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Commentaries on IDC Theory in practice

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Abstract

A total of seven scholars were invited to provide commentaries to the paper on the IDC experimental school in Taiwan. We collated their commentaries below, arranged in alphabetical order of the authors' last names. We acknowledge and appreciate the excellent points raised by the commentators regarding the current and future directions of IDC Theory and the experimental school. We embrace their views and take heed of their suggestions to refine IDC Theory and our practices further.

Bridging research and practice to achieve scale: nurturing future-ready Interest-Driven Creators

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We are in a VUCA (volatility, uncertainty, complexity, and ambiguity) post-pandemic era with increasing emphasis on technology, interconnectedness, and interdisciplinarity. How should educational researchers and practitioners design quality learning experiences and environments to prepare students for their future better? How to nurture lifelong learners by providing holistic education experiences to support students' cognitive, social, physical and psychological development? Beyond rethinking education goals, curriculum models and pedagogic practices, what is more impactful is to systematically implement education reform endeavours to realise quality learning design informed by learning theories to sustain and scale up the teaching and learning innovations beyond one lesson, one subject, to whole school and even system levels.

Reading Looi et al.'s (2023) paper titled "Interest-Driven Creator Theory: Case Study of Embodiment in an Experimental School in Taiwan", I am delighted to see a compelling



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story illustrating how theory and practice is bridged to change the deeply seated exam-driven education culture by systemically designing and implementing education reform in an experiment school in Taiwan based on Interest-Driven Creator (IDC) Theory (Chan et al., 2018).

The initiative in setting up a new experimental school by a group of researchers in Taiwan is to timely respond to the pressing demands of the knowledge-oriented and lifelong learning society and close the gap between what education systems provide and what society needs. The curriculum design and implementation of this experimental school have reflected many learning design theories which inform us what to learn and how to learn in the fast-changing dynamic society.

Design for future learning: student centred active learning for holistic development

The experimental school has a balance in structured and unstructured learning. On one hand, the school structured curriculum in various subjects such as Math, English, Science, social studies and other non-academic subjects such as arts, music and physical education. The innovative pedagogies used in various subjects emphasise active learning when students engage in meaningful learning by reading, writing, thinking, discussing, exploring, investigating, and creating.

On the other hand, the school also has many initiatives across these subjects with allocated curriculum time was given to these interdisciplinary programs such as Modelled Sustained Silent Reading (MSSR), Self-Initiated Challenge. These programs ensure curriculum time and room for inter-disciplinary learning the development of students' 21st century competences when students practise skills, solve authentic problems, make decisions, propose solutions, and create knowledge and artefacts. Curiosity and interest-driven learning and creation are highlighted in these programs. The students are learning something they are curious about and interested in and enjoy the learning process, which fosters their passion for learning and prepares them for a life of learning.

The whole-school approach of curriculum reform is an audacious move, especially in an exam-driven education system. This responds well to Collins (2017)'s argument that education systems need to move from a focus on broad knowledge acquisition to one developing beneficial habits of mind, and to do this, educators must "rethink what is critical to learn in a complex and changing society". In the past decade, researchers have been calling for change of learning content from 3Rs (reading, writing, arithmetic) to many Cs (e.g., communication, collaboration, computing, critical thinking, creation).

Teachers as transformative agents of change

As identified in Looi et al.'s (2023) paper, one challenge of this school is the teacher's professional development. IDC is different from what most teachers learnt and did in their previous training and working environments. The concepts of unlearning, relearning, co-learning for teachers have never been more relevant today. "The illiterate of the 21st Century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn." (Toffler, 1970). Teachers are lifelong learners as well. They must do away with (unlearn) old pedagogical practices for and adopt (relearn) new ways of teaching and learning informed by IDC Theory. As explained by Lao Tzu, "To attain knowledge, add things every day. To attain wisdom, subtract things every day".

The researchers mentor the teachers at the experimental school at the beginning for the learning design and enactment of IDC practices. Over time, teachers will need to take more agency to design meaningful IDC experiences and environments for their students. As agents of change, teachers must constantly think through what they have learnt, be ready to unlearn and relearn, and acquire the skill to design and enact new and innovative pedagogies.

From research to practice, from experiment to achieve scale

The learning design and implementation of this experimental school are led by a group of university professors who aim to change the deep-seated exam-driven culture and prepare future-ready learners by nurturing interest-driven creators. IDC Theory is guiding the learning design of the whole school. IDC design has reflected many common themes in various envisions of future learning such as collaborative learning, personalised learning, connectiveness, self-directed learning.

The journey has started in an experimental school. IDC Theory has begun to show its positive impact on students' learning and development in this experimental school. IDC Theory started in Asia, but it can be applied in wider context. The researchers and practitioners are aiming to scale the innovative learning design to more grades, subjects, schools, and countries/regions. Nevertheless, the tension between educational innovations and traditional assessment in the exam-driven culture still exists.

Designing successful educational innovations that can scale is not easy. Applying Clarke and Dede (2009)'s scaling framework, the IDC initiative could do more in the following five aspects.

- Depth (the quality or effectiveness of the innovation). More systematic design-implement-evaluation is needed to study the intervention's effectiveness (changes that are desired) to optimise the learning design. It is a multi-stage iterative process that involves teachers as co-designers and co-evaluators of the educational innovations;

- Sustainability (the extent to which the innovation is maintained in ongoing use). The school and teachers continue to practise IDC Theory in their daily teaching practices. The experimental school in Taiwan is an excellent example in sustainability;
- Spread (the extent to which large numbers of people or organisations adopt an innovation). IDC design is flexible enough to be used in a variety of contexts. We have witnessed IDC initiatives spreading to more Asian countries/regions. We hope more schools and teachers join this initiative in various ways;
- Shift (a decentralisation of ownership over the creation of an innovation). A group of Asian researchers are leading IDC initiatives. The school leaders, teachers, parents, and students are important stakeholders practising IDC initiatives on a routine basis. Many adaptations of IDC initiatives are expected from various stakeholders during their teaching and learning practices and a community of practice can be formed to share the good practices with each other;
- Evolution (learning from adopters by the original creators of an innovation). IDC Theory is not perfect. It is still evolving. The community can continue to test, question, and revise IDC Theory in different context.

The world is changing. The education landscape is changing. The learners are changing. Learning scientists believe that the future is not out there to be discovered — it has to be designed. I am delighted to read a compelling story on a whole-school approach of education reform to provide holistic education experiences to students informed by IDC Theory. Change is not easy. But as Churchill (1942) stated, “Now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning.”

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Synchronising international reforms in schools: a comparative perspective

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Synchronising international reforms in schools

I shall comment on the paper in question from the perspective of studies in comparative education. According to Looi et al. (2023), in addition to its development and implementation in Taiwan, the Interest-Driven Creator (IDC) Theory has been used in coding education for 32 local primary schools in Hong Kong, undergraduate education in Malaysia, and Science, Technology, Engineering and Mathematics (STEM) education in Singapore. Researchers from these aforementioned countries co-wrote it. The case study presents a new model of school reform that represents a reciprocal learning process among Asian educators.

A characteristic phenomenon of creating pedagogy in the 21st century is international collaboration. Western comparativists use the terms “transfer” and “borrowing” to describe the idea of educational policies travelling from one country to another. When a country finds a good solution, other countries tend to import and adopt it, translate it for their local contexts, and finally transform the original idea by indigenising it. However, this core concept is challenged by the new trend of internationalisation (Cowen, 2009). When the Organization of Economic Cooperation and Development’s (OECD) Program for International Student Assessment (PISA) gained popularity in the early 2000s, a global discourse on key competences, 21st century skills, students’ agency and world-class education emerged (Hayashi, 2019). During the COVID-19 pandemic, we experienced the real-time “sync” of information, when countries closed schools almost simultaneously. We have entered an era wherein countries simultaneously monitor and refer to progress in each other’s school reforms, much like the collaborative editing of online documents. The history of education is being co-written through international collaboration.

Western prejudice among Asians

Despite global trends, classroom teaching is inherently rooted in local culture (e.g., Stigler & Hiebert, 1999). The paper being commented on views examination-driven culture and teacher-centred learning approach, typical features of Asian education systems, in a negative light. The assumption is that Asian teaching excessively focuses on acquiring knowledge and skills, rather than preparing students for the 21st century society.

It is then somewhat surprising that such practices have driven Asians' top performance in international assessments, which are known for measuring 21st century skills. Watkins and van Aalst (2014) pointed out "the Paradox of the Asian Learner," and Biggs (1994) claimed that Asian students from the Confucian-heritage (China, Hong Kong, Singapore, Japan and Korea) are stereotyped in the West for passively memorising. I wonder whether now, it is Asians who have assumed this old Western bias, while the West has become aware of its prejudice and is trying to change its perception. In this context, the paper's suggestion that the traditional Asian style of teaching (if such a thing exists) must be transformed is rather controversial.

Implementing IDC Theory is an attempt at transplanting an alternative pedagogy into the Taiwanese education system. Thus, the foundational style of imparting lessons in the IDC School seems to be the whole-class approach. The practice's success for Modelled Sustained Silent Reading (MSSR), HCBL (or HaCuBeLo), Book Reading Centric (BRC) English, Interest-Driven Mathematics Thinking (IDMT), Question-Initiation-Driven-Inquiry (QIDI) and Scenario Issue Resolution (SIR) could partly be attributed to the Asian school culture, which includes teacher-student relationships based on respect and a disciplined classroom-learning environment.

Moreover, the manner of implementation is "Asian"; the IDC School is approved by the concerned authority (in this case, the Taiwanese government). While the Western alternative schools, such as the Summerhill School in England were initially motivated by the anti-authority movement, Asian experimental schools often receive government recognition and support. This is an interesting point from the comparative perspective, because it demonstrates the possibility of multiple optimal solutions for policy implementation. The Asian-style policy transfer model should be investigated in depth.

Beyond the school: contributions to society

Although the concerned paper claimed that an evaluation of its case would be premature, it is essential to elucidate the critical criteria to be adopted for evaluation. These should be adopted by considering the experiment's ultimate goal. The paper explained that the IDC School intends to become a model to inspire public schools in the future. In this case, the evaluation criteria should include students' academic performance, attitudes, habits, and teachers' and parents' readiness levels. However, the scope of the evaluation should extend beyond the "future school" to look at the future society and the school's contribution to it.

Society builds schools, and schools create society. The experiment's value would lie in reflecting the school community's desire and scope for future society. The essential question for implementing the experiment's findings and evaluation is "What kind of society do we want?" I believe that the IDC School must play a role in demonstrating the future society through its everyday teaching and learning process in its classrooms.

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Equipping introspective skills and cultivating habits of mind as continuous self-directed professional development for pre-service teachers

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This commentary highlights the Malaysian experience cultivating the Interest-Driven Creator (IDC) tenets in a teacher preparation program at a public university. It resonates with Looi et al.'s (2023) well-written article on "Interest-Driven Creator Theory: Case Study of Embodiment in an Experimental School in Taiwan," on teachers' professional development in implementing IDC-based education in schools. I share the efforts made by my colleague and me to induce and nurture IDC learners as a means to kick-off and immerse pre-service teachers in continuous professional development through ePortfolio writings. Pre-service teachers are equipped with introspective skills that allow them to self-direct their professional development without depending on training providers.

Paramount to the teaching profession, professional development is crucial to pre-service teachers as it is to in-service teachers (Agustin, 2019). It serves as a platform for teachers to ready themselves for the challenges and requirements during in-service, which were unforeseen during their pre-service years. This highlights the importance of professional development at the pre-service level. Thus, it is suggested to carry out a longitudinal study to understand the experience of pre-service teachers transitioning to in-service teachers.

Continuous involvement in professional development events has many advantages for teachers. It promotes self-reflection and self-disclosure which lead to broader awareness and a higher level of internalisation, and fosters collaboration and interaction among teachers (Abeywickrama, 2021). It is essential for pre-service and in-service teachers alike to be continuously engaged in professional development courses within a community of practice to keep their knowledge and skills abreast. As such, sustained involvement in continuous professional development events can shape their minds and growth (Agustin, 2019; Bokiev et al., 2017), which could help them build the habits of mind.

Habits of mind are closely related to behaviours. In their seminal work, Anderson et al. (2008) vouch that habits of mind can be understood as one's disposition towards selecting a certain pattern of intellectual behaviour when facing unfamiliar problems. When a person employs their habits of mind, they would choose a pattern of intellectual behaviour to be employed for a specific problem. However, Anderson et al. remind us that mastering the habits of mind requires a skill to be carried out efficiently over time. They assert that habits of mind would imprint these experiences in individuals where they would then reflect, evaluate, modify and apply the habits in future events.

In Looi et al.'s (2023) article, they mentioned that oftentimes teachers who were already trained to teach with IDC Theory and student-centred learning pedagogies, would revert to their old teaching habits and eventually move towards teacher-centred learning without them realising it. This could mean that teaching with IDC Theory has yet become habituated among the teachers, especially those who had developed their habits of mind and teaching practice before learning about IDC Theory. According to Anderson et al. (2008), truly habituated tasks would be automatically and spontaneously performed without prompting as they have been internalised. As such, "they become an internal compass to guide actions, decisions, and thoughts" (Anderson et al., 2008, p. 63). Because behaviour is the result of the habits of mind, cultivating the habits of mind at the pre-service level is essential for teachers to form the correct teaching habits that can uphold the tenets of IDC Theory when they serve in the real environment. It is also recommended to explore the relationships between the teachers' habits of mind and the habits of teaching as a form of behaviour output, in more detail.

To solidify the tenets of the IDC Theory in education, I shall share my experience with undergraduate students at my faculty who would later graduate as secondary school teachers. My colleague and I started an effort to induce and nurture IDC as the habits of mind among pre-service teachers undergoing teacher training at our faculty. This was done by employing IDC Theory as a framework that foregrounds the ePortfolio writing in the Educational Technology course. The involvement of pre-service teachers in ePortfolio writing is a form of reflective and self-directed professional learning, which, according to Bokiev et al. (2017) could lead to other forms of professional development.

The ePortfolio writing was made a compulsory assignment that must be done on a weekly basis over the course of fourteen weeks (one semester). For this assignment, the pre-service teachers can use any electronic platform to create their ePortfolio and then share the URL to the course instructor. Throughout the semester, they composed their ePortfolio, guided by questions that the course instructors crafted within the lens of IDC Theory to challenge their intellect, pique and cultivate their curiosity and interests in their teaching and learning practices, explicate their comprehension, as well as create awareness of their understanding of their professional development. By responding to the questions, the pre-service teachers could introspect their teaching and learning practices within the lens of IDC Theory by reflecting on the lessons and activities carried out in our classroom each week.

ePortfolio writing was chosen because it has been a useful tool for teacher development as it encourages reflection, creativity, collaboration among teachers and the exchange of valuable feedback among the community of practice (Bokiev et al., 2017; Karsenti et al., 2014). Teachers who involve themselves in portfolio writing consolidate a myriad of information in a magnitude of aspects of their work such as their teaching philosophy, methods and goals, teaching strategies, demonstration of teaching activities, and sources

for teaching performance, to name a few (Gudeta, 2022). Curating all the aforementioned elements made portfolio writing one of the ways for teachers to engage in reflective practice efficiently. According to Cornito and Caingcoy (2020), reflective practice can foster sustained professional development, contributing to the habits of mind. Bokiev et al. (2017) also suggest that reflective practice through the writing of ePortfolios implies one's commitment in setting goals for improved performance and continued self-enhancement. As such, teachers' involvement in reflective practice could hone their skills in visualising, devising and employing their behaviour for their teaching practice, which is an output of the habits of mind.

In conclusion, for IDC Theory to be habituated among teachers, efforts from the roots need to be amplified. As pre-service teachers' professional development begins when they embark on their undergraduate degree to become professional teachers (Agustin, 2019), inclusion of IDC Theory in the teacher training curriculum, pedagogies or learning activities can begin here. Teachers' ability to manage and withstand the dynamic nature of the school environment relies on their professional preparation (Lingam et al., 2014). When teachers can develop a repertoire of instructional strategies with their habits of mind, these will have a follow-on impact on the learners who would also develop their habits of mind (Anderson et al., 2008). Therefore, their involvement in self-directed professional development through reflective practice is imperative. Looi et al.'s (2023) paper had considered including reflective practice in the future planning for their teachers' professional development. With the constantly changing educational climate, equipping pre-service teachers with introspective skills is essential to sustain their involvement in continuous professional development. It is hoped that more empirical and evidence-based research will be carried out in the future to explore the possible relationships between reflective practices, habits of mind, habits of teaching, and teachers' professional development.

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IDC Theory and practice: a blueprint for educational transformation around the world

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It was the year 2003 when I was invited to a workshop on global one-to-one computing, organised in Taiwan by Prof. Tak-Wai Chan, to focus on improving learning experiences through individual devices (Chan et al., 2006). At one point, the discussion focused on: why learning in our schools is so boring? Why can't it be joyful? When these questions were being explored, the participants were not reflecting on just the educational system in Taiwan. Lack of student engagement and preponderance of rote learning in schools have been the reality in most Asian countries and even beyond.

Kids in most parts of the world seem to learn primarily to pass exams rather than understanding the concepts and their applications for long-term retention. The content is forced upon them with the premise that they will need it in future. With no clear understanding of “why I am learning it”, students do not find relevance and meaning in the learning. No wonder there is no engagement and little motivation in today's kids, particularly towards learning the core subjects, such as Mathematics, English, Science and Social Studies.

Educational researchers have long been aware of these issues. However, the rigid structure of the school curriculum, strict regulations preventing adoption of new ways to teach and learn, and overwhelming workload the teachers experience on an ongoing basis, make it very difficult if not impossible to transform the learning process. A change in such scenario requires breaking away from the traditions of the current educational system and restarting the process by bringing those elements together that not only bring engagement and motivation back to the classroom but also focus on the skills today's kids need to be successful in tomorrow's world.

The Interest-Driven Creator (IDC) Theory provides such breakthrough — a strong foundation that enables kids to learn by following their interest and become knowledge creator instead of passive recipients of content. The paper “Interest-Driven Creator Theory: Case Study of Embodiment in an Experimental School in Taiwan” describes a unique implementation of IDC Theory in an experimental school in Taiwan that is breaking all boundaries and old traditions inhibiting the meaningful learning, and instilling students with the skills and competences that would make them successful 21st century citizens. While the efforts started much earlier with attempts to transform public schools, limited success was achieved due to the tendency to maintain the status quo and the difficulties of implementing innovative pedagogical models in an established curriculum. The change in

the policy in Taiwan allowing researchers to create their own experimental schools provided the path forward to start from scratch and create a model school that could then become a role model for change for others.

The basic tenet of IDC Theory to make the students engaged participants in the learning process reflects in all aspects of the experimental school. While reading is considered a critical activity, implemented through Modelled Sustained Silent Reading, it is just a start. The focus is to design the curricula in such a way that leads the kids from being voracious readers to start engaging in writing, so as to eventually develop sufficient interest over the years to become lifelong creators of knowledge as well as tangible artefacts or human activities. The process starts as early as the first grade so that right kind of habits are formed through the developmental years.

The IDC Theory is not limited to language only. It has been successfully implemented in mathematics in the form of Interest-Driven Mathematics Thinking where whole elementary mathematics curriculum with over 1300 concepts is visualised, enabling students to ‘see’ their work in order to self-reflect. In science, it is implemented as Question-Initiation-Driven Inquiry with the aim to arouse students’ curiosity and get both their minds and hands in inquiry about the natural world. IDC Theory has been further implemented in various other subjects such as social studies, arts, music and physical education. A unique aspect of IDC Theory is character building, which has seen erosion in recent years in typical school curricula worldwide. The emphasis of character building is on core values such as integrity, commitment, equity, innovation, communication and environment.

The experimental school in Taiwan is certainly a building block for transformation of education and there is a dire need for more such efforts both in Taiwan as well as in other parts of the world. With unique nuances of cultural and other differences, it would be important to apply IDC Theory to suit the local needs. Indeed, the paper describes several such attempts where basic principles of IDC Theory are used in specific scenarios. In Hong Kong, it is applied in learning coding by implementing it as ‘To Play, To Think, To Code’ by generating students’ interest in coding by playing target apps to recognise the target problem through thinking about the target knowledge and to solve problems through coding. In Malaysia, instructors used IDC Theory to design learning activities for undergraduate students. The policy makers in Singapore have launched applied learning program in STEM, which aligns well with IDC Theory. Other parts of the world also need similar efforts to move away from rote learning and create learning environments that foster interest in the kids for meaningful learning and empower them with the knowledge and skills that will make them better 21st century citizens.

Real success will realise only when the transformation extends further from the limited number of experimental schools to regular public schools. The paper identifies various challenges experimental schools face that will most certainly be experienced at even

greater proportion in public schools. Teachers in experimental schools need proper training to get familiarity with various aspects of IDC Theory implementation, and this challenge will be enormous in public schools where a complete cultural shift will be required to move away from teacher-centred instruction towards student-centred practice. Societal challenges, such as educating parents about the proper use of technology, require careful consideration. Transition issues will also need to be handled to ensure smooth transition for students moving from an IDC-driven school to a higher education institution that has not yet embraced the transformation.

I hope IDC Theory and the example implementation described in the paper become a blueprint for use by researchers and teachers around the globe to finally see the educational transformation that is long awaited.

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IDC Theory and repositioning human agency in learning

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Reflection and practice are inextricably linked to theory. Interest-Driven Creator (IDC) Theory is itself informed by practice, whether in its early framings (Chan et al., 2018) or where an experimental school has provided an ideal environment for testing its efficacy (Looi et al., 2023). This commentary on IDC Theory aims to contribute to its ongoing development by reflecting on the contemporary environment in which several drivers of change are impacting education systems worldwide, not least of which is the impact of the pandemic on systemic transformation. The impact of the pandemic is already dealt with in detail elsewhere, so for contextual focus, two other recent constructs from Asia are highlighted: *Society 5.0* from Japan and *Merdeka Belajar* from Indonesia. Like IDC Theory, both are focused on repositioning human agency in learning. Both have also emerged in the third decade of the 21st century.

Theory in context

The field of Education is replete with theories that explain learning and pedagogical models that aim to optimise it. IDC Theory aims to do both. Likewise, the ‘anchored concepts’ in IDC Theory have each received due attention as they collectively speak to the pivotal role of student engagement and agency in learning. For example, several Student Driven Inquiry models foreground the role of *interest* (Buchanan et al., 2016), while the *5E instructional model* highlights *engagement* (Bybee, 2009). Likewise, *knowledge construction* has been a core construct of technology enhanced learning for decades (Clark et al., 2007), and *habit* has featured in various learning theories beyond James (Malone, 1990; Chastain, 1969; Hovland, 1940). IDC Theory is a welcome contemporary addition to this body of literature, particularly in the context that it emerges from – the pervasive examinations-driven education systems throughout Asia. In a sense, this is a narrow context. Despite recognising the importance of ‘digital support’ at the IDC School, the theory does not yet elaborate in detail on the digital environment’s pervasive influence on the transformation of teaching and learning. Interestingly, however, the development of IDC Theory has also been situated within a community of practice as researchers primarily involved in technology-enhanced learning engaging conversations over many years.

21st century learning

No learning theory explains the full scope of learning. Even knowing that scope is out of reach, contemporary theories need to evolve for it to be in sync with the times. This is

illustrated by the development of connectivism, a ‘theory of learning for the digital age’ (Downes, 2022; Siemens, 2005). Moreover, *engaging with* and *within* the digital environment is now informed by a diverse array of disciplines beyond Education, including Computer Science, Information Science, Psychology, Neuroscience, Knowledge Management, Anthropology, and Sociology to name a few. Learning Science is now an established field, and increasingly informed by data analytics. But while pedagogy is often highlighted as the primary concern to an educator, those pedagogues in education who think technology is ‘just a tool’ are mistaken. The digital environment is ubiquitous, enabling, and disruptive. From the perspective of Big Tech, we are often the tools of data collection within it. For over two decades ‘21st century skills’ have often been discussed with the same conceptual tools. But a century spans 100 years so there is a need to refresh the terminology, routinely. Thus, *data literacy* is emerging as a competence requiring detailed attention, a competence that is interdisciplinary (Leon-Urrutia et al., 2022) and not sufficiently conceived as an aspect of *digital literacy*. The scope of interdisciplinary social studies at the IDC School is well positioned to tackle this, as a real-world characteristic of ‘Double E’ problems.

In the case-study presented by Looi et al. (2023), a question emerges in relation to the immersive and quiet exercise of reading with the Modelled Sustained Silent Reading (MSSR) approach. This could also be understood as cultivating concentration by creating uninterrupted time. For over two decades education systems worldwide have placed emphasis on the ‘4Cs’ of communication, critical thinking, collaboration, and creativity – the core competences of 21st century skills. Given the disruptive features and multi-tasking affordances of the digital environment (e.g., through social media and system alerts), perhaps it is timely that attention is given to concentration, and perhaps ‘5Cs’ might better sustain the foundations for learning.

Society 5.0

Iterations of software releases have increasingly become shorthand for expressing the latest capabilities or an imminent future. *Web 2.0* occupied academic and public discourse for many years. After at least 50 years developing as a branch of Computer Science, Artificial Intelligence is now commanding broad public attention and beginning the shape all kinds of possible trajectories of innovation. Together with Big Data it is a centrepiece of a mix of transformative technologies driving *Industry 4.0* (Costa et al., 2022; Schwab, 2017) where human beings are challenged not only by emergent and hybrid intelligence and data ubiquity, but also to catch up to technological innovation. While such technologies remain enablers in *Society 5.0*, however, human agency is repositioned as the centrepiece of a sophisticated new architecture (Carayannis & Morawska-Jancelewicz, 2022). Such repositioning has been described as a ‘super smart’ ‘new humanism’ (Suzuki, 2021). In

focusing on student interest, IDC Theory likewise repositions human agency in learning outcomes.

Merdeka Belajar

Conceived as a radical intervention to curriculum development, *Merdeka Belajar* (freedom to learn) is poised to lead the next transformation of school-based education in Indonesia. From 2022, a phased introduction was introduced to enable many students to choose their own mix of subjects based on their interests. Articulated by the Minister of Education, Nadiem Makarim, a former entrepreneur and developer of the Gojek social media platform. It is no surprise that engaging with the digital environment is recognised as an enabler of self-determined learning and integral to this new policy. Importantly, this is not the first time Indonesia attempted radical change to the curriculum. *Kurikulum 2013* recognised the significance of the digital environment and represented an attempt to shift the teacher-centric practices of the traditional classroom. To date, however, the literature suggests this has only had patchy success (Palobo et al., 2018; Suryaratri, 2015). Like IDC Theory, *Merdeka Belajar* is presented as a student-centred intervention that also aims to remove emphasis on the National Examination. It will be interesting to see whether this is successful.

Questioning

To conclude this short commentary the locus of questioning in the classroom is considered for the reason that questioning is also a critical competence of the 21st century classroom – particularly in this era of misinformation and ‘fake news’. Traditionally, however, teachers typically control the questioning in the classroom and students are schooled to ‘think in answers’. For over a decade the Question Formulation Technique has been used to flip this traditional dynamic so that students learn how to be confident in asking their own questions, and to ‘think in questions’ (Rothstein & Santana, 2011). Research on implementing this technique within the IDC School might also be worthwhile and might be a revealing way to discern student interests. IDC Theory will also benefit from ongoing questioning of its propositions, assumptions, and core constructs. Questions that seem relevant include:

- What is the scope of ‘creation’ in the anchored concept creator? Is semantic overlap with ‘creativity’ intended, or is it more like an extension of ‘knowledge construction’?
- Is reading in MSSR a surrogate for the practice of concentration?
- In what other ways can we develop a re-synthesis of curriculum knowledge, skills, and attitudes so that alignment with contemporary needs of human agency is met?
- In what ways might machine learning support and even develop interest?

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A reflection on overcoming the challenges in accomplishing and advancing the IDC practice

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The Interest-Driven Creator (IDC) Theory-embodied experimental school as presented in Looi et al.'s (2023) case study paper is no doubt an ambitious and laudable effort, with promising potential to become a point-at-able model of 21st century schooling system. Yet as a participant of the earlier IDC Theory-developing effort, I see differences in the paper between its narration of the case and the underpinning IDC Theory. This could be due to the gaps in the actual implementations in the school, or a clarity or granularity issue in how the school practice is depicted in the paper.

The IDC Theory is a learning design/process framework by nature (Wong et al., 2020), comprising the (intertwined and not necessarily linear) process of nurturing interest, facilitating creation and fostering habit. The key issue is how to translate IDC Theory from its conceptual form to actual school or individual learning practice with reasonable fidelity that manifests its expected effects. I had looked forward to learning from this paper that to what extent the translated practice has been aligned with the original theory.

In the paper, the narration of the case begins with the exposition of some enabling conditions of this initiative. These include the Taiwanese authorities' 2014 policy that opened the opportunity for setting up experimental schools, and the school management's conscious filtering of the first batch of teaching staff applicants based on the congruency of their epistemological and teaching beliefs with IDC Theory. The school did not select student applicants in a similar vein. Yet I assume that the overarching educational philosophy of IDC Theory has been transparently conveyed to the public. Hence, the parents who were "still" willing to enrol their children to the school should be receptive to the said idea. The supportive mindset of these key stakeholders is crucial for the plain-sailing implementation of bold and innovative curriculum or initiatives which might otherwise be resisted by relatively conservative, examination-minded educators and members of the public.

Section 5 describes the curriculum and pedagogical practices. Despite being akin to 21st century learning in a general sense, I notice their unbalanced mappings with the full IDC Theory. Most of the section elaborates on how the creation loop is enacted through various learning tasks in individual subjects. Contrarily, the interest loop, albeit being cited in the implementation of all subjects, is in general reduced to its creation-triggering role in exposition – as though the interest development in the students started and ended in the emergence of situational interest, while it is unclear whether it was later advanced to

individual interest. An alternative reasoning is that the intangible interest development process might ensue along with the tangible creation activities. Henceforth, the full interest loop might have been tacitly transpired in the actual practice.

Notwithstanding, the habit loop has even been more under-exposed in the paper. The only curriculum description that mentions the habit element is the writing curriculum in the form of “writing habitually” under the “writing repertoire” of HCBL. Yet the form is essentially discussed at the conceptual level. It is unclear if the actual HCBL practice has engendered students’ regular, if not daily, writing habits without being instructed by their teachers.

The introductory paragraphs of section 6 which summarise the IDC practices in the school, exhibits a similar pattern. Half of the stated text segment focuses on the exposition of the full creation loop. The discussion on interest is limited to a justification of its importance. Conversely, there is no mention of habit.

This probably reflects a rather challenging status of the habit loop in the both the research and practice endeavours of IDC Theory. Indeed, prior research literature on learning habit formation is limited in forming the teaching and learning practices (Chen et al., 2020), resulting in the need to explore and design such practices from scratch in most cases. Furthermore, habit is personal, intrinsic, and self-initiated (Alfalah, 2018). For example, we should refrain from attributing students’ engagement in teacher-prescribed regular in-class creation activities to habit formation. When a genuine learning or creation habit is developed, a student would instead conduct relevant activities routinely at their own will, typically beyond school hours. However, from the perspective of IDC teachers of knowledge- or skills-based subjects such as science and writing, the design, enactment and orchestration of interest-triggering creation activities are already a potentially overwhelming challenge. Henceforth, except for reading which is a habitual activity by nature with a pre-existing IDC-aligned strategy (MSSR), it may not be realistic, in most cases, to demand teachers to design and enact more sophisticated curricula that target fostering (and perhaps subsequently monitoring) individual students’ relevant learning or creation habits beyond classroom. A greater focus on interest and creation is an inevitable and understandable choice to initiate IDC practice in the school, while advancing to the habit loop as the ultimate IDC state may remain as an idealistic advocate until the IDC researchers or practitioners attain an in-depth understanding of how to operationalise it in school contexts.

In closing, I commend this paper for disseminating the experience of establishing and running the IDC School. I believe the paper could excite and influence the educators, policymakers and the general public, especially by offering them food for thought about the purpose of education and how the schooling system should be reformed. Looking ahead, I expect follow-up publications that unpack and analyse the theory-to-practice translation

process ensued in the school and the established schooling ecology, under the lenses of, for example, Activity Theory (Engeström, 1987) or complexity theory (Morrison, 2002). At the student level, rather than investigating the effects of individual IDC elements in a reductionist manner (see section 6.1), there should be academically rigorous mixed-method studies on their IDC experience and outcomes. The intention is to validate and perhaps fine-tune the three intertwining IDC loops holistically. Hopefully, such follow-up studies would inform future IDC adopters on more concrete principles and strategies to operationalise the innovative IDC-informed pedagogy.

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From theory to practice: the story about a school implementation of Interest-Driven Creator Theory

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Developing a sound theory and implementing it to create meaningful changes in an educational system is a challenging task. It takes a village to succeed in such an effort. A group of Asian scholars took this challenge and developed the Interest-Driven Creator (IDC) Theory that aims to bring fundamental changes to the teaching and learning in school systems in Asian regions, changing them from examination centric to interest-driven and from teacher-centred to student-centred (Chan et al., 2018). The IDC Theory is based on the idea that “when learning activities in classrooms are designed to spark student interest, this will generate an impetus for students to be engaged in the knowledge creation process which then leads them to be habitual learners through repetition of the creation activities in their daily routines” (Looi et al., 2023). The IDC Theory focuses on three anchored concepts, and each has a loop of three processes, including the interest loop with triggering, immersing, and extending (Wong et al., 2020), the creation loop with imitating, combining, and staging (Chan et al., 2019), and the habit loop with cueing environment, routine, and harmony (Chen et al., 2020). These three loops interact with each other in creating meaningful interest-driven learning experiences.

While reviewing the articles published on the IDC Theory, I first questioned myself, “What kind of theory the IDC Theory is? Is it a learning theory? Or is it an instructional theory?” A learning theory is descriptive. It provides the fundamental knowledge that describes how people learn. A learning theory may address human cognition (e.g., how people receive, process, retain, and recall knowledge during learning; Ormrod, 2012), but also can focus on the motivational and emotional processes of learning (e.g., why people learn, how people feel, and how people manage their thoughts and feelings during learning; Schunk & Zimmerman, 2012). On the other hand, an instructional theory is prescriptive. It offers explicit guidance on how people should learn to better achieve desired learning outcomes (Reigeluth, 1999). Similar to learning theories, instructional theories may address cognition (e.g., the first principles of instruction; Merrill, 2002), motivation (e.g., the ARCS model of motivational design; Keller, 2010), or other area of learning. Upon my own reading and interpretation, the IDC Theory is more geared towards an instructional theory as it directly provides guidance on how instruction should be structured to drive interest, support creation, and promote habit formation. The interest loop addresses the affective and motivational domains, the creation loop addresses the behavioural and

cognitive domains, and the habit loop aligns well with the executive and self-regulatory processes of learning.

If the IDC Theory is an instructional theory, the next group of questions I had for myself include “What are the learning outcomes this theory is prescribing for? What’s the level of investigation in this theory?” The IDC Theory is aimed to transform the education system in Asian regions to help students develop core competences for the 21st century. Therefore, the IDC Theory addresses both the institutional changes at the systemic level and the individual changes in learning at the student level. Achieving changes at these levels with success is a great undertaking. The authors of the IDC Theory have provided a convincing story about the implementation of the IDC Theory in an elementary school in Taiwan (Looi et al., 2023). To bring systemic transformations to a school, careful and systematic considerations and designs for various aspects of the school are required. The story of this IDC School is impressive in many ways.

First, in the IDC School mentioned in this case, all stakeholders in the community, including administrators, teachers, students, parents, and researchers, were fully committed to implementing IDC Theory. Only with such commitments can the IDC Theory function as a catalyst for transforming a school. This can be especially challenging in an examination-centric society where all attentions and pressures in the education system are focused on testing scores. The determination and effort to get everyone on board in shifting the focus from exams to learning skills, problem-solving skills, collaboration skills, and creativity is admirable. In fact, they already had the acceptance from school administrators, teachers, parents, and students – a major achievement. While this story does not provide details about how these were achieved, future publications from the authors may share insights.

Second, the breadth of this implementation of the IDC Theory is impressive, covering almost all subject areas in this elementary school. Although the IDC Theory is domain-general, this particular theory-to-practice implementation had considered subject-specific nuances. In situating the IDC Theory in the subject areas, the researchers considered coupling subject-specific theories, framework, models, and methods with the IDC Theory, for instance, the Modelled Sustained Silent Reading (MSSR) in reading, HCBL (or HaCuBeLo for easy remembering) in writing, the Book Reading Centric (BRC) English approach for English language, the Interest-Driven Mathematics Thinking (IDMT) for math, Question-Initiation-Driven Inquiry (QIDI) for science, Scenario Issue Resolution (SIR) for social studies, and etc.

In addition, this implementation of the IDC Theory took a systematic approach in considering not only the curriculum design, but also associated supporting components, such as, teacher professional development, digital technology support for learning, as well

as parental and community support, which are all critical to the success of the theory-to-practice implementation.

While it was very inspiring reading about the IDC Theory and the case of the IDC School, a few questions remain for further discussion and exploration. First, the IDC Theory was originally developed in correlations with educational policies and societal constraints that are specific in Asian regions. The story about the IDC School also happened in Taiwan. So, “Can the IDC Theory be generalised beyond this IDC School, and beyond Asian regions? What kind of adaptations need to be made in order to apply the IDC Theory in other settings?” In my opinion, all theories, models, and frameworks need to be adapted in order to address issues in specific contexts and settings. For example, in the United States, many school systems have already moved away from exam-centric approaches by highlighting the importance of 21st-century skills guided by the educational standards set for various subject areas. Many school curricula have already started to attend to students’ interest, motivation, and engagement (e.g., Xie et al., 2022) and to promote and support knowledge creation (Bereiter & Scardamalia, 2014). Therefore, the implication of the IDC Theory may lean towards the habit loop that can be a great addition to the current educational practice in US schools. On the other hand, the implementations of educational interventions in US schools can have different challenges as compared to the story about this IDC School. It would take great effort to have the necessary level of commitments from the community stakeholders. It would take great financial support to thoroughly redesign the curriculum in all subject areas to reflect the core concepts in the IDC Theory. Second is the question of “Is this an effective theory? If so, how do we know if it is effective?” As noted in the story about the IDC School, “there is a need to conduct various studies to verify and refine the IDC Theory.” For example, one effort that can be made in the future is to operationalise better the constructs and variables involved in the IDC Theory and create valid measures of these constructs and variables. They would help to evaluate the processes involved in the IDC Theory and correlate them to students’ performance and outcomes.

In summary, I appreciate the authors of the IDC Theory in addressing the long-standing issues in the educational systems in Asian regions. The foci of the IDC Theory on interest, creation, and habit are indeed critical to developing the 21st-century skills and to the success of our students in the modern society. The story about the IDC School in Taiwan is truly inspiring as it offers a concrete picture and specific nuances about how the IDC Theory can be applied in a school. With adaptation, this theory has the potential to impact education and society beyond Asian regions. Future work may focus on exploring the needed adaptations for a broader generalisability. Future work may also create measures of variables in the IDC Theory, examine the effectiveness of the IDC Theory, and further provide empirical validity evidence.

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Abbreviations

3Rs: Reading, writing, arithmetic; BRC: Book Reading Centric; IDC: Interest-Driven Creator; IDMT: Interest-Driven Mathematics Thinking; MSSR: Modelled Sustained Silent Reading; OECD: Organization of Economic Cooperation and Development; PISA: Program for International Student Assessment; QIDI: Question-Initiation-Driven-Inquiry; SIR: Scenario Issue Resolution; STEM: Science, Technology, Engineering and Mathematics; VUCA: Volatility, uncertainty, complexity, and ambiguity.

Authors' contributions

All authors collaborated to write the manuscript, make revisions, and to read and approve the final manuscript.

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Funding

Not applicable.

Availability of data and materials

Not applicable.

Declarations

Competing interests

The authors declare that they have no competing interests.

Received: 4 August 2022 Accepted: 6 November 2022

Published: 28 February 2023 (Online First: 12 December 2022)

Publisher's Note

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