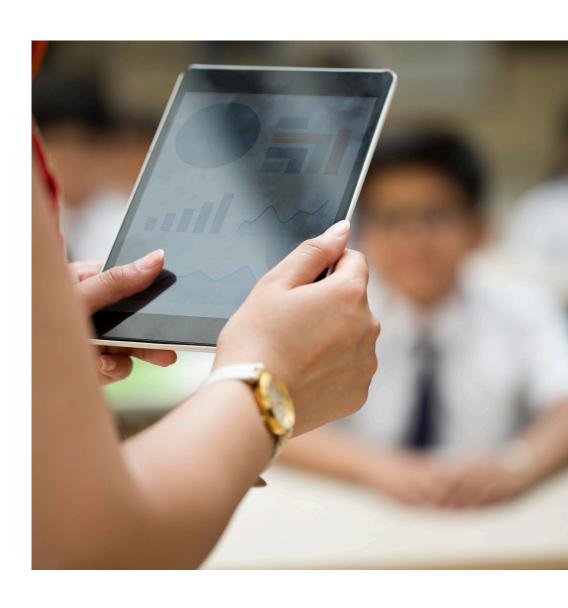
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# Governing in the Age of AI: Shaping the Future of Advanced Learning in Singapore



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## **Executive Summary**

Artificial intelligence is reshaping economies, societies and education systems at an unprecedented pace, redefining which skills matter, how they are acquired and what education systems must deliver to ensure national competitiveness and social cohesion. This imperative is as urgent for advanced economies as it is for developing ones, and even globally recognised leaders in education such as Singapore must now evolve to meet the demands of this exciting and challenging new era.

Singapore's education system has long been lauded for its rigour and consistent high standards. But while it has moved with the times to reflect shifting socioeconomic priorities, in the face of the lighting-fast technological disruption that characterises the Al era even the most successful models must be reimagined to remain effective. It is clear that Singapore has recognised the need to adapt its educational strategies to meet these challenges, not least by supporting social mobility through the targeted development of its most academically capable students.

In his 2025 New Year's message, Prime Minister Lawrence Wong spoke of the need to "revise our policies, reset attitudes and mindsets, and refresh the Singapore Dream", affirming that economic progress must be matched by inclusive opportunity. Nowhere does this matter more than in the education system, which must continue to cultivate excellence while also extending access to high-potential learners from all backgrounds.<sup>1</sup>

The Tony Blair Institute for Global Change is at the forefront of exploring how Al can transform public services. Through its *Governing in the Age of Al* series, TBI examines how technology can modernise national infrastructure and reshape public-service delivery. Now, building on this work, TBI explores how Al can drive a new phase of education reform in Singapore – specifically in the context of advanced education programmes.

Singapore's Gifted Education Programme (GEP) was designed four decades ago to identify and develop the top 1 per cent of intellectually gifted students by providing them with specialised teaching approaches. However, while the GEP has successfully nurtured gifted learners, its exclusivity has also prompted some criticism, including over the narrow definition of "giftedness" that overlooks singular talents and late bloomers, growing socioeconomic disparities in access, and the sense of elitism within the programme, as well as a heavy reliance on a single and potentially lifechanging selection exam at just 9 years old.

The GEP has remained exclusive chiefly owing to limited specialised resources: enhanced curriculums, advanced learning tools and small class sizes that created an "enriching, nurturing and tolerant" environment that can stimulate students of the highest abilities, as well as supporting twice-exceptional learners (students who have exceptional abilities as well as learning or developmental challenges). This education trilemma – balancing high-quality education with affordability and scalability – is a common challenge across many education systems. Expanding customised programmes to a broader student population would require considerable investment in personnel and infrastructure, often at the cost of maintaining high standards of excellence.

To overcome these challenges, the Singapore Ministry of Education (MOE) has introduced a series of incremental reforms over the years to refine the GEP model. These include introducing mixed-ability classes to encourage greater integration between GEP and non-GEP students, and offering subject-specific after-school enrichment programmes in English, mathematics and science for High-Ability Learners (HAL) – a category comprising approximately 7 per cent of each cohort.

With more capacity in schools to support HAL, in 2024 the MOE announced a major revamp of its approach to high-ability education. <sup>5</sup> Building on evidence from international best practice, the reforms are set to expand the HAL provision to 10 per cent of each cohort. Critically, students will no longer be required to transfer to one of the nine GEP schools; instead, they can remain in their existing schools while accessing targeted support. The

identification of gifted learners will also become more flexible, with multiple points of entry using multiple sources of information replacing the former single-threshold selection model.

These reforms are not designed to benefit all students equally, but rather to better identify, develop and support those with the highest aptitude and potential. Put simply, the goal is to ensure that advanced learners – regardless of their socioeconomic backgrounds – can access an education that is sufficiently challenging, enriching and inclusive. As former Minister for Education Chan Chun Sing has noted, "Education is and will continue to be a critical enabler for social mobility."

In this context, personalising education is not simply an aspiration – it is a necessity. All provides an unprecedented opportunity to deliver this personalisation at scale, overcoming the traditional trade-offs between quality, cost and reach. To accelerate the pace of change that is demanded by rapid global shifts, policymakers should adopt the following strategic priorities to guide this bold transformation:

- Develop institutional frameworks and tools: The MOE should develop
  an Al-powered national framework that aggregates school-level data into
  a federated and centralised performance database for benchmarking,
  evaluation and continuous improvement. This framework would help
  underperforming schools raise their standards.
- Personalise curriculum and pedagogy: The curriculum should retain its
  focus on interdisciplinary, higher-order thinking skills (for example, critical
  thinking, problem-solving and creativity), with Al tools providing
  personalised learning experiences. Al can support project-based learning
  and simulations that cater to diverse student interests and abilities,
  ensuring that intellectual rigour is maintained and aligning with the MOE's
  21st Century Competencies Framework.
- Support educators: All can be used to personalise instruction and free
  up educators from administrative tasks, allowing them to focus on more
  impactful student engagement. Professional-development opportunities
  should include training on how to integrate All tools into classrooms and
  foster critical thinking among students.

• Engage parents: Al-powered communication tools can provide parents with real-time insights into their child's academic and social-emotional development. These tools can help create stronger partnerships between parents and educators, ensuring that students receive holistic support both at school and at home.

The AI era demands a bold reimagination of existing education models. While economic progress has historically been a driver of the changes and developments within Singapore's education system, by embedding AI at the core of its advanced-education strategy, Singapore can continue to lead the world in shaping an education system that unlocks talent wherever it is found, ensuring that the most capable learners are empowered to drive the country forward.

Singapore has long thrived by being ahead of the curve and the page is now turning on the next chapter of the Singapore Dream – a dream powered by Al, defined by opportunity and underpinned by a world-beating, innovative and forward-thinking education system that achieves the very best outcomes for its very brightest students, irrespective of their socioeconomic background.

This is the Singapore Dream, enabled by Al.



# The Evolution of Educational Excellence

Traditional models of national education systems, largely designed for industrial economies, have always been constrained by limited resources and service-delivery mechanisms. The availability of teachers, class sizes and the personalisation of education delivery continue to limit ambition despite countries across the world making substantial investments in their digital infrastructure. The education trilemma – a contest between quality, affordability and the ability to deliver at scale – is a challenge common to all types of education systems.

Even Singapore, long regarded as a global leader in education and technology, is not immune to these limitations. Its undoubtedly excellent education system, a top priority for its governments since independence in 1965, has been developed within the constraints of its size and available resources. In the early days, the country found that its education system's one-size-fits-all approach resulted in high dropout rates, prompting ability-based streaming to be introduced to ensure students were studying at a pace appropriate to their abilities, reducing the likelihood that they would leave school.<sup>6</sup>

The Gifted Education Programme (GEP), introduced in 1984 as a bold response to Singapore's need to develop intellectual capital during a pivotal phase of its economic transformation, sat at the summit of the system. Targeted at the top 1 per cent of the age cohort identified through a one-off rigorous standardised testing at Primary 3 (around 9 years old), the GEP set out to nurture higher-level thinking skills and capabilities for self-directed learning, moving beyond academic excellence and ensuring that intellectually gifted students' needs were catered for.

Since independence, the development of education in Singapore has been described and delineated by various scholars in five distinct phases (see *Annex*), <sup>7,8,9</sup> evolving in response to specific social, economic and political contexts as shown in Figure 1.

FIGURE 1

## How Singapore's education system has evolved since independence

Period	Major events	Education phase	<b>Education policies</b>
1965–1977	1965: Singapore's independence	Survival-driven	1960 and 1966: Bilingual policy; 1974: First major restructure of the education system
1978–1996	1980s: Global financial crisis	Efficiency-driven	1978: The Goh Report – streaming at primary and secondary levels; 1984: Launch of GEP
1997–2011	1997: Asian financial crisis; 2008: Global financial crisis	Ability-driven	1997: Thinking Schools, Learning Nation; 2005: Teach Less, Learn More; 2010: Launch of 21st Century Competencies (21CC) framework
2012-2019	2011: Occupy Wall Street; 2016: Brexit	Student-centric; Values-driven	2018: Learn for Life; 2018: Expansion of Direct School Admission programme to all secondary schools
2020- present	2021: Covid-19 pandemic; Present: Al, tech, geopolitical disruptions	Learn for life	2020: Learn for Life (continuation); 2020: EdTech Plan; 2023: EdTech Masterplan 2030; 2024: Streaming replaced by Full Subject-Based Banding

Source: TBI

Singapore's education policies evolved to focus on supporting an industrial economy in the 1980s, a knowledge economy in the 1990s and 2000s, and a flexible workforce from the 2010s. Its success lies in the country's ability to anticipate and respond swiftly to the changing demands of the economic and political environments.

Built on rigorous, meritocratic academic standards, Singapore's education model has served the country well for decades. The government's strong emphasis on public schooling has established education as a cornerstone of national identity and civic responsibility, reinforcing social cohesion, stability and upward mobility across generations.

However, the pressing need for new skill sets amid rapid global economic and digital transformation, widening socioeconomic divides and the meteoric rise of Al-driven industries means that this model may no longer

be sufficient. The country has recognised the imperative to constantly adapt to the new realities of global disruption and to expand pathways for social mobility.

The ongoing need to "revise our policies, reset attitudes and mindsets, and refresh the Singapore Dream" – a vision of meritocracy-based but shared economic prosperity, social stability and opportunities for all – was highlighted by Prime Minister Lawrence Wong in his 2025 New Year message. <sup>10</sup> And now, in the next phase of Singapore's education journey, the country must once again redefine its education model, not just maintain it.

Changing demographics, characterised by an ageing population and a shrinking student cohort, necessitate a more inclusive and flexible learning system that maximises the country's human capital. At the same time, concerns over social cohesion, including the perception that elite educational tracks engender exclusivity, highlight the need for a more inclusive approach.

The disruption to labour markets due to the impact of globalisation and worldwide economic shocks means that, without urgent reforms, governments risk deepening socioeconomic divides, exacerbating workforce mismatches and leaving citizens unprepared for the realities of the future. As Al reshapes industries and demands new skills, as described in TBI's paper <u>Augmenting Intelligence</u>: <u>Shaping the Future of Work in South-East Asia</u>, Singapore's pursuit of excellence needs urgent renewal.

An education system fit for the future must balance excellence with intergenerational social mobility, ensuring that all learners – regardless of background – can benefit from Al-driven advances. Over the years, Singapore's education policies have increasingly emphasised holistic learning, moving beyond academic achievement to equip students with skills in collaboration, creativity and adaptability. This evolution reflects a broader national transformation from an education model that is largely driven by economics to one that fosters resilience, lifelong learning and inclusivity – a transformation that Al can accelerate at scale by enabling more personalised and equitable learning experiences.

Reflecting on national education priorities, Chan Chun Sing, Singapore's education minister at the time, told delegates at 2024's International Summit on the Teaching Profession that "education is and will continue to be a critical enabler for social mobility. We must ensure that students in Singapore, regardless of background, are able to rise beyond their lack of family support". To do so, the minister continued, the MOE will "democratise access of the best teaching materials using technologies available, and [make] them accessible to each and every child". 12

To this end, the Singapore EdTech Masterplan 2030 laid out a bold vision – "Technology-transformed learning, to prepare students for a technology-transformed world" – aiming to leverage education technology as a critical enabler of learning to cater to individual students' learning needs, while also supporting teachers to manage the pace of change. <sup>13</sup>

To fully harness Al's potential in education, policymakers must develop a future-ready education system that integrates Al innovations within a comprehensive Al-policy framework that ensures accessibility, inclusivity and holistic development. This ambition was outlined in the National Al Strategy 2.0, signalling the intention "for Al to be the great equaliser, which equips our people and businesses with the capabilities and resources to thrive in an Al-enabled future". 14

Today, policymakers have access to a growing number of AI tools, including intelligent tutoring systems that provide real-time personalised feedback, predictive analytics that optimise curriculum planning, and AI-powered platforms that identify and close skills gaps at scale. Our analysis focused on the UK, *The Economic Case for AI-Enabled Education*, shows that AI could boost educational attainment by between 6 and 8 per cent, and governments must seize the opportunity to remodel an education system that will prepare its citizens for the future.

The age of Al demands not only innovation but also a reimagination of how education is delivered – ensuring that every citizen, not just the most advantaged, benefits from Al's transformative power.



# From Singapore Inc to Singapore Inclusive

Prime Minister Lawrence Wong's first National Day Rally speech in 2024 announced a significant overhaul of the GEP, providing a concrete example of the broader political shift towards policies that recognise Singapore is in its next phase of growth – a shift towards a more inclusive society where every citizen has the opportunity to succeed.

The revamp is a continuation of previous reforms, representing a notable change of emphasis in Singapore's education policy, focusing on accessibility, inclusivity and the holistic development of a broader group of students. Originally conceived as a platform for identifying and nurturing Singapore's top 1 per cent intellectual elite, the GEP was later complemented by the High-Ability Learner (HAL) programme (targeted at the top 7 per cent) to ensure that a broader base of talent could be nurtured.

In 2007, the gifted-education branch of the ministry started to support schools in offering enrichment programmes and activities for high-ability learners. Distinct from the GEP, where students must demonstrate all-round potential in different subjects, the HAL programme offers enrichment in specific subjects (English language, mathematics and science). These programmes and activities are targeted at developing students' interests and strengths in selected subjects.

Under the latest reforms, GEP has been discontinued in its original form (starting from the 2024 Primary 1 cohort) and the HAL programme is being expanded and integrated into all primary schools to ensure that a wider pool of students – approximately 10 per cent of each cohort (up from 7 per cent) – can benefit. This is not an isolated policy change but part of a larger trend in Singaporean governance in the context of Prime Minister Wong's goal of refreshing the Singaporean Dream, for prioritising social cohesion, citizen participation and inclusive policymaking.

#### Development of the Gifted Education Programme

The GEP has been unique in nurturing high-potential students, with the following features contributing to its success:

- Exclusivity: The GEP has operated as a centralised programme, housed in nine primary schools, with gifted students streamed into specialised classes. Its structure was specifically designed to cultivate an environment wherein the selected student's intellectual capability was recognised, cultivated and developed. The GEP has provided a fertile environment, including for the most exceptional students, whose different ways of thinking have been celebrated rather than being seen as in some way unusual.<sup>17</sup>
- **Small class sizes:** GEP students were placed in small class sizes of around 22,<sup>18</sup> less than the average,<sup>19</sup> allowing teachers to be more effective.
- Enhanced pedagogy and learning approaches: Small GEP class sizes
  allowed for an intense focus on intellectual stimulation through discoverybased learning, advanced problem-solving and interdisciplinary projects.
  Students were taught an enriched curriculum, which exposed them to
  differentiated advanced critical-thinking skills, such as synthesis,
  evaluation and analysis.
- Specialised teaching resources: GEP teachers have received specialised training from gifted-education specialists. Additional funding and resources have also been provided.

Despite its success in nurturing high-ability students, the programme design has prompted reflections on various areas:

• Elitism: As noted by several scholars, the formulation of the GEP was very much a top-down, elitist approach, reflecting the priorities as understood at the time, but with the very features that made it a flagship initiative creating their own challenges. The programme's exclusivity caused stark divides between GEP students and their peers in mainstream education, raising concerns about equity, social cohesion and exclusivity, with some critics fearing that the programme could create an elite group disconnected from wider society. This was, to a certain degree,

addressed in 2007, when a change allowed GEP students to spend up to 50 per cent of their lesson time with some of the mainstream cohort within the same schools that administered the GEP, as well as to participate in some shared non-core classes such as physical education and art. But although these concerns were acknowledged, the programme's emphasis on meritocracy and the efficient allocation of resources to high-potential students was consistent with Singapore's developmental objectives at the time, prioritising quality over scale within the public-education trilemma. The GEP was seen as a necessary investment to ensure that the nation's brightest minds were fully supported.

- **Definition of "giftedness":** The GEP's selection criteria based primarily on cognitive ability - limited its relevance in an evolving education system. However, from 1997, Singapore's education policy began to shift under the "Thinking Schools, Learning Nation" initiative. This emphasised creativity, lifelong learning and adaptability, calling for a holistic education system that could nurture diverse talents while encouraging innovation. In response, other specialised secondary-level programmes (for example, Singapore Sports School, School of the Arts, NUS High School for Maths and Science) were set up by the MOE, and the GEP underwent reforms to align with these broader goals. The government replaced rigid categorisations of "gifted" and "non-gifted", enabling tailored approaches that met individual needs while ensuring social cohesion. Over time, the definition of "giftedness" went through adjustments to better align with Singapore's educational vision, which increasingly emphasised diverse abilities and holistic development. Despite these adjustments, challenges within the GEP persisted. Its reliance on a single entry point - a highstakes selection test at Primary 3 - remained a core issue. This approach effectively identified students with early-developing intellectual abilities but often overlooked late bloomers or those with uneven academic strengths. By prioritising early academic performance, the GEP failed to account for developmental variability, which is increasingly recognised as a critical factor in understanding "giftedness".
- Uneven social outcomes: As the GEP evolved, systemic challenges became more apparent. Chief among these was the role of socioeconomic disparities in shaping access to the programme. Over

time, the GEP became closely associated with preparatory tutoring, with affluent families disproportionately benefiting from access to private tutoring to prepare their children for the selection tests. This phenomenon, sometimes referred to as "parentocracy", eroded the meritocratic ideals of the GEP. Entry into the programme became a marker of social prestige, further entrenching educational inequities and reducing opportunities for students from less privileged backgrounds.<sup>20</sup>Greater autonomy was granted to schools to adapt the programme to more diverse student profiles, and teacher training in supporting inclusive education was prioritised. Together, these changes reflected a growing recognition of the importance of inclusivity in Singapore's education system. The psychological and social impacts of the GEP also drew criticism. Separating so-called gifted students into specialised classes, while providing an intellectually stimulating and nurturing environment alongside like-minded peers, often led to social isolation from mainstream classes. This divide also placed undue pressure on students to meet consistently high expectations, often at the expense of their emotional wellbeing.<sup>21</sup>

Amid Singapore's evolving socioeconomic landscape, the design of the GEP's specialised programme has come under increased scrutiny. Its centralised structure and rigid selection criteria contrasted sharply with MOE's push for flexibility and diversity in educational pathways. And while the GEP's intellectual rigour remains a strength, its traditional model has struggled to adapt to these broader policy directions.

#### Shifts in Education Policy

With this evolution in mind, in 2024 the MOE announced a major reform of how advanced learners are supported, focusing on the following core areas:

 Inclusivity and accessibility: The new approach seeks to identify and support advanced learners (both gifted and high-ability) within their own schools, allowing more students – about 10 per cent of the cohort – to benefit from enhanced learning opportunities. This will allow each school to deliver its own provisions to develop its learners, a shift designed to accommodate a wider range of abilities, reflecting a move towards a more inclusive education system.

- Holistic assessment: The selection criteria for the GEP will incorporate
  multiple sources of information beyond testing, such as ongoing teacher
  observations, and evaluations of students' work and abilities. The revised
  system is designed to recognise diverse academic potential and support
  late bloomers. Moreover, by keeping students in their current schools, the
  initiative aims to preserve their existing relationships and promote more
  balanced development.
- Flexibility: The selection process will be redesigned, transitioning away
  from a single standardised high-stakes test in Primary 3 to more flexible
  entry points for students between Primary 4 and Primary 6. This change
  will enable students to join (or leave) based on their evolving needs and
  interests, rather than relying solely on a one-time assessment. It will also
  allow late bloomers to join at different times.

Overall, the revamped approach preserves the core mission of identifying genuine intellectual potential, while offering a more nuanced and holistic assessment of students' capabilities. This is an important step towards extending this advanced education offering to a broader, more diverse cohort of students, while continuing to prioritise their social development and creating a more inclusive and adaptive vision of educational excellence.

In 2023 Chan Chun Sing noted that, "In the next leg of our nation's economic development, we cannot just have a narrow definition of success, where some people who have succeeded academically are seen as the beacon for everyone else." The ministry continues to adjust policies to align with societal and economic shifts, making Singapore's education model an evolving landscape focused on holistic and inclusive development.

#### The GEP at a Crossroads

The GEP's 40-year journey reflects both the successes of and tensions within Singapore's education system. As a transformative initiative, it has nurtured generations of gifted learners who have made noteworthy

contributions to the nation's progress. Yet its traditional structures – rooted in exclusivity and limited selection – are less suitable when set against the backdrop of today's changing priorities. The GEP's challenges, including its tendency to exacerbate existing socioeconomic disparities, its psychological and social impact, and its limited scope for recognising diverse talents, demonstrate the need for reform.

Expanding advanced learning to support more students is a step in the right direction, but reform should go beyond just widening its scope. Simply scaling up without adapting pedagogy, resources and methods of assessment could lead to gaps and inconsistent learning experiences across schools, resulting in some of the following issues.

- Limited accessibility and inclusivity: While making school-based HAL
  provisions available in every primary school improves geographic access,
  hidden barriers may remain unaddressed. These include inadequate
  parental awareness and biases in identification methods or
  socioeconomic disparities that may still exclude deserving students.
  Apart from scale, the expansion must also take equity into account.
- Resource constraints: Given the level of specialised teaching and the
  value of maintaining small class sizes, expanding from 7 to 10 per cent
  may stretch teaching resources, curtail professional-development
  opportunities and widen infrastructure gaps. This may lead to uneven
  implementation, limiting effectiveness.
- Greater need for flexibility and scalability: Increasing the cohort without
  restructuring risks diluting educational quality. Because the original GEP
  programme was designed for a small and niche group, there are
  questions over its suitability for a broader, more diverse group of
  advanced learners. A more flexible, tiered system with personalised
  pathways would better cater to students with varied abilities.
- A shortage of specialised educators: Because specialised teachers
  undergo rigorous training, scaling up and replicating advanced learning
  nationwide could prove difficult. Ensuring consistent teaching quality
  across all schools could also be challenging.

The GEP's foundational strengths – its ability to challenge and inspire learners – remain vital. Its history illustrates the delicate balance between excellence and equity, a balance that continues to shape the evolution of Singapore's education system. As the country moves forward, harnessing the potential of Al's capabilities will ensure that advanced learning continues to stand as both a testament to past achievements and a focal point for reimagining ability-driven education in a way that aligns with Singapore's vision of an inclusive and future-ready society.



# Reimagining Ability-Driven Education

Traditionally, integrating varying levels of ability within a single classroom has remained an ambitious yet challenging goal.<sup>23</sup> The core issue lies in managing mixed-ability classrooms, ensuring advanced students are intellectually stimulated, while also supporting other learners without compromising either group's educational experience.

This conflict exemplifies the education trilemma, where achieving excellence, equity and efficiency simultaneously becomes increasingly difficult. Education policies have traditionally struggled to balance these three goals: ensuring all students receive the right level of challenge and support (excellence), widening opportunities for every student (equity), and doing so in a way that is sustainable and scalable (efficiency).

Advanced learners often grasp core foundational material quickly and require advanced, thought-provoking content to stay engaged and develop their critical thinking and creativity.<sup>24</sup> Without such enrichment, they risk frustration, boredom and even disengagement from learning. Conversely, mainstream learners may need more time and structured support to grasp the same concepts. If the curriculum is too advanced, it could diminish the academic confidence and motivation of mainstream learners.

For teachers, the challenge becomes even more complex as they are tasked with employing different teaching methods for mixed-ability classrooms, often finding themselves caught between the need to enrich content for advanced students and reinforcing foundational material for slower learners. This dual focus puts additional strain on teachers, who must constantly adapt their approach to meet the diverse needs of their students while managing their own workload and ensuring that all their students remain engaged.

As a result, some primary-level education systems separate advanced students into specialised programmes. While this ensures that they receive the intellectual challenge they need, it also prompts questions about social integration and equitable access to quality education.

## The Case for Change: Achieving Greater Social Cohesion in Education

Critics of specialised education argue that placing advanced learners in exclusive programmes can limit their social, emotional and behavioural development as it limits their interactions with diverse peer groups. Research suggests that advanced learners can benefit from heterogeneous learning environments, where they engage in cooperative learning groups alongside students of varying academic abilities. Research suggests that advanced learners can benefit from heterogeneous learning environments, where they engage in cooperative learning groups alongside students of varying academic abilities.

Additionally, integrating different students can encourage crucial "21st-century core competencies" – collaboration, adaptability and communication – that are essential for future success in a rapidly evolving world. This echoes our own research, *Ending the Big Squeeze on Skills: How to Futureproof Education in England*, which found that the "4Cs" – critical thinking, creativity, communication and collaboration – are key to futureproofing students, equipping them with the skills to reach their full potential in a fast-changing, tech-driven world.

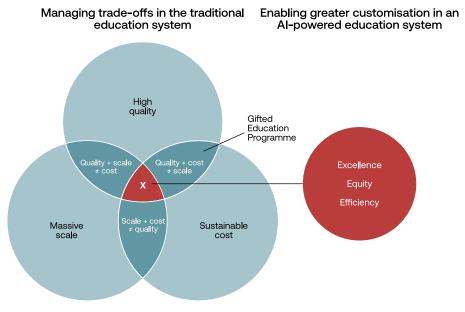
However, the decision to scale reform of the GEP has led some parents to worry that, without the specialised resources previously available at designated GEP schools, the quality of enrichment for students may decline, and that blending gifted and other learners could dilute the depth of instruction that their children need. This, they fear, could hinder their children's ability to excel academically – an outcome that holds considerable cultural importance.

The challenge, then, is to design an inclusive education model that caters to diverse learning needs without compromising excellence.

## **Enabling Equitable Expansion Through Greater Customisation**

FIGURE 2

# AI resolves the traditional trade-offs between quality, scale and cost



Source: TBI

At the heart of these policy reforms is the need for curriculum customisation, ensuring that all students are appropriately challenged, supported and engaged. Singapore has come a long way in driving personalisation in education, from addressing the challenges of a one-size-fits-all model in its early years, introducing streaming by abilities, and establishing specialised schools (arts, sports) and vocational pathways, to replacing streaming with Full Subject-Based Banding (FSBB).

Introduced in 2024, FSBB represents a major step forward in Singapore's efforts to customise learning. It is designed to allow students the flexibility to customise their learning by taking a range of subjects at different levels depending on their interests, aptitudes and learning needs.

This flexibility reflects a deeper recognition that learners are not defined by a single ability profile and that academic potential varies across disciplines. In short, it provides customised learning, which is about giving what is needed to each student: adaptability with no compromise on excellence. Al offers a transformative opportunity to take the customisation of education to a new level, creating personalised learning experiences for students and allowing the flexibility that teachers need to focus on teaching, innovating and tailoring their approaches to meet the unique needs of every child. Leveraging Al can ensure that each student is appropriately challenged and empowered to achieve their individual potential.

The global Al-in-education market is projected to grow hugely, from \$5.18 billion in 2024 to \$112.3 billion by 2034.<sup>30</sup> As a global leader in Al and innovation, Singapore must seize this moment to further integrate Al in its education system, with excellence and equity at its core.

Al is the key to equitable curriculum customisation and the real-time personalisation of learning pathways, helping tailor education to each student's unique strengths and pace. Al can dynamically adjust content to challenge gifted students and provide targeted support where needed, ensuring all students succeed without compromising the quality of advanced learning. This allows educators to collaborate with Al developers in crafting individualised learning pathways for each student, something that used to be difficult to achieve on a larger scale.

Singapore – a leader in both Al and education – is well positioned to embed Al into the educational ecosystem. There has been some progress in this direction through MOE's core platform for learning and teaching, the Singapore Student Learning Space (SLS),<sup>31</sup> with Al-powered tools currently in use including:

- Adaptive-learning systems: Al algorithms assess student progress and recommend learning resources or practice exercises based on individual needs and readiness, thereby creating Personalised Learning Pathways.
   The system also encourages self-directed learning and provides Alenabled feedback. This is currently limited to upper primary and lower secondary mathematics, plus upper secondary geography, leaving plenty of room for expansion.
- Al-enabled learning assistant: Currently available for students from the secondary level onwards, this is a student-facing dialogic agent that guides students' learning via iterative questioning by providing them with timely and contextual responses informed by curated learning materials in the knowledge base, reinforcing understanding and enabling selfdirected learning.
- Authoring co-pilot: Available across all levels and subjects, this is an Al
  tool that helps teachers to streamline lesson-planning across all subjects
  and levels, generating modules, activities and other components, based
  on teachers' inputs.
- Learning-feedback assistants: This suite of Al-enabled features
  assesses students' responses and auto-generates feedback on a variety
  of tasks. By providing more timely and customised feedback, the Alenabled features help refine learning and teaching. This is currently
  available for all levels and subjects, for both students and teachers.

While these initiatives mark significant progress, Al's potential in education, and in the reforms to advanced learning more specifically, could be further explored. To scale equitably and effectively, Al can play an enabling role in the following areas:

- Broadening student intake and becoming more inclusive: Al-powered
  tools offer affordable avenues to high-quality learning materials, levelling
  the playing field for students from diverse socioeconomic backgrounds
  while still nurturing excellence in education. Data-driven approaches
  should be used to track and assess a broader spectrum of abilities, to
  help enable a more equitable selection process for students.
- Retaining small class sizes without straining resources: Research by McKinsey shows that teachers typically spend less than half their time in direct interaction with students, with the majority of time spent on a

combination of preparation, evaluation and feedback, and professional development and administration. <sup>32</sup> Al can increase the time that this already small pool of specialised educators spends with students by automating some of these tasks. Automated assessments could free up teachers' time by 6.5 hours per week, providing the time and space to support the development of students' behavioural, social and emotional skills – areas in which teachers are currently spending around 3.5 hours per week. <sup>33</sup> The Tony Blair Institute for Global Change's own UK-based research, *The Economic Case for Al-Enabled Education*, suggests that up to 8 per cent of teachers' working hours could be saved with the help of Al. Increased use of Al tools can facilitate non-student-facing activities such as lesson preparation, evaluation and feedback, as well as administrative tasks, saving time and enabling teachers to do more with less.

- Scaling enhanced pedagogy and learning approaches: Al-driven tutoring systems and adaptive-learning platforms can provide customised instruction that was once possible only with specialised teachers, making high-quality education accessible to more students without diluting rigour. Learning analytics can help educators track student progress, identify strengths and tailor interventions, making differentiated instruction more scalable.
- Democratising specialised teaching resources: Like their students, teachers can benefit from more affordable and accessible specialised training. Al-powered professional-development platforms including peerto-peer facilitation can also help the exchange of best practice and new ideas.

#### A Future of Inclusive, Customised Education

Leveraging AI – not as a replacement for teachers but to make them more effective – makes it possible to scale customised learning equitably and effectively, while at the same time maintaining the integrity of the specialised personalised education that has defined the GEP and HAL programmes. The needs of advanced learners must not be overlooked, 34

and teachers play a pivotal role in providing emotional and motivational support, while also guiding their students through increasingly complex social and emotional landscapes – responsibilities that Al alone cannot fulfil.

Despite the plethora of AI tools in education, experts have observed that, as it stands today, AI is unable to adequately provide the full range of support that is instrumental in helping students become more independent learners. Human input remains crucial and, in this respect, teachers play a key role in helping students learn new concepts and skills. However, as students become more competent, direct teacher support can be calibrated over time, allowing teachers to operate more effectively while increasing the use of AI co-pilots where appropriate.

Advances in AI are reshaping the education landscape by optimising curriculum development and reducing costs while maintaining high standards, enhancing teaching efficiency and freeing educators to focus on higher-level instruction and mentorship, and customising learning pathways to ensure that each student, gifted or otherwise, receives an education tailored to their potential.

By embracing and deploying Al-powered technologies, Singapore can more effectively scale its customised advanced learning, creating a unified adaptive-learning ecosystem that provides personalised pathways to meet the needs of a wider range of students. This would not only address the diverse developmental needs of advanced learners but would also empower all students to flourish at their own pace.



### **Policy Recommendations**

The preceding chapter has demonstrated how reforms to Singapore's advanced-learning programmes can be enabled by Al. To institutionalise the benefits of education reform more effectively in the longer term, we make the following policy recommendations targeted at structural-level changes.

#### **Develop Institutional Frameworks and Tools**

The MOE should develop an Al-powered national data framework that establishes a federated performance database to aggregate school-level data, benchmark programmes and generate actionable insights. By implementing standardised benchmarking protocols, the framework will support evidence-based evaluations of programme outcomes, and promote the identification and sharing of best practices.

This centralised national framework can be used to aggregate insights from school-level data and monitor programme effectiveness across institutions. The framework would benchmark best practice, track student outcomes and inform resource allocation, guaranteeing consistency and equity in the expansion. Schools that fall below established thresholds will then engage in a structured performance-improvement cycle with defined milestones and dedicated support resources.

Where systemic issues are identified, the framework will enable the redesign or enhancement of processes to address underlying challenges. This approach ensures consistent excellence across all schools while providing targeted intervention where improvement is needed. Long-term tracking of academic performance, emotional wellbeing and leadership potential will provide valuable insights to policymakers, ensuring the expansion meets its objectives.

The MOE should also implement an Al workbook, with Al monitoring systems seamlessly integrated into classroom environments, to enable the real-time identification and support of learners' individual needs. These

systems would facilitate robust data collection, analysis and evaluation, offering actionable insights into students' capabilities, learning trajectories and developmental patterns.

Leveraging these data, the systems can generate personalised development plans, guaranteeing that each student is supported to reach their full potential and unique level of giftedness. By adopting continuous assessment methodologies, the need for rigid entry points into the programmes would be eliminated. This approach ensures that all learners, including late bloomers, are consistently assessed and identified in respect of their potential to achieve excellence, creating a more inclusive and adaptive framework for talent development.

To further enhance interdisciplinary teaching and collaboration, the system should implement interoperability across schools, providing all educators with access to shared data. This ensures that students' skills and talents are systematically captured across all subject areas. This cross-disciplinary approach will enable the comprehensive documentation and nurturing of student abilities, fostering a holistic and equitable model for talent development and educational excellence.

#### Personalise Curriculum and Pedagogy

To expand advanced learning effectively, it is essential to retain its hallmark enriched curriculum while leveraging AI to scale its benefits across a broader cohort of students. The advanced and inter-disciplinary curriculum, which emphasises higher-order thinking skills such as critical analysis, synthesis and creative problem-solving, must remain central.

Al-powered tools can embed these skills into project-based learning opportunities, allowing students to apply knowledge across disciplines and engage in deeper, discovery-driven learning. Al can adapt project challenges to individual students' abilities, interests and learning styles, providing customised resources and guidance.

Integrating AI into the curriculum allows for enhanced personalisation and engagement. Simulations, virtual experiments and global knowledge repositories can support discovery learning, making the curriculum accessible and relevant for diverse learners. These tools can simulate conversations and test ideas with subject-matter experts, giving students access to specialised knowledge beyond what is available in the classroom. Modules that align with the MOE's 21st Century Competencies Framework – including Critical, Adaptive and Inventive Thinking (CAIT) – should be embedded, and the curriculum must align with the Desired Outcomes of Education, nurturing confident, self-directed learners – concerned citizens who actively contribute to society.

Al-powered adaptive-learning tools play a vital role in creating personalised educational pathways that cater to the needs of a larger and more diverse student population. By designing bespoke learning journeys, these tools ensure continuous growth while maintaining the intellectual rigour of specialised programmes. Advanced modules can effectively challenge gifted learners, while targeted interventions can address areas requiring additional help.

Nevertheless, developers must carefully balance personalisation with the need for encouraging adaptability, employing pedagogically robust methods to engage students in critical thinking and equip them to navigate unfamiliar challenges. Additionally, Al-driven tools should systematically monitor students' cognitive and affective development, empowering educators to adjust instructional strategies accordingly, promoting holistic growth and safeguarding young learners against cognitive erosion and overreliance on Al tools.<sup>35</sup>

Robust safety and security features should be integrated into the design of AI tools to address emerging concerns such as excessive screen time, stress and burnout among students. In line with the national guidelines on screen time for children, the proposed safety framework should include intelligent usage-management controls that enforce healthy screen-time limits, complemented by context-aware reminders encouraging regular breaks, physical activity and outdoor engagement.

Advanced analytics dashboards should provide educators with actionable insights into student digital-engagement patterns, including early-warning systems to identify concerning behaviours such as late-night study sessions or excessive usage. These tools should feature customisable thresholds tailored to different age groups and learning needs, ensuring an adaptive and inclusive approach while acting as a helpful assistant to educators rather than as a taskmaster, leaving them empowered to make good decisions.

To support these measures, the tools should incorporate robust reporting capabilities that allow educators to make data-driven interventions. Detailed wellness analytics should enable teachers to identify potential signs of stress, fatigue or unhealthy work habits, facilitating timely and targeted support. Additionally, the system should promote a balanced approach to learning by actively encouraging non-digital activities, ensuring technology remains a tool for educational enhancement rather than a source of strain.

#### **Support Educators**

#### **Supporting Small-Group Learning at Scale**

Small-group learning environments have been a cornerstone of programmes like the GEP, fostering meaningful teacher-student interactions and peer collaboration. Scaling this model across a larger cohort requires the innovative use of AI to deliver personalised attention and differentiated instruction. AI can assist teachers by analysing real-time data to identify individual students' needs and learning patterns, enabling customised lesson delivery tailored to each learner's pace and abilities. For example, if a student repeatedly encounters difficulty in certain areas, this can be flagged to teachers to prompt in-person support where needed.

#### **Automating Administrative Tasks**

Routine tasks such as grading and tracking student progress can be automated, allowing educators to focus on facilitating deeper engagement within small groups. The MOE's SLS currently provides the authoring copilot<sup>36</sup> function to facilitate teachers' creation of different learning ideas and question types, as well as the provision of feedback. However, this is limited to online assignments.

To support in-classroom and hybrid learning, Al-supported models can boost the scalability of small-group principles by integrating virtual assistance into larger classroom settings. For example, adaptive Al platforms can provide personalised support to students while fostering peer collaboration. These tools can also form diverse learning teams by matching students with complementary strengths, encouraging cooperative learning and social integration that aligns with 21st-century competencies.

#### **Equipping Educators for Al-Enhanced Teaching**

Expanding advanced learning requires educators who are adept at leveraging AI to enhance teaching and learning. Comprehensive and ongoing professional-development programmes will support teachers to further integrate AI tools into lesson-planning and classroom delivery. Training should focus on managing mixed-ability groups, promoting creativity and critical thinking, and maximising the potential of AI-driven educational platforms.

Al-powered platforms can also support scalable, personalised professional development for educators. Systems can analyse teaching performance and recommend tailored training modules to address specific areas for improvement. Establishing mentorship networks can further enhance pedagogical quality, enabling experienced educators to share best practice with their peers. This collaborative approach will help maintain the integrity and effectiveness of Singapore's advanced-learning offering as it scales.

#### **Engage Parents**

Parental engagement will be key to the success of the expansion. Alpowered communication tools can provide parents with clear and accessible insights into their child's progress, focusing on growth in not only academic areas but also behavioural areas, such as creativity, collaboration and emotional intelligence. Visual dashboards, simplified language and chatbot functions can help parents understand their child's development, fostering a sense of partnership with educators.

To mitigate the risks associated with overemphasising raw performance data, policies could limit parental access to information presented without context or explanation, and instead share curated insights that highlight individual growth and areas for improvement. Al explainability features can boost trust further by demonstrating how recommendations and assessments are generated. These tools can also offer personalised guidance for parents to support their child's learning journey, ensuring that engagement remains constructive and empowering.

As part of the existing SLS interface, there should be provision for a secure parent portal to provide meaningful insights into children's use of educational technology and their learning patterns. This dedicated function could feature personalised dashboards displaying daily and weekly online learning activities, including subject-specific screen time, assignment-completion trends and preferred study times.

Customised notifications would alert parents to potential concerns, such as late-night study sessions, excessive screen time or sudden changes in engagement. The portal would offer actionable recommendations based on individual usage patterns, such as suggested break schedules and offline activities in response to prolonged screen time. Parents would also receive regular wellness reports highlighting key metrics, including digital-learning balance, stress indicators and subject-specific engagement levels, enabling early identification of academic pressure or burnout.

To strengthen parent-teacher collaboration, the platform would include communication tools for sharing observations and concerns directly with educators. It would also provide guidance on encouraging healthy digital-learning habits at home, including recommended screen-time limits, optimal study schedules and strategies for maintaining a balanced routine.

#### Conclusion

Singapore has long been a global leader in education, continually evolving its policies to stay ahead of the economic and technological curve. The next phase is about creating an Al-powered, future-ready education system, one that is not only academically robust but also socially inclusive and adaptable to the demands of an Al-driven world. The expansion of the advanced-learning programmes presents a timely and critical opportunity to balance the needs for academic rigour, holistic development and inclusivity, preparing students for an uncertain future where adaptability, creativity and problem-solving will be just as important as intellectual ability.

This is not just about expanding access. It is about transforming how education is delivered. By integrating Al-driven tools, Singapore can personalise learning at scale, optimise teaching resources and ensure that every child, regardless of socioeconomic background, can receive a high-quality education that meets their needs. Al offers the means to move beyond a rigid, test-based model of gifted education towards a flexible, dynamic and inclusive system where talent is constantly nurtured, not just identified early.

However, technology alone is not a silver bullet. Al must be embedded within a strong policy framework that prioritises ethical use, data transparency and equitable access. Moreover, policymakers must ensure that teachers are well equipped to work alongside Al, leveraging it as a tool to enhance their skills rather than as a replacement for them. Parents, too, must be engaged, ensuring that Al-enabled education, rather than deepening social divisions, levels the playing field for all.

By expanding the principles of customised learning to a broader base of learners, not only does Singapore possess a golden opportunity to set the global benchmark for Al-powered education, it also refreshes the national social compact that excellence is accessible to all.

The ultimate goal is clear: a forward-thinking education system where every child has the opportunity to thrive, innovate and contribute meaningfully to the country's future. This is the renewed Singapore model, one that does not just reward intelligence but empowers every student to realise their fullest potential.

The Singapore Dream is evolving, and policymakers, educators and wider society should embrace this bold transformation.

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# Annex: Singapore's Education Journey

Singapore's education and skills system is globally renowned. The country has consistently topped global indices such as the PISA (OECD) and the Human Capital Index (World Bank), cementing its worldwide reputation for academic excellence and workforce performance. Its reputation for consistent academic performance in mathematics in particular has drawn educators around the world to what is termed "Singapore mathematics" – with more than 50 countries importing Singaporean mathematics textbooks and/or trying to incorporate aspects of the national mathematics curriculum or style of teaching into their own national syllabus. Thowever, Singapore did not get it right the first time around: the academic achievement of today is a result of determination and rigorous policy reforms over the past few decades.

To start with, Singapore is a small city-state with few natural resources, and therefore developing its human capital has been a socioeconomic policy priority over the decades. By its independence in 1965, Singapore had already achieved universal primary education, with 28.8 per cent of its total budget allocated to education.<sup>38</sup> Education is – and always has been – one of the largest budget items in terms of government expenditure (the other being defence). From primary, secondary and through to tertiary levels, education has mostly been supported under the central leadership of the Ministry of Education (MOE).

In the post-independence years, Singapore's education system focused on nation-building and expanding access to education. The aim was to provide universal access to schooling to develop a cohesive, literate workforce from a diverse, low-skilled migrant community. In the early years, the emphasis was on basic literacy, numeracy and bilingualism (English and mother tongue) to unify a multiethnic society. However, challenges such as high dropout rates and a one-size-fits-all approach led to inefficiencies, prompting later reforms to improve quality, workforce alignment and economic relevance.

However, the 1980's financial crisis highlighted inefficiencies, leading to a shift towards an efficiency-driven education model. This represented a turning point that accelerated Singapore's transition from a labour-intensive to a knowledge-based economy. Consequently, the education system was restructured to prioritise efficiency, workforce skills and economic resilience, ensuring that Singaporeans were equipped to meet their fullest potential in a rapidly changing global economy. As a result, reforms aiming to upgrade the workforce for economic competitiveness were put in place. The "Towards Excellence in Schools" report in 1986 advocated decentralising school management and the curriculum, leading to the independent status of eight secondary schools in 1988 and increasing the professionalism of school leaders.

The country was transitioning from a survival-driven (1965–1978) era to an efficiency-driven one (1978–1997), with the focus on optimising education to meet the demands of industrialisation and economic growth. Developed as a bold response to Singapore's need to develop intellectual capital during a pivotal phase of its economic transformation, the Gifted Education Programme (GEP) was then introduced in 1984. The reasons were two-fold: 1) educational – to deliver the appropriate mental stimulation and intellectual challenge for students who require it; and 2) sociopolitical – to prepare talented youth for "responsible leadership and service to country and society". 39

The GEP was part of a series of reforms from the "Goh Report" authored by the then-Deputy Prime Minister Goh Keng Swee. This report, which also introduced streaming into Singaporean schools, was designed to maximise human potential, identifying and nurturing the intellectual elite who could lead the nation's progress. Modelled after Israel's approach to gifted education based on the established links between the two countries, the GEP initially targeted 0.25 per cent of the age cohort; this was subsequently increased to 1 per cent by the early 2000s. Students were identified through one-off rigorous standardised testing at Primary 3 (around age 9). Beyond academic excellence, it aimed to cultivate critical thinking, creativity and leadership skills, ensuring that these gifted learners could contribute meaningfully to Singapore's ambitions.

The 1997 Asian financial crisis and rising tide of globalisation underscored the importance of human capital in a competitive global economy. In the same year, the "Thinking Schools, Learning Nation" policy was developed to promote critical thinking and problem-solving to aid the transition from basic manufacturing to higher-value industries. The curriculum content was reduced by about 30 per cent, in order to enhance teacher training, allow more inter-disciplinary project work to nurture creativity and innovation, and allow more sharing of best practices and ideas across schools. Building on that, the "Teach Less, Learn More" initiative launched in 2005 sought further improvements to the quality of teaching and enhancements in student learning. The curriculum was reduced by a further 20 per cent, to create even more time and space for more active and independent learning.

Following the 2008 global financial crisis, which shone an unforgiving spotlight on inadequacies in workforce agility, reforms were focused on adaptability, with programmes such as SkillsFuture promoting lifelong learning and industry-aligned upskilling. Diversified pathways in polytechnics and the Institute of Technical Education addressed workforce needs, while science, technology, engineering and mathematics (STEM) education and digital literacy prepared students for a knowledge-based economy.

Building on efforts to move away from an overemphasis on academic results, the government introduced the "Learn for Life" movement from 2018. This development entailed the reduction of school-based assessments, in order to create more opportunities for student-centred teaching and learning approaches. Educators could also access an enhanced Professional Development Roadmap for teachers to strengthen their classroom practices to better meet their students' interests and needs. Overall, this movement laid the groundwork for nurturing lifelong learning attitudes and skills, to prepare students for an increasingly complex, interconnected and tech-driven world.

Launched in 2023, the "Transforming Education through Technology" [EdTech] Masterplan 2030 was the ministry's strategic initiative designed to harness the potential of technology in education. 42 Building upon previous initiatives such as the 2020 EdTech Plan and ICT Masterplan, this new framework is designed to equip schools with enhanced capabilities to

leverage technology effectively in teaching and learning. The strategic focus on technology addressed the opportunities and challenges of the post-Covid landscape, where technology has become a critical enabler of learning.

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