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

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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

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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.

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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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