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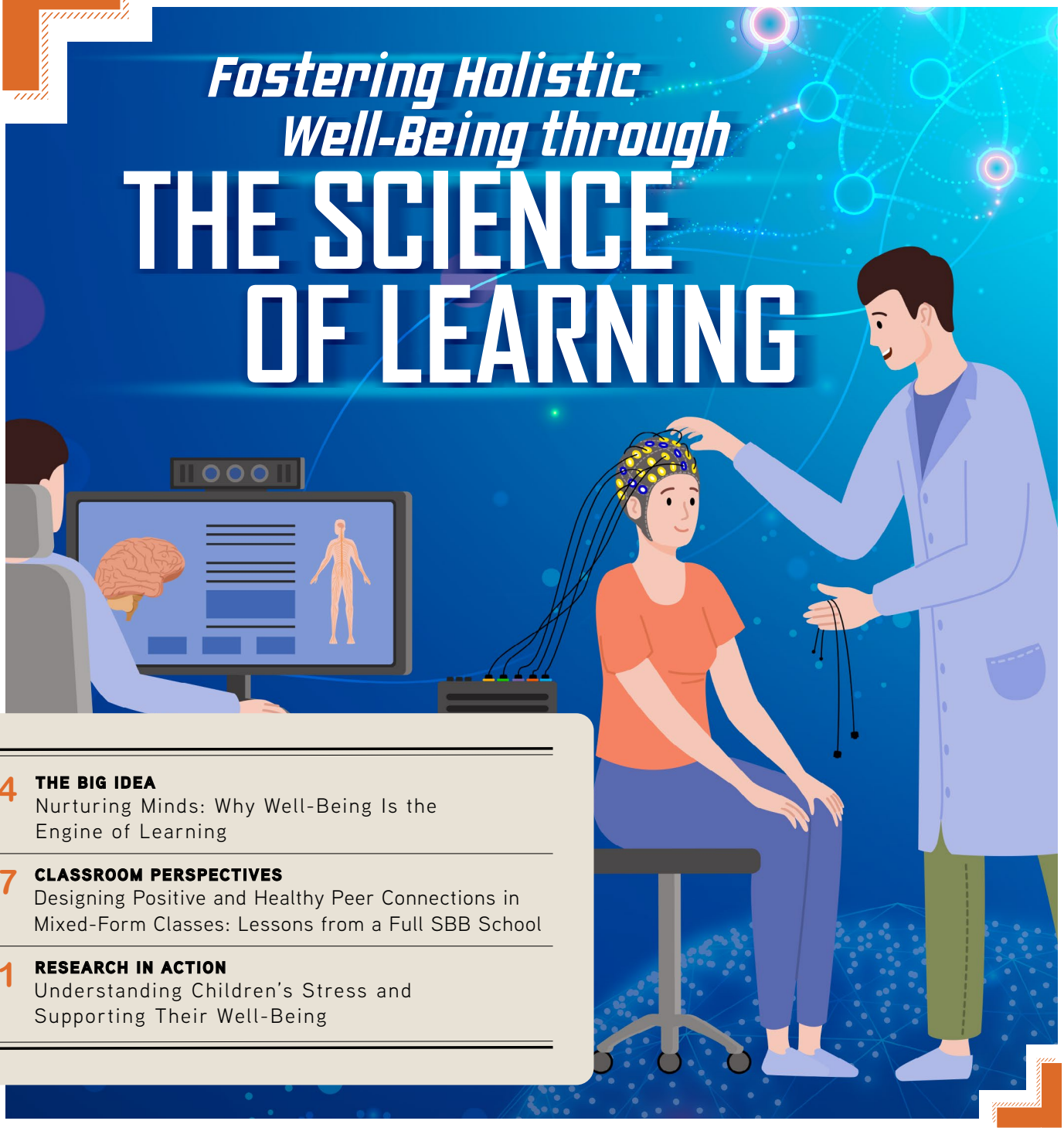
Fostering Holistic Well-Being through THE SCIENCE OF LEARNING



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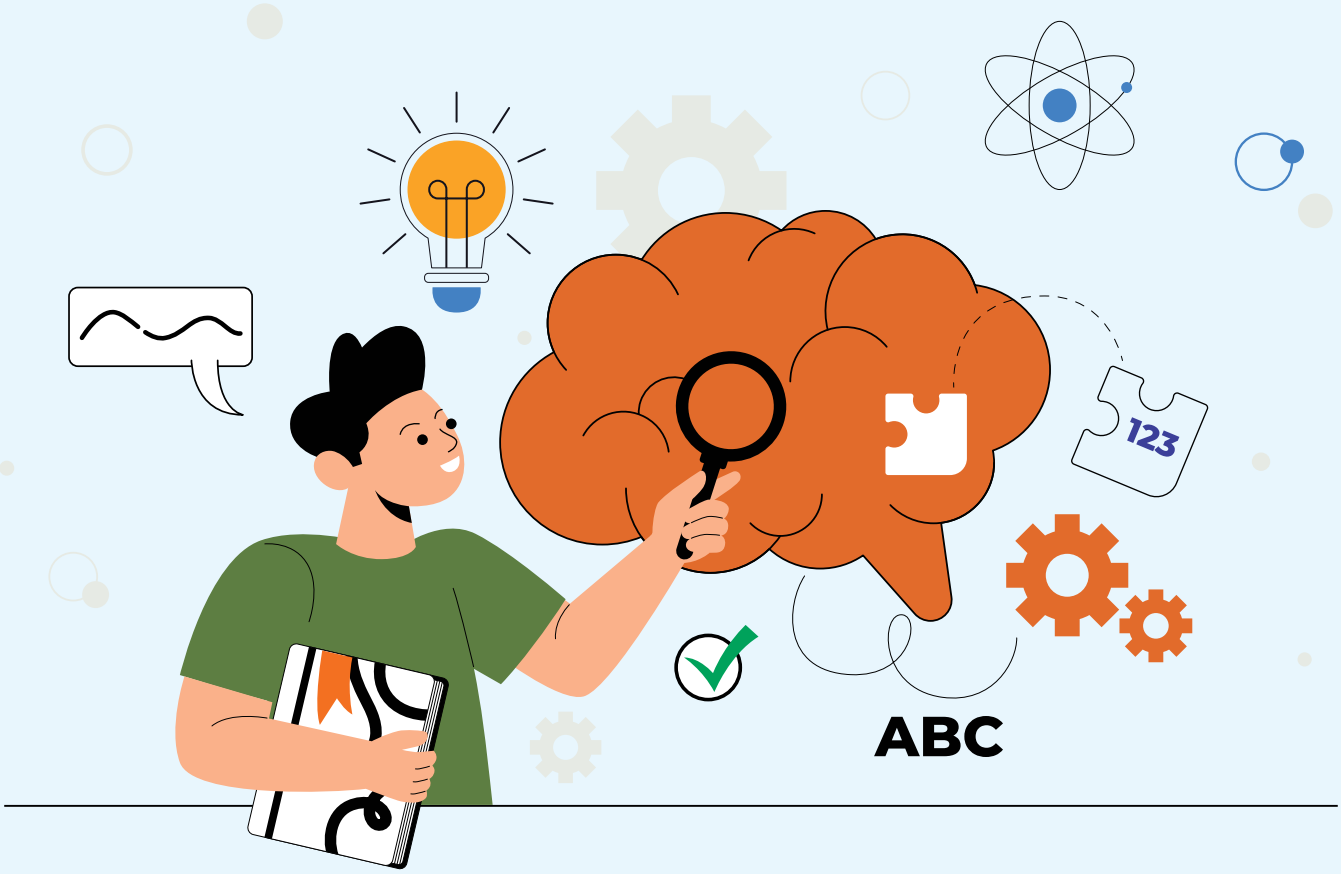

Learning to Thrive: The Science of Learning and Student Well-Being

Learning has always been at the heart of education. Increasingly, however, educators are recognizing that how students learn is inseparable from how they feel, relate and make sense of the world around them. In this issue of *SingTeach*, we turn our attention to the science of learning and its growing role in deepening our understanding of student well-being.

The science of learning brings together insights from psychology, neuroscience, education and the social sciences to illuminate the processes that shape how people learn across contexts and stages of life. At its core is a simple but powerful idea: learning does not happen in isolation from emotions, relationships or purpose. Well-being is not an add-on to learning—it is a condition that enables it.

Across schools, teachers are navigating increasing complexity. They support students' academic growth while attending to their social and emotional needs, responding to diverse learning profiles and making sense of rapid technological change.

This issue explores how science-informed approaches can help educators design learning environments that are intellectually rigorous, emotionally supportive and deeply human. Together, the articles in this issue invite us to reframe learning and well-being as mutually reinforcing pursuits. They remind us that when educators attend to the conditions under which students feel safe, motivated and purposeful, deeper learning becomes possible.

We hope this issue offers you not only ideas and evidence, but also encouragement to continue asking thoughtful questions about what it means to help every learner thrive in a complex and changing world.

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PEOPLE

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Nurturing Minds:

WHY WELL-BEING IS THE ENGINE OF LEARNING

As student experiences and classroom contexts grow more complex, well-being plays an increasingly important role alongside academic learning. Drawing on insights from the Science of Learning in Education Centre (SoLEC) at NIE, this article explores how research at the intersection of cognition, emotion and social connection is reshaping how we understand learning, flourishing and the role of schools in nurturing the whole child.

LEARNING BEGINS WITH HUMAN FLOURISHING

When educators talk about learning, achievement is often the first word that comes to mind. Yet, at the 2025 Science of Learning Symposium hosted by NIE's Science of Learning in Education Centre (SoLEC), the message was clear: learning cannot be separated from well-being.

Opening the symposium, NIE Director Prof Liu Woon Chia situates this focus within a broader moment of reflection and renewal. As Singapore marks 60 years of nation building, and NIE celebrates 75 years of transforming teacher education, the science of learning has emerged as a strategic growth area that bridges neuroscience, psychology, technology and education.

"Evidence shows that well-being is the engine of learning," Prof Liu emphasizes. When students feel psychologically safe, socially connected and emotionally supported, they are better able to engage deeply with ideas and persevere through challenges. In contrast, stress, anxiety and a lack of belonging can inhibit learning, no matter how carefully lessons are designed.

This year's symposium theme, *Nurturing Minds: Fostering Holistic Well-Being through the Science of Learning*, reflects a growing recognition that classrooms must attend to cognitive, emotional and social dimensions together. For SoLEC, this is not a departure from academic rigour, but a more precise understanding of how learning actually happens.

A SCIENCE-INFORMED LENS ON FLOURISHING

According to Prof David Hung, Centre Director of SoLEC, the science of learning offers educators a powerful lens to understand student well-being and flourishing because it brings together how people think, feel and relate to others.

At the heart of this lens is SoLEC's 4 LIFE framework: Lifelong, Lifedeep, Lifewide and Likewise learning, with self-regulation at the centre. "Human flourishing requires all four LIFEs," Prof Hung explains. "Self-regulation is the heartbeat that sustains them."

Traditional schooling has often focused narrowly on academic outcomes, but research in the science of learning shows that students do not learn despite their emotions and relationships. They learn with and through them. Stress, anxiety and psychological threat can shut

down learning, while a sense of purpose, connection and safety opens students up to challenge and growth.

Flourishing, Prof Hung adds, goes well beyond test scores. It includes developing the capacity to think deeply, regulate emotions, appreciate diverse perspectives, persist through failure and pursue meaning. "These capacities are not peripheral. They are foundational to resilience, character and lifelong learning," he explains.

Given how rapid artificial intelligence is developing, this human-centred focus becomes even more critical. As machines take on routine cognitive tasks, what remains distinctively human—empathy, ethical reasoning, creativity and self-regulation—must be intentionally nurtured in schools. "The science of learning", Prof Hung notes, "helps educators design learning environments that cultivate these qualities alongside academic understanding."

FROM ADD-ON TO INTEGRATION IN THE CLASSROOM

Despite growing awareness of the importance of well-being, integrating it meaningfully into everyday classroom practice remains challenging. A/P Teo Wei Peng, Deputy Centre Director of SoLEC, observes that many teachers feel caught between competing demands.

"Teachers often have to balance many priorities," he says. "These include students' learning and well-being, curriculum coverage, assessment demands and school administrative responsibilities. Amid these competing considerations, well-being practices can sometimes be perceived as additional activities rather than as an integral part of everyday teaching and learning." Some teachers also feel unprepared to support emotional regulation or mental well-being, unsure of what to do or how to respond to students' needs.

The science of learning challenges this separation. Instead of treating well-being as a separate programme, it reframes it as integral to effective instruction. Insights about self-regulation, motivation and emotion help teachers design lessons that manage cognitive load, support self-regulation and create emotionally safe, high-engagement classrooms.

This shift is also reshaping professional development. Rather than relying on one-off workshops, teacher learning is becoming more job-embedded, personalized and practice-driven. Coaching, learning communities and science-informed design principles allow teachers to experiment, reflect and refine their practice in real contexts. Over time, schools themselves begin to function as learning organizations.

What excites Wei Peng most is the growing convergence between research and practice. "There is a shared language emerging," he notes, "one that helps teachers make sense of stress, motivation and social connection in ways that are both evidence-based and deeply human."

MEASURING WHAT MATTERS IN LEARNING AND WELL-BEING

For Dr Imelda Caleon, Principal Education Research Scientist at NIE whose main research interests is in the areas of resilience and well-being, the strength of the science of learning lies in its holistic and integrative approach. "By drawing on interdisciplinary perspectives and diverse methodologies, researchers can better understand not just what students learn, but how they experience learning," she shares.

Traditional measures often capture outcomes after the fact. In contrast, science of learning approaches allow researchers to examine learning processes in real time. By analysing and integrating multimodal data collected using diverse approaches, such as brain imaging, physiological response monitoring and eye tracking, researchers can gain comprehensive insights into students' engagement, emotional states and social interactions.

For example, studies show that students are more engaged and more likely to remember information when their brains are synchronized with others in the classroom, highlighting the importance of social interaction in learning. Research on gratitude interventions has also revealed how simple practices can activate brain regions associated with long-term well-being.

Crucially, learning and well-being are mutually reinforcing. Drawing on the broaden-and-build theory of positive emotions, Imelda explains that positive emotional experiences can broaden learners' perspectives, encourage intellectual risk-taking and build psychological resources that support learning and creativity. In her own research, a sense of meaning and purpose, which is a key aspect of well-being, was found to be associated with academic resilience among students who started secondary school with low academic performance.

Well-established pedagogical approaches such as active learning, collaborative learning and peer instruction do not only enhance academic outcomes. Increasingly, they are also shown to support students' well-being. Imelda notes that when educators understand the mechanisms behind these approaches, they are better equipped to embed them intentionally into practice.

FROM RESEARCH TO SYSTEM-LEVEL IMPACT

Beyond classrooms, NIE and SoLEC play a unique role in supporting national priorities in mental well-being and educational excellence. As Imelda notes, this involves three interconnected functions: knowledge generation, knowledge integration and knowledge translation.

At SoLEC, researchers generate local evidence on learning and well-being using emerging research technologies. These findings are then integrated with international

research to identify what is distinctive to the Singapore context and what cuts across cultures. Through partnerships with schools and MOE, this knowledge is translated into teacher education, professional learning and school-based innovation.

Such research-practice partnerships are essential for sustaining impact. Rather than prescribing solutions, they create spaces for educators and researchers to learn together, test ideas and adapt insights to real-world constraints. Over time, this builds capacity not just to implement interventions, but to think scientifically about teaching and learning.

TOWARDS SCHOOLS THAT NURTURE GROWING MINDS

As Prof Liu reminds symposium participants, the science of learning only becomes meaningful when it is enacted in classrooms by empowered educators. As schools navigate AI, digital innovation and evolving societal pressures, staying grounded in human flourishing is more important than ever.

Seeing well-being as the foundation of learning invites a profound shift in how success is defined. It moves education beyond the accumulation of knowledge towards the cultivation of resilient, curious and socially connected individuals.

If the science of learning offers one enduring insight, it is this: when schools nurture minds in all their complexity, learning does not diminish. It deepens, endures and becomes a force for both individual growth and collective good. ■

ABOUT THE INTERVIEWEES

Prof Liu Woon Chia *is Director of National Institute of Education (NIE), Singapore.* ***Prof David Hung*** *is Centre Director of NIE's Science of Learning in Education Centre (SoLEC) and is also the President's Chair in Learning Sciences.* ***A/P Teo Wei Peng*** *is Deputy Centre Director of SoLEC and he currently heads the Motor Behaviour Laboratory at NIE.* ***Dr Imelda Caleon*** *is Assistant Dean (Impact and Partnerships) at the Office for Research and Principal Education Research Scientist at SoLEC.*

Designing Positive and Healthy Peer Connections in Mixed-Form Classes: Lessons from a Full SBB School

The implementation of Full Subject-Based Banding (Full SBB) has reshaped how students learn and interact in secondary schools. As students from different academic streams come together in mixed-form classes, schools must attend not only to curriculum and assessment, but also to the social dynamics that emerge in these new learning environments. At Edgefield Secondary School, they see the need to better understand how peer relationships form within mixed-form classes and how these relationships can be intentionally supported. Miss Alicia Mak, School Staff Developer at Edgefield Secondary School, shares her experience collaborating with NIE researchers to examine students' peer networks and how research-informed insights guide classroom practices to foster inclusion, belonging and positive peer interactions.

UNDERSTANDING PEER DYNAMICS IN A FULL SUBJECT-BASED BANDING CONTEXT

As a pilot school for Full Subject-Based Banding (Full SBB), Edgefield Secondary School wants to better understand how students from different academic streams interact when placed together in mixed-form classes. Bringing students with diverse learning backgrounds into the same class creates new possibilities for interaction, but also raise important questions about emerging class dynamics, friendship formation and students' sense of belonging. Ensuring that students build healthy, inclusive and supportive peer networks quickly becomes a key priority for them.

This focus aligns well with the work of Dr Imelda Caleon and her NIE research team, who are examining how students' social networks develop in mixed-form class environments. "Seeing the relevance to our Full SBB context, we decide to collaborate with the team to better understand how students are connecting and how schools can support more positive peer relationships," Miss Alicia Mak shares.

In the initial phase of the study, social-network data are collected within each form class. "These data allow us to map out how students are connected, which peers they gravitate towards and whether the mixed-form structure is promoting interaction across posting groups," Alicia remarks. Beyond fulfilling the study's requirements, the school extended this work by examining peer networks across CCAs and teaching groups, giving them a broader understanding of how students are connected both within and beyond their form classes.

In the second phase, the NIE team develop and implement a five-week Peer Power lesson package as an intervention to support selected students in strengthening their peer connections and forming new friendships. Students are identified based on the data from Phase 1, as well as form teachers' observations and inputs. The intervention aims to increase overall connectedness while providing structured opportunities for students who will benefit from additional support in building peer relationships.

USING DATA TO INFORM CLASSROOM PRACTICE

Participating in this research study has prompted them to be far more intentional in planning group work and structuring classroom interactions. "The social-network analysis (SNA) provides a deeper insight into the class dynamics, allowing us to make more informed decisions about grouping students for projects and discussions, especially during CCE lessons and our school's Future-Ready Programme," Alicia explains.

Knowing which students are well-connected and which are more socially isolated helps them design groupings that intentionally encourage more inclusive interactions.

When students from different posting groups work together intentionally, they begin to see one another for their strengths rather than their academic labels. Over time, students become less conscious of stream differences and more focused on how each individual can contribute meaningfully to the group.

The data also guide practical decisions such as seating arrangements. Students who need additional support can be placed near peers they felt comfortable with or who are able to support them academically or socially. This approach has been particularly helpful in mixed-ability teaching groups, where both academic readiness and existing social relationships are considered. "By strengthening peer support structures in this way, we create more opportunities for students to learn from one another, both academically and socially," Alicia adds.

IMPACT ON STUDENTS' BEHAVIOUR AND LEARNING

They observe meaningful changes in students' behaviour and attitudes, especially among those who participated in Phase 2. Form teachers share that a few of these students become more open to forming new friendships and gradually show increased confidence in class. Some students who are previously quieter begin speaking up more frequently and participating more actively during discussions.

In academic teaching groups, positive shifts are also evident. When students are intentionally seated or grouped using insights from both academic profiles and SNA data, those who need more support are more willing to seek help from their peers. At the same time, students who are stronger in certain subjects become more comfortable offering support. "These interactions happen naturally once students are placed in mindful, data-informed groupings," Alicia adds.

These outcomes reinforce the importance of peer relationships in a child's development. When students feel connected and supported, they are more willing to take academic risks, share ideas and seek help. Peer-supported environments help them build confidence, develop collaboration skills and understand different perspectives. "Over time, these skills contribute not only to their academic learning, but also to their social growth and overall well-being," Alicia shares.

BUILDING A SCHOOL WHERE EVERY STUDENT BELONGS

Moving forward, they hope to continue using SNA to support the ongoing implementation of Full SBB, especially as incoming cohorts adjust to the mixed-form class structure. "Each cohort brings its own social patterns and dynamics, and regular data collection can help us monitor integration across streams and identify students who may need additional support," Alicia says.

They also aim to build on their experience with the Peer Power lesson packages. There is strong potential to broaden their use beyond form classes, whether through CCAs, school-wide bonding programmes or other platforms where students naturally interact with peers outside their immediate groups. "By extending these practices to more learning contexts, we hope to create even more opportunities for students to expand their friendships and strengthen their sense of belonging," Alicia shares.

Another area they hope to explore is the long-term development of peer networks. Tracking these networks over time will give them a better understanding of how friendships evolve through the secondary school journey and how different interventions can influence these patterns. "This will allow us to design timely, targeted support for students who may be at risk of social isolation, ensuring that no student slips through the cracks," Alicia adds.

"Ultimately, our vision is to cultivate a school culture where every student, regardless of posting group, background, or profile, feels connected, valued and supported," Alicia concludes. By continuing to integrate research-based practices into their programmes and decision-making processes, they hope to strengthen not only academic learning but also the social and emotional growth that is essential for students to thrive. ∎

How has research-informed practice influenced a shift in the school's culture? Scan the QR code to read all about it.

ABOUT THE INTERVIEWEE

***Alicia Mak** is the School Staff Developer at Edgefield Secondary School. She is a Biology teacher by training and headed the school's Research Committee from 2019 to 2024, overseeing research collaborations and supporting the use of research-informed practices to enhance teaching and learning. This project is headed by Dr Imelda Caleon from NIE who is one of the keynote speakers at the Strategic Growth Area—Science of Learning Symposium 2025.*

Empowering Students to Discover the Science of Well-Being

What comes to mind when you hear the word "well-being"? Most of us would associate it with positive emotions such as happiness, contentment or a sense of purpose. However, well-being also includes negative indicators such as stress, anxiety and depression. In this article, Associate Professor William Tov, Deputy Director of the Centre for Research on Successful Ageing (ROSA) at Singapore Management University, shares insights on the science of well-being—what it really means to "feel well", how culture and life circumstances shape our happiness, and how teachers can support students' well-being.

WELL-BEING LITERACY FOR STUDENTS

Well-being literacy refers to the vocabulary, knowledge and communication skills one needs to intentionally maintain and improve the well-being of oneself and others. According to Associate Professor William Tov, whose research examines the multi-level processes underlying well-being, it is a skill that can be taught and nurtured in students.

"Well-being literacy is more important than ever, especially in this age of social media," he says. "Students today are constantly exposed to curated images and comparisons that can shape how they see themselves and others."

By helping students develop the language and awareness to talk about emotions, relationships and purpose, teachers can empower them to recognize what supports or undermines their well-being—and to take intentional steps toward a healthier mindset.

MAKING SENSE OF WELL-BEING

When it comes to nurturing students' well-being, William highlights three key distinctions that can help teachers guide their students to better understand—and express—what it truly means to "feel well."

The first is the distinction between **well-being state** and **well-being trait**.

"Well-being state refers to our moods that can shift from moment to moment, while well-being trait reflects a person's general outlook and enduring patterns of thought and emotion," he explains. "Changing your well-being trait requires deeper changes in your habits, lifestyle and circumstances."

When students can tell the difference between the two, they learn that ups and downs are a natural part of life—and that developing healthy long-term habits is what really helps them thrive.

The second distinction is **hedonic well-being** and **eudaimonic well-being**. Hedonic well-being is about pleasure and enjoyment, while eudaimonic well-being refers to meaning, purpose and personal growth.

"Understanding the difference between hedonic and eudaimonic well-being helps students become more aware of what contributes to their happiness," he shares. For example, when students can identify moments of hedonic well-being, such as having fun with friends or enjoying a hobby, they learn to appreciate everyday sources of joy.

At the same time, recognizing eudaimonic well-being—which can come from pursuing goals, finding meaning or helping others, even if they are challenging—encourages them to look beyond short-term pleasures and focus on what gives their lives purpose.

The third distinction is the difference between **affective well-being** and **cognitive well-being**.

"Affective well-being relates to our emotions—both the positive affect (PA) such as happiness and excitement, and the negative affect (NA) such as anger, sadness or anxiety. Cognitive well-being, on the other hand, has to do with how satisfied we are with our lives as a whole," he explains. For example, whether our basic needs—such as having enough to eat or a safe place to live—are met can strongly influence our sense of life satisfaction.

"When it comes to improving well-being, the actions one takes depend on which aspect is being addressed—whether it's about fostering PA or managing NA, or whether one wants to enhance overall life satisfaction," he adds.

UNDERSTANDING WHAT SHAPES WELL-BEING

What are the key factors that drive our sense of well-being? William shares four key findings that reveal how our happiness is shaped—not just by who we are, but also by the actions that we take and the world we live in.

Well-Being Can Be Measured

We often think of happiness or life satisfaction as purely personal, and something that cannot be quantified. However, research says otherwise. "Well-being is not just a matter of opinion," says William. "It can be measured and studied scientifically."

Studies show that people's self-reported well-being actually correlates with objective outcomes such as health, longevity and even immune system functioning. It also links with broader environmental indicators like air quality, crime rates and climate.

"Understanding that well-being has measurable patterns helps students see that it's a serious field of study backed by scientific evidence," he notes.

People Do Not Always Adapt Quickly to Change

Another important insight is that people don't simply "bounce back" from major life events. A 15-year study in Germany tracked how people's life satisfaction changed after unemployment. Unsurprisingly, happiness dipped when they lost their jobs—but what is striking is that even a year later, life satisfaction had not fully recovered.

"Life circumstances can have a lasting impact on our well-being," William explains. "We shouldn't assume people can naturally adapt to life-changing events."

This reminds educators and students that emotional recovery often requires time, intention and support. He reminds us that improving well-being isn't about instant positivity; it is also about making consistent effort to create conditions where one can truly thrive.

Culture Shapes How We Experience Well-Being

Our social environment also influences how we define and express happiness. For example, people in Western cultures tend to value high-arousal positive emotions such as excitement and enthusiasm. In contrast, many Asian cultures value low-arousal emotions such as calmness, peace and contentment.

"In a lot of Asian cultures, it's more important to pay attention to your social context and to maintain harmony," William says. "In the US, which is more individualistic, expressing yourself openly is more acceptable."

Even the relationship between positive and negative emotions varies across cultures. In the West, people who feel more positive emotions tend to feel fewer negative ones. But in Asia, it's more common to experience both at once—for instance, feeling grateful and sad at the same time.

"Understanding these cultural differences helps us become more context-sensitive," he explains. "People from different backgrounds may prefer to feel or express well-being in different ways."

Well-Being Has Real Benefits

Research shows that positive emotions are beneficial. Happier people are less likely to fall sick, more likely to build strong relationships and even tend to earn more over time. One long-term study found that cheerful college students from 1976 were earning more 20 years later—regardless of how wealthy their families were.

"Many students in Singapore might not see well-being as important," William observes. "They might even think it is selfish. But it is not. Taking care of your well-being doesn't take away from success—it supports it."

Happiness isn't just a feeling; William reminds us that understanding the science of well-being helps both teachers and learners see that positive well-being builds a strong foundation for healthier, more meaningful and successful lives. ■

ABOUT THE PRESENTER

William Tov *is Associate Professor at the Singapore Management University. He also serves as co-deputy director of the Centre for Research on Successful Ageing (ROSA) which manages the Singapore Life Panel—a high-frequency monthly survey of the well-being of older adults in Singapore. This article is based on his presentation titled "Teaching the Science and Practice of Well-Being Science" at the Strategic Growth Area—Science of Learning Symposium 2025.*

Understanding Children's Stress and Supporting Their Well-Being

What does stress look like in the lives of children, and how can schools support them more effectively? Drawing from research in a local primary school, NIE Education Research Scientist Dr Munirah Shaik Kadir unpacks the science behind stress, the realities of at-risk learners and what educators can do to strengthen children's holistic well-being. She also sheds light on pressure in Singapore, and how home and school environments can better support students in today's high-pressure landscape.

UNDERSTANDING STRESS IN CHILDREN

Stress is often thought of as something to be avoided, yet psychologists remind us that not all stress is harmful. Stress arises when individuals feel that the demands placed on them exceed their capacity to cope, and children experience this just as frequently as adults do. What differs is the impact: because children's brains are still developing, their responses to stress can leave longer lasting imprints on learning, behaviour and emotional regulation.

"Children's prefrontal cortex—responsible for self-regulation, planning, decision-making—is still maturing. This makes them more vulnerable to stress. While it can be harmful if chronic, unmanaged and unsupported, most times, stress can also be good," Dr Munirah from the Centre for Research in Pedagogy & Practice at NIE shares.

Although adults and children share the same biological stress system involving the amygdala, prefrontal cortex and hippocampus, children are more vulnerable to stress. Their brains are also more plastic, meaning stress can leave longer-lasting effects. Adults rely on developed coping strategies, but children depend heavily on external support from teachers, parents and peers. This makes the classroom environment a significant protective factor.

"In child psychology, we categorize stress into three parts: positive stress, tolerable stress and toxic stress," Munirah explains. **Positive stress**—such as the first day of school or meeting new classmates—is short-lived and builds resilience. **Tolerable stress** arises from more serious experiences like losing a family member, but strong relationships can help children cope. **Toxic stress**, however, occurs when stressors persist without support. This keeps cortisol levels high and disrupts the brain regions responsible for memory, emotion regulation and focus.

INSIGHTS FROM A LOCAL PRIMARY SCHOOL STUDY

Children's well-being involves physical, emotional, psychological and social health. When these domains are in place, children can learn more effectively because they feel safe, motivated and connected. Research consistently shows that strong well-being predicts better academic achievement and healthier long-term outcomes. Globally, many countries, including Singapore, now recognize well-being as a key priority.

To better understand stress and well-being in authentic school environments, Munirah and her research team conduct a study with Primary 4 to 6 students aged 10 to 12. A total of 343 students took part, and both teachers and students were later interviewed. Students are grouped into two broad categories: at-risk (based on indicators like SES, absenteeism or home circumstances) and non-at-risk. The study measure their emotional, psychological

and social well-being, which allow the researchers to explore whether well-being differs across groups and what protective factors might be present.

When Munirah's team examines the well-being data, several findings stand out. Emotional well-being shows the largest gap, with at-risk students reporting more negative emotions than their peers. In contrast, psychological and social well-being appear similar across both groups, suggesting that even children facing external challenges can still maintain a strong sense of purpose, belonging or confidence in their relationships.

Interviews shed further light on these findings. Many at-risk children describe themselves as "used to stress," and several highlight positive coping habits such as seeking support from friends or engaging in physical activity. They also share how they benefit from after-school programmes organized by the school, including support from school counsellors and mentor teachers. Teachers observe that with the right environment and support systems, these children often display optimism, buoyancy and strong self-worth.

"These children are very good at bouncing back when they face problems," Munirah notes. Despite adversities, many maintain hopefulness and a belief in their own abilities. At this stage, they can still be supported in meaningful ways. These findings challenge deficit views of at-risk learners and underscore the importance of building on their strengths.

ACADEMIC OUTCOMES A TOP STRESSOR IN CHILDREN

"Exams emerged as the dominant source of stress for all students. Fear of receiving low grades, waiting for results and preparing for major assessments were common stressors," Munirah shares.

However, differences surface between groups. At-risk learners express a stronger fear of being left out socially. Their stress is tied to belonging and acceptance as much as to academic performance. Non-at-risk learners are more focused on academic concerns, including lack of sleep from studying and worries about future pathways. Across the board, academic stress remain central, but emotional and social stressors shape the lived experiences of many at-risk children.

WHAT THIS MEANS FOR SCHOOLS

Understanding how children experience stress helps educators identify when a child needs support and what kind of intervention is appropriate. It also reminds us that children's outward behaviour may reflect deeper emotional needs that require understanding rather than quick correction.

The findings from Munirah's study highlight the importance of creating environments that buffer stress and build resilience: predictable routines, warm teacher-student relationships, opportunities for student voice and classrooms that normalize help-seeking rather than shame it. "At the system level, many Singapore schools are already strengthening mental health literacy, improving access to school-based counselling and engaging parents to understand how academic pressure and comparison can negatively affect children," Munirah says.

As stress becomes an increasingly relevant part of childhood, particularly in a fast-paced and competitive society, research like Munirah's deepens our understanding of what children need to flourish. It highlights the hidden strengths among at-risk students and reinforces the idea that well-being is not merely the absence of stress, but the ability to harness manageable stress as a source of motivation, supported by strong relationships and meaningful learning experiences that help every learner grow.

As Munirah puts it, "Every time we buffer stress with the right support, we are not only protecting our children's brains, but we are also nurturing their potential to learn, flourish and contribute meaningfully to society." ∎

How can we better support children in handling stress? Scan the QR code to find out.

ABOUT THE PRESENTER

Munirah Shaik Kadir *is Education Research Scientist at NIE's Centre for Research in Pedagogy and Practice. Her research interests include science education, positive education, motivation and student and teacher well-being. This article is based on her presentation titled "Understanding Children's Stress and Supporting their Holistic Well-Being: Research Insights and Practical Strategies" at the Strategic Growth Area—Science of Learning Symposium 2025.*

Roots of Resilience: What Helps Adolescents Bounce Back?

What is the essence of resilience, and how does research identify the protective factors that enable individuals, especially adolescents, to adapt positively in the face of significant adversity? NIE Principal Research Scientist Dr Imelda Caleon shares insights into resilience, highlighting the complementary internal and external factors that shape young people's capacity to thrive at the recent Strategic Growth Area–Science of Learning (SGA-SoL) Symposium 2025.

UNDERSTANDING RESILIENCE AND WHAT SUPPORTS IT

When we think of resilience, we might imagine a tree that bends when strong winds blow and then stands upright again after the storm. In a similar vein, resilience can be described as the ability to "bounce back" and adapt positively in the face of significant challenges. It is not just about getting through hard times, but about growing and thriving despite them.

Some risk factors, such as language or financial difficulties, make it harder for young people to follow typical developmental trajectories. But protective factors help cushion the effect of these risk factors and strengthen their capacity to cope with adversities. They act like a "psychosocial resource" giving young people what they need to manage and overcome challenges that might otherwise hold them back.

Returning to the tree metaphor, Dr Imelda Caleon who is also Assistant Dean at NIE's Office for Research highlights two critical, connected elements that promote resilience: strong roots and fertile soil. Strong roots represent internal protective factors that provide strength from within, such as mindsets, beliefs, and a sense of purpose. Fertile soil represents the protective factors from the external environment, like supportive relationships and social systems, that nourishes growth and allows resilience to develop.

THE STRONG ROOTS: RESILIENCE FROM WITHIN

Resilience often emanates from a student's inner strengths. These qualities act as protective factors, helping students not just cope with challenges, but grow from them.

The Power of Mindset

Mindsets, which shape how students interpret experiences and respond to such experiences, are key to resilience. Research highlights three ways mindsets are particularly important:

1. **Stress**: Students with a stress-debilitating mindset see stress as harmful and may disengage from the challenges that they face, thereby increasing the risk of

developing poor school outcomes and depression. In contrast, students with a stress-is-enhancing mindset see stress as energy or motivator that can boost focus and performance. Resilient students are more likely to adopt this positive view about stress and use active coping strategies, like problem-solving and emotional regulation.

2. **Failure**: Resilient students see failure as a turning point rather than an endpoint. Setbacks are considered as opportunities to learn, improve and adjust strategies. One student described how a failure prompted them to study not just more, but "better."
3. **Growth**: Data from Singaporean students in the Programme for International Student Assessment (PISA) shows that a growth mindset is a strong predictor of academic resilience, especially among socially disadvantaged students.

The Driving Force of Resilience: Having a "Why"

A clear sense of purpose motivates students to overcome obstacles. Highly resilient students often have long-term, strategic and "self-transcendent" goals, such as supporting their family or contributing to the community. Low-resilience students tend to have shorter-term, self-focused goals.

A known Austrian psychiatrist, best-selling author, and Holocaust survivor, Viktor Frankl, shared that a strong sense of purpose helps people rise above their suffering. It allows them to reframe challenges—see such challenges as part of a bigger picture rather than dwell on setbacks.

THE FERTILE SOIL: BUILDING AN ENVIRONMENT FOR RESILIENCE

"Resilience grows best when students are immersed in supportive environments. Just as a tree needs fertile soil to develop strong roots, students need enabling external factors—especially strong and caring relationships—to thrive," Imelda shares.

The Power of Relationships

Research shows that the quality of relationships with peers, teachers and parents predicts resilience. "For adolescents, peers serve as the strongest relational factor shaping school resilience, while parents and teachers remain stronger forces for resilience across life contexts," Imelda explains.

Support from others can be transformative. For example, a student who had missed half a semester was ready to give up, but encouragement from her teacher and friends—a "second chance"—helped her turn things around. She studied hard and did well in her secondary school. Students with lower resilience often cope alone, raising concern that those who need support most are sometimes the least likely to seek it.

Neuroscience confirms the power of connection in developing resilience. Imelda highlighted the results of a study that was conducted by a group of researchers

from Germany: Participants preparing for a stressful presentation showed lower stress hormone levels when a friend was present, demonstrating how social support helps in reducing physiological responsiveness to stress.

The Teacher's Touch: Supporting Resilience in the Classroom

"Teachers play a central role in nurturing resilience," Imelda emphasizes. Her research also highlights "turnaround teachers"—those who taught classes characterized by a relatively higher percentage of academically resilient students—and the practices that set them apart:

- **Attunement Language**: Simple phrases like "Are you okay?" show that teachers notice and understand students' feelings.
- **Follow-Through**: When a student says they are not okay, turnaround teachers check in further, making their support sustained and meaningful.

Communicating high expectations can feel stressful for students. In an Australian study cited by Imelda, the most effective teachers, according to students, frame expectations positively: They build confidence ("makes me feel good about myself"), encourage autonomy ("creating what's happening") and take time to understand their needs ("checking in on me").

NURTURING THE ROOTS OF RESILIENCE

Resilience develops through a combination of inner strengths and supportive environments. Resilience from within is grounded in strong roots—adaptive mindsets and a clear sense of purpose. Resilience also grows in the fertile soil of positive, nurturing relationships. Adolescents with strong roots in rich soil are well-positioned to develop into resilient individuals.

When helping young people build resilience, Imelda shares that it is important to keep three key points in mind:

1. **Resilience is domain-specific**. A student who shows resilience academically may not have the same strength socially or emotionally. Success in one area does not automatically mean a student is thriving in all areas.
2. **Resilience can be developed**. It is not a fixed trait —new experiences and opportunities allow young people to learn and strengthen resilience at any age.
3. **Resilience is a journey**. For some individuals, building resilience takes time. Turning points, such as new opportunities, second chances or supportive relationships, can help them develop resilience later in life.

Adults play a key role in creating environments that nurture resilience. Teachers, parents and researchers can provide supportive conditions, but one of the simplest and most powerful tools is modelling resilience ourselves. By talking openly about our experiences and how we navigate challenges effectively, we give young people a roadmap for managing their own difficulties. ∎

What are some effective strategies that can help foster internal resilience in students? Scan the QR code to read all about it.

ABOUT THE PRESENTER

Imelda Santos Caleon *is Assistant Dean (Impact and Partnerships) with the Office for Research at NIE, Singapore. She is also Principal Education Research Scientist at NIE's Science of Learning in Education Centre. Her research focuses on resilience, well-being, mindsets, metacognition and social networks. This article is based on her keynote presentation titled "Roots of Resilience: Mindsets, Purpose, and Relationships" at the Strategic Growth Area—Science of Learning Symposium 2025.*

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