

The Infusion of Key SEL Elements into the Teaching of Mathematics for a Singapore Private School

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Abstract: This research paper discusses on the infusion of social-emotional learning (SEL) into the mathematics classroom at a Singapore private school. To understand about how to implement a SEL program, the paper will first address the benefits of SEL to the students and the possible barriers of implementing an SEL program in a school. This will follow by suggestion of three key 'entry points' to infuse SEL elements into the mathematics classroom, namely: to create a SEL-conducive learning environment, to redefine and redesign lesson plans and to allow time for students to carry out reflection of their own learning. In addition, another two ways to introduce SEL elements into the mathematics curriculum will also be highlighted. One way is to teach SEL skills systematically, together with frequent practices. The second way is to set up a mini SEL unit within the classroom to promote SEL concepts among the students. Towards the end of the research paper, there is also a section which presents a series of steps to blend SEL together with mathematics teaching. The steps can serve as a general guideline for educators who wish to start an SEL program in a school. The paper concludes with a short discussion about the various issues that have been mentioned as well as a brief personal note about the importance of SEL skills in a highly competitive society.

Keywords: Attitudes, self-reflection, self-assessment, key elements.

I. INTRODUCTION

In Singapore, students who study mathematics in private schools are generally less mathematically-inclined than those who study the same subject in public and independent schools. It will require a slightly different set of methods to teach the private candidates how to master mathematics. The introduction of SEL elements into the teaching pedagogy of mathematics may be one of the solutions to help the private candidates learn the subject more effectively.

Therefore, the purpose of this research paper is to explore the various ways of embedding SEL elements into the teaching of mathematics so as to enhance the learning experiences of the students. Three key 'entry points' are: developing an SEL-conducive environment, re-defining 'lesson planning' and involving students for reflection and self-assessment (Jones, Jones, & Vermette, 2009). Other ways to promote mathematics achievement through SEL will also be discussed with relevance to the Singapore education context. A section proposing the steps to implement a SEL learning program together with mathematics teaching will also be presented.

II. LITERATURE REVIEW

In this section, some of the previous studies relating to the introduction of SEL into the classrooms will be discussed.

Over the years, thanks to the increasing amount of research done on SEL, SEL is gaining popularity and importance, especially when it comes to the classroom setting. In many instances, SEL can be introduced across all levels and the teacher plays an extremely important role of incorporating SEL into the lessons.

In one study, 15 primary school teachers and 26 secondary school teachers were involved where their lessons were videotaped. The purpose was to compare which subjects were easier for the teachers to infuse SEL into their lessons. At the end of the study, it was found that teachers were able to infuse SEL in their Character Education and English curriculum content areas better than in their Science and Mathematics subject areas (Ee, Zhou & Wong, 2013).

SEL can also be infused into teacher training programs. During one research study, it has been shown that SEL can be infused successfully into the undergraduate course on curriculum and instruction (Waajid, Garner & Owen, 2013).

With increasing amount of research done on SEL, there are also more and more related approaches and programs. Examples of SEL programs and approaches are PATHS, which stands for Promoting Alternative Thinking Strategies, the Responsive Classroom (RC) Approach, the Reading, Writing, Respect, and Resolution (4Rs) Program and the RULER approach (Brackett & Rivers, 2013).

While educators and researchers acknowledged the importance of infusing SEL into the curriculum, educational policy changes, academic demands and pressures on teachers to improve test results have resulted in schools having less time to integrate SEL into their systems.

III. BENEFITS OF SEL TO SINGAPORE PRIVATE EDUCATION

There are several benefits of introducing SEL into the Singapore private education system. This section of the research paper will discuss three of them.

First, students who enroll into the private schools GCE 'O' level preparatory courses, need the support from the teachers and the school administrators to build up their self-confidence. The introduction of SEL will be able to help them recognize their own feelings and build up their self-confidence (Elias & Arnold, p.60). This will provide the platform upon which future constructive learning can take place.

Second, SEL is able to enhance the teamwork capabilities and communication skills of the students (Elias & Arnold, p.60). By incorporating instructional activities that encourage students to interact with one another during and after lessons, the school creates learning opportunities that strengthen the interpersonal relationships. Instructional activities can include small group problem-solving discussions during mathematics lessons or group projects to study a particular concept.

Third, SEL sharpens the socializing skills of the students so that they are better aware of the various socially acceptable behaviors (Elias & Arnold, p.60). Some of the students who enroll into private colleges lack the basic understanding of the appropriate behaviors that they should have when they are in public places. This is despite the fact that they are slightly older than their peers who study at the same level in government schools. Suitable topics about what to do and what should not be done in public places can be introduced into the lessons for brief discussions.

IV. ROADBLOCKS OF IMPLEMENTING SEL INTO SINGAPORE PRIVATE SCHOOL

While there are numerous benefits of introducing SEL into the mathematics curriculum at private colleges, we need to overcome three types of roadblocks – attitudinal roadblocks, logistical roadblocks (Elias, Bruene-Butler, Blum & Schuyler, 1997) and financial roadblocks. These three roadblocks present the common problems which educators who had initiated SEL programs had encountered and overcome.

1. Attitudinal Roadblocks:

For attitudinal roadblocks, we need to address the following questions: Is the SEL program a fashion style that is adopted with great enthusiasm only for a short period of time? Is the effectiveness of the chosen SEL program proven by research? Will the implementation of the SEL program take away precious curriculum time for the main subjects? Can schools' SEL programs really make a difference to the behavioral problems of the children? Are the students generally receptive of the idea of learning SEL skills, at a more matured age in the college?

There are definitely some teachers who are skeptical about the usefulness of SEL competencies. This is not surprising as the benefits of SEL are rather intangible in the short run, and will probably only be felt in the long term. In this sense, the school administrators and SEL coordinators should communicate the importance of SEL to the teachers. In particular, the positive effects on the behaviors of the students need to be highlighted.

At the same time, an appropriate SEL program that is supported by research evidences should be selected for the implementation. The school's management needs to spend time to assure all subject teachers that the implementation of the SEL program will not compromise on the time for the core subject areas.

Due to the fact that the students at private colleges are generally older than their peers who are studying the same level in government schools, they tend to be less receptive of teachers' advices in relation to social behaviors and emotional management. Many of them feel that they are of mature age to decide how they wish to behave in public places. However, their behaviors may not always be ethical and acceptable by society. For example, when a student starts to hurl verbal vulgarities during a lesson and the teacher points out this form of undesirable behavior, the student may replies that he is old enough to decide how he wants to behave in public.

2. Logistical Roadblocks:

For logistical roadblocks, we need to address the following questions: Do we have spare time set aside for the SEL program? How do we coordinate between all the mathematics teachers and blend the SEL program in school? How do we find the funding to support the SEL program? How do we strike a balance in teacher professional development for SEL-related and non-SEL-related courses?

Proper timetabling and lesson planning have to be done at all grade levels and across all disciplines to infuse the SEL elements into the curriculum. With close collaboration between the various departments, it will be possible to squeeze out some time every week to teach the important social skills to the students. The coordination can take place via a series of short meetings, email exchanges and informal discussions.

However, we must also bear in mind that many of the teachers employed by private colleges are part-time associates. They do not station themselves in the college for the whole day, and most of them will only be present during their lessons. Therefore, it is a challenging logistical (as well as coordination) task to frequently gather all the same subject teachers, such as Mathematics, to discuss about the ways of infusing SEL into the college curriculum.

3. Financial Roadblocks:

The required funding to support the SEL program can possibly be obtained from various sources. One source is the financial support from the parents. As their children are in the school that implements the SEL program, it is reasonable that the school seek financial support from the parents in this area. Another possible source will be the government. There may be some public educational funding available which can help the school to initiate the SEL program.

V. SUGGESTIONS TO INFUSE SEL INTO THE SINGAPORE MATHEMATICS CLASSROOM

The following sub-sections discuss three key 'entry points' which we can infuse SEL into the mathematics classroom.

1. Developing an SEL-conducive environment:

Many SEL studies have revealed the close relationship between the learning progress of the students and their learning environment (Jones, Jones, & Vermette, 2009). A SEL-supported classroom allows the students to frequently practice their social and personal abilities, thus improving on their interpersonal and communication competencies while at the same time, strengthening their subject content mastery.

To create an SEL-conducive climate, it must start from the teachers. The classroom teachers must be comfortable of introducing non-content based skills such as attentive listening and resolving of interpersonal conflicts (Jones, Jones, & Vermette, 2009). As one mathematics lesson is a straight three hours timeslot at most private commercial college, the teachers have ample instructional time to incorporate SEL elements into the lesson.

Mathematics teachers can constantly encourage the students to help one another during problem-solving times. This form of peer assistance helps to reinforce interpersonal relationships. The mathematically stronger students can also act like 'teacher assistants' to help the weaker students. Under the close supervision from the teachers, the weaker students are able to receive timely help, and the academically stronger students can make use of these opportunities to enhance their understandings of the subject contents.

Teachers can also create a SEL-conducive learning environment by generously giving praises to students during lessons. When students receive sincere compliments for displaying good behaviors or for giving the correct mathematical answers, they will feel a sense of recognition, which can help to build up their self-esteem in the long run.

2. Re-defining ‘lesson planning’:

Lesson plans should be redefined to include not only teaching of mathematical contents but also teaching of affective skills (Jones, Jones, & Vermette, 2009). For example, the concept of ‘collaboration and cooperation’ can be incorporated into some of the mathematics chapters to be taught in the classrooms. Students can be introduced to a series of mathematical problems. The lessons may first ask students to solve the problems on their own, and then form small groups to formulate further solutions. Throughout the lessons, teachers can emphasize the advantages of cooperative learning, which is an important competency of social skills (Elias & Arnold, p. 60).

Another component of lesson planning is assessment. The assessment of students’ academic achievement should be divided into two parts. One portion is to assess the level of content mastery of the students and the other part is to evaluate their levels of SEL competencies. While the former type of assessment can be traditional written tests, the latter can be informal assessment in the form of multiple-choice questions or class interviews and surveys.

The mathematics teachers and school administrators at private colleges can work together at the end of the school year to infuse SEL elements into the lesson plans for the next academic year. Instructional materials will need to be suitably modified in order to accommodate such changes to the curriculum.

3. Allowing students time for reflection and self-assessment:

SEL elements can be infused into the mathematics classroom by encouraging students to conduct reflection and self-assessment activities (Jones, Jones, & Vermette, 2009). Students who frequently practice reflective thinking of their own learning are more likely to develop self-evaluation competencies. They are better at assessing how much they have understood the concepts, and what else need to be done in order to strengthen the content mastery of the subject.

Mathematics teachers can request the students to keep reflective journals. At the end of every lesson, the teacher can set aside about 10 minutes for the students to reflect upon their level of understanding and to write down whatever relevant information they have received from the teacher. Examples of items to be included in the reflective journal can be: the chapter’s formula, the important application examples, simple mind-maps to establish relationships between the various concepts, or even personal feelings about the whole learning experience.

In addition to reflection and self-assessment, the teachers can also guide the students to set personal goals (Jones, Jones, & Vermette, 2009). Students who set their own affective goals are in better positions to achieve greater academic and personal successes than those who do not set goals. In this sense, to promote goal-setting will mean that teachers must teach goal-setting skills to the students. The lesson plans will need to consider this aspect of SEL when designing the instructional activities.

VI. OTHERS WAYS TO INFUSE SEL INTO MATHEMATICS TEACHING IN A PRIVATE SCHOOL

Besides creating an SEL-conducive climate, redefining the lesson plans and allowing the students time for reflection and self-assessment, there are other ways to infuse SEL into the mathematics classrooms. Two alternative ways are discussed in this section.

1. Systematic teaching of SEL skills with consistent practice:

Most SEL skills can be cultivated into habits. In order to do that, teachers must make an effort to ensure that ample opportunities are given for the students to keep practicing the skill. When the skill has been applied many times, it will be internalized into the students’ minds and can be easily recalled and used in the future for different situations.

A good example will be the skill called ‘Keep Calm’ (Elias & Arnold, p. 135). Many private college students lack the self-confidence to do well in mathematics. Many of them tend to feel nervous when they are required to sit for mathematics tests. This skill is very useful to help calm the students’ emotions when they are going to sit for such written tests. For a start, the mathematics teachers can introduce the skill just before a class test, and explain the steps to use it.

Let the students practice the breathing technique a few times before allowing them to start writing. From then on, the 'Keep Calm' skill must be practiced for all subsequent class tests. The teachers can even get the students to practice the skill every time they are stuck with mathematics problems which they initially do not know how to solve. This is a way of encouraging the students to apply SEL skills directly to the subject matter (Ragozzino, Resnik, Utne-O'Brien & Weissberg, 2003).

2. Setting up of a mini SEL unit within a mathematics class:

The numerous benefits of SEL on the academic achievement of the students can be a valid reason for the teacher to set up a mini SEL unit within the mathematics classroom. The small SEL unit can comprise three to four appointed students as the SEL coordinators. Their roles are to help the teacher create a safe and caring learning environment.

While the SEL student coordinators are not able to replace the teacher in teaching SEL elements, they can contribute to SEL skill building in other ways. The first way is to help the teacher identify students who are facing emotional problems whom the teacher may not have noticed in the first place. This will enable the teacher to offer appropriate and timely help to the identified student before the problem gets worse. The second thing that the SEL student coordinators can do within the classroom is to help fellow classmates practice on their SEL skills. The 'Keep Calm' skill as mentioned in the previous section is one such example. The SEL student coordinators can constantly encourage their friends to apply the SEL skill when they are trying to solve difficult mathematics problems.

VII. HOW TO BLEND SEL TOGETHER WITH MATHEMATICS TEACHING

The following steps are suggested as a general guideline to blend SEL teaching together with a private college's mathematics curriculum for the GCE 'O' level preparatory course.

The first step is for school administrators to brief all mathematics teachers in the college about the plan to infuse SEL elements into the curriculum. The information can be disseminated via emails to all mathematics teachers, with a formal meeting to confirm the initiative.

Next, mathematics teachers are to prepare lesson plans and modify existing instructional materials. This is a tedious phase, which should preferably be done six months before the start of the next academic year.

Short meetings among the teachers need to be arranged to finalize the content of the materials. The series of meetings should be held sometime end of a school year.

Assessment tasks to evaluate on the effectiveness of SEL teaching during the mathematics lessons have to be separately designed by the teachers. This phase can be done when the new school year commences so that appropriate assessment activities can be designed for the students.

Once the new school year begins, the teachers are to carry out the actual content teaching together with the teaching of the social skills. Teachers should try to bring in SEL concepts when they are teaching the various mathematical concepts. Continuous feedbacks need to be provided by the teachers to the department head about the delivery of the SEL program in the mathematics classes.

At the end of a semester or a school year, a big assessment task can be designed to assess the levels of SEL competency among the students. At the same time, surveys and interviews with the students can be conducted to better understand how to improve on the SEL program for the next batch of students.

VIII. CONCLUSIONS

This research paper discussed about the benefits and potential barriers of starting a SEL program in a Singapore private college. The benefits include the building of self-esteem and self-confidence, improving the collaboration skills and communication techniques, and the learning of socially acceptable behaviors. Possible barriers to implementation involved three types of roadblocks – attitudinal, logistical and financial. Two examples of attitudinal roadblocks were the skepticism of the teachers and the receptivity of the students about the program. Logistical roadblocks include the time constraint in timetabling and the availability of teachers. The main financial roadblock was the sourcing of funding to sustain the program. Teachers and school administrators must consider the above points when implementing the SEL program.

It also examined three main ways to infuse SEL into the Mathematics teaching at a Singapore private school. The first way was to create a SEL-conducive learning environment for the students. Another suggestion was to redefine the lesson plans to include SEL elements into the curriculum. The third way was to allow time for students to conduct their own reflections and self-assessments. Other ways to infuse SEL elements into the mathematics classrooms include the teaching of SEL skills using a systematic framework with frequent practices, and the appointing of SEL student coordinators in the class. The final section of the paper proposed a series of steps to blend SEL together with the learning of mathematics in the classroom.

As a personal note, there is little doubt that SEL, if taught and learned properly, will benefit the students in the long term. In a highly competitive and meritocracy society, it becomes increasingly important that a person must possess a high level of social and emotional competencies so as to increase the chance of achieving successes in life. Unfortunately, the mastery of the core academic subjects in schools often took priority over the learning of social skills. The success of the SEL program, therefore, requires the full commitment of all educators to ensure that the students maximize their learning of social-emotional capabilities while preparing themselves for the country's high-stakes tests.

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