Reinventing curricula and promoting community involvement

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International School Ho Chi Minh City (ISHCMC) is a K-12 school in Ho Chi Minh City, Vietnam offering the International Baccalaureate (IB) curriculum. ISHCMC moved their secondary school (Grades 6-12) to a new, purpose-built building in January 2018. This paper will evaluate the implementation of 21st century best practice teaching and learning in the curricula and learning environment of ISHCMC secondary campus. The context for evaluation will mostly be STEM teaching and learning; however, other examples from the wider school community will also be used as examples of certain 21st century best practices.

Part 1: Description of the ISHCMC learning environment and curricula in the context of 21st century teaching practices

Developing a framework for describing 21st century teaching practices

Feighny (2017) describes several features of effective 21st century learning environments such as personalized, rigorous, flexible, inquiry-based and ongoing (Part 1, p. 3). Other aspects of 21st century teaching and learning discussed by Feighny include collaboration, development of higher order thinking skills, meaningful learning activities and effective use of technology. Similar definitions of 21st century teaching and learning practices can be found in the literature. Sumardi, Rohman and Wahyudiati use the term "connectivism" to describe learning that takes place via networked devices and suggest that the four main characteristics of 21st century teaching and learning are student-centered learning, collaboration, use of technology and completeness in learning material (2020, p. 360). Greenhill suggests several approaches such as a balance of direct instruction and project-oriented teaching methods, using a variety of assessment methods to evaluate student performance, and tapping into community expertise (2010, p. 11). Ibrahim, Adzra'ai, Sueb and Dalim (2019) mention mastery learning, critical

thinking, collaborative groups, meaningful tasks and self-directed learning. Based on these sources, I have consolidated the common features of discussions of 21st century teaching and learning into 11 key characteristics. These are defined below, and then used to evaluate the 21st century learning environment and curricula at ISHCMC secondary campus in Table 1.

Personalized. This includes "differentiated" but takes the concept even further. It refers to providing learning experiences that are tailored to each individual student's needs, providing exactly the right level of challenge at exactly the right time, while also allowing for a degree of student choice in learning materials and project work.

Collaborative. This refers both to collaborative groupwork done by students and collaborative choice of learning pathways by teacher and student, as well as collaboration with other stakeholders in the school community.

Rigorous. This includes clearly defined high expectations, depth and breadth of knowledge and concepts in the curricula, and also development of 21st century skills.

Flexible. This includes flexibility in the physical environment, such as flexible learning spaces, and also flexibility in the delivery of curricula – scope and sequence, assessment instruments, team teaching, and so on.

Inquiry-based. In a general sense, this refers to any form of learning that takes place when students start with a question and then search for or construct the knowledge they need in order to answer the question, as distinct from direct instruction.

Ongoing. This can be taken to mean ongoing over a period of time such as a unit of study or a school year (in other words, a project-based learning) and also ongoing beyond the classroom walls and the school day (in other words, community-based learning).

Authentic. Authentic learning occurs when students engage in meaningful tasks that are connected to their own lives and the real world.

Metacognitive. Some definitions of metacognition restrict its use to "thinking about thinking"; however, here I use the word as an umbrella term for higher order thinking skills such as critical thinking, creativity and problem solving, and also to refer to reflection.

Performance-oriented. This refers to teaching and learning that assesses learning against well-defined outcomes, standards and criteria. Marks are not awarded for effort or participation; all students are theoretically able to achieve the highest grade and working "smarter" rather than harder is part of the classroom culture.

Flipped. This refers to the now well-known term "flipped classroom", in which students learn basic content on their own (usually via well-curated digital resources), often outside of class time, and the teacher's role shifts to that of learning coach and mentor.

Networked. This can include "crowdsourcing" of data, participation in blogs and forums, and students collaborating in cloud-based documents.

Discussion of choices of degrees

In most cases, the examples and evidence supplied in Table 1 render the choice of degree to which the characteristic is addressed obvious, so the discussion here will be limited to cases where the choice of "somewhat" requires further explanation. The IB curriculum framework, at least for the STEM disciplines, is fairly well prescribed, and almost all of the summative assessment that occurs is individual, hence "somewhat" was chosen for the Personalized, Collaborative and Flexible characteristics of the ISHCMC curricula. The learning environment was judged as somewhat addressing collaborative learning because, although students can collaborate together on the whitewalls, there is no means available for students and teachers to

interact on-screen in a freehand manner (for example via a virtual whiteboard app and student devices with styluses), a gap that became very noticeable during online learning. Moreover, the school has smart projectors in every classroom, but there is no whole-school, coherent approach to using them, and anecdotally, I've noticed that many teachers are not using them.

For the Ongoing characteristic, while the school does have a strong service-learning component, it is not directly connected with academic curricula in most cases. The learning environment was judged as somewhat addressing the authentic characteristic because several other aspects of the building and technology used by students (other than the ones given as examples) are school-specific and not very similar to a real-world workplace environment. Reflection is well integrated into the ISHCMC learning culture; however, other aspects of metacognition such as critical thinking, problem solving and knowledge transfer could be taught more explicitly, and are often noticeable weaknesses in our students' 21st century skill sets. Finally, while the development of a flipped classroom environment has been accelerated recently due to the classroom environment being forced online, it is still not integrated explicitly into documented ISHCMC or IB frameworks.

Part 2: Addressing the gaps

In light of the analysis above and in Table 1, I will now suggest some ways to move the aspects of ISHCMC's learning environment and curricula that are currently in the "somewhat" category into the "very well" category.

Basic rearrangements

While most of the areas in need of improvement require deeper structural changes in curricula and school organization, some easily achieved changes that do not require additional technology or hardware include rearranging of classrooms to more closely resemble a 21st

century office environment, such as a co-working space, and also formalising the recent innovations in “flipped” and “blended” learning into school policy.

Use of technology

ISHCMC is already quite well-furnished with 21st century learning technologies; however, there are still aspects that could be Augmented, Modified or Redefined (as per Puentedura’s 2013 SAMR model) to improve collaboration and authenticity, for example. To improve the collaborative aspects of the learning environment, especially during online learning, the “gold standard” would be Apple Pens, iPad Pros and an Explain Everything interactive whiteboard software subscription. This would allow real-time collaboration between teachers and students on a virtual whiteboard with freehand drawing and is also authentic in that the same software is also used by teams of remote-working professionals. A free solution is OpenBoard, an alternative interactive whiteboard software. It does not allow input by more than one user onto a given screen at the same time, but it could be used with our existing smart projectors. This would at least allow small groups of students to collaborate at a projector screen, and the resulting work could be saved.

Personal and community resources

In the domain of personalized and flexible curricula, there are certain actions I could take that leverage my personal strengths, interests, skills and abilities. For example, drawing on my engineering teaching experience to offer students more choice in the projects and learning pathways that they take in my physics class. There is also some flexibility built into the IB Physics curriculum that we are not using. Schools can choose to offer one or several of four options: relativity, engineering physics, optical physics and astrophysics. We currently offer only one option per cohort based on the strengths of the teacher; however, we have the expertise

within our science department to deliver three of them. This could possibly be achieved with a combination of flipped learning, blended learning and flexible timetabling.

Expanding beyond my own classroom and physics teaching colleagues, we could, as a science department, work on building more student interdependence into lab and other investigative work, and also look for curriculum links between the different science curricula and the design technology curriculum, with the aim of integrating more tasks requiring cross-subject collaboration into our respective unit plans. This would also make learning more authentic. Regarding the Metacognitive characteristic, we could invite other teachers trained in metacognition to suggest ways that we could more explicitly teach skills such as critical thinking and knowledge transfer in our science lessons. The community-based learning aspect of the Ongoing characteristic could also be improved, and this will be discussed in the next section.

Part 3: Stakeholders in the learning environment and curricula at ISHCMC

Many narrow definitions of school stakeholders in the literature such as those in Keller (2015) and Janmaat, McCowan and Rao (2016) only include students, parents and educational professionals directly involved in the school's operations. However, a more comprehensive definition should include any members of the community who are affected by the school's operations and the quality of the graduates it produces. Local businesses, charity organisations and universities are the most closely associated with this extended definition of school stakeholders, but it can also be expanded to include the general taxpaying citizenry in the school district (RMC Research Corporation, 2009). Service learning is already well established at ISHCMC, and its relationships with local charity organisations are mentioned in the school profile (International School Ho Chi Minh City, 2019). An example of a local business collaborating with students is given in Table 1. However, almost all the so-called "CAS"

(Creativity, Activity, Service) programmes at ISHCMC are extracurricular; they are not directly linked with students' classroom subject work. In RMC Research Corporation's 2009 report on engaging stakeholders, produced for the U.S. Department of Education, one of the guidelines for engaging stakeholders includes "Partnership activities must be directly aligned with student goals" (p. 5). Although the IB CAS programme learning outcomes can be seen as a subset of student goals, there is a distinct lack of direct industry involvement in student coursework at ISHCMC. As a first step towards engaging with local industries to support STEM learning, a collaboration with RMIT Vietnam's mechatronics and robotics engineering department should be established, in an attempt to tap into the network of industry internships that they have already established (RMIT University, 2019). Moreover, further collaboration with RMIT Vietnam's "Activator", a student entrepreneurship hub, could be leveraged to connect with industry experts in diverse fields and possibly integrate their six pillars of the entrepreneurial mindset (RMIT University, 2019) into our own 21st century skills teaching. Another community resource that ISHCMC could perhaps be engaging with more proactively is parent experts. This could easily be achieved through sending out a survey to gauge interest, and extending the invitation regularly via school email newsletters, social media and event posters.

Conclusion

There are many ways to improve the implementation of 21st century best practices in the learning environment and curricula at ISHCMC using a combination of new technologies, the specific strengths and skills of individual teachers and departments, and greater engagement of community stakeholders in student learning. By encouraging collaboration between students and a greater variety of school community stakeholders, their worlds will be expanded, and with it, so will student engagement, learning effectiveness and development of 21st century skills.

Table 1

Evaluation of the learning environment and curricula at ISHCMC in relation to 21st century best practices

21st century best practice characteristic	**Degree to which learning environment addresses the practice**	**Examples and evidence**	**Degree to which curricula addresses the practice**	**Examples and evidence**
Personalised	Very well	Availability of several online self-paced resources.	Somewhat	Student choice of topic for mathematics exploration and physics investigation.
Collaborative	Somewhat	Table, hallway and lab arrangements are conducive to groupwork. Virtual collaboration is facilitated via Google Suite and school LMS.	Somewhat	Compulsory interdisciplinary group science project (The IB Community Blog, 2019), "collaborative" is one of the 6 IB approaches to teaching (Lawless, 2015).
Rigorous	Extremely well	Expectations are clearly defined in course outlines and assessment calendar via school LMS. Students upload assignments and receive Turnitin feedback in a similar, which prepares them for college.	Very well	Students must choose from 6 subject groups and also complete an Extended Essay in one subject (International Baccalaureate Organisation, 2020); 21st century skills are integrated into the curriculum via the Approaches to Learning (Lawless, 2015).
Flexible	Very well	Moveable walls and desks on rollers facilitate team teaching and rapid	Somewhat	Curricula can be arranged in any sequence of topics and units as the

		changes in classroom layout. Google Meet facilitates a blend of online and face-to-face teaching.		school and teacher(s) see fit. IB curricula can be taught alongside other national or state curricula.
Inquiry-based	Very well	Science labs, design labs and the library media center (International School Ho Chi Minh City, n.d.) all facilitate inquiry-based learning.	Very well	"Inquiry-based" is one of the fundamental IB approaches to teaching (Lawless, 2015).
Ongoing	Somewhat	The Gardening Club is an example of ongoing community-based learning beyond the classroom walls. The school has partnerships with multiple local charity organisations.	Somewhat	All DP students must undertake an extended CAS project (International Baccalaureate Organisation, 2020).
Authentic	Somewhat	Students use tools similar to those used by professionals, such as sensors and dataloggers and spreadsheets.	Very well	Personal engagement is a criterion in most DP coursework. International-mindedness is integrated into all IB programmes (International Baccalaureate Organisation, 2017).
Metacognitive	Somewhat	Reflection is built into the school LMS gradebook, including opportunities for both pre- and post-reflection.	Somewhat	The IB approach to teaching is based on an inquiry-action-reflection cycle. "Reflective" is one of the attributes of the IB Learner Profile (2017).
Performance-oriented	Very well	Assessment criteria are displayed on classroom posters. Homework is framed in terms of suggested practice for achieving certain outcomes.	Very well	All assessment is graded against either criterion level descriptors or a mark scheme. Marks are not awarded pro-rata based on attendance.

Flipped	Very well	All resources are posted on the school LMS prior to each lesson, so students can work at their own pace and/or access remotely.	Somewhat	IB pedagogy has been moving towards blended learning for some time now (Perrault, 2012).
Networked	Very well	Students frequently collaborate and consolidate data and information via Google docs and spreadsheets. The school LMS has class forums.	Very well	Many science and statistics activities are designed so that students crowdsource data from their classmates, grade level or even the whole school. Students regularly design and send Google Forms surveys to the school community.

Note. Description of degree is based on a 5-point Likert scale: extremely well, very well, somewhat, not so well, not at al

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