

Future Trends Report
Based on Analysis of the Team's Chosen Community / Organisation in Mid-Term and Final Evaluation

Community / Organisation Studied: Hwa Chong Institution

Preamble:

Technology is pervasive in modern life. In particular, algorithms and Big Data influence the way we see the world, live our lives and make decisions. As a result, we are less able to exercise our free will. This is the “curated life” which historian Yuval Noah Harari has warned about.

We conducted 2 interviews with the teaching staff of Hwa Chong Institution. To ensure their anonymity, we will be addressing them as Mr. A and Mr. X. The interview was targeted at investigating the collection and use of students' data, such as personal data and academic performance, and how it impacts the teaching methods and teaching policies of Hwa Chong Institution. The interviews will be used as empirical evidence.

STEP 1. Identify Challenges

Challenge #1:

In Singaporean schools, decisions in important areas that affect students are increasingly made by data.

During our interview with the teaching staff, Mr A said that “In terms of student data (eg academic performance etc), there may be irrelevant chunks of information that hinders the process of organisation, and therefore hinders the ability to create and provide the correct learning materials”. This means that more data is not always better. This may cause teachers to make decisions for their students that may not be helpful to the students' learning based on the low quality data that they are given. A further example is the use of data to make decisions that affect the progression of their students in Hwa Chong Institution. The school uses student performance and data to determine which special programs students are allocated to. Students in special programs will learn different things from other students and receive different kinds of opportunities. This would greatly impact their learning and thus it is important for these decisions to be made correctly.

Challenge #2:

During the interview, Mr. A brought up a concern about how well protected the data of the students and teaching staff are. He mentioned that there would be a lot of background data about the students and teaching staff stored in both the school systems and the Internet. For example, personal data such as the results, attendance and teachers' comments about the students is stored within the school system. Other information such as the information on Student Learning Space (SLS) and google sites is stored on the Internet.

Due to a large amount of data about the students and school staff on the school system, hackers can find their personal data more easily, and this would cause privacy issues. Possible advancement of hacking programs and methods would make it easier for hackers to break into the school system if security is not tight enough. This leads to further concerns over the safety of the data of students.

Data leaks can smear the reputation of the schools that are affected by the leaks, and cause parents to lose trust in the school. Thus, enrolment rates of the school will decrease. On average, data leaks caused organizations 1.57 billion dollars [Cisco, 2020] in terms of lost business and compensation. If data leaks occur more frequently in the future, schools are going to have to pay a lot of money in the long run. Thus, in addition to taking in fewer students, the schools may have exponentially increased expenses from the possible data leaks.

Challenge #3:

During the interview, Mr. X cautioned that any policy change "without the data from empirical backing would render the change as 'unwarranted'" and that "these changes can be wrought at the whims of the person in charge". On the other hand, Mr. A stated that subjects may not know that their information was being collected. While student data are increasingly being collected, decision-makers may not know how to use such data appropriately and students may not know that policies can be made better with their data. This is problematic because the decision-makers may interpret the data to support himself or his own views. This would no longer be "empirical

evidence”, and could lead to Big Data being less and less used due to the lack of factual information. In fact, a study done by Macmillian Learning has found that Big Data cause “high variability among educational settings leading to limitations in data in any given context”. As such, the data will not have a and can be interpreted in different ways by a person in charge.

Challenge #4:

One of our interviewees, Mr. X, cautioned against a possible phenomenon which he stated as an “echo chamber effect” when students do not access different sources. He thinks that the school “teaches students to be critical thinkers and not take facts/articles at face value.” However, lower secondary students may not have developed critical thinking yet. They may still be vulnerable to echo chambers when doing research in their studies. In other words, a curated life may result in students accepting facts at face value to a greater degree because they lack intellectual and insightful engagement with content, thus losing their rigour in thinking. This will be a big problem, because students will learn less and cannot think critically.

A study conducted by the Foundation for Critical Thinking on faculty from universities across California such as Stanford, UCLA, UC Berkeley etc found that only 9% of respondents were teaching critical thinking in class. Another key result was that although 81% of respondents felt that their department’s graduates develop a good or high level of critical thinking ability while in their program, only 9% were able to clearly articulate how they would assess the extent to which a faculty member was or was not fostering critical thinking. The remaining respondents had a limited conception or no conception at all of how to do this. We can thus see that students of even the top universities are at risk of missing out on attaining the skills of critical thinking.

Looking at students themselves, results of research conducted by Alan Schoenfield showed that a majority of students were unable to display critical thinking. In the given scenario, 93 elementary students were asked a question that tested their critical thinking skills. 76 out of the 93 elementary students were unable to answer this question. They instead used simple mathematical operations to find a way out of the problem presented, although what was required of them was to apply critical thinking. This 82% of students not being able to display nor apply critical thinking skills is proof that the current education industry lacks critical thinking within students, most students thus gain less knowledge compared to their peers who apply such critical thinking skills. With this research that shows the prevalence of the lack of critical thinking in students, we find that the lack of critical thinking is a possible challenge that Curated Life presents in the education industry.

Challenge #5:

During the interview, Mr. A mentioned that “Big Data algorithms are effective in providing teachers and students with only relevant information in terms of search results.” Relevant information is defined as information / articles that answer the question only. As such, this statement substantiates a possible challenge students of our education industry face, which is the limiting of their reading and thinking scope. This is because, providing students with what they search for only does not provide extensive reading for students to process based on their questions, they thus lack the knowledge and thinking skills that could have been gained had they expanded their reading scope. By providing students with extra knowledge that extends beyond the mere requirement or relevance, students gain more knowledge, and opportunities to develop their thinking skills. Therefore, our Curated Life may pose a challenge to the students by limiting their scope of reading.

According to research conducted by Susser and Robb (1990), the importance of extensive reading is highlighted with the claim that “To become good readers, learners need to read as much as possible.” This explained by asserting that extensive reading allows “for global or general understanding.” Another benefit of extensive reading was that “comprehension and fluency benefits from extensive reading practice.” The above research is key in showing that extensive reading is beneficial in gaining understanding on the world, improving comprehension and fluency, which in turn allows those who adopt extensive reading practice to develop into “good readers.” Therefore, we can see the severity of the challenge stated above through this piece of research, which has identified potential problems as a result of the limiting of students’ reading scope in our Curated Life.

Robb, T., Susser, B. (1986). Extensive reading vs. skills building in an EFL context. *Reading in a Foreign Language*. 5. 239-251.

STEP 2. Craft the Underlying Problem

Incorporating Challenge(s) #4 and 5

Underlying Problem:

Given that Curated Life narrows content accessible to students, students lack breadth in learning and their confirmation bias is reinforced. As a result, Curated Life exacerbates the lack of critical thinking. How might we inculcate critical thinking skills of Lower Secondary students in Hwa Chong Institution from 2030 onwards?

STEP 3. Produce Solution Ideas**Solution #1:**

Hwa Chong Institution education staff will shift school culture away from the past exam-driven culture, such that school culture revolves around critical thinking and reading to achieve quality in learning. This will take place in Hwa Chong Institution, targeted at Lower Secondary students, and the gradual shift of school culture will take place from 2021 to 2030.

With such a solution, lower secondary students in Hwa Chong Institution will be influenced, to a greater extent, to apply critical thinking skills in the classroom. There will be a greater involvement of critical thinking skills in class activities rather than memorisation of information for examinations. They will learn to break the societal stigma that examinations are everything, instead being motivated to learn and think critically, across different perspectives, contexts and disciplines. Students will thus be inculcated critical thinking skills and learn to apply such skills and knowledge more frequently, through increased, continuous and rigorous exposure to critical thinking in the changed classroom environment.

Solution #2:

Teachers in Hwa Chong Institution will identify students that possess critical thinking skills, and thus Lower Secondary students will be allocated classes such that there is an even spread of critical thinkers in each class. This class allocation will be carried out as lower secondary students are promoted to Secondary 2. With such a solution, students will be easily influenced by their peers to think and read critically, resulting in a greater inculcation of critical thinking skills in classrooms for a greater quality in learning.

Solution #3:

The teachers of Hwa Chong Institution will undergo rigorous selection processes to find the best teachers in 2025 conducted by the School Board of Directors. This will allow them to choose better teachers who can stimulate students' minds better to think critically. The teachers will be also given better materials to plan out engaging and interactive activities for the students, dispelling the myth that school is boring, and allowing them to learn better as such and can stimulate their minds to absorb more information and how to think critically. Eventually, more students will be able to think critically and will not be inhibited by a Curated Life due to his past experience with his teacher, thus a more rigorous selection of teachers is a good solution.

Solution #4:

Hwa Chong Institution education staff will shift school culture away from the past exam-driven culture, such that school culture revolves around critical thinking and reading to achieve quality in learning. This will take place in Hwa Chong Institution, targeted at Lower Secondary students, and the gradual shift of school culture will take place from 2021 to 2030.

With such a solution, lower secondary students in Hwa Chong Institution will be influenced, to a greater extent, to apply critical thinking skills in the classroom. There will be a greater involvement of critical thinking skills in class activities rather than memorisation of information for examinations. They will learn to break the societal stigma that examinations are everything, instead being motivated to learn and think critically, across different perspectives, contexts and disciplines. Students will thus be inculcated critical thinking skills and learn to apply such skills and knowledge more frequently, through increased, continuous and rigorous exposure to critical thinking in the changed classroom environment.

Solution #5:

Our group will present a proposal to Hwa Chong Institution to change its teaching policy to that of having its teachers act as facilitators by bringing up various topics relating to the subject in class and then ask their students questions about them for the students to research themselves. This will take place in Hwa Chong Institution and is targeted at lower secondary students. The teachers will be trained in how to facilitate such discussions and questioning in class along with their lessons in 2021 along with persuading the teachers of the effectiveness of this method in the same year and the teachers will begin using this new method of teaching students from 2022 to 2030. The teachers will be trained how to incorporate such methods in the class to varying degrees, depending on the extent such methods will be effective in their lessons. Different subjects have differing levels of suitability for this method. For example, Mathematics is less suitable while History is more suitable. As such a solution is being implemented, this change in teaching style to discussing topics in class will cause the students to be aware of different aspects of knowledge that they never thought about before the teachers mentioned them. At the same time, due to the teachers asking them to research, the students will be much more likely to research on these topics in order to answer the questions and then continuing their research due to personal interest. As a result, the students will increase the amount of content that they are accessing leading to these students having an increased breadth of

learning. Since the students now have to answer questions about these topics through research, they will learn how to analyse the facts and opinions presented in the different sources they researched to form answers to the teacher's questions. Hence, the students will slowly pick up critical thinking skills and at the same time, apply such critical thinking skills frequently to improve on them.

STEP 4a. Select Criteria

Criterion #1:

Which solution will be the least expensive for Hwa Chong Institution to implement so that Hwa Chong Institution is more willing to accept the solution?

Criterion #2:

Which solution will be the most effective for Hwa Chong Institution so that students will be able to be inculcated with the greatest amount of critical thinking skills and be the best possible at it?

Criterion #3:

Which solution will be the most feasible to implement for Hwa Chong Institution so that students of Hwa Chong institution will be able to learn how to think critically with a high success rate?

Criterion #4:

Which solution will be the most efficient for Hwa Chong Institution to implement so that students will be able to think critically in the shortest possible time span?

Criterion #5:

Which solution will have the most impact on changing the students' mindset towards critical thinking for lower secondary students so that students will be most willing to utilize critical thinking skills?

STEP 4b. Apply Criteria

Step 3 Sol'n #	Solution Idea	Criteria					Total
		1	2	3	4	5	
#1	Class allocation and banding	4	5	2	5	3	19
#2	More intense selection of teachers	2	4	3	4	1	14
#3	Change in school culture	1	3	1	1	5	12
#4	Reducing pace and amount of work	5	1	5	2	2	15
#5	Changing into a discussion-based class environment	3	2	4	3	4	16

STEP 5. Develop an Action Plan and Evaluate its Feasibility**Action Plan derived from Solution #2 and 5:**

We, the Foundation for Promoting Critical Thinking (FPCT), will propose to the Board of Directors in Hwa Chong Institution to change the streaming process of lower secondary students such that teachers in Hwa Chong Institution will identify students that possess critical thinking skills, and these Lower Secondary students will be allocated classes such that there is an even spread of critical thinkers in each class. Hwa Chong Institution will consider and study this new policy in 2021 and then officially announce it to the students at the start of 2022. In the course of the year 2022, Hwa Chong will start implementation of this policy by identifying Secondary 1 students that possess critical thinking skills. Hwa Chong Institution will fully implement this policy by carrying out class allocation at the start of 2023 when those students are promoted to Secondary 2. How this works is that when the students are Secondary 1, their teachers will observe their behaviour in class and the way they engage in class discussions. Then, the teachers will use these observations to assess the presence of critical thinking skills. At the end of the year, the teachers will then distribute those students who are identified to possess such skills evenly in their new Secondary 2 classes while trying to at the same time, move as few students as possible. This will cause the other students to be easily influenced by their peers to think and read critically as their peers might encourage them to emulate such behaviour. This results in more students that possess some form of critical thinking skill through their own initiative. This increases the critical thinking skills inculcated in classrooms for greater quality of learning.

The FPCT will also propose to the Board of Directors in Hwa Chong Institution to change the mode of class discussion to facilitate critical thinking development. The teachers in classes conducted in the school will start discussions in class related to current affairs or the like and promote better participation through using captivating examples and methods, like talking about trends and possibly games. This will facilitate students to think deeper into said topics and develop critical thinking skills to analyse the situation at hand. By changing the discussion mode, many students will then learn how to think more critically in a fun and natural way, by teaching themselves the techniques instead of relying on teachers all the time. This solution will benefit both the teacher and the student as the teacher need not fret about trying to teach harder topics like this to students, instead they are the firestarters to their candle of curiosity, and the student will learn better without the help from others just to make sense of a situation.

The action plan is able to have a great impact on students' mindset towards critical thinking, effectively and efficiently solving the problem of students lacking critical thinking skills, while also being feasible and cost-effective.

Bibliography

List of references:

Yuval N. H. (2016). Yuval Noah Harris on big data, Google and the end of free will. Retrieved from <https://www.ft.com/content/50bb4830-6a4c-11e6-ae5b-a7cc5dd5a28c>

Handel, S. (2018, November 21). How Social Media Creates FOMO and Why You Should Minimize Your Time on the Internet [Blog]. The Emotion Machine. Retrieved from <https://www.theemotionmachine.com/how-social-media-creates-fomo-and-why-you-should-minimize-your-time-on-the-internet/>

Sharma, R. (2017, December 6). Our Curated Lives: The Insanity of Living Monotonously Happy, Perfect and Successful Lives [News Website]. Huffpost. Retrieved from https://www.huffpost.com/entry/our-curated-lives-the-ins_b_5711825

Zwitter, A. (2014). Big Data ethics. *Big Data & Society*, 1(2). Retrieved from <https://doi.org/10.1177/2053951714559253>

Helbing, D., Frey, B., Gigerenzer, G., Hafen, E., Hagner, M., Hofstetter, Y., van den hoven, J., Zicari, R., & Zwitter, A. (2019). Will Democracy Survive Big Data and Artificial Intelligence?: Essays on the Dark and Light Sides of the Digital Revolution. In *Towards Digital Enlightenment* (pp. 73–98). Springer. Retrieved from https://doi.org/10.1007/978-3-319-90869-4_7

P. Simon (2013). Too Big To Ignore. The Business Case for Big Data. In *Elements of Persuasion: Big Data Techniques* (pp. 77-107). Wiley.

Har Carmel, Y. (2016). Regulating “Big Data Education” in Europe: Lessons Learned from the US (SSRN Scholarly Paper ID 2772755; Internet Policy Review, p. 17). Social Science Research Network. Retrieved from <https://papers.ssrn.com/abstract=2772755>

Davret, B. (2019, May 10). Are You Comparing Yourself To A Curated Life? Retrieved from <https://medium.com/the-ascent/are-you-comparing-yourself-to-a-curated-life-2adff000be98>

Sumpter, P. D. (2018, April 25). The algorithms that control your life and the one thing that you really should be worried about. The Telegraph. Telegraph Media Group. Retrieved April 11, 2020, from <https://www.telegraph.co.uk/science/2018/04/25/algorithms-control-life-one-thing-really-should-worried/>

Rosenbaum, S. ((2015, May 10). A Framework For Living The Curated Life. Forbes. Retrieved May 5, 2020, from

<https://www.forbes.com/sites/stevenrosenbaum/2015/05/10/living-the-curated-life-a-framework/#1403a095295d>

Boudreau, E. (2020, January 21). *Learning in the Age of Algorithms*. Harvard Graduate School of Education. <https://www.gse.harvard.edu/news/uk/20/01/learning-age-algorithms>

Alison J. Head, Barbara Fister, and Margy MacMillan, Information literacy in the age of algorithms: Student experiences with news and information, and the need for change (15 January 2020), Project Information Research Institute, <https://www.projectinfolit.org/uploads/2/7/5/4/27541717/algoreport.pdf>

Paul, R. (2004). The State of Critical Thinking Today. *The Foundation for Critical Thinking*. <https://www.criticalthinking.org/pages/the-state-of-critical-thinking-today/523>

Cisco (2020, April 27). Securing Schools: The 5 Key Components of a Comprehensive Approach to Cybersecurity in Education. Center for Digital Education. <https://www.govtech.com/education/news/Securing-Schools-The-5-Key-Components-of-a-Comprehensive-Approach-to-Cybersecurity-in-Education.html>

Koh, K. H., Tan, C., & Ng, P. T. (2012). Creating thinking schools through authentic assessment: The case in Singapore. *Education assessment evaluation and accountability. Educational Assessment, Evaluation and Accountability* 24(2), pp. 1–15.

Stankov, L. (2010). Unforgiving Confucian culture: A breeding ground for high academic achievement, test anxiety and self-doubt? *Learning and Individual Differences*, 20, 555–563. Retrieved from, https://d1wqtxts1xzle7.cloudfront.net/48272534/Unforgiving_Confucian_culture_A_breeding20160823-5243-1gz8s8.pdf?1472021132=&response-content-disposition=inline%3B+filename%3DUnforgiving_Confucian_culture_A_breeding.pdf&Expires=1596869894&Signature=FgvvcB7NImavU9eBfpf0ZH5RqGk9KR6-V6hMre-tITU8DboUYCTtOY5ThYr2oCPqWjbtfusW0ZTnliKOlgPKfzIQjFBZGOMf7fm9y~nldxW74ixLLUyR-vsQeDuiiJEpIR-uk-CEPR43bePlnomVhQcRaTAu-t8R-gMiIEiztBPB5f9Gq2s5TMkl7UrUgJQC4loLwjAoeLF01BLs9pZVosDMvLvob8BECq-tDrT3MYD~5rvM3GgF2-NRp5JhpUZ8XpAQ6yIL4-10PEdwDGTSLwORwVhWpOx27zQuQTuLTYu~C7rIZdqC1cPf2inYcuKH0uGQTIKpEQgC5A-KaW5g__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

Chiam, C. L., Helen, H., Flora, N. H. K., Tay, W. Y., Creative and Critical Thinking in Singapore Schools. National Institute of Education. Retrieved from, https://www.nie.edu.sg/docs/default-source/nie-working-papers/niewp2_final-for-web_v2.pdf?sfvrsn=2

Sullivan, H. S., (1953). *The Interpersonal Theory of Psychiatry*. New York: Norton.

Commeyras, M. (1993). Promoting Critical Thinking through Dialogical-Thinking Reading Lessons. *The Reading Teacher*, 46(6), 486–494. JSTOR.

Fan, L., Quek, K. S., Zhu, Y., Yeo, S. M., Pereira-Mendoza, L., & Lee, P. Y. (2005, August). *Assessing Singapore students' attitudes toward mathematics and mathematics learning: Findings from a survey of lower secondary students*. <https://repository.nie.edu.sg/handle/10497/3345>

Polick, A., Cullen, K., & Buskist, A. (2010, September 01). How Teaching Makes a Difference in Students' Lives. Retrieved August 10, 2020, from <https://www.psychologicalscience.org/observer/how-teaching-makes-a-difference-in-students-lives>

Cheung, K., Yip, T. L., Wan, C. L. J., Tsang, H., Zhang, L. W., & Parpala, A. (2020). Differences in study workload stress and its associated factors between transfer students and freshmen entrants in an Asian higher education context. *PLoS ONE*, 15(5). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7228073/>

Mixed-ability classes have both pros and cons. Retrieved August 11, 2020, from <https://www.todayonline.com/voices/mixed-ability-classes-have-both-pros-and-cons>

Wolpert, S. (2009, January 27). *Is technology producing a decline in critical thinking and analysis?* UCLA. <https://newsroom.ucla.edu/releases/is-technology-producing-a-decline-79127>