



Research article

Techno-optimism of Malaysia education blueprint (2013-2025) and its effect on the local sustainability education narrative

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Abstract: Given the increasing dominance of technology across various sectors, it is not surprising that education has also adopted narratives supporting and sustaining its importance in humanity's daily lives. In Malaysia Education Blueprint, narratives partial towards technology, known as techno-optimism, are commonly sighted. The concern with these narratives lies in the environmental impact a techno-optimistic education blueprint would perpetuate; that is, a partiality that enables the continuity of a consumptive status quo that induced the climate crisis in the first place and the maintenance of an unrealistic expectation of continuous comfort in an increasingly challenging ecosystem fuelled by misplaced optimism on technology. To break free from such a lifestyle and promote sustainability, education must support the effort by providing an alternative perspective that prioritises the sustainability of Earth and the well-being of its people. This paper argues for the Malaysia Education Blueprint that serves to guide the nation after 2025 to be based on a holistic approach that takes into account the sustainable interdependence between humans and the environment, as well as the cultivation of a mindset that fosters mutual flourishing.

Keywords: techno-optimism, sustainability education, Malaysia education blueprint, neoliberalism, critical policy discourse analysis

1. Introduction

Technology has been widely celebrated for its ability to address various challenges in life. The contributions of technology in this regard have been undeniably significant, ranging from improving human living conditions and enhancing the provision and quality of basic needs to increasing global life expectancy and advancing the quality of shelter, as well as emphasising comfort [1]. However, behind the allure of better material life, technology has also contributed to a growing divide in social and environmental terms [2]. Advancements in technology and economic growth originated from humanity's exploitation of Earth and its rich natural resources. As we progress into the Fourth Industrial Revolution where technology and digitalisation play a central role, the boundaries between the physical, digital, and biological realms have become increasingly blurred, making the revolution's impact on the environment as well as sustainability efforts more complex [3]. Bonnett [4] argued that this form of illogical and self-destructive act, where development is concerned, was partly a result of the West's utilitarian rational precepts. In light of the worldview where humans are perceived as the "pinnacle of creation, liberated by technology" [5, p. 23], with the self-given prerogative to consume and exploit what nature has to offer without care, many of the world's top polluters have become proud contributors to the "global and generational threat" [6, p. 2] by continuing their exploitative acts.

These destructive acts of environmental exploitation pose a great threat to the people and planet as we approach the proposed 2030 timeline for a 50% reduction in carbon emissions and the 2050 timeline for achieving net zero [7]. As the 2030 deadline draws near, climate-related researchers have reached the sobering consensus that limiting the warming to 1.5 °C, a threshold deemed crucial for minimising existential risks to both human and non-human life, appears to be increasingly unattainable within the constraints of contemporary circumstances. Consequently, maintaining the global temperature rise under 2 °C is now viewed as a collective victory [8]. With temperatures hovering around the 1.2 °C mark at present, a potential ecosystem collapse is becoming more perceptible with discernible manifestations, notably through phenomena such as glacier retreat, coral bleaching, ice sheet collapse, tipping of the Amazon rainforest into savannah-like state in patches, and changes in ocean currents occurring on an escalating scale [9,10]. In a notable departure from previous assessments, some authors on the Intergovernmental Panel on Climate Change (IPCC) went even further by issuing a dire projection of the current impact as well as the projected impact of climate change, concluding that mass starvation, heightened incidence of catastrophic weather events, and large scale omnicide (the annihilation of life forms) would not be the unfounded claim of an alarmist if the warming trends persist [11].

The role of technology in enabling the exacerbation of environmental degradation is discernible, with some asserting that much of the technology that exists has been developed to enhance the pursuit of economic growth [4,12], while the well-being of nature and its importance to people and the planet have been relegated to the background. This has led to the assertion by Bonnett [13] that nature has devolved into an anachronism, so much so that the idea of it has become redundant and only appearing when politically expedient. Despite the undeniable role of technology in exacerbating the ongoing climate change [2], there persists a cohort of technology enthusiasts who are ardently optimistic in believing that all forms of technological innovation hold the key to the solution to environmental problems. There seems to be an underlying assumption that humans have the ultimate control over nature, and if it deviates from the expected norms, technology serves as the perfect remedy for realigning them. It is this positive partiality towards technology and its capacity to

alleviate various challenges in life that may have fostered a sense of misplaced faith in its ability to confront the gargantuan challenge posed by the climate crisis. This has prompted Bonnet [13] to lament that “humanity has sought to ‘deal’ with environmental problems by changing the environment rather than itself, relying on technological ‘fixes’—either actual or hoped for” (p. 254). This unwavering faith and optimism in technology and its ability to fix anything is aligned with our collective desire to perpetuate the economic and social development of humanity. The term *techno-optimism* was born out of such false beliefs, aiming to describe the phenomenon where one holds the notion that “humanity will be able to solve environmental challenges primarily through technological advancement” [3, p. 73] while existing growth-oriented socioeconomic systems can remain unchanged.

According to the prevailing patterns of techno-optimism, efforts towards the environment have resulted in the normalisation of greening businesses, the attachment of efficiency to resource usage, and the reduction of wastage in the consumption process [1]. These findings are in agreement with Alexander and Rutherford’s [2] conceptualisation of techno-optimism as the optimistic belief that environmental problems could be solved by science and technology while retaining the dominant “growth-based economies or the nature of Western-style, affluent lifestyle” (p. 2). Concurring with the opinions cited, this article conceives techno-optimism as a falsely optimistic belief that world systems operating on a neoliberal ideology could persist as usual with science and technology being the key to solving complex environmental problems. Embedded in the discussions raised would be the continued operation of a growth-oriented socioeconomic system that retains and promotes a materialistic and consumptive way of being that we are growing used to and instilled from young; the exact way of being that got us into this environmental conundrum in the first place [14,15]. This growth-oriented socioeconomic system is understood as the fundamental conceptualisation of neoliberalism for the purpose of this article. It is acknowledged that the term neoliberalism is both controversial and encompasses various incoherent concepts [16]; however, as the focus of this article is not on the philosophical discussion of neoliberalism per se, a conceptualisation of neoliberalism as a growth-oriented socioeconomic system promoting materialistic and consumptive ways of being is sufficient for the purposes of this article.

Expanding on the point above regarding the juxtaposition between techno-optimism and climate mitigation efforts, Bonnett [17] argued that science as an instrument for research and the philosophical tenet of scientism are two distinct concepts that have been interchangeably used. However, it is crucial to recognise that scientism signifies “a set of presumptions about the significance and application of the assumptions, methodologies, and findings of this field of research in our daily lives” [17, p. 341]; these same set of presumptions are unfortunately often manipulated to further sustain the techno-optimistic status quo favoured by neoliberalism [18]. Supporting these assertions would be Ribeiro and Soromenho-Marques [19], whose analyses of past narratives on science and technology pointed to attempts at greenwashing embedded in various presentations. Reflecting Bonnett’s [17] assertion, the authors argued that there is a clear distinction between the communication of science products that present them as a panacea and science communication, which aims to encourage the democratisation of opinions and knowledge to better understand the relationship between human and nature. The former was labelled “techno-washing”, a term signifying the blatant attempt at normalising the propagation of “‘science’ and ‘technology’ products, using communicational and marketing techniques” (p. 5) that made the support of a “utopian” dream a foregone conclusion, under the guise of bringing science to the masses [19]. The authors cautioned that the danger in such attempts can lead to the manipulation of public opinion through the

“exploitation of science concepts, methods, and research projects” (p. 6) and the exploitation of public interests by policymakers or public entities geared toward neoliberalism.

The manipulation of scientific messages to favour the neoliberal status quo is not a new tactic. The work of Oreskes and Conway [20] on the manipulation of scientific communication by certain parties to spread doubt on climate change narratives supports the findings mentioned above. In a related environmental research article, Supran and Oreskes [21] analysed the communication tactics of ExxonMobil, a company with a vested interest in climate change, and found that the company had blatantly attempted to create doubt about the anthropogenic effects of climate change and the role of the fossil fuel industry role in exacerbating it. In education, this meant that the scientific consensus around climate change and the evidence-based role of carbon emitters, such as the fossil fuel industry, was watered down, thereby compromising the encouragement for a balanced view of how this came to be and giving equal weight to the economic and social needs that might run counter to environmental health efforts. This led Kopnina [22,23] to lament the fact that the call for a “balanced view” in environmental issues, which considers economic, social, and environmental needs equally, undermined the concern for environmental well-being and species justice. Qualitative frame analysis and critical discourse analysis by Megura and Gunderson [24] that focused on the sustainability reports of fossil fuel companies further substantiated the argument that techno-optimism was adopted as one of the approaches in attempts to weaken sustainability efforts. More specifically, the article concluded that the downplaying of the anthropogenic root of climate change, the greenwashing of environmentally harmful actions, and the illogical justification of maintaining the status quo were achieved through four frames, one of which is techno-optimism.

This brings us to the main issue that this paper attempts to highlight, namely, the dangers of encouraging techno-optimism in education. With the ever-increasing emphasis on Science, Technology, Engineering, and Mathematics (STEM) education worldwide, there is a growing concern about the potential negative consequences of directing education towards a “neoliberal, hi-tech growthist perspective” [25, p. 8]. In their recent critiques, Smith and Watson [5] highlighted three main concerns that warrant attention in the context of the rise of STEM and its enthusiastic integration into education. The **primary concern**, according to the authors, lies in the messages of *uncritical faith* ascribed to economic growth that underpins the support for STEM. Gumbo [26] asserts that the celebration of technological advancements that fuels the industrial revolution of the 21st century is merely beneficial to transnational corporations and not to local communities [27]. In the words of the author, globalisation, which places STEM innovation at its core, is intent on “making money” (p. 11) at the end of the day. The **second concern**, which Smith and Watson [5] emphasise as being more directly damaging to the learners, is the complicity of STEM in the “narrowing of young people’s ability to envisage a range of futures beyond the technological” (p. 4). This ideological framing of possibilities in STEM poses a serious threat to imagining alternative futures, or in the words of the authors, “to fire students’ imaginations” (p. 7). Given the environmental crisis and sustainable development agenda, the role of STEM education in feeding learners with the possibilities of a more sustainable tomorrow charged with “green technologies” led to what Bonnett [17] argued as an agenda that “smacks of political convenience of a pretty high order” (p. 255). The **final concern** is associated with the growing disconnect between humans and nature as a result of prioritising STEM innovations and developments. By positioning STEM as optimistically as we have in today’s world, there is definite risk of “further disconnecting students and indeed ourselves, from deep engagement with nature” (ibid, p. 7). In this regard, STEM has and will continue to play a central role in anthropogenic environmental destruction, especially when it is

designed to “alienate us both from nature and our own nature” [13,28], as the presumed mastery of nature has led to the current environmental conundrum where nature is forsaken in the face of political and economic interests [17,29].

It is alarming to observe that evidence is pointing to an uptake of narratives partial towards the emphasis of STEM education internationally [30]. There seems to be an unexplained optimistic belief that technology is and will be the answer to “fixing existing problems” [31, p. 298]. In the case of the Malaysia Education Blueprint (MEB) (2012), in which the focus of its transformation plan is on STEM and its promise of propelling the nation’s economic and social development, the aforementioned optimism attributed to technology could not have been more obvious [18]. This optimism, coupled with the fact that the MEB was developed by an international consultancy firm famous for its “extreme neoliberal” leanings [32] and overseen by a panel made up of members with entrepreneurial backgrounds [33], leads to the main argument of this paper. That is, there is a need for an alternative way of learning and knowing that can resist the persistence of techno-optimistic narratives in an education blueprint fuelled by the neoliberal interests of transnational and local corporations that prioritise revenue over environmental health. The subsequent sections of this paper will focus on exposing the tone of techno-optimism apparent in the MEB through critical policy discourse analysis. It will then argue for sustainability as a frame of mind and the use of critical realism as the primary lens for the impending revisions of the MEB, where due consideration is given to instil a way of life that celebrates the mutual flourishing of people and the environment. Before delving into the discussions on how the analysis of MEB content is to be conducted, this paper will explore some socioeconomic and political factors that led to the transformation plan laid out in the MEB.

2. The Malaysia education blueprint and its plans

The MEB was developed as a means to mitigate growing public dissatisfaction with the increasingly poor performance of Malaysia’s education system [34]. This poor performance was partly due to the global trends of using large-scale assessments such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS) as a measure for education quality. Independent local studies at that time showed that the literacy rates of 13–17-year-old Malaysian students scored as high as 95.2% in the Malay language, English language, and Mathematics, while their critical literacy rate was 71.2% [35]. However, in 2011, the performance of 15-year-old Malaysians in PISA was at least 100 points lower than their regional peers in all three domains of Mathematics, Science, and Reading [36]. This “poor” performance coupled with a slowdown in the country’s gross domestic product [37] may have contributed to the weakening political hold of the incumbent government at that time. The MEB was developed under these socioeconomic and political conditions as a means to sway public opinion in favour of the ruling party in order to achieve better election results [38]. In order to further enhance the appeal of the MEB as part of the nation’s plan to achieve high-income status by 2050 [39], the transformation plan laid out in the MEB included two politically appealing proposals: the emphasis on technical and vocational education and training (TVET), and the upgrading of technology-related facilities in classroom settings [33]. According to Lee [40], a significant portion of the country’s federal budget was allocated to funding STEM education, specifically supporting computer science instruction and smart classroom facilities required to prepare learners for the Fourth Industrial Revolution, which is centred on digital technology and artificial intelligence. The political

motivations, public sentiment regarding education quality, and the vested interests of Malaysia's business moguls (as mentioned in the previous section) all contributed to the MEB's treatment of education as an avenue for building human capital [41]. Given that employment opportunities and economic growth are often key factors in political contests, it is not surprising that some critics argue that the MEB is less concerned with education and more focused on promoting "popularity and inducing partisan fealty" [40, p. 3; 42]. Needless to say, environment-based education was contextualised and oriented towards technologically optimistic narratives, with sustainability being viewed as a matter of adopting green technology and innovation, while opportunities for immersive experiences in nature were limited [43].

3. Tone of techno-optimism through the lens of critical policy discourse analysis

To better present the central arguments of this paper, Fairclough's critical discourse analysis (CDA) approach was adopted to clarify the connections between policy text, techno-optimism, and neoliberal narratives within the MEB. In simple terms, CDA entails a detailed analysis of text as a means to identify how the social practice or ideology studied is privileged through the use of language [44]. Fairclough [45] expanded that the focus of CDA is primarily on "relations between semiotic and other social elements" (p. 13) rather than semiotic aspects alone. Considering policy as a document that reflects a discourse in which the voices representing certain interests are embedded through the words used, structure, and presentation [46], discourse in this context refers to the worldview associated with a specific social perspective, such as neoliberal discourse, as explained by Fairclough [45].

Specifically relevant to this paper is a branch of CDA known as critical policy discourse analysis (CPDA). A relatively recent development in CDA [47], the emergence of CPDA was motivated by the desire to "grasp the finer semiotic details" [47, p. 631] between policy analysis and CDA. As an analytical framework, it aims to capture, conceptualise social structure, and scrutinise the finer details of policy in a way that can provide a fresh perspective on how policy is understood, developed, and even implemented [44]. In the words of Montessori et al, CPDA has the potential to offer:

"... theoretically informed language of explanatory critique, capable of showing not only how, but why, the language of logic of neoliberalism comes to dominate and colonise even those voices which ostensibly stand in opposition to it" [44, p. 8]

In essence, by scrutinising the language employed, the political leanings implicit in the chosen texts, the voices that were represented, and the voices muted, this analysis will attempt to gain a deeper understanding of how and why growthist, techno-optimistic narratives in the MEB have become dominant. With this interpretative framework as a guide, it can be argued that the discourse embedded within the text, graphs, footnotes, forewords, appendices, and pictures of the MEB are reflective of the social, political, and economic landscape in Malaysia [48]. This approach allowed for an analysis of the policy concerning three key areas: (1) the presence of technology-oriented narratives in the policy, (2) narratives regarding the relationship between the economy and technology, and (3) the implications for sustainability education in the country due to the policy's partiality towards technology. The analysis was conducted by examining the vocabulary, grammar, cohesion, and text structure of both the spoken and written texts of the policy, as well as taking into consideration the sociopolitical context in which the texts were produced, distributed, and

consumed [49]. By focusing on the vocabulary choices of the MEB and the sociopolitical context in which it was developed, this paper aims to provide a comprehensive analysis of the policy while also taking into account the linguistic limitations of the authors for whom the English language is their second and third language.

In the initial section of this writing, the discussion of the analysis will concentrate on analysing the dominance of techno-optimistic (and thereby neoliberalistic) language in the MEB. The subsequent section will then explore the reasons behind the prevalence of techno-optimistic narratives. Finally, the last section will examine the possibility of revising the MEB post-2025 from one rife with techno-optimistic and neoliberal narratives to one that could support environmentally inclined sustainability efforts.

3.1. Tone of techno-optimism in Malaysia Education Blueprint (2013–2025)

It is unsurprising that an education-related document would exhibit techno-optimism, which is associated with a zealous faith in STEM education. This can be seen in the MEB through its association of education's purpose with the global competitiveness of Malaysian learners and their mastery of STEM:

“[the] purpose of education in Malaysia is to enable [the] Malaysian society to have a command of the knowledge, skills, and values necessary in a world that is highly competitive and globalised, arising from the impact of rapid development in science, technology, and information.” [33, p. 63]

In the policy, the benchmark for global competitiveness at the primary and secondary levels was linked to TIMSS and PISA, both of which are large-scale assessments designed to assess the competency in scientific and mathematical knowledge, as well as the reading skills, of a specific age group [50]. Needless to say, these large-scale assessments, with their emphasis on Western-based science and mathematics, have been conceived as techno-scientific in nature [51]. In referring to the concept of techno-scientism, Bensaude Vincent [52] argued that it refers to the “contamination of science by management and capitalism” (p. 169), where the emphasis on science has been infiltrated by performance-oriented narratives. Based on this view, the policy's association with techno-scientific assessments can be observed in numerous instances:

“... rising from the bottom-third to the top-third of countries in international assessments like PISA and TIMSS in 15 years” [33, p. 7]

“Almost 60% of the 15-year-old Malaysian students who participated in PISA failed to meet the minimum proficiency level in Mathematics, while 44% and 43% did not meet the minimum proficiency levels in Reading and Science respectively. A difference of 38 points on the PISA scale is equivalent to one year of schooling. A comparison of scores shows that 15-year-olds in Singapore, South Korea, Hong Kong, and Shanghai are performing as though they have had 3 or more years of schooling than 15-year-olds in Malaysia” [33, p. 22]

“... It will also continue to benchmark [the] performance of the entire system against international standards such as TIMMS and PISA, to ensure comparability with other school systems” [33, p. 244]

Although the wording may vary, the tone and content of the three excerpts cited demonstrate a consistent underlying theme of global competitiveness and its correlation with large-scale assessments. A notable aspect is the fixation on outperforming or achieving parity with learners from top-performing areas such as Singapore, South Korea, Hong Kong, and Shanghai, all of which are consistently ranked among the top performers in PISA and TIMSS assessments. As the analysis of these excerpts progressed, the question of why there seems to be such a strong preoccupation with achieving the top-third percentile performance in PISA and TIMSS arises. Another excerpt provides an answer by establishing a clear connection between the economic performance of a country and its educational achievements:

“international evidence indicates that there is a strong positive correlation between a country’s GDP per capita and PISA scores” [33, p. 98].

This narrative aligns with the capitalistic ideology of “return on investment” and directing funds towards factors that yield the greatest gains, a concept that will be further explored in a subsequent section.

Redirecting our discussion back towards STEM, it is evident that there have been more attempts at aligning its education pathway with neoliberal narratives that are related to human capital and the knowledge economy. In particular, there seems to be careful planning in gearing up the expansion of education pathways through greater inclusion and emphasis on STEM-related vocational training:

“... the Ministry of Science, Technology and Innovation (MOSTI) ... has set ambitious and urgent 2020 human capital targets that include increasing the number of individuals with science-related training from 120,000 to 1.2 million. Out of the 1.2 million, 500,000 should have Science and Engineering degrees (from 85,000 today).” [33, p. 183].

It is not difficult to discern the neoliberal narrative of “human capital” in the excerpt, which refers to Malaysian learners. Likewise, the tone of techno-optimism conveyed through a positive outlook towards advancement in the field and the various personnel required to support the country’s ambitious plans in this area is evident. This is especially so when the education ministry appears to prioritise education’s emphasis on STEM, regardless of which pathway the learners eventually choose. Just as there are policies in place to ensure that 60% of secondary learners pursue science-related pathways while the remaining 40% enter art-related streams, a similar approach has been adopted for vocational education in an attempt to ensure a steady supply of vocational graduates who will meet the need of “three critical areas: (i) engineering and applied sciences; (ii) design and technology; and (iii) business and services” [33, p. 188]. From the few excerpts associating STEM with neoliberal narratives, there seems to be an acknowledgement that education should be instrumental. As the policy states, “each education pathway will be well-integrated with the labour market, providing students with a clear route to their chosen profession” [33, p. 185].

In the previous sections, concerns regarding STEM education and its association with neoliberal narratives have been discussed. These are the same neoliberal narratives that are single-mindedly focused on maximising profit, resulting in environmental health being relegated to the backburner [14,53,54]. Therefore, it is crucial to exercise caution against such narratives when there is an explicit intention to link a country’s academic performance to its economy, as represented by its GDP. It is for this reason that critiques of PISA and TIMSS are growing, particularly among sustainability educators, who argue that these techno-scientific-focused benchmarking exercises do little to address the affinity of education systems to neoliberal narratives. Rappleye et al. [55], along with Komatsu

and Rappleye's [56] series of studies examining the construct of PISA and TIMSS and their impacts on participating countries, argued that what is measured in these tests is a poor reflection of what matters most in the current climate crisis. To be precise, the measurements obtained are "narrow [in] spectrum" [57] and primarily focused on associating education with economic narratives [56], essentially resulting in a distorted comparison that encourages short-term fixes without meaningful change to the quality of education and life for the learners [55]. These assertions are further substantiated by the narratives found in the MEB, which state:

"The Ministry acknowledges how important education is in providing a foundation for nation building and sustainable economic growth in line with Malaysia's goal of transforming into a high-income nation" [33, p. 59].

Evidently, the excerpt cited is yet another among many that emphasises economic growth and the will to transform into a high-income nation through educational change.

The message embedded in the few excerpts cited, and in the policy document as a whole, seems to convey that the transformation of education is geared towards the promotion of academic standardisation, where students' learning is aligned with the curriculum taught in the top-third quartile of schools to ensure that the country can "produce individuals that are able to thrive and compete globally" [33, p. 59]. Disregarding the connotation of phrases such as "producing individuals", which connotes commodification, the question of what the policy meant by "thriving" and being able to "compete globally" requires further examination. In seeking to that, the analysis discovered narratives in the MEB that revolve around several recurring themes of human capital, the knowledge economy, and the neoliberal status quo, as evidenced by the following quotes:

"... able to compete in the modern labour market" [33, p. 6]

"... allow them to succeed in the 21st century and ... compete with the best in the world" [33, p. 8]

"... to have a globally-competitive education system that produces globally competitive talent" [33, p. 62]

"... to compete against in today's knowledge economy" [33, p. 80]

From the excerpts, the association between the competency of a country with the modern labour market and competitive talents (which are associated with human capital narratives), the 21st century (which is associated with the neoliberal status quo), and the knowledge economy has been established. Aside from narratives associating improved education quality with increased competitiveness from the perspectives of human capital and the knowledge economy, no explanation was given as to how these associations came to be. Although there have been attempts at explanation, such as by citing how "in today's global economy, a nation's success depends fundamentally on the knowledge, skills, and competencies of its people" [33, p. 22], the root of this association was not addressed. However, this statement does serve its purpose.

During the course of the analysis, it became apparent that there were inconsistencies in the reasoning. The impact of improved education quality, as defined through techno-scientific assessments, on the overall improved competence of learners was acknowledged. However, it did not address whether this improvement translates into the development of a "highly skilled [and] innovative workforce" [33, p. 12], which is necessary to propel the country into a successful high-income nation, as defined by the policy. This then raises the question of why there would be a need

for the country to compete globally. Partial answers seem to suggest that it is associated with a fear of falling behind economically, leading to disadvantages from an economic sense; however, a comprehensive answer remains elusive. Regardless, the focus of this article is on the increasing encroachment of techno-optimistic narratives in education policy. In the policy, there appears to be an intention to direct education and learning towards technology, with narratives dating back to the 90s setting the stage by highlighting the “vast development of Information and Communication Technologies (ICT)” and how it “hastens the globalisation era” [33, p. 230]. Later narratives continue to build on the notion of techno-optimism through messages suggesting how “globalisation, liberalisation, and the vast development of ICT continued to influence the development of the national education system” [33, p. 230] in the early 21st century.

The revised MEB, which builds on the techno-optimistic narratives of its predecessors, is set to guide the country’s education system from 2013 to 2025 by continuing along the same trajectory. This version of the MEB places considerable emphasis on the enthusiastic utilisation of technology in various aspects of education, particularly in “leverag[ing] ICT to scale up quality learning across Malaysia” [33, p. 37], where the use of technology has been uncritically associated with improved education quality. The rationale for such a move seems to be the belief that “ICT has tremendous potential to accelerate the learning of a wide range of knowledge and thinking skills” [33, p. 40]. In addressing the how, the policy seems to suggest that “greater personalisation of their educational experience” [33, p. 40] and being “able to learn at their own pace” (ibid) are sufficient explanations. This leap of logic in equating personalised learning delivered through technology with quality learning is rather incomprehensible, given that personalised learning, in particular, often seems to be primarily associated with the pursuit of “subjects that are not offered at their own school and [to] learn directly under the best teachers in the country through distance learning programmes” (ibid).

While there are reservations about the learning efficiency and comprehension of learners experiencing distance learning, there are still concerns about the relationship between personalised learning and technology, which is often perceived to be a representation of quality learning. It seems to be implied that traditional learning with minimal aid from technology, defined by the policy as the use of digital and communication devices, is the reason for unsatisfactory learning quality thus far. However, there seems to be an acknowledgement that technology alone may not be almighty, especially if it is not meaningfully used, as stated in the following excerpt:

“high-end facilities, like computer laboratories, smart classrooms, and science laboratories only become useful once teachers and students alike know how to use the technology and equipment in meaningful ways within learning processes” [33, p. 168].

Despite this acknowledgement, it is still regrettable that discussions and mentions about the downsides of technology usage in learning have been avoided. Granted, there is one acknowledgement that evidence supporting the unequivocal potential of ICT is lacking, as can be seen in the following excerpt:

“... creative and innovat[ive] applications of ICT are seen as important potential tools to transform the educational process so as to support the development of these higher-order thinking skills ... However, an evidence base remains limited” [33, p. 171].

Nevertheless, the subsequent rationalisation indicates that uncritical optimism towards techno-scientific elements and the potential benefits they may bring still dominate despite circumstantial evidence to the contrary. This can be observed from a statement in the policy, which asserts that the

uncertainty regarding the potential of ICT does not stem from the technology itself, but rather “the lack of clear metrics for measuring the impact of ICT on higher-order thinking skills” [33, p. 171]. In light of such limitations, the reasoning seems to be that

“... the promise and potential of ICT in revolutionising education remains undeniable. The growth in the number, sophistication, and use of ICT devices in society provides a strong basis for making schools more productive and efficient—transforming” [33, p. 171].

Such fallacious reasoning, in which optimism for ICT persists in light of limited evidence and a dubious attempt at rationalising its limitations, followed by an obvious attempt at emphasising the revolutionising potential of technology, should raise concerns among its proponents. Yet it did not. Instead, the narratives continued with techno-optimistic notions being associated with capitalistic agendas. To support the realisation of a high-tech learning environment, the narratives naturally leaned towards the incorporation of capitalistic terminology in an attempt at normalising the treatment of education and its planning through a business perspective, a viewpoint defined by the implacable multiplication of exploitation and domination [29]. In the words of the policy:

“... the Ministry will need to transform the way it operates and organises itself to bridge the gap between policy formulation and delivery capacity and to ensure optimal return on investment. This is particularly true for two of the most capital-intensive investments managed by the Ministry: school infrastructure and ICT” [33, p. 148]

Capitalistic concepts such as “return on investment” and “capital-intensive” carry with them the connotation of exploiting additional benefits and domination over what is being “invested” in. This drive to save more and gain more in return permeates the entire document with the introduction of technology into the classroom. As a result, there are narratives advocating for the need to “leverage each party’s [referring to policy actors in differing roles] competitive advantage to deliver better results with fewer resources” [33, p. 148]. Furthermore, these capitalistic concepts indicate a consciousness of cost, as evidenced by the emphasis on the substantial expenditure allocated for “infrastructure development”, which is considered a high “return” project. This is exemplified from narratives emphasising how “the Ministry [has] spent more than RM6 billion on ICT over the past decade” [33, p. 40].

In another aspect of the plan to transform Malaysia’s education system, ICT has been linked to school-based management. To be precise, an administrative software was introduced into the schooling environment to provide better support for the transformation initiative, as claimed in the policy. Hence, narratives along the lines of “the Ministry will use 1BestariNet to ensure that schools are equipped with the best ICT practices to facilitate such school-based management” [33, p. 156] could be seen. This seemingly suggests that the adoption of technology is the best way to enhance school management practices with greater efficiency.

Through the above analyses, we can see that there are deliberate efforts to encourage the readers’ optimism towards techno-scientific elements. From the association between techno-scientific assessment and education quality, which resulted in a pattern of standardisation and competition-based narratives, to narratives encouraging the adoption of technology for high-quality teaching, learning, and management, the messages may differ, but the underlying essence is similar. However, any potential drawbacks or criticisms that could hinder support for the policy were tactically

excluded. In light of these findings, the following section discusses why such leading narratives have emerged in the MEB.

4. Why has techno-optimism become so prominent in MEB?

In the search for explanations for the various factors contributing to optimism towards technology and STEM in all aspects of education, several narratives stand out. Among these, three prevailing narratives have emerged: (1) attempts to associate technology with techno-scientific-based large-scale assessments; (2) the association between capitalistic narratives, technology, and education; and (3) the role of neoliberal narratives in the provision and management of education pathways. The observed narratives are influenced by both local and global factors; therefore, it can be said that in the MEB, at the very least, this phenomenon of techno-optimism has arisen due to a combination of national interests and the influence of global trends that appear to be heading in the same direction—a future in which technology is dominant.

4.1. Global influence: suggestive narratives from transnational corporations

It is widely debated that the influence of global trends can be considered a form of globalisation; according to Nikolakaki [27], this influence is “nothing other than a new stage of imperialism” that is pro-capitalist in nature and serves to fulfil the global interests of powerful supranational and/or transnational corporations. As discussed in the previous section, the capitalistic narratives in the MEB, which lean towards exploitation and domination, indicated that the will of learners is less important than the developmental plan of the country, as inferred from the dogmatic 60:40 science versus art stream policy and the aforementioned 60:40 academic versus vocational education pathways. Anuar’s [58] postcolonial-framed ethnographic study on rural learners and their schooling experiences points to the surreptitious domination of learners’ choices through the 60:40 policy meant to emphasise the importance of STEM in the country’s progress and development. The author argued that STEM education and its potential to enhance a nation’s developmental status is particularly prominent in Malaysia, to the extent that it has been bestowed “a powerful status” (p. 13) capable of shaping discourses in school systems and influencing the educational choices presented to learners. Following this rationale, he acknowledges neoliberalism and capitalism as “the circumscribing backdrop” (p. 12) towards Malaysia’s “proclivity for technology” (ibid) in the education sphere. This viewpoint aligns with Peck [59], who argued that the movement of such narratives across geographical regions has less to do with rationality, and more to do with compatibility with powerful global interests and/or dominant hegemony globally. This led Peck et al. [60] to suggest that the circulatory policy systems of today operate:

“... across a now deeply neoliberalized terrain, from which promising local models are variously seeded, scale-up, and stylised for emulation, more often than not under the aegis of multilateral agencies, private consultancies, and expert networks” (p. 279).

In other words, there are signs that the global neoliberal status quo that is techno-optimistic in narrative is influencing the directions of local policy through multilateral agencies, private consultancies, and expert networks.

The impact of these influences on the MEB can be observed in its employment of the services provided by McKinsey & Company in its development. As previously mentioned, McKinsey &

Company has been proven to exhibit “extreme neoliberal” leanings [32]. Means [61] argued that multilateral private agencies such as McKinsey function as authoritative figures in the framing and development of policies across different geographical contexts. Auld and Morris [62] supported this argument by positing that there seemed to be a new economic-laden narrative for education worldwide, which encompasses the following key elements: (1) preparation of learners for a world defined by the knowledge economy; (2) quantifiable education outcomes, as measured by large-scale assessments, as a proxy for the quality of a country’s human capital; (3) calling for education reforms that encourage global competitiveness, especially through the development of world-class education; and (4) adopting a best-practice transfer and identification approach from selected high-performing systems. All these are narratives identified in the analysis of the MEB, as previously mentioned. Ruuska [63] went a step further by lending greater evidence to Althusser’s argument on how education is likened to the United States Army Intelligence Support Activity, whereby it subtly seeps into one’s daily life and operates in the background without being noticed.

Lingard’s [64] review of Lewis’ PISA and the OECD analysis revealed a more complex situation. Reflecting on the discussions from the previous section, rather than being straightforward, the picture revealed that national interest plays just as much of a role in ensuring that the country’s education is aligned with techno-optimism, similar to the influence of the OECD through the PISA rankings. In the words of Lingard [64],

“OECD’s education work is not only a global manifestation of policy as numbers, but also ‘soft’ governing through decontextualised examples and through nominal descriptors of PISA poster children, which acknowledges to some extent at least the national and cultural specificities of different schooling systems ... the nation-state now works in different ways in the context of globalisation, but remains nonetheless significant.” (p. vi).

The OECD’s influence, as explained by Lewis [65], primarily focused on science and technology in the context of education, with a strong emphasis on vocational training rather than education as a means of learning. The concern with the OECD’s focus is two-fold. For one, the OECD’s primary focus on science and technology has led to an optimism that the revolution brought forth by technological advancement could only be beneficial to humans. This optimism, according to Means [61], was largely expressed in economic and technical terms: “where progress is measured primarily through the potential of new technology to enhance worker productivity and economic efficiencies that drive down costs and promote economic growth” (p. 7). In support of Lewis’s [65,66] findings, Auld, Rappleye, and Morris’s [67] analysis of PISA and its influence in Cambodia similarly revealed a mixed picture of national interests that were enhanced and moulded to fit the status quo. This led the authors to conclude that although the OECD’s attempt at soft imperialism through education might not be realised in full, they have certainly managed to leave their mark in the form of “ideological systems that emerged with such force and promise from Europe in the 20th century” [67, p. 21]. As a result of such framing, local policymakers and actors were given a frame in which effective and quality education is conceived, limiting their vision of what education could be and should be [62,65–67].

Shifting the discussion towards the policy’s emphasis on pushing for a STEM-based future, we see the MEB’s enthusiasm in promoting it through vocational training pathways. The attempt to rationalise education as training and linking it with STEM exemplified a standard strategy employed by multilateral agencies to promote techno-optimism and economic narratives within local education

systems [68]. This is a sign that warrants concern, as there is a significant difference between providing the foundation for the development of thoughts among learners through educational approaches and impartation of knowledge, and the training of people to ensure that they exhibit predefined knowledge and behaviour correctly [69,70]. According to Jickling [71], the prior approach to learning is considered education, while the latter would be snubbed as training. The difference between training and learning aside, the issue with the promotion of technology as the ultimate solution to global challenges and the answer to an increasingly knowledge-based economy is a problematic area that warrants further scrutiny, particularly when it is forcefully linked with STEM education. This sense of optimism seems to be a pattern commonly employed by multilateral agencies, such as the WEF, OECD, and McKinsey, in associating technology with the educational policy changes needed. These changes are believed to translate into economic benefits linked to “productivity, innovation, and growth” [61, p. 13]. However, it is important to note that such an endorsement of optimism can be dangerous to its target due to its manipulative potential and also naive due to the injustice embedded within. Moreover, there is still a significant concern regarding the impact of technology on the environment, which requires careful consideration. Bonnett [15,72] argued that an optimistic view of technology translates to a destructive mastery of nature worldview, which is the root of the problems with the current education model. Watson and Smith [73] asserted that this misplaced sense of mastery stemming from a “defective Western worldview” championing the instrumental treatment of nature only serves to fulfil the prosperous growth vision of the current neoliberal status quo in the short run. In the long run, such a conceptualisation that promotes consumption and its maintenance through misplaced beliefs in the promises of technological advancement can only spell disaster for the health of both the environment and the society [25,68].

4.2. Influence stemming from local policies and interests

Before arriving at the arbitrary conclusion that techno-optimism is a result of global influence *per se*, various clues in the MEB seem to indicate that the techno-optimistic tone in Malaysia’s local education policy is not due solely to large-scale assessments and multilateral agencies. Instead, it appears that local economic policies, most notably Vision 2020, the 10th Malaysian Plan, and the National Transformation 2050 programme, which are also technologically optimistic, have played an equal role in shaping the educational landscape. Vision 2020, in particular, focuses on propelling Malaysia towards the path of science and progress [74], where the country moves in a direction that is on par with the global south without emulating its developmental pathway [75]. However, this Vision 2020 that pushed for technological catch-up and a technologically optimistic future was later “adapted, de-emphasised and displaced” by subsequent prime ministers [75, p. 889], and replaced by the National Transformation 2050 (TN50) programme. Rather than banking on science as the prime avenue for the country’s move towards developed nation status, the TN50 expanded its scope to encompass macroeconomic conditions and policies covering the areas of investment, trade, and industry. The role of education in the realisation of TN50 lies in providing the support needed to ensure the long-term feasibility and sustainability of Malaysia’s mission to become a “top 20 nation in the world by 2050” [39]. This is particularly obvious in the MEB, which seems to reflect a commitment to science, technology, engineering, and mathematics (STEM) in its education planning. The most notable effect of such planning is evident in the initiative to equip schools with devices that will transform them into “smart classrooms”, and in the inclusion of computer science components in curriculum planning [39]. Such examples tie in with Malaysia’s increasing persistence in marrying

the hype of the Fourth Industrial Revolution with education to boost the country's competitiveness in the fields of artificial intelligence, virtual reality, and the Internet of Things (IoT), just to name a few [76].

Drawing from the signs and decisions made regarding educational planning, it appears that amidst the global race for technological advancements, the local commitment to science, technology, engineering, and mathematics in the education sphere is influenced by both global and local aspirations, due to the country's various development agendas. It could be argued that a country's developmental plans are increasingly influenced by global agendas, most notably neoliberalism [49,77], to such an extent that a country's freedom to decide is confined within the larger ecosystem in which the world operates. Nevertheless, for the case of Malaysia at the very least, there seems to be a conscious awareness of the global status quo and for it to consciously demarcate developmental decisions based on what best represents its local interest. This is especially obvious in its attempt to highlight its developmental aspirations as being distinct from the model adopted by the dominant West or emerging East. In the words of Bajunid et al. [78], rather than external influences from different geographical regions, the most pressing issue for Malaysia's education stemmed from politics and the politicians who wielded it like a tool for personal and party gain. Adopting the exact wording of the authors, it is "the meddling hands of politics and politicians" [78, p. 171] that we must be most wary of. A sentiment that Hamid and Jaharudin [42] concur with, upon their discovery of how the MEB's revamp intensified in light of the upcoming General Election and how the allocation of budget seemed to travel among "crucial voting bank in Malay heartland states" [42, p. 40], particularly so where Islamic Education is concerned.

From an ethnographic viewpoint, Anuar [58] provided yet another refreshing perspective on the idea that the dissemination of techno-optimistic narratives might not be a simplistic acceptance of the international status quo by local people. The idea of "aspirational equality" proposed by Ferguson was utilised by Anuar [58] who used it as a basis to reason that the positivity towards technology displayed by learners in the urban peripherals goes beyond the naïve conditioning of neoliberalism and capitalism. Instead, it also serves as a manifestation of their desires to "aspire to standards of development taken for granted in many parts of the city a desire from the postcolonial periphery to transcend class boundaries" [58, p. 13]. This perspective aligns with the current chapter's discussion, implying that it is definitely possible that aspirations of the policymakers and actors to be on a level playing field with technologically advanced countries may have played a role in the techno-optimistic stance of the MEB, despite the prevailing neoliberalism and capitalism.

5. Conclusions

As previously discussed, the signs of techno-optimism and its impact on education are indisputable. However, there is a concern that this partiality would be detrimental to long-term environmental efforts that prioritise the sustainability of the Earth, rather than the sustainability of the neoliberal status quo. This concern stems from the ideological roots of technology, which are Western in origin [5,15]. As mentioned at the beginning of this paper, this seems to feed humanity's growing normalisation of an extortionist lifestyle, which is illogical and self-destructive at its core [4]. In the event that humanity continues to operate under the assumption of human mastery and seeks to address any environmental and/or social problems using technological means alone [3], mass-scale species collapse through omnicide—the annihilation of life forms—will not be a mere possibility, but a certainty [79,80]. For education, this concern is particularly relevant given its

impact on impressionable young minds; it is alarmingly easy to normalise the “economic extraction and exploitation of both humans and nature” [81, p. 3] by technological means through pedagogical planning. Education under the influence of capitalism and neoliberalism has turned the concept of meritocracy into a competitive practice “with questionable outcomes” [63, p. 254]. Unfortunately, for the health of this planet, this questionable outcome often involves a superfluous consumption mindset and behaviour nurtured per the norms, attitudes, and practices of techno-optimistic, growth-oriented capitalistic, and neoliberal discourses [63,82].

Considering the global deterioration of biodiversity and ecosystem health, and the very likely possibility for mass species extinction as global temperatures continue their upward trajectories [11,25], it is clear that drastic changes to our current way of being and knowing are necessary for any observable change to occur. This, in turn, calls for an alternative frame of mind that can support the development of an education policy capable of challenging the dominant status quo and resisting the presumed metaphysical mastery of nature charged to unparalleled heights by capitalist and neoliberal notions of knowing and being [15,72]. Instead of prioritising the sustainability of economic wealth, this frame of mind should place the sustainability of the Earth and all its inhabitants at its core. To break free from the capitalist narratives of human capital, the knowledge economy, and an overly optimistic partiality towards technology, this paper advocates for a frame of mind where learning through direct contact with the environment takes centre stage [72,83]. This approach aligns with Ontong and Le Grange’s [84] exploration of place-based education, which has sustainability as its core principle. The proposed frame of mind encourages the exploration of day-to-day human-environment relationships focused on mutual sustainability, that is, a frame of mind in education designed to encourage critical scrutiny of technology’s purpose and effect rather than a naïve optimism of its promises [5,73]. It emphasises that equal consideration be given to the well-being of all living beings on Earth, rather than the economic standing of the elites [29,85], and instils a sense of value in nature for its inherent worth, rather than its potential economic value.

In terms of curriculum policy, sustainability as a frame of mind meant the adoption of a flexible approach to the selection of themes and topics of learning, as opposed to the rigid curriculum policy currently in place in Malaysia. This flexibility allows educators to structure learning around pertinent current issues and environmental problems, which is a better way of approaching sustainability education [83]. From the perspective that champions the immersive experiences gained from being in nature, a curriculum policy that adheres to these principles is one that encourages cross-disciplinary learning surrounded by the local natural environment learners are familiar with. Nature, as perceived from this frame of mind, is viewed “as those non-human, self-originary aspects of the world” [86], where it persists regardless of human awareness of its existence. We could envision a policy of this framing to be context sensitive [87], which would allow schools located near Malaysia’s various aboriginal villages to design their learning programmes around the environment in which they grew up, while urban schools could base their learning on the environmental issues affecting their area. In other words, a policy viewed as a frame of mind with sustainability as its end goal meant the construction of one that deviated from the MEB discussed earlier. Rather than a policy that treats education as an avenue to boost economic growth, we would be looking at one that cultivates a mutually flourishing human-nature relationship [83]; rather than a policy that emphasises the country’s performance on competitive large-scale assessments, we would emphasise on developing an individual’s metaphysical understanding of the self and the world [88]. At first glance, a policy of this nature would seem rather chaotic and “wild” [83,89]; however, given the uncertainties that lie

ahead, a radical shift in the way we perceive education is in order. In the words of Evans [89], it may be time that we “learn to harness the chaos” (p. 34).

Author contributions

Aau Sheau Yean: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing; Suzieleez Syrene Abdul Rahim and Umi Kalsum Binti Mohd Salleh: Supervision. All authors have read and approved the final version of the manuscript for publication.

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The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

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The authors declare that the ethics committee approval was waived for the study.

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