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Effectivenss Computational Thinking Tecniques on Student Interest to STEM Subject

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Abstract

The purpose of this study is to investigate the impact of Computational Thinking Techniques on Student Interest to Science and Mathematics subject at schools in Sarawak. The study was conducted on two different types of data collection, online survey, and interview session. A total of 217 respondents responded been selected from teachers and student primary and secondary schools. The teachers selected based contribution on The Computationally Thinking and Computer Science (CTCS) teaching certificate program and recognized on teaching subject STEM-based. The findings can be referred to by the policymaker and Ministry of Education, Science and Technological Research (MESTR) on educational experiences in schools. We recognize that some other challenges on practice CT technique required policy to empower education system on schools in Malaysia. However, CT techniques be challenged when countries are hit by the pandemic COVID-19.

Keywords: Computational Thinking, STEM Education, Teaching Technique, Student Understanding, COVID-19

Introduction

Malaysia's younger generation shown a worrying level of lack of interest in science and mathematics subjects. The interest in mathematics and science in schools and, consecutively, universities seem to be waning as reflected in the poor enrolment into science stream at secondary schools, and the lack of good candidates for STEM-based program at universities. National STEM Movement chairman Datuk Professor Dr Noraini Idris said this disinterest in science and mathematics stemmed from uninspired teaching of the subjects at schools, which had a continued impact at the higher-education level. With the implementation of Computational Thinking techniques training, we hope to study the impact of it to Science and Mathematics interest among students.

Faculty of Computer Science and Information Technology (FCSIT), UNIMAS has been chosen as one of the hubs for MyDigital Maker (MYDM) CPD Center under the collaboration with Malaysia Digital Economy Corporation (MDec). The roles of MYDM CPD Center are to increase

the readiness in digital knowledge through computational thinking (CT) and computer science (CS) teaching certificate program for teachers, outreach program based on digital making, programming, and robotics for school students and as a reference point for Digital Maker in East Malaysia (Sarawak) zone.

From March 2017 until August 2019, 280 teachers had attended the Computational Thinking and Computer Science (CTCS) Teaching certificate program conducted by 6 lecturers from FCSIT and which cover the schools from Kuching to Lawas. This certification program required the teachers to attend 40 hours face-to-face training at the center, followed by completing two assignments to measure their skills in applying CT in class and programming skills. This program is to give teachers recognition of teaching competence for new revised ICT Standard Curriculum for Primary School (KSSR) and Standard Curriculum for Secondary School (KSSM) which has begun its implementation in 2017 for Year 1, Form 1 (Basic Computer Science subject) and Form 4 (Computer Science). On top of that, we also conducted the workshop to teachers on basic Scratch and Python programming on October 2017, Asas Sains Komputer and Sains Komputer (ASK SK) Training in 2018 and 2019, and Rekabentuk Teknologi (RBT) Training in 2018.

Research Objectives

This study has the aim to investigate the impact of Computational Thinking Techniques on Student Interest to Science and Mathematics subject at schools in Sarawak. The findings can be referred to by the policymaker and Ministry of Education, Science and Technological Research (MESTR) on educational experiences in Sarawak. It also can assist MESTR in planning an optimized CT techniques application on Science and Mathematics subjects at schools in Sarawak.

Literature Review

Computational Thinking

Since 1980, computational thinking was introduced by Seymour Pappert that would suggest ways programming computers will enhance thinking skills as a tool (Papert, 1980). Later (Wing, 2006), computational thinking resurgence of interest on ways to solve the problem not as applied in programming but should be used to analyze child ability and understand human behaviour with applying. Campuses US and abroad are revisiting introductory course undergraduate curriculum, changing their approach in computer science with cover concept programming and fundamental principle. Besides that, potential computational thinking impacts interest and excitement surrounding research and undergraduate educations (Wing, 2010).

The computational thinking method are primarily developed into several other computer science subjects from the K-12 curriculum. It continued approaches such as the psychology approach subject in the development of education in US and UK countries (Anderson, 2016). According Yadav et al (2017) contempt its fundamentals, computing thinkers, are focused on programming. Still, Wing's hurdles in proposing the concept of computational thinking introduced to teachers' educators show an educators concept analogy that helps undermine the quality of educator services Voogt et al (2015) computational thinking refers to the thought process in helping to complete complex problem solving, generalizing and moving to the solution process, which crystallizes on computational systems.

This computational thinking technique is embodied in the interpretation of education in New Zealand and Australia, influencing students' interest in the attitude and school curriculum(Williams & Mangan, 2016). Conferring (Najibulla et al., 2018), computational thinking techniques also help solve problems and find solutions based on the formative formulas introduced by (Selby & Woollard, 2013), namely decomposition, pattern recognition, abstraction, evaluation, and algorithm thinking, where it can be practised according to the suitability of the young as proposed by Wing in her argument.

(Harimurti et al., 2019) Computational thinking has its own components in neutralizing issues in an issue or topic of interest

Component CT		Descriptions
Decomposition	:	solve problems with smaller, easier-to-manage parts
Abstarction	:	focusing only on important information, ignoring irrelevant details
Logical/Pattern Recognition	:	looking for similarities in the problem
Algorithms	:	develop a step-by-step solution to the problem

Computational Thinking on STEM Education

According to White (2012), Science, Technology, Engineering and Mathematics (STEM) education is synonymous with science, technology, engineering, and mathematics. Introduced by Sputnik in World War II, the Soviet Union successfully launched the Sputnik satellite. That was the beginning of the "Space Race" era between the United States and the Soviet Union. Regarding scholars, STEM indicates that integrative, collaborative education introduces K-12 students as majors in higher education.

Günbatar & Bakırcı (2019), computational thinking skills as tools used by educators, it affects the entire discipline. The goal of the STEM subject is to become a creative individual in solving problems. by applying computational thinking in STEM, it strengthens the module on generating tools to solve understanding and enhances student interest. Various tools and scales in measuring learning attitudes covering a wide range of fields, and many researchers evaluate computational thinking as distinct part of thinking Skills, which provides creative dimension, cooperation, problem solving, critical thinking and algorithm thinking (Sun et al., 2021).

In New Zealand, the marketability of graduates from engineering is a bit worrying as only 6 per cent succeed; the weakness of young people's understanding of STEM's importance drive efforts in enhancing equity and influence in building positive values by assessing the impact of interventions on STEM subject interests and influential factor discovers (Williams & Mangan, 2016). In addition, Wang et al (2021) computational thinking and STEM concept operations are different from the tools and skill aspects of would suggestion on education; however, in applying computational thinking techniques in STEM education, they need to be appropriate in their respective fields to achieve practical domains solution.

In terms of cognitive development of children ages 10-11, brain and mature development capabilities are at a critical learning stage; statistics show that computational thinking on STEM helps improve children's intelligence and comfort (Sun et al., 2021). Intensifying computational thinking in primate and secondary school is a challenge that

needs. It is a revolution in the education system that requires concerted effort, discipline, and the need for the support of the relevant body in expanding the education community (Lu & Fletcher, 2009).

In context Malaysia, exposure to STEM education awards to teachers inspires and directly impacts student motivation and engages inactivity, even that, the authority can assist in the provision of training to the faculty and facilities in addition to achieving the value of school student learning support (Ramli & Talib, 2017). According to Najibulla et al (2018), through the Malaysia education blueprint 2013-2015, STEM subjects were seen as at the core of student interest in the product of the skills. They identified factors in the decline of STEM education enrolment at the primary and secondary school levels. ICT exposure as the basis for teaching and learning sessions opens opportunities to attract students.

Challenges Computational Thinking in Education Program

According to Basu et al (2016) the current challenges faced are stalled because the student environment does not help the growth of students, but the introduction of CT in the face-to-face group improves educational performance at the secondary level EL-Deghaidy et al (2017) in looking at CT as a tool for solving problems, it needs to look at other factors in helping to build good understanding among students, determining the total capacity of students, the ease of use it affects the time in school learning. The lack of resources on concern exams needs to be strengthened through empowering STEM curriculum activities and tracking of time external constraints.

Besides that, the argument by Li (2021) order to strengthen student education, teachers need to be exposed early through pre-service before teaching in school, this is because in using CT techniques in school learning, it is easier to apply early so that it is not a problem for students to understand.

However, it is a challenge when, in the introduction of CT in school education, it needs to be monitored for the maturity and development of the child's brain, four-grade primary schools (10–11 years) may be a critical period for children's cognitive learning and development in terms of gathering information and formulating thoughts (Sun et al., 2021). Bati (2021) also stated that his argument for CT practice was more readily accepted by the stud age than children in Early childhood, this is because, in early childhood, it was more effective in physical activity. Also, early childhood growth is influenced by the environment and limousine of the brain for 3 to 4 years compared to 5 to 6 years undergoing the process of working memory.

According Anderson (2016); Swaid (2015) propose a study that focuses on the effectiveness of computational thinking in a STEM discipline and is prepared to face more complex challenges that are difficult to solve through CT techniques. As suggested Yadav et al (2014; 2017), a detailed study is necessary by introducing computational thinking on the subject of education so that students do not rely too much on computer technology in solving problems.

In strengthening research studies, EL-Deghaidy et al (2017) stated that the number of teacher engagements can influence data analysis, the recognition of teachers teaching STEM subjects. It will help us to understand more about STEM education and why to look at specific factors that facilitate or hinder its implementation. The unity between teachers and universities needs to be evaluated in an efficient context so that the preparation of STEM subject teachers will be stronger by having a strong relationship with local school (Rinke et al., 2016).

Research Methods

Based on (Rinke et al., 2016). in assessing the ability of computational thinking in STEM education, the method of mixing method used to test the effectiveness, it is necessary to look at the value of teacher efficacy and identify demonstrated practice and pedagogies, and even to review traditional methods in the persistence evaluation. Moschella (2019), Mixed method research design helps study the structure of action in measuring cognitive skills in children. Researchers and teachers state the method of interpretation, whether computational thinking techniques explain student understanding and how fundamental human construction programming structures evolve.

This research conducted involves collecting data and analyzing two independent stands of quantitative and qualitative. The convergent design merges the results of two data base within descriptive analysis and thematic analysis. The purpose of this research is to survey on CT techniques applied to Science and Mathematics subject and measure the effectiveness of it and survey on the impact of CT on student interest in Science and Mathematics before and after CT techniques is implemented.

Results

The research was conducted on two different types of data collection, online survey, and interview session. A total of 217 respondents responded been selected from teachers and student primary and secondary schools. The respondent from online survey, equal 54 teachers and 151 students, while interview session were 4 teachers and 8 students. The teachers selected based contribution on The Computational Thinking and Computer Science (CTCS) teaching certificate program and recognized on teaching subject STEM-based.

Perception by Teachers on CTCS

Understanding and Application CTCS

The data based on number of teachers knowing term CT before attending the CTCS program show, mostly not sure about the term CT is equal 23 teachers. Besides that, 22 participants from this program knew CT technique. Others, 10 teachers are not sure about the term. Probability on the technique CT, we given six (6) component CT that can be applied on class. Our respondent rated the higher on technique Pattern Recognition in the class with 41 votes greater than other technique CT. The second ranked CT technique applied was algorithm. Based on performance teaching, our respondent declares mostly their skill technique in practice CT in the class had been well increased after they attend the CTCS programmed, for side 7 respondents selected nothing changed.

Table 1 shows the most basic thing in understanding CTCS, four of the participants were able to explain and practice in the classroom. There are agree CTCS technique, simplify the process learning, to interest students in understanding a subject and can be solve from big problem break into smaller. In addiction the other teacher argues CTCS technique difficult to practice and suitable on for a small number's student in class

Table 1
Understanding Respondent on CTCS Technique

Respondent	Statement
R1	*Help to facilitate the teaching process*
R2	*we can solve it by solving a big problem, this big problem, we break the problem into smaller problems.*
R3	*greatly increase it is not. Because if there are more than 21 students in one class, it is quite difficult for us to apply for CTCS because CTCS needs students whose number is not too large and it takes time for us to calm down the students*
R4	*some are indeed used so that my students can more easily understand the subject being taught*

Application Technique CTCS
Based on the method that we focus on CT technique, 16 methods can be practiced in class show on figure 1, and the highest probability that been chosen was to use video with hint 41 votes. The middle voting which uses the method of bubble mapping and the other uses a different method that suggested microlearning video duration of 3 minutes and application technique on PJK games.

Table 2
CT Activity on Classroom

Activity	Vote
Using scratch for quiz	27
Slide image	35
Games	20
Graph paper programming	7
Flash cards	15
Video	41
Peer assessment	22
Recycle resource materials	34
Bubble mapping	26
Tree mapping	28
Sing	17
Painting	19
Cut and Paste	21
Gallery walks	27
Practice	31
Others	4

Next, the teacher also used some activity to interact with students in class. Most of them stated that the group activity, friends' guidance and speaking in front of the class, were techniques that build interest and aspiration in class. However, they had some lacks on practices which the activities effective on small number of classes.

Table 3
Activity on Class

Respondent	Statement
R1	*group activity aa if the worksheet is the usual one...* *the guidance of friends so they are more comfortable to communicate within the group...*
R2	*Speak in front of the class or make aa collaboration with friends.*
R3	*activities such as decomposition, so what kind of impact does he have on students, maybe out of 20 people, maybe 1/3 or half can solve problems*
R4	*This CTCS has helped increase their interest and build aspirations to produce STEM projects.*

Mostly students are interested in pattern recognition as presented on teaching skills with 29%. Next, the lowest CT technique that not quite encouraging was abstraction which only 4%. The techniques relate the respondent on practice, their suggests that several components be used on classroom. Most of them practice algorithms, decomposition, pattern recognition, and abstractions, as models on teaching and learning on optional subject to students.

Table 4
Application Technique CTCS

Respondent	Statement
R1	*I'm more inclined to aa algorithm because if it's me, this algorithm, I will first explain the work process as a student before they carry out their project and carry out any task.*
R2	*pattern recognition and also abstraction which I tend to use more*
R3	*Decomposition is when he solves a problem because when he solves a student's problem, he can see the wishes of any main point that needs to be solved in the problem.*
R4	*I prefer to use algorithms. For my students, people have to complete the project so they have to complete it step by step*

Teaching Technique, Student Understanding, Issue on Practice CTCS
Mostly the respondent agrees on this question about process CTCS technique on learning and teaching with average 31 – 45 voting on all the questions. In middle, the teachers voting average in quantity 8 – 16 votes and only one (1) disagree on statement “I understand the CTCS structure as a technique in solving subject” on table 5.

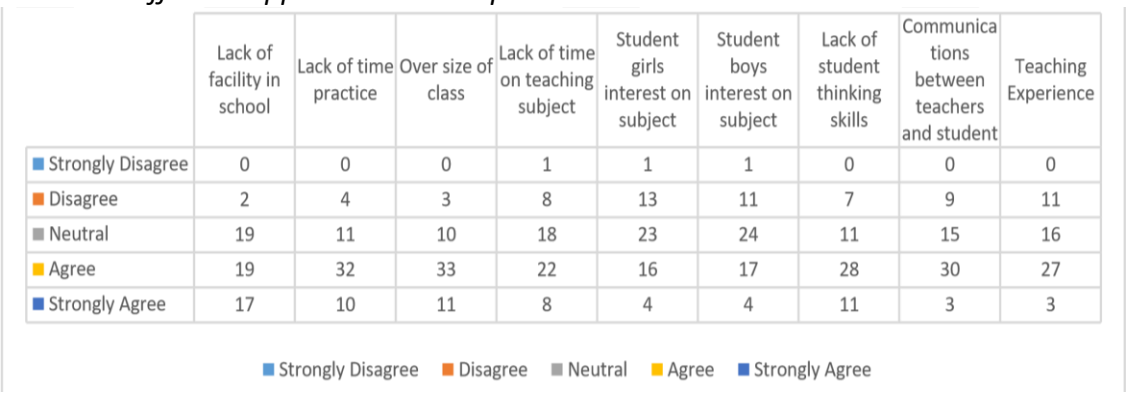
Table 5
Process CTCS Technique on Learning and Teaching

	I have my own technique in teaching	I apply the CTCS technique in learning and teaching	I understand the CTCS structure as a technique in solving subject	The CTCS method helps in improving the P&P technique	The CTCS method is suitable for practice in the learning and teaching process
Strongly Agree	10	4	4	7	7
Agree	31	45	41	42	42
Neutral	16	8	11	8	8
Disagree	0	0	1	0	0
Strongly Disagree	0	0	0	0	0

Based on Table 5, that had type of component on factors impact technique CTCS who involved by teachers' perceptions. The issues highlighted on affected application technique was "oversize of class" which 33 voting had been votes. Besides that, "issue lack of facility in school" the respondent voting 19 votes on agree and neutral on this statement. The lowest voting is statement on "lack of the time on teaching subject, student girls' and boys' interest on subject" be equal to one (1) voting.

Table 6
Factors That Affected Application Technique CTCS

	Lack of facility in school	Lack of time practice	Over size of class	Lack of time on teaching subject	Student girls interest on subject	Student boys interest on subject	Lack of student thinking skills	Communications between teachers and student	Teaching Experience
Strongly Disagree	0	0	0	1	1	1	0	0	0
Disagree	2	4	3	8	13	11	7	9	11
Neutral	19	11	10	18	23	24	11	15	16
Agree	19	32	33	22	16	17	28	30	27
Strongly Agree	17	10	11	8	4	4	11	3	3



Our respondent must use various techniques to interact with student on interest subject STEM in classroom. Their use differs methods, skills, and techniques to increase student understanding. The teachers use method facilitators, group discussion and given encouragement words and motivation to helps student interest.

All the techniques had some difficult on practice, the teachers argue, on primary school's levels, year 6 more mature to absorb understanding learning when practices CTCS. The other issue, rate ratio on class brings impact on understanding student. Although the subject use lab as differ class, the rate student interest for male easily distracted compare female more practical practice.

However, the teacher uses some techniques to solve the issue problems in learning. The teacher explains how to plan activity to gain understanding of subject, make sure activity on groupwork, being using internet as reference platform and the activity most suitable on class schedule.

Table 7
Teaching Technique and Understanding Students

Respondent	Statement
R1	*Our sixth year is more mature and they are more mature. Can, can again master the skills of pem*
R2	we need to explain what the purpose is... make sure that I do the activity in a group that is not too big... there are all internet facilities. So I will give students the opportunity to make a reference if necessary. Yes. Google it and find it... my learning needs to be adapted to the activity, meaning not too much and not too much
R3	*The reason is quite strange, most of these students, they are not from the unlucky group...maybe in that one class there may be only a few people who we feel have a special room, they have a special computer, they have a strong internet line...The attendance is also in there are too few classes*
R4	*Especially boys, when we do activities like this that involve these thinking techniques, these boys are easily distracted...Compared to girls...it's that they don't like things like this. He is more of a thing that is like waking up for something. Practical.*

Barrier COVID-19 on Teaching and Learning

The barrier of COVID-19 on teaching and learning students brings impact on eco-learning and practice. The teachers inform, activity online learning, not comprehensive to practice CTCS technique. They argue most of the work, not from student but parents, and teaching limits. The main factors come from students which socioeconomic family, learning devices, environments and internet access and attendance is not comprehensive. The alternative teachers use interactive platform as medium on teaching with Google Meet, Google Classroom and Youtube.

Table 8
Barrier COVID-19 on Teaching and Learning

Respondent	Statement
R1	*It doesn't help if most of the work is not the work of the student's parents*
R2	*Our teaching is a little limited...* *like to see aa eye direct contact aa I contact myself with students, if the students who are aa sometimes we tell them to open the video, they don't open it. It's as if we're just enjoying ourselves*
R3	*The reason is quite difficult, most of these students, they are not from the unlucky group...maybe in that one class there may be only a few people who we feel have a special room, they have a special computer, they have a strong internet line...The attendance is also in there are too few classes*
R4	*The P&P can still be carried out as usual because there are many mediums that can be used such as google meet, google classroom youtube*

Advantanges, Challenges and Suggestions

Hence, the respondent stated the CTCS technique make advantages on increase the percentage performance on subject STEM, improve something in the practice activities teaching and learning, employ teaching techniques and student exploration in a subject without technology.

There are some challenges for teachers to practice CTCS technique, their express most students' ability on follows the process teaching and learning, non on CTCS process. The related issue, there had limited time and teaching aids in class, students tend with traditional method and student easily despair. The teachers also complain about some issues, most of them must do ad-hoc work related to clerical duties and need to attend briefing or workshop on prime-time school.

There are several suggestions, from respondent which are reduce density on subject STEM, time setting on subject, special exposure with workshop to teacher and need further research on effectiveness CTCS on primary and secondary school.

Table 9
Advantanges, Challenges and Suggestions

Respondent	Statement
R1	*Most students' ability to follow the teaching process is not CTCS*
R2	*Reduce the density in basic computer science content*
R3	*In 60% he can increase If he really does it... ad-hoc Work that is ad-hoc regarding clerical work... when is the right time for example right, he can't if it's our class, he can't start after break or before break*
R4	*help me to add and improve some practices in activities, teaching and learning.... employing my own teaching techniques and student exploration in a subject and without using technological tools... there is further research. to express the level of effectiveness of computational thinking techniques among primary and secondary school students*

There are some issues that focus on challenges on practice techniques CTCS. There are seven (7) issues with two (2) that have been highlighted by teachers which are lacking facilities in classroom to accommodate capacity in large students and difficult on handling introvert

student. Besides that, our respondent voting on issues lack of student facilities (gadget) and lack of access Internet as highest than ICT knowledge by teacher with overall 44 and 41 votes. The lowest voting was 20 votes only, followed by others. The medians on this figure 16 was lack of student facilities (gadget) with 34 votes and ICT lack of teaching aids 29 votes.
The suggestion is improved technique CTCS by voting of the teachers. On the middle data, they suggest providing mentor program in school with voting 34 votes. Hence, the other on 3 votes respondent also suggest on to including CTCS element in *Rancangan Pengajaran Harian* to able to apply in method learning and teaching, expanded on primary school and giving exposure to PPD of their respective district, so that easy for them to understand and then to assistant PPD, school administrators and teachers.
Lastly, the data for suggestions technique CTCS on stem based. The highest on this data voting by teachers about provide regular CTCS training to the teachers in 55% and second ranks 44% on application of CTCS in all subjects in stages. The other suggestion by teacher was implement in phases (Kohort) at the school levels such as *Transformasi Sekolah 2025 (TS25)* program and there needs insert brand logo to identify schools that have implemented it.

Perception Students Interest on Subject STEM-Based

The students responded to our interview session that included students from primary and secondary school. Most students are interested in the subject STEM with some interactive activity that is used by the teacher. The reason beginning on this subject, they likely interact group work, experiment, interactive learning which Quizzes and Kahoot. Besides that, for other that, student interest subject STEM especially science computer with some activity sketching and practical theory. We ask random questions of scale interest on subject, most of them voting 9 out of 10.

Table 10
Students Interest

Respondent	Statement
S1	*lots of experiments… group work*
S2	*group work makes us feel like fun... learning new things, we will feel like we are interested in something in the new teacher*
S3	*The cost I'm interested in, requires STEM and computer science. With me I can learn new facts or theories...we people will sketch randomly, sketching is the reason to help us understand better*
S4	*provide us with a module to do training If, for example, the teacher is not near the school, we can make the module, we will discuss it together...such as quiz, kahoot so I think it will be fun to learn that subject*

Most on higher vote on agree statement was “I am interested in learning if the teacher explains step by step to answer the questions” 140 voting. The others lowest voting equal to 1 vote on disagree statement “I am interested in learning if the teacher makes a discussion and emphasizes important points in a topic”.

Table 11
Students' Understanding of The Teaching and Learning Process

Arguments	Disagree	Neutral	Agree
I am interested in learning if the questions are divided into small questions that are easy to solve	15	0	136
I am interested in learning if the teacher makes comparisons by giving examples	17	1	133
I am interested in learning if the teacher makes a discussion and emphasizes important points in a topic	1	13	37
I am interested in learning if the teacher explains step by step to answer the questions	11	0	140
I am interested in learning if given the opportunity to check my friends' assignments	50	86	15
I am interested in learning if the teacher uses the bubble map method (mind map) in learning	9	97	45

There are several factors that cause student discomfort on learning subject STEM in classroom. The respondent expresses some issues on environment, facility, weather, and health. The student stated getting some noise in class, ventilation issues as factors that student being uncomfortable. On other side, some of facility especially computer on lab, the software system not UpToDate and not support the application for project.
The suggestions from students that can be considered were cleaning, communal work facility in the class and teacher should make the learning more interactive and upgrading communication skills.

Table 12
Challenges and Suggestions

Respondent	Statement
S1	*There are projector chairs, blackboard tables, speakers, projector screens*
S2	*if the class is noisy, we can't focus in class... The temperature is harmful... we can open the window or clean the fan like getong royong.*
S3	*Disrupting the main focus in the class is one of the first environment in terms of the issue of distracting, and health... the teacher should make the learning more interactive. Because when there is an interaction between a student and a teacher, it is not only him who can. improve the level of communication with each other*
S4	*the problem that bothers him when we want to do a school computer application project is that the school can't support the application to do the project*

The higher overall voting from student chose to disagree on “I don’t interact (get along) with friends” was 117 votes. On the agree side, the higher statement was voting on two statement which is “I noticed an improvement in my academic performance” and “I always involve myself in learning activities” equal 114 votes.

Table 13
The Problems in Learning Classroom

Arguments	Disagree	Neutral	Agree
I easily pay attention when the teacher is teaching	2	46	103
I can easily understand the content of the subject when the teacher is teaching	6	54	91
I always involve myself in learning activities	4	33	114
Space to do limited learning activities	91	50	10
I don't interact (get along) with friends	117	29	5
I noticed an improvement in my academic performance	2	35	114

The data online surveys show our respondent the problem issue in learning in the classroom. The higher overall voting from student chose to disagree on “I don’t interact (get along) with friends” was 117 votes. On the agree side, the higher statement was voting on two statements which are “I noticed an improvement in my academic performance” and “I always involve myself in learning activities” equal 114 votes.

Discussion

The aim for this study is to measure effectiveness CT technique and impact student interest on subject STEM. We recognize that some other challenges on practice CT technique required policy to empower education system on primary and secondary schools. The data that been collected, show that implemented CT make change the results before and after CT applied on STEM subjects. Abdul Wahab et al (2021), argue the STEM subject is a core subject and most of countries integrated CT as based learning in curriculum with adaption technology and computers in classrooms.

Based on the findings, mostly students are interested in activities that are recommended by teachers to assure their focus and interactive learning in classrooms. The medium interactive learning supports students with teamwork in class, using technology especially on video and Kahoot quiz. Implemented CT technique on activity in class, viewing improvement scale before and after applied CT. Hence, that had some issues regarding facilities, environment and communication among teachers and students. This issue can be overcome by upgrading facilities both in class and outside, for it to be booster on performance on academy especially subject STEM-based.

Exposure CT technique as medium interact interest subject STEM-based for teachers, proving improvement on teaching and learning on classroom. Encouraging respondents to CT technique indicates suitability for practice on subject. We noticed that the teachers had specialist and creativity in how to interact and it depends on the suitability of subject STEM in class. The CT technique on algorithms, pattern recognition and decomposition, developed primary preference to practice in learning and teaching.

However, CT techniques were challenged when countries are hit by the pandemic COVID-19. Limitations on this issue on factors students' financial backgrounds, families, settings, and access to the internet are the key determinants, along with their attendance, which is not exhaustive. With Google Meet, Google Classroom, and YouTube, alternative teachers employ interactive platforms as teaching tools.

Besides that, some schools had issues with facilities provided at school, and distracted students from focusing on class. Teachers also expressed their willingness to continue this

workshop periodically according to the appropriate and non-disruptive time on teaching and learning class. Their encouragement CT techniques on Cohort as syllabus and promoting needs insert brand logo to identify schools that have implemented it.

Conclusion

To conclude, the findings show the outlook on CTCS technique on implication teaching and learning in class. From a viewpoint, some factors, issues, challenges, and suggestions on this matter have been recognized. The data represented responded voice and allowed us to identify possibility CTCS technique as one of part technique teaching and learning classroom.

We hope contextual contribution to this research will be continued practice CTCS especially for educators in Sarawak for how it implemented. The significant existing knowledge on teaching technique can improve by enrolling component CTCS technique to attract students interested in subject STEM by applying technology as medium of participation learning in school.

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