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Pop the "Maths Anxiety" Bubble: An Approach to Support Nursing Students to Self-Manage Anxiety While Studying Drug Calculation

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Abstract

This is a report on an informal action research undertaken between 2013 and 2014 to find solutions to support tertiary nursing students experiencing anxiety while studying drug calculation. The literature identifies traditional "maths anxiety" and modern-day specific categorisations of "dyslexia" and "dyscalculia" yet offers no clear solution on how to support students. I explored the constructive-developmental perspective of human development, the conception of the triune brain, and the psychosynthesis conceptual map of body-feelings-mind, in order to develop an approach to help students navigate their daily experience on campus and consciously express their will to succeed. These techniques proved to be successful, evidenced in the overwhelmingly positive feedback from both students and maths tutors. This article invites colleagues within the broader ATLAANZ community to adapt and apply this approach in their practice to support students with anxiety to succeed while studying.

Keywords: maths anxiety, dyslexia, dyscalculia, anxiety management, triune brain, psychosynthesis BFM map

I have worked as a part-time learning advisor and learning development lecturer since May 2010. In 2005, I began part-time training with the Institute of Psychosynthesis New Zealand to further my interest in human development and better understand the intricacies of being human. My subsequent training as a psychosynthesis counsellor in 2014-2016 and my lasting interest in human development, specifically

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Robert Kegan's constructive-developmental perspective on human development, have given me rich resources to draw on in my role as a learning advisor.

In 2013, while continuing my literacy support at Unitec, I took on an interim role providing maths support for the nursing students. During this time, I noticed more and more students experiencing anxiety with their studies. Their anxiety seemed to be slowing down their cognitive functioning, causing frustration, feelings of defeat, and low self-esteem, as evidenced in the example below.

In Semester 2, 2013, a student came with this question: "If a tablet contains 0.25mg [drug], how much do you administer for a dose of 1.75mg?" The student had failed her maths exam the semester before and been given the chance to redo the paper. She could not see that the words "a tablet" meant the number "1" nor factor this information into a formula to find the solution. She appeared anxious and told me she felt overwhelmed by her studies. This student was only one among a number of nursing students who presented different levels of anxiety while studying drug calculation, especially around exam times. The anxiety seemed to be due to their difficulty in understanding the necessary information embedded in the mathematical language, as in the above example. At the same time, it came to my attention that students in other programmes also showed signs of stress, particularly when assignments were due, one after another, in a short timeframe.

I found that most of these nursing students could think and process maths information efficiently and accurately when sitting with me alongside as their guide and advisor. However, when they were on their own or in exams, they seemed to lose touch with what they had learnt in class, despite being able to demonstrate this knowledge clearly in my presence. I asked myself the question: "How could I, as a tertiary learning advisor, best support my nursing students to self-manage anxiety and successfully master their numeracy, especially drug calculation, to graduate and become registered nurses?"

I searched the literature to help me understand what was happening for the students in order to better support them. Accordingly, I embarked on a journey that simulated action research (Marriam & Tisdell, 2016).

Literature Review

Guided by three questions—"What is happening to students when they cannot see the obvious in the maths question?", "What is the human development perspective?" and "How does the brain work?"—my literature review initially covered three areas to find answers: the phenomenon referred to as "maths anxiety"; Robert Kegan's constructive-developmental perspective of human development; and the triune brain. A fourth question then followed: "How can I best support those students to manage their anxiety and be successful in their studies?" When I began looking at the situation from my Psychosynthesis counsellor's perspective, I found a possible solution, using the Psychosynthesis' body-feelings-mind (BFM) map to formulate an approach to support students to self-manage anxiety and succeed in mastering drug calculation.

In searching for an understanding of why students misread information in maths problems, I learned that the phenomenon of anxiety associated with numeracy had been explored as early as in 1957. The first term coined was "number anxiety" (Dreger & Aiken, 1957), followed by "statistics anxiety" and "dyslexia" (Jordan et al., 2014), then "developmental dyscalculia" (Mammarella et al., 2015) and "maths anxiety" (Khasawneh et al., 2021), as scholars continued to explore learners' reaction to number problems. In particular, Khasawneh et al. (2021) pointed out that "maths anxiety" could be differentiated from dyscalculia by the presence of learners' "emotional" reaction in the former and the absence of it in the latter. They identified contributing factors for maths anxiety, beginning with social/cultural aspects, including gender (based on the perception that males are more dominant in mathematics whereas females find the subject harder to comprehend), followed by "learning difficulties" and "numerical skills".

However, the authors found that if students believe in themselves and have confidence, they can usually succeed in maths. Their suggested methods to alleviate the symptoms of maths anxiety were for educators (teachers and parents/peers as role models) to create a relaxing and encouraging environment for learners, and for learners to become aware of their own learning habits/difficulties and develop self-belief/confidence to become their own champions. This idea of learners becoming aware enough to be their own champions coincided with what I wanted to achieve.

Furthermore, recognising maths anxiety as an emotional reaction to numbers suggested that helping students manage this response might be the first step in preparing them to succeed. However, merely labelling the phenomenon did not give me a solution.

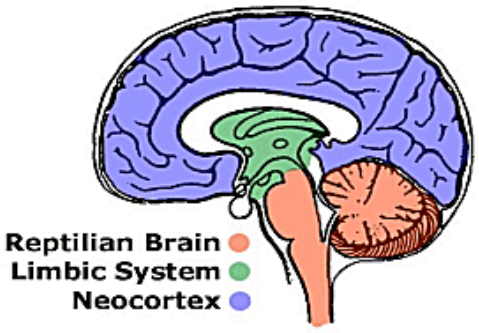
So I explored further, and was drawn to Kegan's (1982) "constructive-developmental" perspective of human development (p. 4). Kegan regarded human beings as meaning-makers on an evolutionary journey through life. In their appointments with me, anxious students told me that they felt like a failure and attributed this to their inadequacy (meaning-making). Feeling inadequate was working against their effort to succeed in their studies. According to Kegan, human beings are in a dynamic process of "integration" and "differentiation" which spurs on-going growth and development throughout their lifetimes (p. 5). In terms of integration, we as living organisms like to be included and inclusive, belonging to a group and feeling safe. Yet as soon as integration is completed, the need for growth and development will pull/push us to differentiate and move away from the sameness in a group in order to define ourselves as individuals. This is the process that we are constantly engaged with, consciously or not.

Kegan's constructive-developmental theory and, in fact, many other human development theories (Erikson, 1963; Hillman, 1996) helped me understand that while students may not be aware of the push/pull of integration and development in their daily lives, they are certainly aware of the difficulties they face within their studies. Being a student and feeling anxious while learning numeracy are part of their journey as human beings. They will move through the phase more smoothly if they are well supported towards their next developmental stage. Therefore, I chose to view the phenomenon as a passing phase that students found themselves in, thereby moving away from pathology, in order to find solutions to better support them to move forward to their success.

As a further aspect in my exploration, learning about the triune brain (depicted in Figure 1 below) helped me understand how the brain works, thus giving me a better understanding of my students' experience of learning difficulty.

Figure 1

The Evolution-Designed Brain



Note. From *The Role of Values in Wisdom,* by C. MacDonald, n.d., http://www.wisdompage.com/roleofvalues.html. Copyright 2021 by Leland R. Beaumont on behalf of Copthorne Macdonald. Reprinted with permission.

This figure visually shows the three layers of the brain, which developed in response to different evolutionary eras (Smith, 2010):

- The reptilian brain processes the information based on one's instinct, regulating essential bodily functions like breathing, heartbeat or body temperature.
- The limbic system developed to allow mammals to remember their experiences, and links memory to accompanying emotions. This brain is hard-wired to constantly look for signs of unpleasantry or threat. It sends messages of danger to all parts of the brain, switching on its instinctual 'freeze, fight or flight' function.
- The most recent and most highly-developed layer is the neocortex in human beings. This newest part of the brain is capable of higher and more complicated functions such as processing information and reasoning, but it needs time to process information and make decisions based on its judgment of the situation. When students are feeling unsafe or threatened (in the case where their exam is coming up and failing may jeopardise their career plans), the functions of the first two brains shut down, meaning no other information can get through to the next layer, thus stopping the neocortex from functioning.

The concept of the triune brain helped me understand that, when students are overwhelmed and feeling anxious, their brains are incapable of processing academic or numeric information that is irrelevant to their safety or emotional stability. This brought up the next question for me: How could I help my students to lower their anxiety and free their brains up for processing the maths information in order to solve their problems at hand?

Kegan (1994) pointed out that we, as creatures living in the modern world, have been trained by the educational system to use our brains more often than our emotions or bodily senses to access and/or process information. So the human brain has been really busy, whereas feelings/emotions or bodily sensations are often not exercised in decision-making or responding to the environment. Such pressure overwhelms the brain and causes anxiety.

Further, according to Mental Health Foundation of New Zealand (2019), anxiety normally manifests as a generalised concern where people worry about things in life, such as an exam coming up, or a friend in trouble, etc. This type of anxiety can be alleviated through measures such as distraction (i.e., watching a movie, talking to somebody, or going for a walk). However, when this generalised worrying escalates, the person may experience panic attacks or obsessive-compulsive disorders that pathologically disrupt their lives, and professional clinical intervention is usually needed. What my students were presenting was a generalised sense of stress or anxiety. In this case, labelling their anxiety as a disorder did not help. Therefore, I chose not to see it pathologically, but as a phenomenon that a learning advisor could help address. In this way, I could support students to overcome anxiety and improve their study.

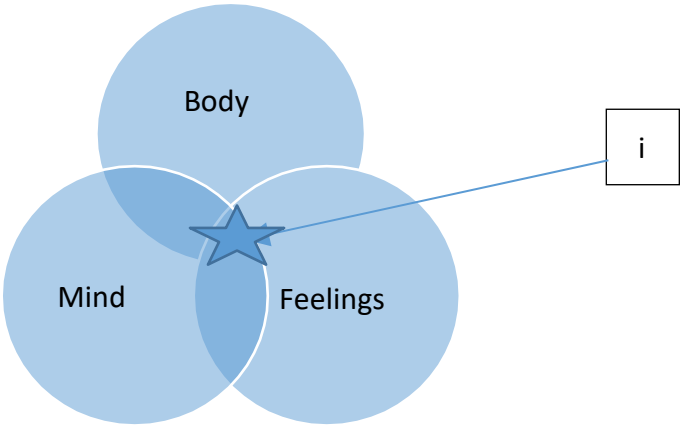
Understanding Kegan helped raise more questions for me: First, is our brain the only faculty to help us gather and process the information available to us to cope with life situations? Second, how could I, during each one-hour appointment, help the students feel safe physically and emotionally to open the channels in their brain to process the maths information to solve the problems successfully?

At this stage, my vision was broadened to seeing anxious students as human beings experiencing difficulties in their lives. I naturally turned to my training as a psychosynthesis counsellor. Psychosynthesis is a psychospiritual framework to

understand human beings' inner experiences; it was developed by Italian psychiatrist Roberto Assagioli (1888-1974), a contemporary and colleague of Carl Jung (1875-1961) and Sigmund Freud (1856-1939). A key concept of psychosynthesis is "the body-feelings-mind (BFM) map" that helps practitioners "explore the territory of experiences" (Palmer, 2010, p. 54).

Figure 2:

Psychosynthesis BFM map



Note: Adapted from *Psychosynthesis in the South Pacific: Ontological and Epistemological Considerations in the Context of Aotearoa New Zealand* [Psychosynthesis Monograph,10] (pp. 21-22, 54), by H. Palmer, 2010, Institute of Psychosynthesis.

The overlapping centre of the three dimensions (body, feelings, and mind) is the personal centre of identity (PCI)—the personal "I" of one's embodied physical experience on earth. It is similar to an information hub in a community. Therefore, I chose the iconic information-centre symbol "i" to depict the PCI in my graph (see Figure 2). It represents the concept that a person, with conscious awareness, can make use of information gathered from all three aspects of their experience (physical, emotional, and mental) to make a conscious decision to respond (rather than react) to each life situation (Palmer, 2010).

This exploration finally enabled me to reach a clear decision to use my skills, especially my understanding of the BFM map and human development perspectives as a counsellor, to help my anxious students understand and navigate the territory of their experiences in their study. I decided the best approach was to help them stay at their

personal centre of identity, and to consciously access the information from their experiences in all three areas of their existence. At the same time, they would need to keep reminding themselves that none of the three is more important than either of the other two. This way, they would be less likely overwhelmed or remain stuck anxiously in their mental field, as often unconsciously happens.

Methodology and Method

According to Marriam and Tisdell (2016), action research is "practitioner research" (p. 49), where practitioners seek to understand how participants make meaning of a problem or a problematic situation and engage with them in their process of meaning-making to help improve the situation. It is most popular with teachers or social workers who seek to make changes/improvements in any given situation. Its method usually involves gradually engaging with the participants and problem identified (for the study), taking action to help address the problem, evaluating the outcome and repeating the actions in that order until the situation is improved.

My study started as a self-exploration when I first noticed the problem of nursing students complaining about feeling anxious while studying drug calculation. I identified my questions and went about finding answers through a literature review to help me understand the situation and find a possible solution in my one-on-one and group appointments. Students as participants were engaged in so far as they told me about their anxiety during their appointments, trusted my way of supporting them, and willingly followed my instruction to start each appointment with a five-minute BFM meditation before we moved on to look at their questions that they brought to the session for support.

Evaluating the outcome was carried out through checking the student feedback in the evaluation box sitting outside my office, which is the basic way to evaluate all learning advisors. The students voluntarily wrote the comments provided later in this article as evidence of the positive outcome of my action research. Feedback from maths lecturers/tutors was obtained when I was collecting evidence for my promotion to Senior Lecturer in 2016. Apart from their verbal feedback/thank-you notes/praise via emails at the end of the semesters, they willingly commented on my work providing maths support for that one-year period.

Improving Students' Experience of Feeling Anxious

I have consequently planned my appointments with all students to include the following procedures:

- Doing a 'Body, Feelings and Mind' Meditation (5 mins or so) whenever necessary after a little chat to relieve students of whatever is on their mind so they can be present to the meditation. I invite the anxious student to sit comfortably in their chair and take three deep breaths to become more aware of their own presence in the room. Then I invite them to scan their body parts one after another while maintaining their breathing and saying to themselves: "I am my body, and I am more than my body". Then slowly and gently, I ask them to shift attention to their feelings to acknowledge whatever they are feeling including having no feelings, and say to themselves: "I am my feelings and I am more than my feelings". Then I gently shift their attention to their mental field, asking them to scan what thoughts they are engaging with or merely have floating in their head, and to acknowledge these thoughts by saying to themselves: "I am my mind and I am more than my mind", then to say to themselves: "I am a centre of consciousness and will. I am aware and I direct". When this is done, I allow a minute or two for them to recompose themselves and come back to the room/their bodily/physical presence for the work at hand. This is to help students become conscious of their experience, disidentify with mental anxiety and express their will to succeed (Palmer, 2010, p. 55). This step also engages them in their meaning-making process as pointed out by Marriam and Tisdell (2016), to expand their conscious awareness of what else is involved in their daily experience. Almost all the time, when we have completed the meditation, students comment that they felt calmer and more present in their work. They tell me with delight that they are quietly amazed by how clear their thinking has become.
- Letting students know that it is never their fault if they do not understand the mathematical content in the first instance and there is always a way to move forward towards finding the solution to each problem. All they need to do is to take it slowly and gently. On another note, this reassurance also helps ensure

safety to calm their reptilian and limbic brains when they encounter difficulties in their assignments.

- Helping students understand the concept of the maths problem and the solution in its simplest formula, then do a lot of practice with similar types of maths problems until students are comfortable and familiar with both concept and formula before we move on to the next question. This step helps students build up numeric skills and overcome learning difficulties. It also helps build their self-belief and confidence in solving problems on their own.
- The last step is to remind the students to feel their body parts, for example, toes, breathing, knees, etc. to focus their attention to their physical experience and emotions/feelings; that is, to bring them to their centre of consciousness and will. With the above practice, all students learn to take a deep breath before an exam, yet often automatically (i.e., unconsciously) switch to thinking mode even with the understanding that taking a deep breath helps calm their mind. One morning at the café cart, I came upon several nursing students who were on the way to their exam and appeared anxious. I asked them how they were; they took a deep breath and told me they were fine. However, I could see in their eyes they were anything other than that. So, I invited them to feel their toes in their shoes. Immediately I saw their bodies loosening from their previous stiff posture and their eyes relaxing. I smiled, told them they were ready to go to their exam and reminded them to feel their toes during the exam. They later told me that they had all passed their exams that day.

I began using this concept and practice in all my one-on-one and group appointments and workshops with nursing students focusing on drug calculation and preparation for final exams. The results were most encouraging.

Evaluation

The evaluation and analysis of the outcome is on-going throughout the action-research-styled exploration. The immediate evaluation of my approach came in the form of positive end-of-each-appointment outcomes where each student was able to process the maths information and solve the problems they were working on. When they came

and told me that they had passed their exams with big grins on their faces, I knew my approach had been successful:

> "One of the biggest challenges I face in my studies is anxiety and feelings of self- doubt".
>
> "I find that coming to Hua for Maths support clarifies my understanding of what I need to know and what I have been required to do as I sometimes find what is required confusing within a class and lecture setting".
>
> "Receiving help from Hua has been really good for me, as not only has it helped me to understand, pass and gain better grades in Maths which is a subject that I struggle with, it also helped me to gain confidence within my difficult subject".
>
> "I leave feeling inspired about my study—that I can actually do it! Through Hua's guidance, I came to realize the importance of breathing and relaxation techniques. Hua told me how I am the 'master of my own studies'. And that really resonated with me and allowed me to gain a feeling of control over my learning".

All students who came to me for support successfully graduated. Their maths lecturers also gave me positive feedback, reporting that, with my support, their students' pass rates were the highest they had ever recorded. With on-going analysis, I adjusted my approach as necessary, according to students' feedback after each appointment, to spend more or less time on the meditation or chat. The approach above is an emergent living process that supports students according to their ever-changing needs, based on where they find themselves at in any appointment; that is, the technique is only a guiding principle to meet students where they are and be present to their needs at any time.

Further Applications of my Approach

Beyond my own practice as a learning advisor using the BFM map, in collaboration with counselling colleagues I have also designed and delivered a series of "Understanding and Managing Anxiety" workshops at Unitec. The first 30 minutes are led by the counsellor, who elaborates on anxiety and its effect on the person's performance and function, in order to help students become aware of what is happening when they feel overwhelmed. The second 30 minutes are when I, as a learning advisor, help students understand their learning styles and timetables; that is, where (in the week) each of their subjects take place and when each of the assessments is due. This is designed to help students establish an effective study routine to manage their workload,

through previewing and reviewing course materials, planning to complete assignments on time, and scheduling physical activities to help build their fitness and help them be more aware of their physical experiences. Regular exercise has been shown to improve brain functioning (Deslandes et al., 2009). Such measures are designed to help students reduce their chances of becoming overwhelmed. I also teach them about the BFM map and help them understand the territory they can traverse when feeling anxious. The BFM meditation helps them return to their centre (PCI), thereby reducing their levels of anxiety. This workshop has run regularly for two years and the students who attended have all given positive feedbacks, although their comments were not captured as part of my informal action research. At the same time, I have continued my one-one and group support using the same approach with all students whenever anxiety is present in their experience.

Small modifications to the approach occur constantly to cater to different students' levels of anxiety. When students are obviously overwhelmed, I extend the chat about pressing issues on their mind for longer before beginning the 5-minute meditation. This way, students can be relieved and stay present to the following procedures that help ground them. Sometimes, the only thing the students and I manage in that appointment might be just the chat, so they are at least able to feel heard, seen and safe before the next step of processing academic information. They can always go to a drop-in session for academic support to resolve their query if I am unable to continue working with them after that appointment.

My approach aims to directly help students self-manage their anxiety with specific learnt/taught steps. In comparison, other studies on maths anxiety (Khasawneh et al., 2021) offer only vague advice, suggesting that educators and parents take measures to change the way maths is taught, that parents act as role models to treat maths as an easy subject; and that learners become sufficiently aware and confident in themselves to self- regulate. The practical skills I offer not only support my students to succeed in their studies but also equip them to self-manage any anxiety they may experience in their future workplace or life situations.

Limitations

This exploration was carried out during my normal daily work as a four-day-a-week student learning advisor. The problem was initially identified in my appointments with students, and my subsequent investigations were done largely in my own time. Students were not involved other than in our discussions during appointments. The project suited my schedule and that of the students; that is, no one needed to take time out to carry out a formal research. Instead, I followed the procedures that an action researcher would take to find a solution to the problem. Evaluations came from students' verbal responses and feedback at the end of each appointment, as well as their written comments which they voluntarily dropped in the evaluation box. So one of the limitations is that my readers are invited to take up this approach based on their trust of the empirical data I have presented here in this paper.

Recommendations

My recommendation to colleagues when applying this approach in their learning advising practice is to watch out for instances when students engage only as a mental exercise: in other words, they understand, but do not "feel" the difference. For example, they may take a deep breath but still remain in a state of anxiety. The goal is to help ground students in their bodily existence so that they can be present to their learning experiences. Although counselling (outside of a learning advisor's scope) may also be necessary to help students address any underlying causes, adopting the body-mind-feelings approach is one way learning advisors can support anxious students in their practice. Future research could also investigate other approaches to alleviate students' anxiety within the learning advisor role.

Conclusion

This article shares the wisdom that psychosynthesis has given me to help nursing students self-manage maths anxiety during their studies. As colleagues will recognise, this approach is also applicable for students feeling anxious with other assessments. The skills and awareness developed through this approach will not only help students self-manage anxiety while studying drug calculation, it can also become part of their kete of resources to draw support on in their personal and future professional life.

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