Understanding the why behind education reforms

Dr. Kim Hailwood, NZPF Policy and Research Officer

Contemporary reforms – mandating a one-size-fits-all to curriculum

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> ***"If we can implement structured literacy being taught in every school in the next couple of years, I will retire a very happy politician because that is monumental. We will be the first country in the world, as far as I'm aware, that has done that. And it is going to be game-changing."***
>
> Hon. Erica Stanford, Minister of Education (NZ Herald, 3 May 2024)

In an article published in *The Australian* newspaper on 24 April 2024, the Executive Director of The New Zealand Initiative, a pro-free-market think tank, remarked, "In New Zealand, one of the most exciting education reforms in the world is quietly getting underway. Erica Stanford, the country's new Education Minister, is on a mission to overhaul the education system from top to bottom – and she is leaving no stone unturned".

Formed in November 2023, the current National-led government asserts that education is pivotal in facilitating equitable opportunities for all citizens. The Minister of Finance, Nicola Willis, reinforced this perspective during the 2024 Budget announcement, declaring, "Education is the great liberator, the great equaliser, and the most enduring gift we can bestow on our children". In her Budget 2025 address, she further articulated a direct connection between educational outcomes and national economic performance, affirming, "To my mind, improving the results we get from our education system is the single most important thing we can do to improve the future productivity of New Zealand".

Minister Stanford states that the prevailing decentralised schooling model places an undue burden on individual schools. She observes that the highly flexible and devolved system, where "school communities make varied decisions about how students are taught and assessed", often leaves educators lacking the specialised expertise necessary for curriculum development, assessment design, and effective pedagogy. The Minister maintains that "Until we fix our curriculum, our pedagogy and assessment, we will not lift our achievement and we will not see the closing of the equity gap"[1].

The Government's restructuring of the national education system is underpinned by a core philosophy comprising three interrelated pillars: ambition, achievement, and outcomes. This philosophical framework has been operationalised through the establishment of six key educational priorities, outlined below. These priorities constitute the overarching structure guiding policy development, resource allocation, and teaching methods within the system.

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[1] Newsroom (Laura Walters), 20 March 2024: Education minister vows to close yawning equity gap

Six key educational priorities focused on lifting achievement		
1.	**Clearer curriculum**	Establishing a knowledge-rich curriculum grounded in the science of learning.
2.	**Better approach to literacy and numeracy**	Implementing evidence-based instruction in early literacy and mathematics.
3.	**Smarter assessment and reporting**	Implementing consistent modes of monitoring student progress and achievement.
4.	**Improved teacher training**	Developing the workforce of the future, including leadership development pathways.
5.	**Stronger learning support**	Targeting effective learning support interventions for students with additional needs.
6.	**Greater use of data**	Using data and evidence to drive consistent improvement in achievement.

In April 2024, the Minister of Education submitted a paper to the Cabinet Social Outcomes Committee, detailing her educational priorities for the forthcoming three years. This document references the work of American educator and academic Professor E. D. Hirsch Jr., who attributes “the systematic failure to teach all children the knowledge they need in order to understand what the next grade has to offer” as the chief cause of "avoidable injustice in our schools."[2]

E. D. Hirsch, through his influential works *Cultural literacy: What every American needs to know* and *Why knowledge matters: Rescuing our children from failed educational theories*, presents two core arguments. First, Hirsch contends that the acquisition of a shared body of societal knowledge, referred to as ‘communal knowledge’, is essential for improving the life opportunities of individuals. Recognising that not all learners have access to this foundational knowledge within their home environments, he stresses the importance of teaching it within schools. Second, Hirsch advocates for a highly structured and sequential educational approach, wherein students systematically develop their knowledge base over time. This, he argues, requires a return to fundamental educational principles, implemented through a rigorous core curriculum.

Hirsch's concept of a knowledge-rich curriculum has attracted considerable critique, particularly with respect to its potential to disadvantage students from diverse backgrounds and to constrain creativity. A central concern relates to the apparent Eurocentric bias of Hirsch's list of ‘core knowledge’, despite claims of its universal applicability. This observation raises important questions regarding the criteria by which 'essential' knowledge is determined and the cultural perspectives that are therefore prioritised, presenting the risk of marginalising or excluding alternative cultural viewpoints and knowledge systems. Additionally, some academics suggest that Hirsch's framework does not sufficiently acknowledge the inherent complexities of literacy and learning, nor does it adequately consider the profound social and cultural factors that shape an individual’s engagement with knowledge.

[2] Hirsch Jr, E. D. (1999). *The schools we need and why we don't have them.* Anchor Books. (p. 33).

The Ministerial Advisory Group (MAG) for Education, chaired by Dr Michael Johnston (a cognitive psychologist and Senior Fellow for Education at The New Zealand Initiative), commenced its work by developing recommendations concerning curriculum design and teaching approaches in early-years literacy and mathematics. With the explicit support of the Minister of Education, MAG's remit was subsequently expanded to encompass the integration of 'science of learning' principles, 'structured instruction', and a 'knowledge-rich curriculum' across all primary and secondary education levels.

Dr Johnston, drawing upon established principles from the science of learning, presented a core educational doctrine that shaped many of MAG's recommendations. This approach stresses the critical need to methodically embed essential knowledge into students' long-term memory before introducing more advanced ideas. Dr Johnston further emphasised the need for a curriculum that is carefully sequenced, content-rich, and selective in coverage. As he observed, "teachers cannot teach everything, the curriculum must therefore be selective. It must ensure that truly foundational knowledge is emphasised."[3]

The Minister of Education advocates for a consistent, one-size-fits-all approach to education. She asserts that a thorough understanding of the science of learning, particularly the cognitive processes involved in knowledge acquisition and reading, is paramount for achieving educational equity. The Minister maintains that, as "the human brain learns to read the same", regardless of an individual's background, leveraging the science of learning is the most crucial action for advancing equitable outcomes.[4]

Minister Stanford stresses that, while fostering cultural responsiveness and ensuring a welcoming school environment are important for promoting student inclusion, these measures are insufficient if the "brain science part" of learning is not addressed. She maintains that, without a firm grounding in the science of how students acquire knowledge, particularly reading skills, students are unlikely to achieve essential competencies, regardless of how inclusive the school environment may be.

2025 – Schools are:
Required to implement structured approaches to teaching reading and writing, pānui and tuhituhi in Years 0-3.
Required to use the updated English and Te Reo Rangatira (Years 0-6), and the updated mathematics and statistics and Pāngarau (Years 0-8) curriculum content.
Encouraged to adjust their assessment, aromatawai, and reporting to reflect how students and ākonga are progressing against the new Years 0 to 6 English and Te Reo Rangatira and Years 0 to 8 maths and Pāngarau curricula.
Required to report to whānau | families about how ākonga | students are progressing against the new Years 0 to 6 English and Te Reo Rangatira, and Years 0 to 8 maths and Pāngarau curricula.
Encouraged to implement 20- and 40-week phonics checks or Hihira Weteoro for Year 1 students and share phonics data with the Ministry of Education.

[3] The New Zealand Initiative (27 June 2024). Insights Newsletter, 23: Towards a knowledge-rich curriculum.
[4] Newsroom (Laura Walters), 20 March 2024: Education minister vows to close yawning equity gap

Looking back briefly

"Many would gladly see the so-called 'three R's' restored to their rightful place in our curriculum. And, on this point, I must say that I am wholeheartedly with them." (R. M. Algie, National Minister of Education, 1949)	***"We have given insufficient attention in recent times to basics in education, and that neglect shows up through the secondary system on to tertiary education and on into adult life, wherever that may lead."*** (Prime Minister Robert Muldoon, 1978)	***"This Government is going to make a difference. We want high standards, not low standards. We want tests that occur week by week and are reported to parents regularly, rather than the four-year approaches taken by the previous government."*** (Labour Education Minister Trevor Mallard, 2000)

Amid widespread public unease over a perceived decline in educational standards following World War II, the Minister of Education, Philip Skoglund, convened an independent Commission on Education. This commission was tasked with conducting a thorough review of the national education system.

The Commission, established in February 1960 under the chairmanship of Sir George Currie and comprising 11 members, undertook a comprehensive investigation into the contentious issue of 'modern educational methods'. The Commissioners concluded that there was no longer a place within New Zealand primary schools for educators who rejected the "cardinal ideas of variation in ability and attainment" and who "narrowed all achievements to success in the three R's" by intentionally preventing students from advancing through the education system "until they had reached each year some fixed level or standard of attainment".[5]

In response to persistent concerns regarding declining standards in primary education, the Commissioners recommended that the New Zealand Council for Educational Research (NZCER) be tasked with the development and implementation of national standardised assessments. These assessments, referred to as 'checkpoints of attainment', were to be administered at five-year intervals in core subjects, thereby allowing for robust and valid comparisons of student achievement at specific points in the primary curriculum (namely, Standards 1, 4, and Form 2). It was emphasised that these 'checkpoints' should serve as a supplement to, rather than a replacement for, teacher assessments, given that teachers possess unique professional insight into the factors influencing student performance and ability.

Following the publication of the Currie Commission's report in 1962, the Minister of Education, Arthur Kinsella, formally requested in 1965 that NZCER develop standardised group assessments to measure attainment in core school subjects. These assessments were to align with New Zealand syllabuses and be applicable across all levels of education. Four years later, NZCER released the initial series of standardised tests, which were subsequently distributed to all primary schools nationwide.

In 1978, the Department of Education published a report entitled *Educational Standards in State Schools*, which provided a comprehensive evaluation of educational standards within state-funded schools across the country. The report, formally submitted to the Minister of Education, sought to address widespread anxiety about an apparent decline in educational standards, particularly in relation to basic literacy and numeracy skills. Prompted by apprehensions about the education

[5] Commission on Education in New Zealand (1962, July). *Report of the Commission on Education in New Zealand* (The Currie Commission), pp. 27–28.

system's capacity to adequately prepare students for further training and employment, the report underscored the necessity for a renewed focus on the teaching of fundamental skills essential for success in both higher education and the workforce.

Throughout the 1980s, significant administrative reforms were implemented within the schooling system as a principal strategy for improvement. Central to this approach were the recommendations of the Picot Report and the subsequent Tomorrow's Schools initiative. Concurrently, an 'outcomes-based' curriculum emerged, outlining national learning outcomes for students while affording schools greater autonomy in determining instructional approaches. However, the initial draft of this curriculum was set aside due to extensive educational and governmental restructuring that occurred in 1989 and 1990.

While in opposition, the National Party sought to address the Tomorrow's Schools initiative by placing particular emphasis on curriculum reform. Dr Lockwood Smith, the Party's spokesperson for education, advocated for a 'back-to-basics' approach, recommending the establishment of achievement benchmarks for students at each year level in what he identified as the three 'core competencies': English, mathematics, and science[6]. After the National Party's return to government in October 1990, Minister Smith implemented a series of substantive reforms, most notably initiating the development of a national curriculum framework. In May 1991, a draft document encompassing seven key learning areas was formally presented by the Minister at a curriculum conference convened by the Post-Primary Teachers' Association.

Due to ongoing concerns and feedback from schools regarding the implementation of the revised curriculum, the scheduled timeline for completing these reforms was paused in June 1996. This decision was taken to specifically address issues related to teacher workload, as well as the scale and pace of systemic change within schools. Over the following eight years, a period notably longer than the originally proposed two-year timeframe, educators progressively received all seven core curriculum documents for Years 1 to 13.

Upon assuming office in 2008, following nine years in opposition, the National Government introduced a 10-point education plan. Prime Minister John Key described this initiative, focused on improving children's literacy and numeracy, as a 'crusade'. Central to this policy was the mandatory, systematic assessment of all primary and intermediate students against established national standards in literacy and numeracy. The Government's stated objective was to provide parents with clear, accessible ('plain English') information about their child's academic performance. This approach was designed to empower parents by giving them a stronger voice and more choice in educational matters concerning their children. The overarching goal was to guarantee equitable opportunities for success to every child and to enable meaningful, consistent comparisons of achievement among schools.

Following the re-election of the National Government in 2011, which was widely interpreted as an endorsement of its economic and social policies, including those related to education, a more assertive market-liberal agenda was adopted. In 2012, the Government mandated that all primary and intermediate schools report student achievement data against established national standards to the Ministry of Education. This directive required schools to submit information detailing the proportions of students assessed by teachers as performing 'above' or 'below' the defined benchmarks.

A significant controversy emerged when a senior political reporter from a major newspaper group submitted an Official Information Act request to all schools, seeking their respective data in advance of the Ministry of Education's scheduled official release later that year. Subsequently, Fairfax Media launched an interactive 'School Report' feature on its website, presenting aggregated national

[6] New Zealand Herald, report, 'Back to basics says National Party', 8 July 1989.

standards data alongside relevant contextual information for all participating schools. The lead political correspondent issued a formal statement explaining the rationale for publishing this information, while acknowledging the data's incomplete and potentially problematic nature.

Programme for International Student Assessment (PISA)

> ***"PISA results show an urgent need to teach the basics. A structured approach to learning is the way to go."***
>
> Minister of Education Media Release (5 December 2023)

The most recent Programme for International Student Assessment (PISA) report, released on 5 December 2023, reveals a continued decline in academic performance. Average scores in mathematics, reading, and science have decreased in comparison to previous years, thereby extending a downward trend that has been evident since 2009. In particular, mathematics scores fell by 15 points, while scores in reading and science each declined by approximately four to five points. Despite these reductions, Aotearoa New Zealand's results remain above the OECD average in all three subject areas.

Responding to the 2022 PISA results, Minister Erica Stanford, in the Government's official media release entitled '*PISA results show urgent need to teach the basics*', described the declines in reading, writing, and mathematics as both disappointing and unsurprising, remarking "we have been using incorrect methods for the past 30 years"[7]. The Minister further emphasised that the PISA results underscored persistent deficiencies in the schooling system's ability to deliver satisfactory learning outcomes for students.

The OECD's PISA initiative systematically evaluates the proficiency of 15-year-old students in reading, mathematics, and science, as well as their readiness for adult life and future employment. The primary objective is to assess the ability of students to apply their knowledge and to draw connections between educational outcomes and national schooling systems. During the 2022 assessment cycle, PISA evaluated approximately 690,000 students across 81 OECD member and partner economies, including 37 OECD countries. Participation from Aotearoa New Zealand comprised nearly 4,700 students, drawn from 169 English-medium schools during Term 3, 2022.

During the 2022 assessment cycle, 18 countries and economies achieved results above the OECD average across mathematics, reading, and science. Mathematics proficiency among OECD nations experienced an unprecedented decline of 15 points from 2018 to 2022, representing the largest decrease on record. Reading scores similarly declined by 10 points, a reduction twice as substantial as any previously observed. In contrast, science performance remained relatively stable over the same period. Analysis over the preceding decade indicates consistent downward trends in both reading and science, whereas mathematics achievement had remained largely stable from 2003 until the onset of the recent decline in 2018. Of particular note, Colombia, Macao (China), Peru, and Qatar have demonstrated consistent improvement across all three core subjects since their respective initial participation in PISA.

First published in 2001, PISA results have been widely recognised as the international 'gold standard' for assessing educational quality, serving as a definitive measure for the overall effectiveness of school systems worldwide. A 2012 OECD report affirms PISA's considerable influence, stating, "PISA

[7] Newstalk ZB (Mike Hosking Breakfast), 6 December 2023

has become accepted as a reliable instrument for benchmarking student performance worldwide, and PISA results have had an influence on policy reform in the majority of participating countries/economies".[8]

The triennial publication of PISA results in early December consistently draws significant attention to the average score rankings of participating countries. With every new set of data, there is a predictable pattern of governmental concern, enhanced media scrutiny, and increased public calls for greater accountability in relation to perceived shortcomings within national education systems. A Google search combining 'PISA' with terms such as 'crisis', 'failure', or 'decline' yields numerous international examples of these associations. For instance:

- PISA tests: the crisis of basic learning (5 December 2023, La Nación)
- Finland's PISA results continue to decline, sparking concern (Helsinki Times, 6 December 2023)
- Dutch kids' reading, maths, and science skills are declining (NL Times, 5 December 2023)
- The cost of failing to make the learning crisis a national priority is high (UNICEF, 7 December 2023).

The term 'PISA-shock' was initially coined in Germany following the first PISA assessment, which revealed that the nation's highly-regarded education system was, in fact, performing at an average level. This unexpected finding had a profound effect, prompting substantial educational reforms throughout the country. In response to similar 'PISA-shocks', other countries, including Norway, Denmark, Sweden, and Japan, have likewise implemented new curricula. Additionally, a number of nations have introduced new national standards and mandatory national testing systems as a direct consequence of their respective PISA outcomes.

Although the causal relationships between school practices and student performance in PISA are complex and sometimes unclear, PISA remains unique in positioning itself as a singular international assessment programme designed to inform governmental policy and advocate for best practices in education. Despite the limitations of the data in establishing definitive causality, PISA exerts considerable influence within policy discourse, largely due to its strategic engagement with international media. This strategic focus increases public awareness of national educational outcomes and places substantial pressure on governments to adopt policies aligned with PISA's recommendations. As a result, PISA has evolved into an influential component of political debate, functioning not merely as an impartial repository of evidence but increasingly as a catalyst that actively shapes educational policy decisions and, at times, amplifies ideological debates.

An analysis of mean PISA scores reveals that most OECD member countries are clustered within a central cohort, displaying only minor differences in their average performance levels. This situation may be aptly compared to a cycling peloton, in which the aerodynamic benefits of group riding result in most competitors achieving closely aligned finishing times. Consequently, even relatively minor variations in a nation's aggregate score can lead to shifts of 10 to 20 positions within the national rankings. Furthermore, a notable degree of uncertainty is inherent in the published PISA scores. This uncertainty arises in part from sampling errors associated with the measurement process, as well as supplementary ambiguities arising from the methodologies used to calculate the reported results.

In May 2014, *The Guardian*, a prominent British newspaper, published an open letter addressed to the PISA Director. This correspondence, endorsed by over 100 education researchers and educators from around the world, highlighted significant concerns regarding the increasingly negative impact of PISA on global education policies. The signatories specifically criticised PISA for encouraging an excessive dependence on standardised testing, which, in their view, has led to an undue narrowing of curricula with an overt focus on measurable outcomes. Such an approach, they argued, has resulted in the marginalisation of other important educational objectives, particularly those relating to the fundamental purpose and broader nature of education. This tendency is attributed to the OECD's

[8] Breakspear, S. (2012). *The policy impact of PISA: An exploration of the normative effects of international benchmarking in school system performance.* OECD Education Working Papers, 71.

emphasis on economic development and its prioritisation of preparing students primarily for the workforce.

Commercial interests are notably advanced through the pursuit of higher test scores. The Educational Testing Service (ETS), a prominent assessment and measurement organisation based in the United States, serves as one of the principal contractors for PISA. In 2024, ETS was appointed as the international digital delivery platform provider for the OECD's PISA-based Test for Schools (PBTS) digital assessment, with contractual responsibilities extending through to 2029. This role entails ETS designing, developing, and maintaining an international digital delivery platform for the PBTS.

The importance of a balanced approach

> ***"Our government will ensure that we have a knowledge-rich curriculum, robust measures of student progress, and structured literacy in every primary classroom."***
>
> Minister of Education Media Release (5 December 2023)

Dr Michael Johnston, Senior Fellow for Education at The New Zealand Initiative and a member of the Ministry of Education's Curriculum Coherence Group, which advises on the development of knowledge-rich curricula, has voiced strong criticism about the current state of education in New Zealand. In his newsletters dated 31 January and 19 June 2025, Dr Johnston asserted that the education system has been in continuous decline over the past two decades. He principally attributes this deterioration to the introduction of the Ministry of Education's 2007 curriculum, describing it as "largely devoid of substantive knowledge" and identifying it as a significant factor in what he terms a "death spiral" within the state-run education system. Despite these criticisms, Dr Johnston expressed cautious optimism concerning the Minister of Education's commitment to systemic reform, observing that the Minister supports a more active and direct role for the state in overseeing educational improvement.

The Minister of Education has described the current curriculum as "vague, inconsistent, unclear, and waffly"[9]. Consequently, the transition towards structured learning forms part of broader efforts to reform the curriculum. According to the Cabinet Paper dated 9 December 2024, the initiative to establish a knowledge-rich curriculum, grounded in the principles of the science of learning, is proceeding according to schedule and has received favourable responses from both the education sector and subject-matter experts.

The science of learning employs a rigorous scientific method to investigate the biological, cognitive, and psychological mechanisms underlying the learning process. It draws upon insights from multiple disciplines, including education, psychology, neuroscience, cognitive science, and computer science, to provide a comprehensive understanding of how individuals reason, perceive, behave, and respond within educational contexts.

Nevertheless, education, at its core, is a humanistic discipline that does not readily conform to a purely scientific model. Teaching and learning are inherently shaped by human interpretation and are subject to considerable variation across individuals and contexts. This intrinsic complexity makes it difficult to fully reduce education to a 'science of learning'. Rather, education necessitates informed

[9] New Zealand Herald,·3 May 2024: Education Minister Erica Stanford can 'retire happy' if structured learning takes off in NZ schools.

and subjective judgements about learning, based on a broad array of criteria. It also requires the skilled management of human behaviour among different age groups, each experiencing rapid and substantial emotional, intellectual, psychological, and physical development.

A knowledge-rich curriculum involves the deliberate and systematic transmission of knowledge, defined as a specific set of facts. This is achieved through the implementation of carefully structured, sequential units of study, where each learning stage builds on the foundations established by prior instruction. In this pedagogical approach, the teacher's role is to guide learners through stages of intellectual development to support the progressive integration and expansion of their knowledge. Given that the acquisition of knowledge is regarded as the central objective, it must occupy a primary place within curriculum design, supported by teaching methods aimed at promoting thorough engagement with academic content.

An illustrative example can be found in classrooms examining the Pacific region, where the primary aim may extend beyond the mere acquisition of explicit knowledge. For instance, students might engage in preparing Samoan pani popo (coconut buns), comparing both traditional and contemporary preparation techniques. In such cases, it is often the collaborative and experiential process of making these buns that is the most impactful and engaging aspect, rather than the memorisation of specific factual information about Pacific nations. Such instances raise a fundamental question: What is the principal aim of our education system? Should the emphasis be placed on the retention of facts and the development of a substantive knowledge base, or is it more appropriate to prioritise outcomes that are broader, less quantifiable, and inherently more adaptable and responsive to diverse educational needs?

Education systems around the world, particularly in high-performing countries such as Finland and Singapore, emphasise not only the acquisition of substantive content knowledge but also the ability to apply this knowledge in innovative and critical ways. For example, Finnish schools adhere to a national core curriculum while permitting local institutions to develop their own detailed curricular frameworks. This approach is designed to promote holistic student development, foster the cultivation of critical thinking skills, and accommodate individual differences in learning, rather than relying solely on rote memorisation and standardised testing.

A core principle underpinning the science of learning asserts that education and curriculum design should provide all students, including those from socio-economically disadvantaged backgrounds, with equal access to disciplinary knowledge. This approach supports the development of a comprehensive and systematic understanding of specialised knowledge that extends beyond practical skills or personal know-how. The provision of such equitable access is regarded as a matter of 'distributional justice', underscoring the necessity for every learner to receive a common set of recognised knowledge and the opportunity to contribute to its further development during their education.

Dr Johnston highlights the critical role of knowledge in securing academic success, referencing educational sociologist Michael F. D. Young's concept of 'powerful knowledge'. Young defines powerful knowledge as 'superior knowledge' spanning diverse fields. He maintains that equitable access to such knowledge should be regarded as a fundamental entitlement for all students, regardless of their perceived academic ability. According to Young, powerful knowledge is inherently linked to social justice, as it forms the basis for a fair and inclusive allocation of educational opportunities. While curricula centred on powerful knowledge are often found in exclusive, fee-paying schools in England, for example, Young advocates for their universal implementation across all educational settings, not solely within privileged institutions.

The science of learning offers valuable insights into the processes through which students acquire knowledge; nevertheless, it is not a definitive or static discipline. As with all scientific fields, its principles are provisional, informed by the best available evidence, and open to refinement as new

research emerges. Yet, the term 'science of learning' is often used to imply a singular, unequivocal approach to improving teaching practice. In reality, the delivery of effective and equitable education depends on a robust profession, one that is not only guided by evidence-based practices but is also fundamentally grounded in the expertise of educators and a thorough understanding of individual student needs.

In an upcoming publication, Dr Johnston and colleagues note, "Ideally, future learners will confidently say: 'I use the internet, but I don't have to look everything up, because I've learned and remembered what matters'. Such deep, resilient knowledge will be essential in navigating a world of endless information – and protecting our minds from cognitive decline amid constant technological distractions."[10] The rapid advancement of knowledge, particularly in the context of artificial intelligence (AI), underscores the necessity of moving beyond a narrowly prescriptive curriculum. As new technologies reshape the ways in which information is accessed and processed, it becomes increasingly important for educators to equip students with the critical skills necessary to engage with, evaluate, and apply this ever-growing body of knowledge.

Notable educational scholars, such as Yong Zhao and Pasi Sahlberg, contend that a rigidly prescriptive curriculum, which focuses predominantly on rote memorisation of static facts, is insufficient for preparing students to meet the challenges of a complex, modern world. Zhao's research highlights the importance of an education system that fosters diverse talents and creativity.[11] Sahlberg, on the other hand, cites the effectiveness of Finnish educational reforms, which achieve a balance between substantive knowledge acquisition and the cultivation of critical thinking and creativity.[12] Developing such skills requires pedagogical practices that differ markedly from those approaches that are primarily concerned with the transmission and memorisation of factual information content, as emphasised by the science of learning.

[10] Oakley, B., Johnston, M., Chen, K. Z., Jung, E., & Sejnowski, T. (2025). "The memory paradox: why our brains need knowledge in an age of AI." In *The future of artificial intelligence: economics, society, risks and global policy* (Springer Nature, forthcoming).

[11] Zhao, Y. (2012). *World class learners: Educating creative and entrepreneurial students.* Corwin Press.

[12] Sahlberg, P. (2011). *Finnish lessons: What can the world learn from educational change in Finland?* Teachers College Press.