplines

Traum-Skizzen aus der Disziplin

Ein innovativer Ansatz zur Identifikation emotionaler Lernhürden bei Studierenden

Zusammenfassung

Emotionale Hürden behindern das Lernen erheblich, werden jedoch in der Hochschulbildung oft übersehen. Dieser Artikel untersucht die Anwendung der Methodik „Disciplinary Dream-Drawings“ (DDD), eine Anpassung von Merskys „Social Dream-Drawing“, im Rahmen des „Decoding the Disciplines“-Ansatzes, um verborgene emotionale Herausforderungen bei Erstsemester-Studierenden der Informatik aufzudecken. In einer Pilotstudie an einer südafrikanischen Universität erstellten Studierende Traumzeichnungen und Narrative, die ihre akademischen Erfahrungen reflektierten. Die Analyse der visuellen und narrativen Daten identifizierte elf zentrale emotionale Hürden, darunter familiäre und finanzielle Belastungen, selbst auferlegte Erwartungen, Minderwertigkeitsgefühle und Stress im Zusammenhang mit Programmieraufgaben. Die Ergebnisse verdeutlichen die komplexe Wechselwirkung zwischen persönlichen und akademischen Lebensbereichen und betonen die Not-

wendigkeit, emotionale Barrieren proaktiv anzugehen. Der Artikel diskutiert die potenziellen pädagogischen Implikationen der DDD-Methodik und bietet Einblicke in deren Anwendung, um Lehrende dabei zu unterstützen, die emotionale und akademische Entwicklung ihrer Studierenden gezielt zu fördern.

Keywords: Bottleneck; Decoding the Disciplines; Disziplinäre Traum-Skizzen; Soziale Traum-Skizzen; Didaktik der Informatik

1 Introduction

Emotional challenges significantly impact student learning and success in higher education (Pekrun & Linnenbrink-Garcia, 2014; Middendorf et al., 2015). Students often encounter psychological barriers, such as anxiety, frustration, or a sense of inadequacy, that hinder their engagement and academic performance (Pekrun et al., 2002). Addressing these emotional bottlenecks is crucial for educators aiming to create supportive learning environments that promote deep understanding and retention of disciplinary knowledge.

The foundation of this work lies within the Decoding the Disciplines (DtD) framework (Pace, 2017). DtD is based on the premise that each academic discipline has its own unique ways of thinking and practicing that students need to master. The seven-step DtD framework provides a structured approach to identifying and addressing specific points where students' learning is interrupted (Middendorf & Shopkow, 2018). These points of interruption are referred to as bottlenecks. While bottlenecks can be cognitive or procedural, emotional bottlenecks (i. e., psychological barriers rooted in students' feelings and prior experiences) are equally significant yet often overlooked (Middendorf et al., 2015).

Emotional bottlenecks occur when students' pre-existing beliefs, emotions, or attitudes conflict with the demands of the subject matter or learning environment (Middendorf & Shopkow, 2018). In disciplines like Computer Science, which require rigorous problem-solving and abstract thinking, these emotional barriers can be particularly pronounced (Lahtinen et al., 2005). Students may experience feelings of overwhelm, fear of failure, or anxiety related to coding and technical challenges, leading to disengagement or resistance to learning.

Uncovering these emotional bottlenecks is a challenging task. Traditional pedagogical approaches may not effectively surface the underlying emotional issues that impede learning, as students might be unaware of them or hesitant to articulate their struggles (Mersky, 2022). Innovative methodologies are needed to access these hidden emotional landscapes to better support students in their academic journey.

This paper explores the use of a discipline-specific adaptation of Mersky's Social Dream-Drawing methodology (2013; 2022) as a tool to uncover the emotional bottlenecks experienced by students in Computer Science. By integrating this adapted methodology within the DtD framework, we aim to provide educators with a novel approach to identify and address the emotional challenges that students face. Through a pilot study conducted with first-year Computer Science students at a South African university, we investigate whether this innovative method can effectively reveal the emotional barriers that impact student learning. Our goal is to enhance educators' ability to foster a more positive and supportive learning environment, ultimately improving student engagement and success in the discipline.

2 Theoretical Framework

2.1 Emotional bottlenecks in learning

Emotional bottlenecks, also known as affective bottlenecks, are psychological barriers that hinder effective learning when students' prior beliefs, experiences, or emotions conflict with the demands of

the subject matter or learning environment (Middendorf & Shopkow, 2018). These moments occur when students' pre-existing ideas clash with disciplinary constructs, leading to resistance or disengagement. This resistance can manifest as superficial participation, hostility, or even withdrawal from the course.

Middendorf et al. (2015) highlight that emotional bottlenecks are deeply intertwined with cognitive processes. Students' feelings about a particular issue are influenced by their cognitive understanding of it. For instance, contradictions between their preconceived notions and the discipline's requirements can evoke strong emotions like anger, confusion, or scepticism. Therefore, addressing emotional bottlenecks necessitates engaging with both the emotional responses and the underlying cognitive structures that support these emotions.

Within the DtD framework, emotional bottlenecks are significant obstacles that impede students' progression in learning disciplinary thinking (Pace, 2017). Educators are urged to decode not only the cognitive challenges but also the emotional responses that may block learning. These bottlenecks often stem from students' beliefs about their abilities or misconceptions about the subject matter, leading to a lack of motivation or active resistance (Middendorf et al., 2015). Unfortunately, educators may overlook these emotional barriers or remain unaware of them, exacerbating the problem.

Addressing emotional bottlenecks requires a strategic approach that combines cognitive and affective interventions. Step 5 of the DtD framework specifically focuses on motivating students to remain engaged despite emotional barriers (Middendorf & Shopkow, 2018; Pace, 2017). By creating a learning environment that acknowledges and addresses both emotional and cognitive aspects, educators can help students overcome these bottlenecks. This involves understanding the emotional dynamics at play and implementing strategies that meet students' affective needs, thereby encouraging deeper engagement with the subject matter.

2.2 Social Dream-Drawing

One promising methodology for identifying emotional bottlenecks in educational contexts is Mersky's Social Dream-Drawing (2013; 2022). Rooted in depth psychology and psychoanalysis, this approach is based on the belief that dreams are expressions of the collective unconscious (Mersky, 2022), offering insights into underlying emotions, perspectives, and psychological challenges. Originally utilised in therapeutic and organisational settings, Social Dream-Drawing has been adapted in educational research as a tool to give students a voice (Pule, 2024), to shed light on the challenges experienced by female academics (Barnard et al., 2023), and to explore students' real-life experiences (Alexander, 2023).

Mersky's approach (2008; 2013) involves the interpretation of actual or imaginary dreams through visual and narrative means. The methodology combines visual data (drawings) and narrative data (written or verbal descriptions) to uncover unconscious material, such as thoughts, emotions, and experiences that are typically inaccessible through conventional research methods. The drawings serve as a means of externalising internal conflicts and emotional responses that might otherwise remain hidden (Mersky, 2013).

At its core, Social Dream-Drawing offers a powerful way to understand how emotions and psychological states shape individuals' responses to their environment. As Mersky (2013) notes, the process of creating and reflecting on dream drawings allows participants to access a deeper understanding of their emotions and cognitive processes. In an educational setting, this methodology can be adapted to help uncover emotional bottlenecks that are often linked to students' resistance or struggles with specific disciplinary content (Middendorf et al., 2015; Pace, 2017).

One of the key strengths of the Social Dream-Drawing methodology is its ability to bring unconscious emotional responses to the surface. Visualising emotions through drawing can bypass the intellectual defences that often prevent individuals from confronting difficult emotions (Mersky, 2013). In educational contexts, where students may be reluctant or unable to articulate their emotional strug-

gles, this methodology provides a creative and reflective outlet that can reveal deep-seated emotional bottlenecks.

Moreover, the collective aspect of the Social Dream-Drawing methodology, where participants share their drawings and narratives with peers, fosters a sense of shared experience and emotional validation (Mersky, 2013). This communal reflection can enhance understanding and empathy among participants, contributing to a supportive learning environment.

3 Methodology

In alignment with the DtD framework, this study proposes the Disciplinary Dream-Drawings (DDD) methodology as an adaptation of Mersky's Social Dream-Drawing (2013; 2022) for educational settings. The DDD methodology aims to explore the emotional challenges that students face in learning, particularly within the discipline of Computer Science. Rather than dealing with actual dreams, this approach uses the concept of dreams metaphorically to tap into students' unconscious thoughts and emotions about their academic experiences.

The DDD methodology involves collecting two types of data: visual data in the form of dream-drawings, and narrative data comprising written explanations and focus group discussions. Students are asked to create visual representations of their experiences as learners in Computer Science. These drawings, accompanied by brief narratives, provide a non-threatening means for students to express emotions such as fear, frustration, or anxiety, which may not be readily articulated through traditional methods.

3.1 Pilot study

A pilot study was conducted with first-year Computer Science students at a South African university to evaluate the effectiveness of the DDD methodology in uncovering emotional bottlenecks. During a scheduled contact session, 141 students were invited to participate. Each student received a blank A4 sheet of paper and shared coloured pencils. They were presented with the following scenario and instructions:

- Scenario: You have just woken up after dreaming about your current life as a Computer Science student.
- Instructions: Create a drawing of your dream.

Students were allotted 30 minutes for the drawing activity. Subsequently, they were given ten minutes to write a short description of their drawing on the reverse side of the paper. They were also informed that they could include their student number if they were interested in participating in further discussions, emphasising that submission was voluntary.

Out of the 141 students, 126 (89.4%) submitted drawings, with 93 (66 %) expressing interest in further participation. The high response rate indicated that students found the activity engaging and were willing to share their experiences.

3.2 Initial data analysis

The initial analysis involved a thorough examination of each drawing and its accompanying narrative. Keywords and phrases were noted to identify recurring themes and specific challenges mentioned by the students. This process led to the identification of 21 broad categories of emotional challenges.

The drawings were then categorised into four groups:

- Future dreams: Depictions of students' aspirations unrelated to the given scenario (17 drawings).
- Positive experiences: Illustrations focusing solely on positive aspects, with no identifiable challenges (38 drawings).
- Challenges mentioned; No further participation: Drawings indicating challenges, but students did not opt for further involvement (19 drawings).
- Challenges mentioned; Interested in further participation: These drawings highlighted emotional challenges, and the students were willing to engage in focus group discussions (52 drawings).

In preparation for the focus groups, attention was concentrated on the fourth category. Although each drawing was unique, several drawings included visual elements such as loops, circles, and/or arrows to depict continuous cycles of tasks students had to repeat on a daily basis (see Figure 1). Another common theme was drawings that depicted the student's study space (see Figure 2). Watches or clocks were the single element that appeared most frequently in the drawings (as also seen in Figure 2). These common themes were further explored during the focus group discussions.

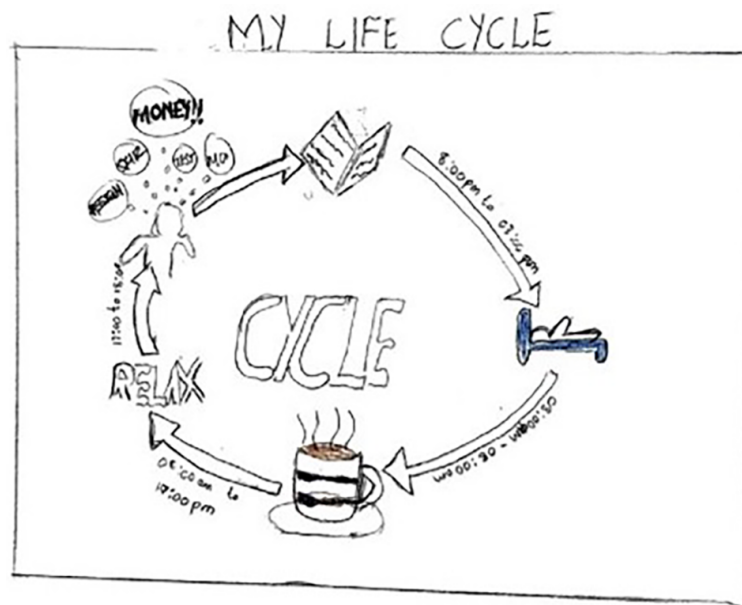


Figure 1: A dream-drawing portraying an endless loop of daily activities.

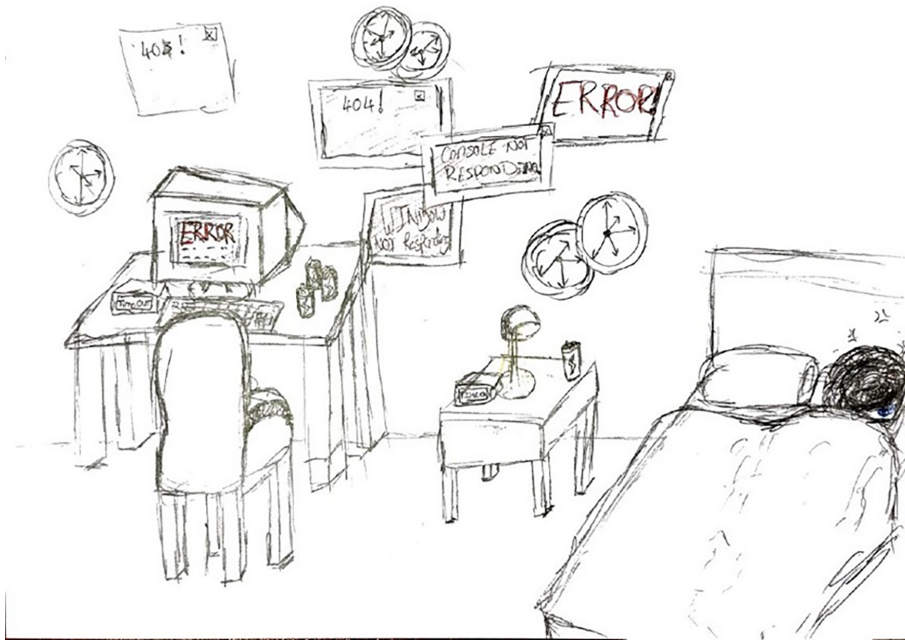


Figure 2: A dream-drawing portraying a study space overwhelmed by coding errors and ticking clocks.

3.3 Focus group discussions

Three focus group sessions were conducted, comprising a total of eleven participants. Sessions were scheduled based on students' availability, with group sizes ranging from one to seven participants. Each session followed the same structured procedure:

1. Introduction: Explanation of the session's purpose, ethical considerations, and obtaining informed consent.
2. Discussion of Drawings (repeated for each participant):
 - The participant (original drawer) presented their drawing and read their narrative.
 - Group members engaged in associative discussions, sharing interpretations and relating to the drawings.
 - The original drawer reflected on the feedback and shared further insights.
3. Thematic Exploration: Collective identification and discussion of emerging themes related to emotional challenges.
4. Reflection and Suggestions: As part of a general discussion, participants offered suggestions for improving emotional well-being and support within the Computer Science programme.
5. Conclusion: The facilitator summarised key points and closed the session.

All sessions were audio-recorded with participants' consent, and detailed notes were taken to capture non-verbal cues and group dynamics.

4 Findings: Identified Emotional Bottlenecks

Building upon the initial visual analysis, the focus group discussions in combination with the narrative descriptions allowed for a deeper exploration of the emotional bottlenecks experienced by the students. Eleven primary themes emerged:

1. Family pressure: Many students depicted scenarios where familial expectations exerted significant academic stress. The pressure to succeed, not only for themselves but also to fulfil their

family's aspirations, was a recurring theme. This burden often manifested as anxiety, particularly surrounding the fear of failing to meet these expectations.

2. Financial constraints: Financial concerns emerged as a major bottleneck. Students expressed worries about tuition fees, the cost of study materials, and the need to balance part-time employment with their studies. These financial pressures contributed to feelings of being overwhelmed and distracted, impeding their ability to fully engage with their academic work.
3. Sleep deprivation: A significant number of students included references to sleep (or the lack thereof) in their drawings (see Figure 2). The demands of their coursework often led to late nights and insufficient rest, negatively impacting their cognitive abilities and overall well-being.
4. Self-imposed pressure to perform: The expectation students placed on themselves to consistently achieve high academic standards was another dominant theme. This internal pressure often led to self-doubt and fear of failure, discouraging students from taking risks or participating actively in class.
5. Feelings of being overwhelmed: Many students conveyed a general sense of being inundated by the sheer volume of work and the complexity of the material. This was especially prevalent among those who felt they lacked the necessary background or foundational knowledge in Computer Science.
6. Mental health challenges: Issues such as anxiety and depression were frequently alluded to in both the drawings and discussions. These mental health challenges were often exacerbated by the stressors mentioned above, creating a vicious cycle that further impeded students' ability to cope with their academic responsibilities.
7. Reluctance to seek help: Despite the challenges they faced, many students were hesitant to ask for assistance. This reluctance stemmed from a fear of being judged as incompetent or not belonging in the academic environment. This is particularly concerning, as it suggests that students may be struggling in silence rather than seeking the support they need.
8. Feelings of inferiority: Some students expressed a sense of not being "good enough" compared to their peers. This often led to a reluctance to engage in group work or class discussions, further isolating them and reinforcing their feelings of inadequacy.
9. Procrastination as a coping mechanism: Several students interpreted their own procrastination as laziness, without recognising that it might be a coping strategy for underlying emotional or psychological stress. This misinterpretation often led to negative self-perception, further hindering their motivation and academic performance.
10. Overcommitment and time management Issues: Students reported having too many commitments, both academic and extracurricular. This overcommitment contributed to feelings of being overwhelmed and unable to manage their time effectively.
11. Stress related to coding activities: The technical challenges of coding were frequently highlighted as a source of stress. Many students felt that programming exercises were difficult and that they lacked sufficient support to navigate these challenges, leading to frustration and fear of failure.

These identified emotional bottlenecks have significant implications for students' learning experiences. The interplay between these factors often created a compounded effect, where one bottleneck intensified others. For instance, financial pressures could lead to increased working hours, resulting in sleep deprivation and reduced study time, thereby exacerbating feelings of being overwhelmed. Recognising and addressing these challenges is crucial for fostering a supportive learning environment.

5 Implications of the Findings

The emotional bottlenecks identified in this study have significant implications for how educators approach teaching and supporting students in disciplines such as Computer Science. The eleven

bottlenecks (ranging from family and financial pressures to mental health challenges and stress related to coding activities) highlight the complex interplay between students' personal lives and their academic experiences. Addressing these bottlenecks is crucial for fostering a supportive learning environment that promotes student engagement and success.

Firstly, the prominence of family pressure and financial constraints suggests that many students are navigating substantial external expectations and socioeconomic challenges. These pressures can lead to heightened anxiety and stress, adversely affecting cognitive functions and academic performance. Educators and institutions can play a pivotal role by providing support resources, such as connecting students with financial aid services, scholarships, or bursaries, and facilitating open dialogues where students can discuss their challenges without stigma.

Moreover, issues related to sleep deprivation, overcommitment, and time management reflect students' struggles to balance academic demands with personal well-being. Chronic lack of sleep and overcommitment can impair learning and increase feelings of being overwhelmed. To address these concerns, educators should promote healthy habits by integrating time management and wellness workshops into the curriculum and encourage reasonable workloads to ensure that course demands are manageable and do not inadvertently encourage unhealthy study practices.

The internal pressures of self-imposed expectations, feelings of inferiority, and reluctance to seek help indicate a need for cultivating an inclusive and supportive classroom atmosphere. Educators can normalise the challenges associated with learning complex material by emphasising that difficulties are a normal part of the learning process. Encouraging help-seeking behaviour by making office hours welcoming and actively inviting students to ask questions can reduce the reluctance to seek assistance. Implementing peer support mechanisms, such as study groups or mentorship programmes, can also help students feel more connected and less isolated.

The prevalence of mental health challenges underscores the necessity for proactive measures to support students' well-being. Accessible mental health services should be readily available and promoted to students. Additionally, providing training for educators to recognise signs of mental distress and respond appropriately can create a more responsive support system within the academic environment.

Addressing the stress associated with coding activities highlights the need for pedagogical strategies that demystify programming and reduce anxiety. Educators can implement incremental learning by breaking down complex coding tasks into smaller, manageable components. Offering practical support through additional coding labs or tutoring sessions, and providing constructive and encouraging feedback, can build students' confidence and competence in programming.

These findings suggest that addressing emotional bottlenecks requires a holistic approach that integrates academic support with attention to students' emotional and psychological needs. By recognising and actively addressing these challenges, educators can enhance student engagement, improve learning outcomes, and promote the overall well-being of students. Institutions should develop policies and programmes that support diversity and inclusion, facilitate collaboration across disciplines to address emotional bottlenecks from multiple perspectives, and implement systems to regularly assess the effectiveness of interventions aimed at reducing these challenges.

6 Reflection on the Execution of the DDD Methodology

The execution of the DDD methodology during the pilot study provided valuable insights into its effectiveness as a tool for uncovering emotional bottlenecks in an educational setting. Firstly, it provided a structured yet flexible tool for identifying emotional challenges that impede student learning. By engaging students in a reflective process that combines visual and narrative data, the methodology allowed for the exploration of emotions that might remain inaccessible through conventional research methods. This aligns with the DtD framework's emphasis on addressing both cognitive and emotional barriers to learning (Pace, 2017).

Secondly, the collaborative nature of the methodology, particularly through focus group discussions, opened opportunities for students to articulate their emotional challenges in a supportive and non-judgemental environment. The sharing of drawings and narratives fostered a sense of shared experience and emotional validation among participants (Mersky, 2013). This communal reflection not only enhanced understanding and empathy but also contributed to a more inclusive classroom atmosphere.

Overall, the DDD methodology proved to be an effective and insightful approach for uncovering emotional bottlenecks among Computer Science students. By integrating this methodology into pedagogical practice, educators can better support their students' emotional and academic development. Following the insights gained from the pilot study, the guidelines outlined in Table 1 highlight several practical considerations for educators and researchers aiming to implement the DDD methodology in their own context.

Table 1: Guidelines for Implementing the Disciplinary Dream-Drawings Methodology

Component	Guidelines
Crafting the scenario	• Use an open-ended scenario to allow students to freely project their experiences. • Consider more specific scenarios to guide focus on particular academic aspects.
Materials and timing	• Provide adequate materials (e. g., individual sets of coloured pencils, ample paper) to facilitate creativity and expression. • Allocate sufficient time (e. g., 30 minutes for drawing, 10 minutes for writing) for deep engagement.
Facilitating focus group discussions	• Organise small groups of 4 to 6 participants to encourage participation and ensure a balance between diverse perspectives and individual sharing.
Venue for focus group discussions	• Choose a quiet, comfortable room separate from regular classrooms to foster a relaxed atmosphere. • Arrange seating in a circle to promote equality and encourage eye contact. • Provide equipment (e. g., large screen) to display drawings. • Minimise external distractions by attending to lighting and seating comfort.
Preparing probing questions	• Develop carefully crafted, tailored questions (for the general discussion step in the focus group discussions) based on preliminary analysis of drawings and narratives. • Aim to elicit deeper reflections and uncover underlying emotions and causes.
Ethical considerations	• Obtain informed consent and assure confidentiality. • Emphasise voluntary participation. • Create a safe environment due to the sensitive nature of emotions being explored.
Emotional support	• Provide access to counselling services or support resources to assist participants who may experience distress during or after the activity.
Cultural sensitivity	• Given the diverse backgrounds of students, cultural considerations should be taken into account when interpreting drawings and facilitating discussions. • Be mindful of different modes of expression and potential cultural stigmas around discussing emotions.

7 Conclusion

The proposed Disciplinary Dream-Drawings (DDD) methodology, adapted from Mersky's Social Dream-Drawing method (2008; 2013; 2022), has proven to be an effective and innovative tool for uncovering the emotional bottlenecks experienced by first-year Computer Science students. By engaging students in a creative and reflective process, the study illuminated a range of emotional challenges (such as family and financial pressures, self-imposed expectations, feelings of inferiority, and stress related to coding activities) that significantly impact their learning experiences and academic performance.

The findings underscore the complex interplay between students' personal lives and academic responsibilities, highlighting the necessity for educators to address not only cognitive but also emotional barriers to learning. The emotional bottlenecks identified are multifaceted and deeply intertwined with both personal and academic spheres, affecting students' motivation, engagement, and overall well-being.

Implementing the DDD methodology has important pedagogical implications. It offers educators a structured approach to identify and address emotional challenges, fostering a more supportive and inclusive learning environment. By integrating this methodology within the DtD framework (Pace, 2017), educators can develop targeted interventions that acknowledge and alleviate emotional barriers, ultimately enhancing student engagement and success.

Reflecting on the execution of the DDD methodology reveals its potential to transform teaching practices. The process of creating and discussing dream-drawings not only provides valuable insights into students' emotional landscapes but also encourages open communication and shared understanding within the classroom. The collaborative nature of the methodology fosters a sense of community and emotional validation, which can alleviate feelings of isolation and reluctance to seek help (Mersky, 2022).

In conclusion, addressing emotional bottlenecks proactively is crucial for fostering an educational experience that empowers students both academically and personally. Educators and institutions have a responsibility to create learning environments that not only impart knowledge but also support the emotional and psychological well-being of their students. By embracing innovative methodologies like the DDD, we can better support our students' holistic development, promote inclusivity, and enhance learning outcomes. Future research could explore the application of the DDD methodology across different disciplines and educational contexts, further contributing to our understanding of how to effectively address emotional challenges in higher education.

Statements on ethics and conflict of interest

Ethical clearance for this study was obtained from the General/Human Research Ethics Committee of the University of the Free State prior to the study (Ethical Clearance number: UFS-HSD2023/0161). All participants provided informed consent, and their participation was voluntary. Participants were free to withdraw from the study at any stage without facing any negative consequences. This work is based on the research supported by the South African National Research Foundation. The author declares that there is no conflict of interest associated with this research.

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Authors

Liezel, Nel. Department of Computer Science and Informatics, University of the Free State, South Africa; Orcid-ID: 0000-0002-6739-9285; Email: nell@ufs.ac.za



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