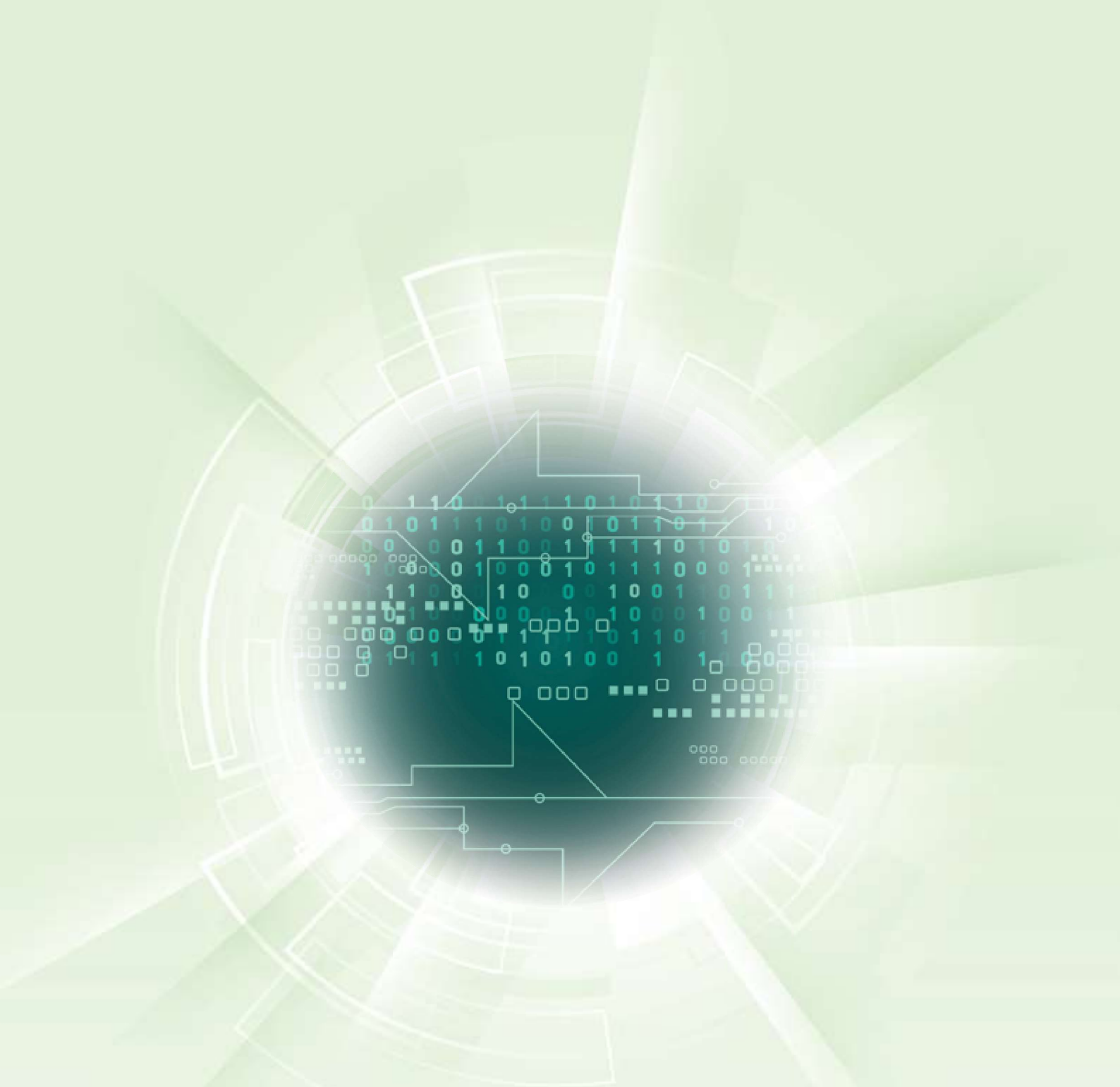

Supplement II

Guide to Using AI in Teaching in Primary and Secondary Schools

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I. Introduction

The Guide to Using AI in Teaching in Primary and Secondary Schools (Guide) outlines the fundamental principles for teachers in respect of using artificial intelligence (AI) in teaching (including the necessary changes in knowledge, attitudes and skills) amid the rapid advancement of the era of digital technology, as well as the areas requiring attention when using AI in learning, teaching and assessment.

II. Guiding Principles for Using AI in Teaching

1. Rooted in education, assisted with technology

Despite the increasingly widespread use of digital technologies in education, nurturing students remains the fundamental focus of education. This involves realising the educational philosophy of cultivating values and nurturing people to foster students' whole-person development. Since AI tools are devoid of emotion, important aspects of education, such as values education, emotional development, psychological support for students and the development of creativity, must be led by teachers rather than delegated to technology, ensuring that due consideration is given to students' affect. Teachers should uphold the principle of mindful use of technology and ethical use of AI tools, thereby appropriately cultivating in students such positive values and attitudes as humanistic qualities, ethical awareness and integrity, and empowering them to leverage technology to enhance their learning effectiveness while using innovation and technology (I&T) for the betterment of society.

2. Leverage technology to benefit students while guarding against over-reliance

Teachers and students should acquaint themselves with the nature of AI, its limitations, and its function as a tool. Teachers should explore how to use AI tools effectively to enhance learning effectiveness, but at the same time avoid over-reliance on AI tools or over-emphasis on technical operations (i.e. avoiding "using AI for the sake of using AI"). In the AI era, it is more crucial than ever for talents to possess sound judgement, creativity, problem solving abilities, communication skills and critical thinking skills. Teachers must therefore be vigilant against students becoming overly reliant on AI tools, preventing them from falling into the trap of being "technologically advanced with lower-order thinking", or replacing their own thinking process with AI. The appropriate use of AI helps minimise repetitive tasks for teachers, reduce their workload and enhance their capacity, providing them with more time and space for innovating and refining

pedagogical designs, catering for the diverse needs of students (including their physical and mental well-being). Furthermore, learning and teaching could be progressively tailored to students' cognitive and affective development, which would ultimately benefit students.

3. Empower teachers to make full use of AI to facilitate paradigm shift

"AI for ALL subjects" is an irreversible trend that deepens a student-centred pedagogical paradigm. This fundamental change is not confined to teachers of specific subjects. Instead, all teachers, regardless of their subject(s) taught or post(s) held, can leverage AI to enhance students' learning effectiveness, support services, and administrative efficiency (i.e. "AI for ALL teachers"). AI cannot replace the role of teachers, and its use in teaching should remain student-centred, serving as an assistant to help better cater for students' diverse learning needs, interests and abilities.

4. Manage risks, provide guidance and foster AI literacy

AI brings enormous opportunities to education, such as pedagogical innovations and shifts in modes of learning, assessment and support. However, it also presents numerous challenges, including risks related to misuse, abuse, ethics, morality, privacy and legality. Thus, teachers must:

- possess a basic understanding of relevant core topics and remain particularly vigilant about the ethical risks, legal liabilities (such as deepfake crimes) and privacy concerns (such as over-sharing of personal data) that may arise from the use of AI;
- act as role models in educational settings to cultivate students' AI literacy (i.e. "AI literacy for ALL"), promptly pointing out the adverse consequences of over-reliance on or abuse of AI in learning, with a view to preventing them from outsourcing to AI tools critical learning processes, such as information search, analysis, synthesis, reflection and judgement, which would hinder the development of their thinking skills;
- use AI appropriately, and consistently strive to foster students' proper values, critical thinking skills and sense of social responsibility.

5. Reflect and optimise pedagogy, uphold professionalism, and keep pace with the times

Teachers may have varying starting points in using AI in teaching, and pedagogical paradigm shift cannot be achieved overnight. At the early stage of using AI in teaching, teachers must:

- acknowledge their shared responsibility to use AI in teaching, familiarise themselves with the *Blueprint for Digital Education Development in Primary and Secondary Schools* (Blueprint)

and the *AI Literacy Learning Framework for Primary and Secondary Schools* (Learning Framework) as early as possible, and understand the literacy (i.e. knowledge, skills, values and attitudes) required for students to learn and use AI technologies at different key stages;

- set self-requirements for using AI in teaching from initial trials to enhanced applications in a progressive manner, with the goal of becoming proficient in using AI within a reasonable timeframe (e.g. around two years); and actively engage in lesson observations and professional exchanges, consistently reviewing the benefits for students;
- continuously review and update the expectations and requirements for students regarding the use of AI in learning in the light of the latest advancements of digital technologies and students' learning needs;
- acquire the professional knowledge and skills to use AI in teaching through continuous learning; consistently reflect on, enhance and innovate teaching strategies with a view to increasing learning effectiveness and catering for learner diversity; and cultivate a deeper collaborative culture, manifest professionalism, and co-create a digital education ecosystem through school-based professional development and research activities such as collaborative lesson planning and peer lesson observation cum evaluation.

6. Deepen understanding of and exercise prudence in using AI

Teachers should deepen their understanding of the nature and fundamental principles behind the learning data generated by AI tools (such as the concepts of large language model (LLM) and the underlying operations of AI), as well as their limitations, thereby gatekeeping AI-generated pedagogical materials in a professional manner. For instance, teachers should:

- remain cognisant that AI outputs are algorithmic results generated from databases making reference to past information collected, which may contain misinformation, insufficient data or biases, and provide erroneous data, misleading information or even AI hallucinations where the information generated is entirely fabricated;
- use prompts cautiously and precisely, train and calibrate AI tools appropriately, and objectively analyse multiple data sources, so as to accurately gauge students' learning progress, and adjust pedagogical content, strategies and pacing to cater for learner diversity;
- maintain sharp professional acumen and carefully scrutinise the information and recommendations generated by AI tools (such as assessing whether the content is factually accurate, free from inappropriate values, and whether the feedback generated might be

impersonal and may induce negative emotions of students); exercise professional judgment with thorough verification of content across multiple sources and due consideration of students' feelings such that no AI-generated material is directly adopted without prior vetting.

7. Ensure legal compliance and a safe learning environment

The use of AI in teaching must strictly comply with the laws of Hong Kong and school administrative regulations. To this end, teachers should possess the requisite legal, administrative and computer knowledge to minimise the risk of data breach and cultivate a healthy, safe and reliable digital learning environment for students of all ages, helping them develop good habits in AI-assisted learning. For instance, teachers should:

- strictly prohibit the use of AI tools to generate content that endangers national security, disrupts social order, or violates social and moral norms (such as promoting pornography, violence or illegal acts, or intentionally fabricating or disseminating false information); should any content generated involve sensitive issues relating to national security, sovereignty and territorial disputes, or improper values, teachers should remove the material and seek advice from the school management;
- ensure that the collection and processing of student learning data via AI tools comply with the Personal Data (Privacy) Ordinance, the Copyright Ordinance, relevant guidelines issued by law enforcement agencies (such as the *Cybersecurity Guidebook for Schools in Hong Kong*) jointly published by the Hong Kong Police Force and other organisations including the Hong Kong Internet Registration Corporation Limited), and relevant school regulations; the use of such data must remain fully compliant and transparent, and a cautious approach to digital footprint should be maintained;
- handle student data with caution and conduct ongoing review and adjustment of the default privacy settings of AI tools with reference to appropriate usage guidelines, thoroughly considering its impact on students' cognitive and affective development. For example, the Learning Framework recommends that the lower primary levels should focus on developing students' initial perception of and experiencing AI technologies. Even for upper primary students, generative AI tools should in principle only be used under the guidance of teachers or guardians, as these students are not yet fully capable of independently assessing the authenticity of the content generated;

- factor in students' physical and mental well-being into AI teaching design and assignments to avoid counter-productive effects. In this regard, the Department of Health (DH) provides relevant recommendations on its "Healthy Use of Internet and Electronic Screen Products" webpage[1] for children, adolescents, parents and teachers; and the World Health Organization has also long expressed concerns over the physical and mental health issues arising from excessive digital immersion following the widespread penetration of the Internet (such as social media addiction[2]);
- effectively utilise appropriate hardware (such as computing devices, coding equipment and school-based AI-related facilities) alongside safe and reliable software platforms (such as vetted AI tools on the market); and formulate clear usage guidelines to progressively foster students' proper values and attitudes, which include protecting privacy, respecting academic integrity, and employing digital technologies ethically.

8. Uphold equity, diversity and inclusion in education

Teachers should ensure that AI technologies are used to support an inclusive and equitable quality education for all. To foster equity, diversity and inclusion in education, students of diverse backgrounds, abilities and aptitudes must be afforded equal learning opportunities. For instance, teachers should:

- utilise AI when designing teaching activities and assignments to provide diversified learning resources and activities, adjust difficulty levels for learning, and offer personalised support;
- employ voice assistive aids or visualised teaching materials to cater for students with special educational needs, and provide targeted support that enhances learning outcomes, enabling students to realise their potential and enjoy opportunities for all-round development.

[1] The DH provides recommendations on daily screen time limits, eye protection measures, and other health-related practices for children and adolescents across various age groups (referred to as "Health Tips"; for details, please visit https://www.studenthealth.gov.hk/english/internet/recommendations/recommendations.html). In response to the recommendations in the Chief Executive's 2025 Policy Address, the DH has established an inter-departmental expert group to review the latest scientific evidence, as well as developments and experiences in other countries and regions. The expert group will consolidate expert opinions to update the relevant health recommendations accordingly.

[2] Symptoms of social media addiction include an inability to regulate usage, the emergence of withdrawal symptoms, the neglect of other activities in favour of social media, and adverse impacts on daily life resulting from excessive use. Other associated health and well-being issues include sleep deprivation, delayed bedtimes, obesity, psychological problems, cyberbullying, and neck problems.

In conclusion, AI-empowered education brings forth both unprecedented opportunities and a myriad of challenges. Nevertheless, AI tools cannot replace the vital role teachers play in nurturing students. When using AI in teaching, teachers must prioritise the cultivation and shaping of students' character, alongside proper values and attitudes, as their core tasks. By upholding their original aspirations and the educational goal of cultivating values and nurturing people, teachers can empower the younger generation to harness digital tools responsibly, ultimately becoming a driving force in the development of our country and Hong Kong.

III. Application of AI in Teaching

Teachers should organically integrate AI literacy into existing curricula and learning and teaching activities in accordance with the requirements of the Hong Kong school curriculum framework, relevant subject and cross-disciplinary curriculum guides, the Blueprint, and the Learning Framework. They should set learning targets for each key stage, encompassing the development of a fundamental understanding and safety awareness of using digital technologies from the lower primary level; the exploration of ethical issues relating to using technology at the junior secondary level; and the practical use of technology alongside deepened social morality, ethics and values at the senior secondary level, enabling students to learn in a progressive and spiral approach, and gradually pursuing the value of "Technology for Good".

The use of AI tools encompasses three major domains: learning, teaching and assessment. It helps enhance teaching effectiveness, promote personalised learning and optimise assessment. Concurrently, teachers should prioritise safeguarding data privacy and upholding ethical standards to prevent the misuse of technology, thereby fostering an efficient and safe digital learning environment. The use of AI tools across these three domains is detailed below. Given that learning, teaching and assessment are intertwined, holistic planning is essential to elevate the quality and effectiveness of classroom teaching, ultimately enriching students' learning experiences.

1. Learning

- The implementation of digital education at the primary and secondary levels should be grounded in students' solid foundation of knowledge, rich and authentic learning experiences, and proper values. The use of AI tools should be appropriately integrated with various teaching strategies, such as group discussions and experiential activities, so as to cultivate students' positive values and to enhance their independent thinking capabilities, especially the ability to distinguish the authenticity of information and construct knowledge, preventing them from outsourcing their thinking processes. In other words, students should take responsibility for their own thinking process and make informed selection of AI tools and the information generated.
- Learning should always remain student-centred, emphasising personalised and self-directed learning (SDL) as well as catering for learner diversity, with the aim of nurturing students into active learners capable of constructing knowledge. AI can be used to deliver tailored

learning content of varying difficulty levels to students of different abilities, or to provide text/speech conversion in Chinese and English. These functions may help students overcome learning difficulties and enhance learning effectiveness. However, it is important to note that students have different developmental needs and characteristics at different key stages. With reference to the Learning Framework, it is recommended that lower primary students only need to gain initial perception of and experience with AI technologies; they are not required to independently operate AI tools for learning. This is to prevent inappropriate use of AI tools and counter-productive effects, protect students' visual health, and ensure that they have ample opportunities for interpersonal interaction to develop their communication skills.

- AI-empowered education results in learning being no longer confined to the classroom, but extends across various online and offline platforms, rendering more flexible and diverse learning and teaching modes. For example, teaching strategies such as flipped classroom and virtual reality learning enable students to utilise AI tools to construct knowledge through active exploration, more vigorous questioning and enquiries. This cultivates critical thinking, and creativity, develops proper values, positive attitudes and reflective skills, and ultimately achieves SDL. Moreover, gamified learning can increase the enjoyment of learning and enhance students' motivation to learn.
- The online world is replete with violent, pornographic and inappropriate contents. To protect students from these negative influences, it is more appropriate for primary students to first cultivate good Internet habits and develop AI literacy under teachers' guidance or parental accompaniment. This foundation enables them to discern the authenticity and appropriateness of information before SDL elements are gradually strengthened. Secondary students should progressively master the use of AI tools for SDL through tasks ranging from lesson preparation to self-directed exploration and peer learning, thereby honing their generic skills, including critical thinking, self-management, collaboration and communication.
- Students should learn to select appropriate AI tools for learning (such as commercially available AI tools authorised by copyright owners, and using subject-related AI assistants), respect intellectual property rights (e.g. by properly citing references), and progressively develop their AI literacy and strengthen their awareness of human-AI collaboration. Meanwhile, they should avoid an over-reliance on AI tools to prevent undermining their learning motivation and other generic skills (such as interpersonal communication skills).

- When harnessed effectively, AI can serve as a personal tutor for students; however, it can also swiftly complete assignments on their behalf. Therefore, assignments and assessment tasks should avoid requiring or permitting students to directly submit AI-generated content or final products. Instead, AI applications should only be permitted as one of the information sources or as a tool to stimulate thinking. Students should understand that they are accountable for any work they submit.
- Teachers should observe whether students are inappropriately using AI tools to replace their own efforts in completing learning tasks. They should address any such issues promptly, foster AI literacy and guide students in developing the awareness/habit of verifying AI-generated content across multiple sources. Furthermore, teachers should be mindful of whether students exhibit negative emotions following an increased use of AI in their learning, such as social media anxiety, school aversion and lethargy. They must also remain vigilant regarding improper behaviours (e.g. disclosing or sharing other people's personal information without obtaining prior consent, copyright infringement, breach of academic integrity or cyberbullying peers using deepfake technology). When necessary, teachers should consult and collaborate with professional guidance personnel, both within or outside the school, as well as parents, to provide appropriate and timely support. Should a serious case occur, it should be deliberated with the school management and handled in compliance with school mechanisms.

2. Teaching

- When using AI in teaching, teachers should have clear learning and teaching objectives to cultivate proper values and attitudes in students, nurturing them with proper moral values.
- Teachers should utilise AI teaching tools to analyse learning data and understand students' learning progress, enabling the design of personalised learning portfolios based on students' individual interests, abilities and pace.
- By breaking through the time and space constraints of conventional teaching modes, teachers can use technology more flexibly to promote pedagogical innovation and optimise teaching design and strategies. This includes creating lesson plans, refining teaching content, assigning coursework or extending learning, and automatically generating stratified curriculum resources based on difficulty levels. Furthermore, designing engaging, age-appropriate cross-subject learning activities and even games can enhance classroom participation and learning effectiveness.

- AI generated and cross-disciplinary curriculum resources can be updated in a timely manner to keep abreast of current affairs.
- AI tools can relieve teachers of repetitive tasks and data updating work, reducing their workload and enhancing their capacity. This frees up more time for deeper engagement with students, thereby realising more efficient, personalised and caring teacher-student interactions. However, AI-generated content must be vetted with professionalism and prudence to ensure its accuracy and appropriateness to safeguard students' well-being.
- Teachers should guide students in the proper use of AI tools (e.g. comparing their personal creation with AI-generated content and vetting the output to ensure accuracy and appropriateness; designing interactive simulated scenarios to provide students with personal experience in upholding principles such as abiding by the law and respecting others in online social contexts; or utilising gamified learning to help students understand the importance of integrity). Concurrently, students should be guided to maintain a critical thinking attitude and an awareness of protecting personal data and respecting privacy. Should instances of misuse, such as plagiarism, cheating, cyberbullying involving deepfake technology or doxxing, be identified, teachers must immediately point out the wrongdoing and handle the matter appropriately in accordance with school regulations. They should also take the opportunity to explore with students the proper use of AI, alongside related ethical and legal issues, in a timely manner.

3. Assessment

- AI technologies enable "assessment" to go beyond the mere evaluation of students' learning outcomes (i.e. Assessment of Learning). They allow for a greater emphasis on data analysis throughout the learning process, thereby facilitating "Assessment for Learning" and "Assessment as Learning". Consequently, assessment methods are shifting from traditional, relatively one-dimensional testing and examination modes towards a diverse, multi-perspective and more authentic approach. This includes real-time, formative and summative assessments, covering multiple dimensions such as knowledge acquisition, skills development (including higher-order thinking) and moral conduct.
- AI can swiftly, or even in real time, analyse student learning data, including qualitative and quantitative assessment data and information (e.g. students' assignments, teachers' observations, tests and exams). By consolidating feedback from teachers, student peers and AI tools, AI can assist teachers in understanding students' strengths, weaknesses and learning

difficulties from multiple angles, and in providing constructive and formative feedback to students in a timely manner. This enables students to reflect on their learning process and identify personal strengths and areas for improvement, thereby adjusting their learning strategies and formulating future learning goals. Consequently, they can progressively acquire subject-specific knowledge and skills, and develop critical thinking skills and SDL capabilities. By appropriately utilising AI, teachers can offer instant feedback, adapt their teaching strategies and pace, and provide students with personalised learning resources, thereby enhancing learning outcomes. Under no circumstances should teachers directly adopt AI-generated grading and feedback without first exercising their professional judgement.

- Teachers should carefully consider whether it is necessary to set restrictions or develop guidelines regarding the use of AI in assignments or assessments. For instance, for topics designed to foster students' creativity and appreciation skills (such as learning elements related to music, visual arts, literature, and STEAM education), teachers should thoughtfully evaluate whether it is appropriate for students to use AI tools to complete assignments, or they may establish new assessment criteria as needed.
- Teachers should consistently caution students against having AI complete assignments on their behalf, as improper use can undermine their thinking, expressive and self-learning abilities, and even their motivation to learn. Students should not directly submit AI-generated assignments as their own work. Teachers should first establish guidelines for AI use and assessment criteria with their students, and then employ various means to verify whether there is any misuse of AI or academic dishonesty in students' work. These methods include conducting oral enquiry in class and requiring students to submit reflective journals to present their thinking process. Certain assignments (such as writing tasks) may only be suitable for completion in class under teacher supervision.
- Due consideration should be given to the socio-economic backgrounds of students when determining the arrangement and types of assignments. For example, teachers should be mindful of whether assignments requiring students to use AI tools at home (especially those involving advanced paid features), or heavily weighted assignments completed at home (such as project learning), might lead to unfair assessments due to disparities in family guidance and support.

- AI can swiftly compile information gathered from the Internet through large language model (LLM) platforms; however, the generated answers are not necessarily correct. AI models can manifest "hallucinations", generating content that appears plausible but is factually incorrect. Moreover, if AI training data contain biases, the generated outputs may also be biased. As such, students must cross-check information from multiple sources or optimise their queries by refining their prompts so as to use information generated by AI tools in an ethical and responsible manner. Teachers should lead by example, guiding students to understand the limitations of AI and teaching them to use AI for learning ethically and with integrity. In the AI era, primary and secondary schools, as providers of basic education, should focus on cultivating students' essential AI literacy, which is even more important than mere technical application skills.
- AI technologies can automate assignment marking or the generation of student learning reports, providing timely feedback on learning outcomes. This helps teachers understand students' progress more efficiently, adjust teaching strategies, and guide students in improving their study methods, thereby realising diversified and personalised assessments, and comprehensively enhancing the precision and effectiveness of teaching. If teachers need to upload student assignments to an AI platform for marking, they should first carefully remove any personally identifiable information to ensure strict compliance with the Personal Data (Privacy) Ordinance.

Examples of using AI technologies in the learning, teaching and assessment of subjects within the Key Learning Areas are available on the EDB website (https://www.edb.gov.hk/en/DEBP). We will update these examples in a timely manner as needed.

IV. Conclusion

Given the rapid advancement of AI and other innovative technologies, the contexts in which these technologies are used in primary and secondary education will continue to expand. Therefore, the Guide may not exhaustively cover all possibilities and will be continuously optimised as needed.

V. Acknowledgement

We would like to express our gratitude for the valuable advice and support provided by the primary and secondary school councils, associations of heads of primary and secondary schools, and various stakeholders to this Guide.