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The Differing Views in using the Common Assessment Tasks in Secondary School Science

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Abstract: ***The Science common assessment tasks currently implemented in Brunei Darussalam (better known as the Brunei Common Assessment Tasks or BCATs) emphasized on developing the 21st Century learning skills among students as well as on the attempt to develop the students to be active learners. However, the effectiveness of the Science BCATs remained debatable. A small-scale case study was conducted involving 33 Year 7 students and four Secondary Science teachers. Questionnaires were used to accumulate data on the views of the Science BCATs from teachers and students. The findings from this study revealed that students have positive perceptions towards the Science BCATs; however teachers perceived them as insignificant. This contradicts with the main aim in the initial implementation of the Science BCATs in the secondary schools.***

Keywords: Common Assessment Tasks, Secondary School Science, Perceptions.

1. Introduction

Under the ongoing curriculum reforms in Brunei Darussalam (hereafter referred to as Brunei) known as the National Education System for the 21stCentury or SPN21 (*SistemPendidikan Negara Abad Ke-21*, in the Malay language), teachers in Brunei government schools are supposed to be more proactive, resourceful and adaptive in helping less-able students. Student evaluations were also innovated with the introduction of school-based assessment and assessment for learning to support the new curriculum [15]–[18]. The current SPN21 greatly emphasizes the importance to equip the students with knowledge, skills and competencies to meet changing economic conditions, job requirements and new technology [14]. Accordingly, the Brunei Common Assessment Tasks (BCATs) were created in all core subjects in early 2011, which served both the formative and summative purposes to promote teaching and learning in lower Secondary.

Traditionally, Science BCATs consisted of four components on its first trial and they were question paper, rubric, self-assessment and peer assessment. However, its components were revised during the third Science BCATs where peer assessment has been omitted, retaining only the three most essential components. Meanwhile in 2012, the first Science BCATs for Year 7 has only two components: question paper and self-assessment omitting rubric. BCATs accounted to 30% of the Student Progress Assessment (SPA) at the end of Year 8, which will then determine the channeling of students into either normal or express upper secondary. The remaining 70% is derived from the Student Progress Examination (SPE), which will be taken by the students at the end of their Year 8 [13].

2. Literature Survey

Science BCATs represent the new assessment tools that are designed to provide an insight to teachers on how good assessment practices should be conducted with students. This has been confirmed from previous researches on the assessment for learning [3], which were conveyed to have positive impacts on students' learning and accordingly, are believed to contribute to the increase in students' accountability test scores.

Assessment for Learning (AfL) refers to all activities carried out by teachers and the students in assessing their own works, and subsequently provides information to be used as feedback in order to modify the teaching and learning activities [3]. The CEA@Islington outlined six positive impacts of AfL to students as follows: know what has been achieved against known success criteria and what to do next; know what standards are required; know what to do to improve; gain confidence, motivation and self-esteem on learning; improve own self-evaluation (self-assessment) skills; and make progress [4].

Meanwhile, the contribution of AfL to teachers takes the form whereby assessing students' work informally taken as feedback from the students, allows an educator to make the right adjustments to teaching when looking at the sequences of lessons. It has a profound influence in the decision of determining the next lesson based on what was learnt in the previous lesson of which often deviates from the original sequences of lessons [1]. In addition, students become more motivated to learn, their instructional decisions are informed by the availability of more accurate information about students' achievement. Teachers also benefit from saving time that resulted from their ability to develop and use classroom assessments more efficiently [2].

By taking the essence of AfL as well as the quality of standardized test into account, the Science BCATs have integrated both types of assessment, formative assessment and summative assessment. This is illustrated by the inclusion of self and peer assessment as they are the essential components to allow the students to reflect a particular topic's learning objectives, to monitor if students have attained those objectives and hence will foster the students' ability to judge one self and others. Furthermore, students are encouraged to give constructive written comments that are formative or descriptive in nature. This helps to promote students to do some critical analysis about their peers' work, which also acts as a mirror for them to improve one's own

work [13]. However, this should be managed carefully, as there might be students who use it as an opportunity to de-moralize another learner especially if they do not get along. Furthermore, the inclusion of rubric is to enlighten the students on how their tasks will be assessed by the teacher that would signify the necessary component of Science BCATs. Students' grades are assigned based on the matching criteria with that of their level of learning's performances [13].

The summative assessment of the Science BCATs is characterized by the question papers, which are integrated with classroom activity such as practical activity to serve it purpose well in developing a range of skills such as, knowledge and understanding skills, thinking and problem solving skills and experimental skills, among the students. The first two skills are tested in the paper and pencil tests while experimental skills are tested based on the students hands-on activities where they also need to record their answers on the papers [13]. Having those skills being evaluated separately, it provides teachers and students evidences about students' current status on which aspects of the skills the students are performing either well or not regardless of their learning abilities.

3. Objectives of the Study

This study investigated the effectiveness of BCATs in lower-secondary Science, with the hope that it can provide insights into the extent to which the effectiveness of Science BCATs can be achieved. This research attempts to explore some factors that might influence the effectiveness of Science BCATs. These factors include teachers and students perceptions, and how both will affect the effectiveness of Science BCATs in accomplishing its aims to improve students' performances, promote an active learning environment as well as to develop 21st Century skills among students. The research question guiding this study is "To what extent can the effectiveness of Science BCATs be achieved?"

4. Methodology

For this study, a secondary school in one of the districts in Brunei was selected. This small-scale case studyinvolved the participation from only one class, consisting of 33 Year 7 students. Moreover, to enrich the data collection in an attempt to investigate the effectiveness of Science BCATs, it sought the participation from teachers who have experience in conducting the Science BCATs. As a result, there were four teachers who participated in this study. The age range of the students and teachers were between 12-13 years old and 27-37 years old respectively.The instruments used for data collection were students' and teachers' questionnaires, and also the documents collected from the students' self-assessment.

4.1 Students' questionnaire

The students' questionnaire consisted of 19 fixed-choice questions and one open-ended question. By having such type of questions, it supplied primarily the quantitative data to confirm whether the Science BCATs may bring positive or negative impact to the students' learning.

The students' questionnaire were tested and piloted and the alpha coefficient for the total 20 items was 0.817, thus suggesting that the item had relatively high internal consistency. The questionnaire was deemed reliable to be used and what was observed during the piloting, students did not have any difficulty in understanding the language because most students were able to complete it within 15 minutes.

4.2 Teachers' questionnaire

In the teachers' questionnaire, a combination of closed and open-ended questions was used to ask participants and to elicit their understanding of participants' viewpoints on the current and previous Science BCATs and its components. In addition, collecting information such as gender, age and the number of teaching years was useful as it might help to acquire the relevant data from the sample.

The designing process of this questionnaire involved two participants who were willing to complete the pilot questionnaire with the attempt to test if the questions could be easily understood and were appropriate for obtaining the necessary information. With their feedback, the initial questionnaire was improved.

4.3 Document analysis

Meanwhile, the analysis on the students' self-assessment was conducted to support the students' findings from the questionnaires. The self-assessment required the students to reflect on their learning of the secondary school Science topic of 'Living Things'. For this task, students were required to study the earlier test given to them and try to match the questions to the criteria stated in the self-assessment to observe how well they have mastered the content. The information attained was then used to analyze the students' abilities to self-assess themselves accurately. Validity checking of the students' ability to self-assess was also conducted and an agreement was made whereby all of the students have the potential to do self-assessment accurately.

5. Results and Discussion

The effectiveness of Science BCATs is dependent on two factors: students' factor and teachers' factor.

5.1 Students' Factor

Students' questionnaires and analysis of self-assessment were used in this study to explore students' ability to use self-assessment and its usefulness in Science BCATs. Students' perspectives towards the Science BCATs including individual component such as self-assessment and rubric are discussed separately in the following sub-sections.

5.1.1 Students' Perception on Self-Assessment

Students' responses to the first five questions that focused on self-assessment were investigated and analyzed using descriptive statistical analysis to show the percentages of

students' responses. The results are shown in Figure 1 below. This was then triangulated with the analysis of students' self-assessment, whereby the findings from the students' questionnaire were used to support the analysis made from the self-assessment.

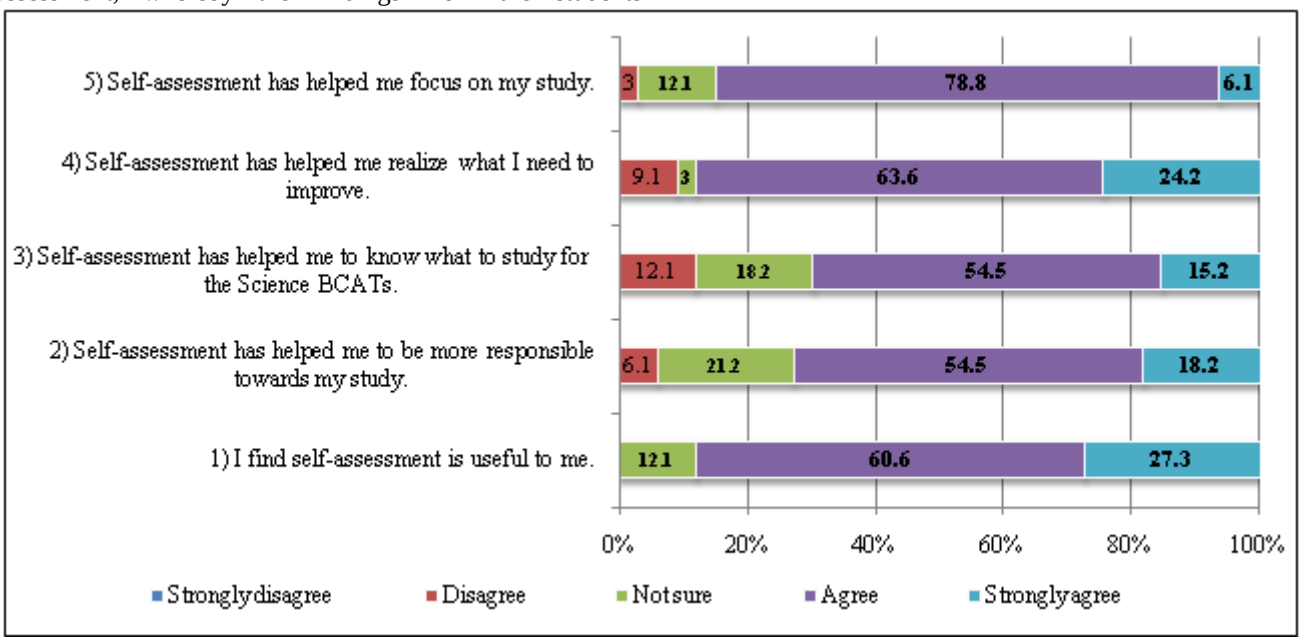

Figure 1: Students' perceptions on the usage of self-assessment

From Figure 1, it was found that majority of the students gave positive responses towards the statements relating to self-assessment. From Statement 1, self-assessment is useful as perceived by most of the students (60.6% + 27.3% = 87.9%) despite only small percentages of students (12.1%) were uncertain of its usefulness which might be due to the unfamiliarity with the use of self-assessment. A total of 84.9% (78.8% + 6.1%, from Statement 5) of the students agreed that self-assessment has helped them to focus in their study and it made them realize what needs to be improved. This has been proven through the analysis of students' self-assessment, which reveals that students have the capability to self-assess themselves even though it was their first experience in doing the self-assessment. In addition, all of them managed to identify at least one objective of the topic that they need to improve on. Their ability in self-assessing themselves was reflected in their subsequent test results where improvement was observed when compared to the earlier tests administered. Additionally, with the help of self-assessment, students know what topics they are supposed to attend to. Ultimately, these have led students to be more responsible in their own learning.

The above findings have shown that self-assessment conveyed a positive influence on students' learning. With proper guidance from teachers, it is believed that students can enhance the development of self-assessing skills and maximize the use of self-assessment and hence obtain benefits from it.

5.1.2 Students' Perceptions on the Usage of Rubric

The students' responses towards the statement with references to the usage of rubric are shown in Figure 2.

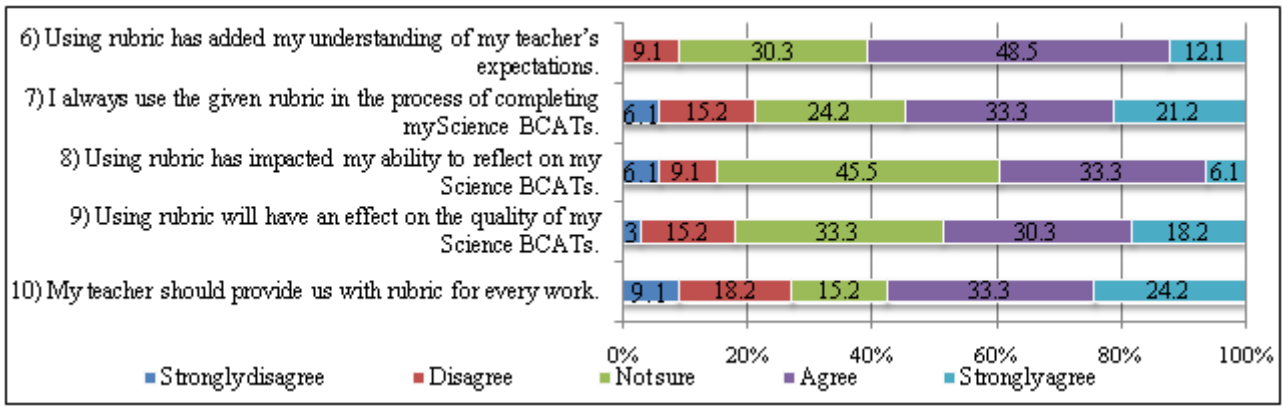

Figure 2: Students' perceptions on the usage of rubric

Based on Statement 10 in Figure 2 above, it was found that 57.5% (33.3% + 24.2%) of the students agreed that teachers should provide rubric for every work. One of the reasons for this agreement could be that teachers' expectation may be understood through the usage of rubric and as results reflected from Statement 7, more than half of the students

have used rubric in the process of completing the Science BCATs. However, from Statement 8, 45.5% of the students were unsure whether rubric has impacted their ability to reflect on the Science BCATs. Perhaps, the students were still uncertain with the purpose of the rubric or they did not have the time to use the rubric in the process of completing the task due to time constraints.

5.1.3 Students' Perceptions on the Science BCATs

The students' perceptions towards Science BCATs vary as shown in Figure 3 below.

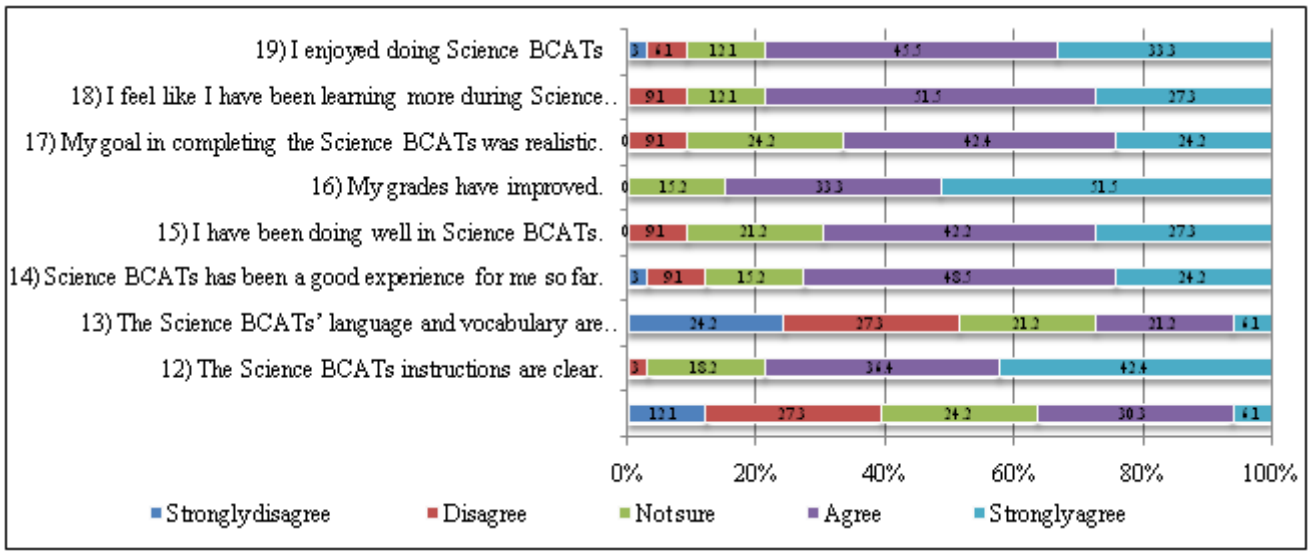

Figure 3: Students' perceptions towards Science BCATs

From Statement 16 of the students' questionnaire, 84.8% (33.3% + 51.5%) of the students have agreed that their grades have improved as a consequence of the Science BCATs. Hence, may indicate that the Science BCATs helped students improve in their learning. While 39.4% (12.1% + 27.3%) of the students asserted that they were able to follow the Science BCATs instructions without the help from the teachers (Statement 11). This was because the instructions were clear (Statement 12), and the language and vocabularies used were understandable as agreed by most of the students (51.5%=24.2% + 27.3%, Statement 13). However, 36.4% (30.3% + 6.1%, Statement 11) of the students still needed teachers' explanation on the instructions given.

Interestingly, majority of the students (78.8%) enjoyed doing the Science BCATs as they felt that it has provided them with good experiences. This may perhaps arose from the exposure in using self-assessment and rubric. Also, as was mentioned earlier, self-assessment has helped them to become more aware on areas that they need to improve on while rubric has helped them to understand teachers' expectation.

In the final question of the students' questionnaire, an open-type question elicits students' opinion whether they preferred to do more Science BCATs in the future. A thematic analysis was employed to identify the codes and then to sort the identified codes according to the potential and relevant themes. The emerging themes from the students' questionnaire are presented below.

Improvement

In response to the students' questionnaire, 42% of the students have stated that they want to do more Science BCATs in the future because they want to improve their learning as well as their grades in Science. The Science BCATs were found to improve Science grades as have been agreed by 84.8% of the students in response to Statement 16. This was further confirmed by the students' answers in response to the open-ended question:

"…it can improve my Science grades." (Student 26)

"…it helps me to improve my study…" (Student 16)

Furthermore, a student has even suggested eliminating the test and replacing it with Science BCATs after experiencing the positive impact of Science BCATs in improving the Science grades. In relation to this, that particular student wrote:

"…Science BCATs help me to improve my study and there's no need to have assessment test just have BCATs test!"(Student 16)

Learning

Due to the improvement as a result of Science BCATs, it has even motivated some of the students to do more learning. In the open-ended question relating to this statement, a few students mentioned:

"…because I can learn more and improve my Science" (Student 6)

"…it will help us to learn more about…and many more" (Student 2)

"…I can learn more on Science and know something new from it" (Student 8)

Hence, due to these reasons, students seemed to prefer to do more Science BCATs in the future.

Subject

Students were willing to do more Science BCATs in the future due to their interest in studying Science and these heightened their awareness on the importance of studying the secondary school subject in Science. A few students confirmed this by stating:

"…I like Science very much" (Student 12)

"…because Science is a very important subject so I like to do more Science BCATs in the future" (Student 7)

In contrast, there are a number of students who did not like to do the Science BCATs due to its difficulty. This difficulty was due to the students' weakness in learning Science.

"…it was difficult" (Student 3)

"…it was hard to me" (Student 19)

"…I'm very weak in this subject!"(Student 14)

The nature of the Science BCATs

Majority of the students wanted to do more Science BCATs in the future since they have experienced the usefulness of the Science BCATs. This was probably due to the presence of self-assessment, in which 87.9% (60.6% + 27.3%) of the students who have identified its usefulness in their learning (refer to Figure 1). Moreover, others claimed that Science BCATs was interesting because of its challenging nature. In response to the question asking whether students would like to do more Science BCATs, the students stated:

"…it is useful to me and my study" (Student 27)

"Yes, because it is very interesting" (Student 10)

"Yes,…it challenge me to learn more" (Student 22)

"Yes, because it is challenging and I like challenging Science" (Student 30)

5.2 Teachers' Factor

5.2.1 Teachers' Perceptions on the Students' Ability to Use Self-Assessment

From the analyses, we found that majority of the teachers reported that students did not understand how to do self-assessment. The reason for this claim was:

"…the statement given in the self-assessment did not provide which part of the question in the BCATs it is referring to. The students did not give proper answer in what they wish to learn more" (Teacher 1)

Perhaps, the students' incapability to do self-assessment was due to the lack of practice given by the teachers, in which the teachers seldom give the students the opportunity to do their own self-assessment. The findings shown in Table 1 below depict the amount of self-assessment practiced in the respective tasks.

According to Hinett and Thomas (1999) [7], induction and explanation of a given task needs to be given to students since the students were unfamiliar with the practice. From our findings, the analysis of students' self-assessment has shown that students were able to monitor their own learning progress and identify which objectives they were having problems with as long as comprehensible guidance was given to them. With students' active involvement in using self-assessment, in turn will help to develop them as independent learner, and thus may lead to effective learning [6], [20]. It is also important for teachers to assist in molding the correct conceptions of learning held by students from the early stages in their schooling, and for teachers to be reflective practitioners of their own practices in their classroom teaching, so that meaningful learning can be achieved [8]–[11].

Table 1: Teachers' use of self-assessment in doing the tasks with students per year.

Task(s)	Frequency			
	T1	T2	T3	T4
Class work	0	5	>10	1
Homework	0	5	0	1
Project	0	0	0	0
Test/Examination	0	0	0	0
BCATs	2	2	2	2

Another comment in response to teachers' perception on students' ability to self-assess, Teacher 4 viewed that the Year 7 students have not developed the potential to think critically.

"…they are lower secondary students so they are not yet able to think critically…" (Teacher 4)

With regard to this, Clarke (2001) [5] claimed that students could take their responsibility for their own learning at any time regardless of their age as long as proper guidance was provided. In reference to Teacher's 4 comments, perhaps, the lack of practice (as shown in Table 1) on self-assessment by the students has been the cause for the students' inability to think critically.

5.2.2 Teachers' Perception on Students' Ability to Use Rubric

From the results of the teachers' questionnaire, in relation to students' understanding and ability to use rubric, all the four teachers agreed that students understood the purpose of rubric. The students' understanding on rubric was enhanced through the weekly 'first period' program implemented in that school. Students were taught about rubric and how to use it in assessing themselves. By having this program, it assisted the students to maximize the use of rubric in their learning. In relation to this, Teacher 4 reported that:

"*We have weekly 'first period' program, in which, students learned what is rubric and how to use them and assess themselves using rubric. They did make full use of the rubric"* (Teacher 4)

However, Teacher 1 explained that a few of the students did not understand the rubric and that not all students were using

the rubric in the process of completing their work. Some students simply did not understand the rubric well even though the first period program had been conducted weekly. This claim is supported by the finding from the students' questionnaire, in which 21% of the students have admitted that they did not use rubric throughout the process of completing their work. Hence, this implied that the weekly 'first period' program was not sufficient to develop the students' ability to maximize the usage of rubric in their learning. As can be observed from Table 2, the lack of practice in providing the students with rubric while doing the respective tasks can also affect the students' understanding and capability to use rubric.

Table 2: Teachers' use rubric in doing the tasks with students per year.

Task(s)	Frequency			
	T1	T2	T3	T4
Class work	0	0	10	0
Homework	0	0	0	0
Project	0	0	0	2
Test/Examination	0	0	0	0
BCATs	2	4	2	4

5.2.3 Teachers' Perception towards Science BCATs

Sought in the teachers' questionnaires were teachers' opinions on the Science BCATs as to whether Science BCATs have the ability to improve learning, promote active learning and develop 21st Century skills. The findings will be discussed in the following sub-sections.

Science BCATs can Improve Learning

When asked for teachers' opinion whether Science BCATs have the ability to improve learning, Teacher 1 responded:

"Not sure, the questions asked are just repetition of what they have learnt before in their previous class work or homework" (Teacher 1)

This could indicate that Teacher 1 did not make any comparative analysis regarding the students' performances before and after the implementation of Science BCATs.Meanwhile, Teacher 3 explained that the Science BCATs did not improve learning because it did not cover all the topics in the Science syllabus.

"The BCATs will not help them to do better in SPE since they are not adapted with exam paper" (Teacher 2)

Furthermore, Teacher 4 had a similar view with Teacher 2, in which she reported that:

"...BCATs is too far from the main SPE exam format. BCATs are simple and fun and full of activities. But the main 70% assessment comes from exam, in which they still need to understand concepts and theories. They will be shocked when sitting for SPE exam"(Teacher 4)

Based on the responses from Teachers 2 and 4, they compared the Science BCATs with SPE and that learning will only be considered to improve if students score well in the examination. The teachers have a set mind that the examination (SPE) is very important due to the greater weightage (70%) of it will account to students' SPA result. And as a consequence, they think that students need to have early practice on the SPE.

Comparing the differences in teachers' perspectives implied that they may not be aware of the actual aims of the Science BCATs which were to focus on assessing various learning skills among students, to improve students' learning and understanding in Science by taking into account students' strengths and weaknesses and to assist them to be the owner of their own learning.

Promote active learning

All the teachers reported that Science BCATs have the ability to promote active learning through the discussions during group work. However, these were the teachers' views based on their experiences in conducting the Science BCATs in the previous year. In relation to this, Teacher 1 and Teacher 3 reported:

"…students discuss with each other to solve questions in the activity. They question themselves and each other orally. They do hands-on activity" (Teacher 1)

"…during group work through communication and promote thinking and argumentation"(Teacher 3)

However, Teacher 4 was in doubt whether active learning can be promoted through the currently implemented Science BCATs. Teacher 4 commented that:

"…lately BCATs is similar to tests or exams" (Teacher 4)

The current Science BCATs has no rubric and no hands-on activity and these actually made the teachers perceived that the current format of the Science BCATs was similar to that of the examination and that there was no guarantee that active learning can be promoted in this way.

Developing 21st Century Learning Skills

Subsequently from the questionnaire, it was found that all the teachers agreed that the Science BCATs were able to develop 21st Century learning skills among their students. Teacher 1 stated that the learning skills could be developed through hands-on activities. The teacher further asserted that:

"…they develop social skill during group activities when they discuss for example as well as critical thinking skills" (Teacher 1)

Moreover, communication skills can also be developed and improved during presentation.Evidence from previous researches on learning styles and study strategies of students demonstrates the significance of using language properly in exposition and questioning [12], [19]. Consequently, Teacher 4 revealed this by stating:

"…students need to know what skills they are learning…in presentation…improve speech skill" (Teacher 4)

However, these skills were the kinds of skills that the students attained based from the Science BCATs the year before. In the currently implemented Science BCATs, the

skills attained by the students were limited to only three, which are knowledge and understanding, thinking and experimental skills.

"…in BCATs…three different types of questions (knowledge understanding, experimental skills and thinking skills)" (Teacher 3)

Teachers' willingness to do Science BCATs in future

In relation to whether teachers would like to do more Science BCATs in future, only three of the teachers were willing, provided that few considerations can be taken into consideration, such as time availability and improvements.

Teacher 1 explained that due to the time constraint and the limited time frame given for each topic, these factors might probably pose difficulty to conduct Science BCATs.

"*If there is free time…because…have to catch up scheme of work"* (Teacher 1)

Other responses from other teachers are reported as follows:

"If improvements are to be made due to all years' comments and suggestions"(Teacher3)

"…please make it more useful, friendly and understandable to students. Students just know how to do it and have fun doing it. But the impacts on the SPE results have not yet to be seen. If improvised and improved then BCAT will do well in the future"(Teacher 4)

The findings here suggested that the teachers were prepared to do more Science BCATs in the future but only if the format of the Science BCATs were to change into a more useful, suitable task format and easier to be understood by the students.

In contrast, Teacher 3 was not eager to do more Science BCATs because he stated that drilling for examination was more important than doing the Science BCATs as it may lead to students' success in their learning.

"Students need to get used of the external examination. Students need to adapt with test and exam for them to prepare for SPE, O-Level and A-Level. If they only do test and exam in the start of Year 9, it's already too late for students" (Teacher 3)

Noticeably the pressures from the external examinations have caused the teachers to focus on practicing test taking rather than using assessment that support learning [17].

Based on all the teachers' comments mentioned above, we can conclude that the teachers were not satisfied with the current Science BCATs being practiced. Teachers viewed the Science BCATs, in a way, has lessen their time for teaching since limited time frame was allocated for a particular topic and thus preventing them to complete the whole syllabus on time. Moreover, the teachers were in doubt whether the Science BCATs will bring positive impact on the students' SPE result as there is no evidence which can assure them that the Science BCATs will contribute to the students' success in their SPE. Accordingly, together with the pressure from the SPE at the end of Year 8, teachers think that early exposure and continuous drilling on the past year examination questions would be a more necessary action that should be considered and given to students.

6. Conclusion

In this study, the effectiveness of BCATs in lower-secondary school Science was evaluated through the findings from both the students' and the teachers' perceptions towards the Science BCATs. It has been proven that implementing the current Science BCATs used in this study have improved the students' Science grades. This improvement was due to one of the components of the Science BCATs, which is self-assessment. It helped the students to be more focused in their study. Additionally, the self-assessment has helped them to realize which objectives of the topic they need to concentrate on. Furthermore, Science BCAT, through the provision of rubric, has assisted the students to understand how the teachers would assess their work.

By considering the benefits ofthe Science BCATs, these have actually intensified the students' interest to do more Science BCATs in the future, as they want to learn more. Based on these evidences, the Science BCATs were effective in improving students' learning. Also, it promoted active learning environment whereby students were actively monitoring their own learning progress through the use of self-assessment. It was also believed that the students could attain those essential 21st Century skills, the self-assessing skills if there is continuous support and guidance from the teachers.

In contrast to the students' factor analyses findings, none of the teachers were truly and unconditionally keen to conduct more Science BCATs in the future. Even though, almost all the teachers wanted to do more Science BCATs, some concerns have limited their willingness. The first concern was due to the restricted time frame available to teach and complete the whole syllabus, which contributed to the difficulties especially in carrying out the Science BCATs.

Secondly, due to the greater weightage of 70% of the SPE, which eventually will contribute to the SPA results, has driven the teachers to focus on examination rather than focusing on the Science BCATs.Hence, teachers viewed that drilling the students with past year examination questions would be the most appropriate action to take. As far as is known, there is no evidence available yet to confirm that the Science BCATs could contribute to students' success in their SPE.

Thirdly, the teachers perceived that students did not understand how to self-assess, while some did not understand the usefulness of rubric, and these have led to a claim that Science BCATs was a waste of time. By considering the teachers' concerns, it can be concluded that, through the teachers' perspectives, the Science BCATs were not quite effective in improving the students' learning.

7. Limitation of the Study

This research is limited in several ways:

- This study was limited to only one secondary school in Brunei and thus must not be generalized to all the lower secondary Science classes in the nation.
- Due to time constraints, only one class of Year 7 was selected to participate in this research. This limitation was further exacerbated by the fact that not all students participated and gave complete responses.
- The results and findings sharedhere derived from the effectiveness of Science BCATs by Year 7 students, within this study only. Therefore, it must not be used as a basis to generalize other schools in Brunei. It is essential to note that the effectiveness of Science BCATs towards students' performances cannot be measured based on only one Science BCATs task.
- This research was limited to only one introductory topic, which may probably be easier than the other Science topics. And it may have contributed to students scoring higher marks and yet,shown improvement in their learning. This may have defeated the purpose of implementing the Science BCATs inimproving students' performance regardless of the difficulty level of the Science topics.

8. Recommendation

From the findings in this study, it implies that for the future, the Science BCATs should have included at least three essential components: the tasks, self-assessment and rubric. It is crucial to consider that the task should not be similar to a paper-pencil test. It should integrate hands-on activity and group work activity, so that the students will feel less pressured while doing the task. Most importantly the students should have a fun experience while learning. Additionally, the task has to be designed in response to the targeted skills the teachers wish the students to acquire.

Teachers also have to modify their teaching strategies in order to facilitate the students to gain understanding in the usage of self-assessment and rubric. They should integrate the self-assessment and rubric into their teaching. In this way, it would not only benefit the students but simultaneously teachers will be aware of the students' strengths and weaknesses. Furthermore, teachers should not view Science BCATs as a burden to them. Instead,use them, as their guide on how good teaching practice should be.

Furthermore, Science BCATs should be taught throughout the whole syllabus, covering all levels of difficult topics, throughout the whole year. This is to assure that Science BCATs can improve students' performances.

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