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Research title: An investigation on students' perception of the effectiveness of reward-based learning in local secondary school students' learning motivation in Mathematics

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1. Research background

In order to provide an innovative and comprehensive learning environment for our next generation, educators strived for effective education strategies over centuries. Reward-based learning was renowned for its positive reinforcement concept which helps enhance students' learning motivation. Elbeheri, Reid and Everatt (2018) stated that reward-based learning could enhance students' knowledgeable skills and self-sufficiency while students' learning motivation could be enhanced as well. Offering rewards to students as a praise was widely used at schools nowadays. However, Wise (2004) suggested that the adoption of reward-based learning should be followed by a well-organized scheme with clear instruction. Teachers should be aware of the effectiveness and limitations in adopting reward-based learning for students from different age groups and cultural backgrounds.

2. Literature review

Reward-based learning was developed based on the concept of reinforcement theory. According to Sakyasingha, Florentin and Poramate (2014), positive reinforcement tracks brought significant change of students' behavior and led to positive outcomes. Ridderinkhof et al. (2012) stated that reward-based learning helped students in decision-learning, students learnt to select actions which led to rewards. Therefore, it led to students' behaviors changing with the frequency for students answering questions and participation in class increased. Teachers could adopt reinforcement tracks such as giving out prizes and rewards to students which helped promote desirable changes on both students' behavior and learning motivation.

Reward-based learning was founded in the United States with a rich historical background — it was developed based on the idea of Thorndike's law of effect and Skinner's theory (Baranek, 1996). Before scholars discovered the concept of positive reinforcement on human's behavior, schools in New York City established a reward scheme called token economy in the 1800's. Teachers gave awards to well-behaved students with correct school works and set up punishment to students with opposite behavior. It gave an operant conditioning in rewarding well-behaved students. In 1898, Thorndike's law of effect was

discovered. It stated that the repeat of behaviors or actions were based on the consequences followed (McLeod, 2018). If the behavior was followed by pleasant consequences, the behavior was likely to be repeated. Oppositely, if the behavior was followed by unpleasant consequences, it was less likely to be repeated. In 1948, there was a new explanation of Law of Effect named B.F Skinner's Theory (McLeod, 2018). The "Skinner Box" experiments were carried out with animals to test the effectiveness of positive reinforcement in promoting certain repeated behaviors. In the Skinner Box, animals could get food if they pressed the lever while electric shock was generated if they did not press the lever. Skinner discovered that behavior tended to be repeated under reinforcement while behavior tended to be weakened under punishment.

The discovery of operant conditioning in reinforcement theory was then widely used at schools which led to the establishment of reward-based learning. According to Bishop (2010), reward-based learning was often used in Northern Europe's education system, it had been found that upper-secondary schools students in Northern Europe had higher learning motivation and much more comprehensive school culture than American secondary schools. The key for Northern European's education system success was that students who worked hard and actively participated in class were rewarded with the help of reward-based learning. With the help of reward-based learning, students received good signals of learning which enhanced their learning motivation. It was found that students from Northern Europe had higher learning motivation than American students and they were more willing to participate in self-learning and self-exploration activities. According to PISA result (2018), students from Finland and Sweden achieved high-standard results with 507 marks and 502 marks respectively while the main score was 478 marks.

The success of reward-based learning in Northern Europe brought inspiration to the Hong Kong education system which may lead to a change. Hong Kong's education system was said to be exam-oriented while students may lose their learning motivation in the long term. According to the Research Office Legislative Council Secretariat (2018), Hong Kong education system was highly exam-oriented while students were required to take at least two school tests and two school exams in each academic year. According to a study from Chu Hai College of Higher Education (2018) on local children's happiness index, the happiness index for students aged between 15-18 had declined continuously which scored 6.09 out of 10 in 2017 and dropped to 6.03 in 2018. It was found that students felt exhausted towards school

life and losing learning motivation were the major reasons that lowered the Children Happiness Index in Hong Kong. Furthermore, the Boy's and Girl's Clubs Association of Hong Kong (2019) completed a research on local students' mental health and happiness index, it was found that the mean score of local students' happiness index was 7.12 out of 10 in 2016 while it decreased to 7.07 in 2019. The research pointed out that local students lacked learning motivation due to insufficient encouragement given by teachers. It was an alarm to increase educators' awareness towards diversifying their teaching methods and changed the classroom learning culture. Rahim and Ros (2016) pointed out that an education system which only focused on transferring knowledge from teachers to learners would lead to spoon-feeding education and would lower one's learning motivation. Moreover, students who were educated under spoon-feeding education may have lower learning ability in creativity and critical thinking compared to other students. Therefore, through investigating the effectiveness of reward-based learning to enhance students' learning motivation could help create a positive and encouraging learning atmosphere in local schools.

Many researches on the effectiveness of reward-based learning in enhancing students' learning motivation had been done in the American Secondary schools. McClean (2016) had conducted research on the impact of incentives and rewards on student learning in an American Secondary school. The research target group was 31 students aged between 12 to 13 years old while rewards were given to students once a week. After 6 weeks of research, McClean (2016) discovered tangible rewards, including snacks and stationaties could help enhance students' learning motivation in mathematics. After adopting reward-based learning in class, students were more willing to pay attention in class and elicited more involvement in class activities. Besides, the research indicated that over 86% of students agreed that they were willing to work hard in mathematics even though their grades remained unchanged under reward-based learning. Moreover, over 75% of students agreed that their learning motivation had increased while they enjoyed the challenge of learning much more complicated and new topics in mathematics. It identified that the reward scheme acted as a stepping stone to encourage intrinsic learning motivation for students. Also, it was relatively effective for American students aged between 12-13 in raising learning motivation towards mathematics. The following were more research that had been done on investigating the effectiveness of reward-based learning.

Lepper, Corpus and Iyengar (2005) completed a research on the intrinsic and extrinsic motivational orientations in the classroom by reward-based learning. This research involved 797 students aged between 8 to 14 from two public school districts in the San Francisco Bay Area of California. The research adopted positive reinforcement schemes on students, such as giving positive verbal reinforcement and praising students with well achievement in class at once. It was found that both students' learning motivation and interest could be enhanced under reward-based learning. Over 80% of students agreed that their curiosity towards their study grew under the outcome of intrinsic and extrinsic motivation through reward-based learning. This research showed that positive verbal reinforcement was an effective reward to enhance students' learning motivation.

On the other hand, Chen and Wu (2019) investigated rewards for reading and the effects of reward-based learning on reading motivation. This research involved 722 pupols from 30 classes in five elementary schools in southern Taiwan. Three types of rewards were adopted in this investigation, including task-contingent reward, performance-contingent reward, success-contingent reward while the rewards were given every 2 weeks. Besides, intangible rewards were adopted, including giving verbal praise to students publicly and privately, hand clapping and giving a smile for students with good behaviors. Results showed that intangible rewards were much more effective in increasing students' learning motivation than tangible rewards. Participants reported that intangible rewards could be gained from teachers, peer or family recognition through peer book sharing sessions and other group reading activities. Also, educators should modify types of rewards based on students' age group, learning ability and interest. For example, teachers could offer more intangible rewards to students with lower learning ability so as to build up students' learning confidence.

Furthermore, Levitt et al. (2011) completed a research on the impact of short-term incentives on student performance. The research was carried out in three low-performing secondary school districts in and around Chicago: Bloom Township, Chicago Heights and Chicago Public Schools. Both gain condition and loss condition were adopted. In gain condition, students were informed that they could receive rewards immediately after the test while rewards would be given upon their baseline score from a prior testing session. In loss conditions, students were given rewards before the test while rewards needed to be returned back if the result could not meet the baseline score. There were 3 types of rewards, including, financial low ($10 cash), financial high ($20 cash) and nonfinancial (trophy). Rewards were

given based on students' performance, students with better achievement could gain financial high rewards. Results showed that all kind of incentives, including low financial incentives ($10), high financial incentives ($20) and non-financial incentives were equally effective in enhancing students' performance while their increase improvement were 0.18 − 0.24, 0.38 − 0.46 and 0.24 − 0.32 standard deviations respectively. However, students may lose their rewards if they could not reach certain requirements under the loss condition; it acted as a negative-reinforcement scheme. Participants' learning motivation and confidence were lowered under loss conditions, the frequency for students asking questions in class was lowered by 20%. The gain condition in reward-based learning was much more effective in enhancing students' learning motivation as a result. As a matter of fact that all 3 types of rewards were equally effective in enhancing students' learning motivation even though the cost for non-financial rewards varied a lot from financial rewards. The cost for non-financial incentives were relatively lower than financial incentives which cost $3 only in this research. This research may serve as an excellent indicator for teachers in selecting suitable types of rewards in class.

Moreover, Rizkinta and Surya (2017) investigated the effect of granting reward on learning outcomes of mathematics in Class IV of public primary school in Buntu Pane (Western Indonesia). Both verbal rewards and non-verbal rewards were adopted in this research. Non-verbal rewards were carried out in 4 approaches. Firstly, through mimicry and body movement include: smile, nod, thumbs and clapping. Secondly, through reward by approach, such as walking toward the student or sitting near a student. Thirdly, through reward by touch, such as encouraging students by tapping their shoulders or shaking hands. Lastly, reward by symbol or object, such as giving certificates. Results showed that both verbal and non-verbal rewards had similar effectiveness on increasing students' learning motivation. However, teachers should be aware of the frequency of rewarding since rewards may lose their meaning in encouragement if prizes were given too often and constantly. Research showed that students may focus on receiving rewards instead of the learning outcome if rewards were given every lesson. Also, Rizkinta and Surya (2017) pointed out that in order to maintain students' mental health, the nature of rewards should not cause jealousy or envy for other children.

The above researches reflected that reward-based learning was effective in increasing students' learning motivation. It was found that Lepper, Corpus and Iyengar's team (2005) and Chen and Wu's team (2019) agreed that intangible rewards, such as verbal reinforcement, were effective in enhancing students' learning motivation. Praising students with good behavior could let students gain recognition from teachers, peers and family. At the same time, McClean (2016) and Levitt et al. (2011) agreed that tangible rewards, such as giving snacks, stationery and scholarship as rewards, were effective in enhancing students' learning motivation. Research showed that tangible rewards with different values were equally effective in enhancing students' learning motivation. Therefore, teachers should select suitable types of tangible rewards based on students' interest and school financial status. Moreover, Rizkinta and Surya (2017) suggested that both intangible rewards and tangible rewards were equally effective in increasing students' learning motivation. Teachers should be aware of the frequency of reward. Chen and Wu (2019) suggested that rewards could be given every 2 weeks while Levitt et al. (2011) pointed out that rewards could be given after every test. Educators should be aware of the reward frequency and nature of rewards when adopting reward-based learning in class.

2.1 Important notes in applying reward-based learning

The adoption of reward-based learning strategies may vary from students' age group and cultural backgrounds. Students would only be motivated through reward-based learning with consequent suitable rewards (Partin et al., 2009). Teachers should select suitable ways for verbal positive reinforcement which include public verbal positive reinforcement and private verbal positive reinforcement. For students in primary to secondary levels, gift reinforcement was often adopted. Reinforcers were usually closely related to students' interest and daily life, such as stationary, snacks or books. For students above secondary level, scholarship reinforcement was often used. Rewards were usually functional and enabled students to enrich their knowledge, such as book voucher, gift voucher and cash. Different types of reward should be given to students with different age groups while verbal positive reinforcement and gift reinforcement were the most common practise at schools (Partin et al., 2009). Teachers may set up a learning goal and deadline for achieving the goal with their students. If students were able to achieve the goal within a certain period of time, reward would be given to students as a compliment. This could enhance students' learning interest and motivate students' responsibility towards their study.

Teachers may have different uncertainty towards the adoption of reward-based learning in class. It may create extra workload for teachers to set up the rules and goals with students to maintain teaching effectiveness. Also, extra capital was needed for buying gifts and offering scholarships for students. Therefore, some schools or teachers may refuse to adopt reward-based learning in class. The operation of reward-based learning required support from many school sectors.

There were some important remarks and limitations for reward-based learning. Throughout the process of reward-based learning, teachers should be aware of the nature of rewards while valuable gifts should be avoided. Also, direct cash reward should be avoided for young learners below secondary school levels. Besides, teachers should pay attention to students' emotional change and mental health under reward-based learning. Students with lower learning ability may feel abandoned since this group of students may not be able to achieve the goal. It was suggested that teachers should aid students with lower learning ability and separated the rewards to different learning ability groups. For example, "Great Progress Rewards" could be given to students with middle to lower learning ability.

From the above research, it was found that both intangible rewards and tangible rewards were effective in enhancing students' learning motivation. However, teachers should be aware in setting up the reward frequency and the nature of rewards. Besides, there was not enough research investigating students' perceptions towards reward-based learning while most of the research focused on teachers' perceptions. Students as the most important participant in reward-based learning may have different perceptions on the research above. In this research study, students experienced a reward-based learning scheme designed based on ideas from the above research with some new modifications. Students' perceptions of reward-based learning in enhancing their learning motivation would be explored and analyzed through questionnaires and focus group interviews. Also, an observation checklist would be given to teachers for checking students' performance in class under reward-based learning. The observation checklist would include the change of frequency for students asking questions, having eye-contact and willingness in participating class activities.

It was important for educators to get a deeper understanding on the effectiveness of reward-based learning for students from different cultural backgrounds and age groups. In current research study, an investigation of the effectiveness of reward-based learning on

enhancing students' learning motivation in Hong Kong secondary school would be carried out. The research would be carried out in a local secondary school for senior secondary school students aged 17-18. With reference to the above research towards reward-based learning, the reward frequency, nature of rewards and some other details would be adopted in this research while students' perspectives towards reward-based learning would be analysed. Since most of the research focused on primary and junior secondary school students from Western countries, the popularity of adopting reward-based learning may vary between Western and Eastern countries which may lead to new research results. With the difference in popularity of adopting reward-based learning at schools and students' age groups, this research gap may bring new inspirations for educators in adopting reward-based learning at schools.

3. Research questions

(i) Is it effective to enhance senior secondary school students' learning motivation through reward-based learning in Mathematics?
(ii) Is intangible rewards more effective than tangible rewards in enhancing students' learning motivation in Mathematics?

4. Methodology

4.1 Participants

This research would be carried out in a local secondary school mathematics lesson with participants being 19 Secondary 5 students aged between 17-18 with lower learning ability. There were 6 girls and 13 boys in class. Participants were selected based on convenient sampling since this group of participants were from my teaching practice school. Due to limited resources, the researcher of this research was the teacher who conducted reward-based learning in class, observer who completed teacher observation checklist and interviewer of focus group interviews.

4.2 Research design

Mixed research was adopted to investigate the effectiveness of reward-based learning on enhancing students' learning motivation comprehensively, including both qualitative and quantitative research methods. Students' questionnaires, teacher's observations checklist and students' focus group interviews would be used to collect data.

In order to gain an overview of students' perspective towards reward-based learning, questionnaires served as an initial investigator on students' opinions. Results from questionnaires were analysed afterwards, students with extreme positive or negative attitude towards reward-based learning were invited to attend focus group interviews. Besides, students from both higher and lower learning ability groups were invited to attend focus group interviews as well. Focus group interviews served as a stepping stone to further explore ideas towards reward frequency, timing and other operation details from students with specific grouping while each focus group interview would last for around 10-15 minutes. According to Kruger et al. (2019), focus group interviews enabled integration on participants' ideas exchange while researchers could explore in-depth insights towards the topics through focus group interviews. Therefore, focus group interviews were an important section of the research. Lastly, the teacher's observation checklist was adopted to investigate the effectiveness of reward-based learning through the teacher's perspective. Teacher's observation towards students' behavior and attitude change could further support the effectiveness of reward-based learning. The duration of this research was 6 weeks, teacher's observation checklist would be completed throughout the research period while questionnaires and focus group interviews would be conducted during the last research week.

4.3 Research Instruments

Questionnaires would be given to participants after the teacher adopted reward-based learning in class (Appendix 1). There were 8 questions in the questionnaires. The first 2 questions asked about students' basic information, such as gender and age. Question 3-6 were multiple choice questions, students would be asked about their perceptions towards reward-based learning, including their overall perceptions on adopting reward-based learning to enhance their learning motivation, their preferred types of

rewards and the reward frequency and timing. Question 7 allowed students to state their preferred types of rewards from ascending order. Question 8 was an open-ended question which allowed students to express their ideas and suggestions in conducting reward-based learning in class. This questionnaire was self-designed to investigate students' perceptions towards reward-based learning specifically.

Focus group interviews would be conducted as well (Appendix 2). 8 students were selected to attend interview sessions after class, including 2 students from higher learning ability group; 2 students from lower learning ability group; 2 students from extreme positive group and 2 students from extreme negative groups based on the result of questionnaires. There were 5 questions for focus group interviews, questions were self-designed based on the questionnaires' content and ideas from literature review. Question 1-3 were designed to further investigate the change in students' learning motivation, including the change in students' willingness in asking questions in class, participating in class activities and practicing self-learning after school. Question 4 was designed to further analyse students' preference on reward frequency, timing and the reasons behind. Question 5 enabled students to express other ideas towards reward-based learning, including their preference in tangible or intangible rewards, concerns towards the learning programme, suggestions on the operation details and the reasons behind.

Furthermore, an observation checklist would be given to the teacher to check students' performance and change in learning motivation in class (Appendix 3). Teachers would observe the change in students' performance under reward-based learning. The checklist was self-designed based on literature review, it contained 3 questions and an open area for teachers to express their own observations. Question 1 was designed to investigate the change in frequency of students asking questions in class. Besides, question 2 was created to analyse the change in students' willingness in having eye-contact with teachers. Also, question 3 was adopted to find out the change in students' willingness in participating in class activities. Teachers would divide students into 4 groups by seating plan and complete 4 observation forms, each for 1 group respectively. This teacher observation checklist helped support and further analysed students' perceptions towards reward-based learning.

4.4 Research Procedure

With reference to literature reviews listed above, a new reward-based learning strategies would be adopted in this research. According to Rizkinta and Surya (2017), a long-term effective reward-based learning strategy needed to fulfil students' mental incentives. Therefore, both verbal and non-verbal rewards would be given to students. Teachers would adopt intangible rewards to students with good behaviors publicly and privately at once. Intangible rewards would be conducted through 2 aspects. Firstly, through mimicry and body movement include: smile, nod, thumbs and clapping in front of the whole class. Secondly, through reward by approach, such as walking toward the student or sitting near a student to give praise privately.

Tangible rewards would be conducted once a week. Students with well-performance in assignments would be given snacks or stationeries as rewards. Besides, it was suggested that teachers should aid students with lower learning ability and separate the rewards to different learning ability groups. "Great Progress Rewards" would be given to students with middle to lower learning ability once a week based on their performance in assignments and in class, such as the attitude of learning, frequency of answering questions and willingness in participating in class activities. This could avoid students with lower-learning ability feeling abandoned while ensuring equality in class and maintain students' mental health at the same time. To avoid jealousy among students, it was important for teachers to be aware of the value for tangible rewards. It was suggested that the value of rewards should be limited below HKD30. Focus group interviews and questionnaires would be carried out afterwards to analyse students' perceptions on reward-based learning.

Teachers should observe students' behavior in class and complete the observation form (Appendix 3). With the help of this teacher observation form, students' perceptions on reward-based learning could be discussed and analysed comprehensively.

5. Data Analysis

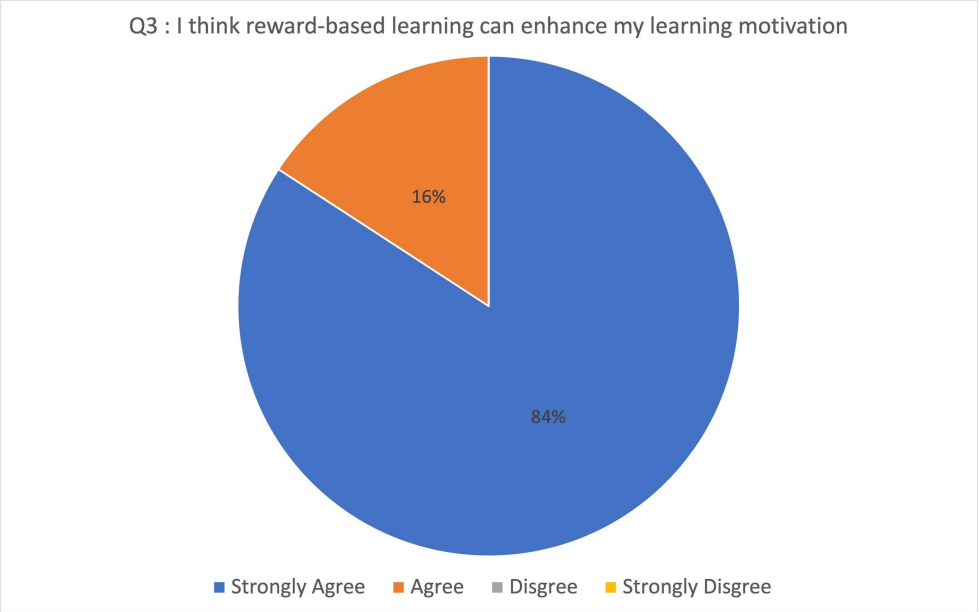
Data from students' questionnaires, teacher observation checklists and selected group of students' focus group interviews were analysed based on two research questions while these data were analysed to address my research questions.

5.1 (i) Is it effective to enhance senior secondary school students' learning motivation through reward-based learning in Mathematics?

Students' perspectives towards reward-based learning were collected through questionnaires. Besides, students were separated into different focus groups to conduct interviews, including 2 students from the higher learning ability group; 2 students from lower learning ability group; 2 students from "group of extreme positive attitudes towards intangible rewards" and 2 students from "group of extreme negative attitudes towards intangible rewards". The interview scripts were attached in Appendix 4 to Appendix 7. It was found that students had a positive attitude towards the adoption of reward-based learning in class. Results from the teacher observation checklist showed that the adoption of reward-based learning was effective in enhancing students' learning motivation in Mathematics. Teacher agreed that students were more willing to ask questions in class while they strongly agreed that eye-contact between teacher and students has increased. It was found that over 60% of students (12 out of 19 students) were more willing to ask questions in class and near 80% (15 out of 19 students) had more eye-contact with the teacher. Also, teacher strongly agreed that students were more willing to participate in class activities while all students were actively participating in class. Through focus group interviews, all interviewees pointed out that they were more willing to have self-learning time after school under reward-based learning. These indicated that reward-based learning was effective in triggering students' learning motivation. Besides, different opinions on reward frequency and preference of reward were given by students. According to the result of question 3 from the questionnaires, all students agreed that reward-based learning was effective in enhancing their learning motivation. The majority of students strongly agreed about the effectiveness of reward-based learning in enhancing their learning motivation, yet some students just agreed with it. 16 students out of 19 students reported that they strongly agreed that reward-based learning could enhance their learning motivation in Mathematics while 3 students out of 19 students agreed with this.

Figure 1

Students' perspective on reward-based learning in enhancing their learning motivation



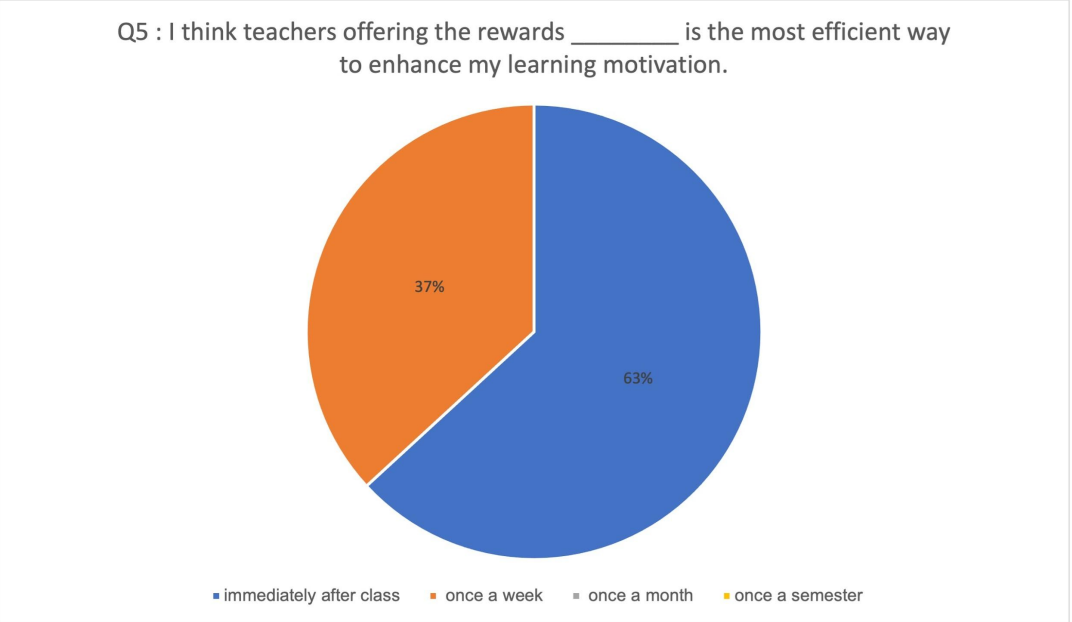
According to figure 1, it was discovered that near 84% of participants highly appreciated the effectiveness of reward-based learning in enhancing their learning motivation. Therefore, the adoption of reward-based learning should be highly promoted to enhance students' learning motivation. During focus group interviews, students selected "strongly agree" claimed that they could gain encouragement and inspiration from teachers under reward-based learning (Appendix 6). It was found that reward-based learning could enhance students' learning motivation as it provided mental support for students through encouragement and praise from teachers. According to Jantine, Helma and Jochem (2011), students' mental support should be given by teachers in order to build up a well teachers-students relationship while a well developed teachers-students relationship could enhance students' learning motivation. Therefore, gaining encouragement through reward-based learning was a key to enhance students' learning motivation. However, students selected "agree" argued that if the learning programme was conducted by several teachers, every teacher would have different measures in carrying out reward-based learning which may affect the effectiveness of the programme (Appendix 4). In order to lower students' uncertainties towards reward-based learning, a well-planned structure of reward-based learning programmes should be explained to students at the beginning

of the programme. A well-planned programme guidance should be created and explained to teachers detaily to further enhance students' learning motivation and standardize the programme regulations, including lesson delivery methods and strategies (Law, 2011).

Regarding the reward frequency on question 5, 12 out of 19 students expressed that teachers offering rewards immediately after class was the most efficient way to enhance their learning motivation in Mathematics while 6 out of 19 students claimed that offering rewards once a week was the most effective method for rewarding.

Figure 2

Students' preference on reward frequency



According to figure 2, results showed that students generally tend to enjoy immediate reward with over 60% of participants reported immediate reward as their preference on rewarding. Besides, over 30% of participants tend to be rewarded once a week while no participant selected the options "reward once a month" and "reward once a semester". According to data from focus group interviews, students prefered immediate reward suggested that receiving rewards at once could strengthen their memories towards the issues and knowledge that they learnt in that lesson. Also, receiving rewards immediately could further make the learning atmosphere soar as most of the students enjoyed receiving positive surprise at once (Appendix 4).

Besides, students pointed out that immediate rewards helped them in building up a sense of accomplishment (Appendix 5). Mohebi et al. (2019) suggested that the dopamine projection was critical in controlling levels of motivation to work for the rewards. Besides, dopamine release ramped up when students' approach to immediate rewards while it acted as a vital signal for students to work hard and approached the rewards next time. Therefore, immediate reward-driven learning could enhance students' learning motivation through offering immediate rewards. However, over-rewarding may lead to a decrease in dopamine release when participants approach rewards as our brains regard rewarding as an usual practice. Rizkinta and Surya (2017) indicated that students may focus on receiving rewards instead of the learning outcome if rewards were given every lesson. Therefore, over rewarding should be avoided. During focus group interviews, students selected "once a week" as their preference on reward frequency stated that students would expect the continuous increase in the value of rewards if rewards were given too frequently (Appendix 7). For example, students may expect to receive snacks or stationeries at the beginning of the programme and end at expecting a smartphone or other luxury goods as rewards. At the same time, students expressed that offering rewards once a week could lower the frequency of rewarding and avoid students losing excitement towards reward-based learning. Moreover, students worried that they may have already forgotten the reasons for receiving rewards if rewards were given after a long time. Therefore, no participant preferred to receive rewards once a month or once a semester in question 5. Mohebi et al. (2019) stated that immediate rewards could help build up students' memories towards certain knowledge gained in class while offering rewards after a long time may lower students' expectation towards the rewards and learning motivation. Results indicated that teachers should avoid offering rewards over frequently or after a long period of time as this may lower the effectiveness of reward-based learning.

Apart from the reward frequency, students expressed their ideas towards the timing of reward. According to the result of question 6, 10 out of 19 students suggested that teachers offering rewards after students completed certain behavior could enhance their learning motivation in Mathematics efficiently. At the same time, 9 out of 19 students tended to receive rewards after class.

Figure 3

Students' preference on timing of reward

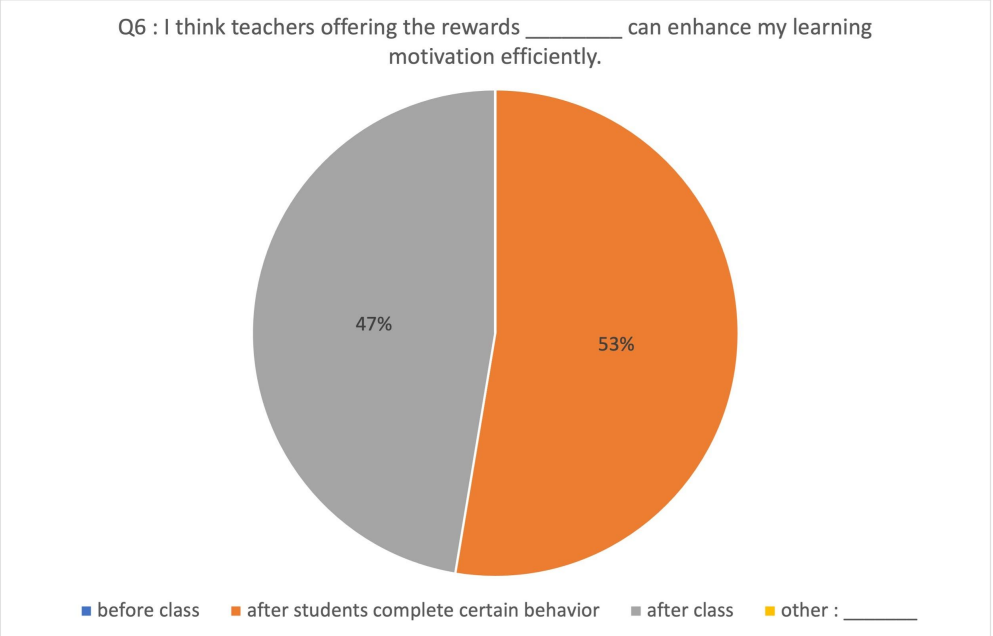


Figure 3 indicated that 47% of participants preferred receiving rewards after class while 53% of participants preferred receiving rewards after completing certain behaviors. According to results from focus group interviews, students claimed that receiving rewards after class was the best timing of reward as teachers could have better time management in teaching context. This may help separating the teaching section and rewarding section more clearly (Appendix 7). Besides, interviewees stated that receiving rewards after students completed certain behaviour could let students know what was the exact positive behavior that teachers appreciated them for. For example, students may receive rewards for being polite, achieving well academic achievement or having excellent leadership skills (Appendix 4). Moreover, reasons for not selecting the option "offering rewards before class" were mentioned in focus group interviews. Interviewees mentioned that students would only focus on the rewards during class if teachers offer rewards before class. Students may discuss the rewards with classmates during class instead of focusing on the class content (Appendix 7). Woolley and Fishbach (2018) pointed out that the effect of reward timing was closely related to the association between an activity and a reward while it could affect students' intrinsic motivation. Offering rewards after class could enhance students' learning motivation in class as students may associate working hard in class and receiving rewards after class together. The results indicated that students preferred

receiving rewards after the learning process. All participants claimed that teachers offering rewards after class or certain behaviors was the best timing to enhance their learning motivation. By combining data from question 5 and question 6, we could assume that offering rewards immediately after class or certain behaviors could enhance students' learning motivation in Mathematics. However, teachers should avoid offering rewards over frequently as this may loosen the meaning of rewards. Over rewarding may loosen students' association between learning motivation and receiving rewards which may lower the effectiveness of reward-based learning (Woolley & Fishbach, 2018). For question 8, students suggested that rewards should be given under a well-planned timetable and the frequency of rewards should not be too high. Interviewees from focus group interviews stressed that teachers should keep their promise to offer rewards according to the schedule. Negative impressions towards reward-based learning would be created in students' minds if teachers break the rewarding regulations. Mohebi et al. (2019) stated that negative impressions towards the learning programme would be created if students' expectations were broken. Therefore, teachers should set up a well-constructed rewarding system with reference to students' preference listed above and modify the details based on students' reactions. Centralizing the reward system could let teachers and students monitor and operate reward-based learning programmes more efficiently.

5.2 (ii) Is intangible rewards more effective than tangible rewards in enhancing students' learning motivation in Mathematics?

Students' perspectives towards intangible and tangible rewards were collected through questionnaires and focus group interviews. It was found that intangible and tangible rewards were both effective in enhancing students' learning motivation in Mathematics.

Regarding question 4 about students' preference on intangible rewards and tangible rewards, 16 out of 19 participants agreed that adopting both tangible and intangible rewards could enhance their learning motivation effectively. Besides, 2 out of 19 participants preferred intangible rewards while 1 out of 19 participants preferred tangible rewards.

Figure 4

Students' preference on tangible rewards and intangible rewards

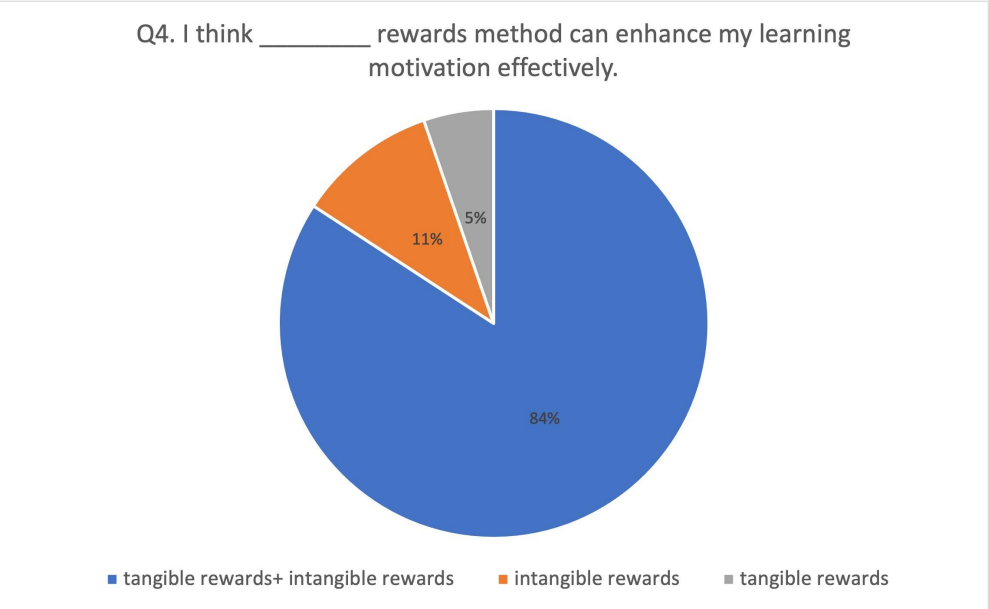


Figure 4 showed that 84% of students preferred receiving tangible and intangible rewards. It was found that the majority of participants prefer a mixed-type of rewarding method. Interviewees from focus group interviews suggested that both tangible and intangible rewards should be adopted in enhancing students' learning motivation. Teachers may take turns in adopting both tangible and intangible rewards in class so as to keep the learning atmosphere fresh (Appendix 4). Interviewees selected intangible reward as their reward preference stated that praising from teachers helped them in building up learning confidence. Also, a sense of accomplishment could be built up from teachers' praise. Albrecht et al. (2014) suggested that verbal rewards such as praising one's competence could enhance the perceived self-determination which helped promote students' intrinsic motivation in engaging the task. This indicated that intangible rewards such as verbal reinforcement acted as a positive reinforcer in enhancing students' learning motivation. Besides, students selected tangible rewards as their reward preference stressed that tangible rewards were more functional and practical. For example, they could enjoy the snacks or make use of the stationery. It was observed that both tangible and intangible rewards should be adopted in order to enhance students' learning motivation.

Moreover, students' preference on different types of tangible rewards were investigated as well.

Figure 5

Students' preference on different types of tangible rewards

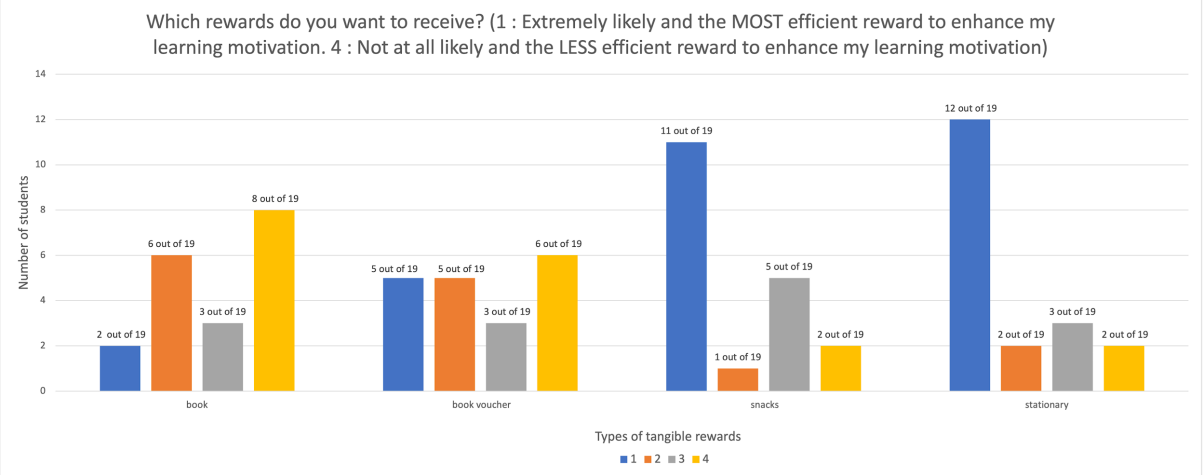


Figure 5 indicated that snacks and stationeries were two of the most popular tangible rewards among participants. It was found that 11 out of 19 participants and 12 out of 19 participants selected snacks and stationery as the most effective rewards in enhancing their learning motivation respectively; 5 out of 19 participants and 2 out of 19 participants reported book voucher and book as the most effective rewards in enhancing their learning motivation respectively. During focus group interviews, interviewees mentioned that they preferred receiving tangible rewards which were practical or may bring enjoyment to them, such as snacks and stationeries. Moreover, remarks on the teacher observation checklist stated that students compared their rewards in different ways, such as the flavour of the snacks, the color of the stationery or the price of the rewards. Brunello and Checchi (2007) stressed that an equal learning environment could ensure students' mental needs and provide equal opportunity for students to enrich themselves. Students' learning motivation could be enhanced significantly under an equal learning atmosphere. Therefore, to avoid negative comparison and maintain equality in class, it was important to keep every reward equal.

Students expressed some ideas or measures that teachers could do to adopt reward-based learning effectively in order to enhance students' learning motivation. Referring to data from question 8, participants suggested that teachers could provide different levels of rewards based on students' daily performance. For example, teachers could offer a "no homework day" for students if they performed well in class. Besides, teachers could offer rewards based on students' learning progress. Teachers could offer intangible rewards to students with slight improvement and offer much valuable tangible rewards to students with greater improvement.

Furthermore, equal opportunities should be given to students with different learning abilities. Interviewees from focus group interviews mentioned that teachers should provide equal opportunity for students with different learning abilities under reward-based learning. For example, the assessment level for students with lower learning ability should be modified and a bit easier for this group of students (Appendix 5). Adjusting assessment levels and teachers' expectations of students could provide equal opportunity for students to reach their own achievement at schools which could enhance their learning motivation (Brunello & Checchi, 2007). In order to maintain equality of the reward-based learning programme, the "Great Progress Rewards" was adopted during the research process. Under the "Great Progress Rewards", students from the lower learning ability group could gain a sense of accomplishment as well. Students mentioned that the "Great Progress Rewards" helped them in ensuring their ability and providing appreciation for their hard work (Appendix 5). Therefore, it was important for teachers to provide equal opportunity for students from different ability groups. Moreover, a well-constructed plan should be drafted before adopting reward-based learning in class. A well-constructed plan should include the frequency of rewards, timing for rewarding, types of rewards, rewarding regulations and other details. Interviewees from focus group interviews stated that if numerous teachers participated in the learning programme, every teacher may have different measures in carrying out reward-based learning which may affect the effectiveness of the programme (Appendix 4). Besides, students stressed that it was important for teachers to keep promises to offer rewards on schedule. Disappointment and negative impressions towards reward-based learning would be created in students' minds if teachers did not offer rewards on schedule (Appendix 6). Law (2011) pointed out that a well-planned programme guidance was the first step to

establish a quality programme operation while operators should ensure the programme guidance was fully explained to participants. Teachers should inform students about the operation details before the start of the reward-based learning programme. A well-constructed plan was an essential element for a successful reward-based learning programme. Teachers may design the plan based on students' interest and ability.

6. Conclusion

This research indicated that the adoption of reward-based learning was effective to enhance senior secondary school students' learning motivation in Mathematics. Besides, it was found that both intangible rewards and tangible rewards were equally effective in enhancing students' learning motivation. Furthermore, it was found that offering rewards either at once or once a week could enhance students' learning motivation effectively while offering rewards after the learning process was the best timing of reward. Although the research outcome was clear and highlighted the importance of reward-based learning significantly, challenges were faced during the research.

Firstly, it was hard to fully observe students' behavioral changes due to lack of face-to-face teaching periods. This research was conducted from 2020 to 2021 under the outbreak of COVID-19 while students were only allowed to attend half school day and maintained social distance. Half of the teaching hours were delivered under virtual mode of teaching via Zoom and Microsoft Teams. Due to students' privacy regulations, students were not required to turn on their camera during online lessons. Although most of the students were willing to speak and actively participated in online lessons, it was hard to measure students' behavioral and attitude change under reward-based learning, such as students' eye contact and other body languages. As a result, there were still rooms for researchers to observe students' behavioral and attitude changes under reward-based learning in future research. Secondly, it was hard to measure the change in students' learning motivation accurately due to the sudden change of learning atmosphere. Due to the outbreak of COVID-19, schools were closed for more than 6 months in 2020. This research was conducted right after school resumed while most of the students were not used to the new learning mode and school life. Some students were still in a holiday mood while academic work created

pressure on students as well. Boyko (2013) stated that participants' mental status was an external limitation for observational research, repeat research and selecting participants with different backgrounds could solve the limitation, including educational background, cultural background and family background. Therefore, students' learning motivation may vary by the re-adaptation of school life which builded up difficulties in measuring the effectiveness of reward-based learning in enhancing students' learning motivation.

Although the outbreak of COVID-19 created some limitations to this research, it brought benefits to reward-based learning programmes as well. School life under online learning was completely different from traditional learning, it was found that students' learning motivation could be enhanced through indirect positive reinforcement. Some students may feel shy or embarrassed to express ideas or be praised by teachers and peers in class during face-to-face lessons. However, most of the introverted participants were willing to express their ideas during online lessons. Besides, offering intangible rewards through online lessons helped lower the embarrassment for students to receive rewards since rewards were given in an indirect way. Tuan (2015) completed a research about the benefits of online learning, it was found that online lessons could shorten the distance between students and teachers which enabled students to express themselves more comfortably. Therefore, reward-based learning programmes which were conducted under online lessons could build up students' learning confidence. Intangible rewards could be given to students who actively participated in online lessons so as to further promote students' learning confidence in face-to-face lessons. Furthermore, Tuan (2015) mentioned that students' academic performance could be enhanced through reward-based learning with the help of online learning. Two groups of students participated in a reward-based learning programme during the research, it was found that students from online learning groups performed much better than students from traditional format learning groups in the same test. Learning flexibility was highly increased under online learning, online learning softwares could be introduced in class under reward-based learning. For example, teachers could create "Kahoot!" competition during online revision lessons while students with well performance could receive intangible rewards. Through adopting new online learning softwares and reward-based learning together, students could experience new learning modes which could trigger students'

curiosity in class and further enhance their learning interest, learning motivation and academic performance. As a result, online learning could bring a series of possibilities in enhancing students' learning motivation and academic performance if teachers fully utilized online learning resources under a well-planned reward-based learning programme.

Some possible predictive challenges would appear if similar research was done in face-to-face learning mode. Time limitation and restriction may appear when adopting reward-based learning in face-to-face lessons. According to Silverstein et al. (2009), teachers may experience difficulties in maintaining students' attention and functionable learning outcomes under reward-based programmes which were conducted in traditional learning format. Extra time may be needed in maintaining class discipline under face-to-face lessons as students were able to freely communicate with classmates in class. Therefore, time congestion may appear in maintaining class discipline, conducting reward-based learning and observing students' learning attitude change at the same time.

Modifications on research design and preparation works could be done for future research on the effectiveness of reward-based learning in enhancing students' motivation. Firstly, third party observers could be invited for lesson observations. In order to avoid bias on students' ability or performance, this observer should neither be a class teacher nor subject teachers of the class. Observers could be other teachers or students inside or outside the school while student observers should not be research participants. Three observations would be conducted by the observer, including pre-programme observation (before adopting reward-based learning), mid-programme observation (after adopting reward-based learning for a period of time) and post-programme observation (at the end of the programme). Observers could observe students' behavioral and learning motivation changes more clearly in different stages of reward-based learning adoption. Besides, they could provide suggestions to teachers for better lesson design under reward-based learning. Student observers could further enhance the effectiveness of reward-based learning through peer assessment, this may also enable ideas exchange towards reward-based learning between research participants and other students. Demiraslan Çevik (2015) pointed out that specific information from participants' generation could be explored from

peer assessment as student observers shared a similar age range with research participants, students observers and research participants may share the same interests and preference towards the research topic. Therefore, peer assessment enabled the research to be observed by students from the same generation and provide suggestions which fitted students more, such as types of rewards which attract students in this age group. Secondly, pre-programme interviews could be done to get a brief understanding towards students' perspective on reward-based learning. In order to lower students' concerns towards the adoption of reward-based learning in class, pre-programme interviews could be done in informal ways, such as small talks in class or during recess. To enhance the effectiveness of the research, researchers should find out students' interests, such as popular cartoon characters, type of snacks and stationery. Besides, students' preference on reward frequency and timing should be roughly investigated in this stage. To avoid the content of pre-programme interviews overlapping with the content of questionnaires and focus group interviews, researchers should get an overview of students' perspective towards reward-based learning during pre-programme interviews while questionnaires should be designed based on results from pre-programme interviews. Finally, questions for focus group interviews should be designed based on results from questionnaires to explore students' in-depth ideas towards reward-based learning and the reasons behind. Getting a better understanding of students' interest during the initial study stage could increase the effectiveness of the research while the change in students' learning motivation could be investigated more easily.

In conclusion, reward-based learning was an effective pedagogy in enhancing senior secondary school students' learning motivation in Mathematics while both tangible and intangible rewards were equally important and should be involved in the rewarding system. By enhancing students' learning motivation through reward-based learning, it was believed that students' academic performance could be enhanced as well. Asano (2002) suggested that students' learning performance and learning interest could be promoted through enhancing students' learning motivation. Besides, lifelong learning could be promoted under a successful learning programme in enhancing students' learning motivation. School is a place for both students and teachers to learn and explore. It was important for educators to investigate and explore more innovative pedagogies to enhance students' learning motivation. School

principals and organisations should support teachers in adopting new pedagogies at school or continue their study in this profession. Reward-based learning promotion teams which focus on setting up regulations and learning schedules for different subjects could be formed by teachers at school, government and universities could invite experts to join the team meeting regularly to ensure the effectiveness of promoting reward-based learning at school. McClean (2016) believed that reward-based learning was an irreplaceable pedagogy in promoting students' learning motivation and creating a happy school life, educators should further improve the operation details and promote the adoption of reward-based learning at school. Reward-based learning was one of the effective strategies in enhancing students' learning motivation, yet there were plenty of improvement areas for educators to fill up.

After conducting this research, I strongly agreed that there are no boring topics or lessons but only boring teachers. There were uncountable ways in conducting a lesson or transmitting knowledge while teachers as the lesson designer should try their best in selecting the most effective ways to enhance students' learning motivation. The enhancement in students' learning motivation was the key of success in promoting the growth in students' learning interest and personal achievement at school. Students are always symbolized as seedlings of the society. Therefore, well-designed pedagogies should be fertilized to our seedlings so as to support their growth while a well-constructed reward-based learning programme could be an excellent fertilizer for our seedlings.

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Appendix 1

有關獎勵式教學的問卷調查
Reward-based learning Survey

Survey number: 01

1. 性別。
   Gender.

   - ◯ 男 Male
   - ◯ 女 Female

2. 年齡。
   Age.

   - ◯ 15
   - ◯ 16
   - ◯ 17
   - ◯ 18
   - ◯ 19

3. 我認為獎勵式教學能有效提高我的學習動機。
   I think reward-based learning can enhance my learning motivation.

   - ◯ 非常同意 Strongly Agree
   - ◯ 同意 Agree
   - ◯ 不同意 Disagree
   - ◯ 非常不同意 Strongly Disagree

4. 我認為_____的獎勵模式能有效提高我的學習動機。
   I think _____ rewards method can enhance my learning motivation effectively.

   - ◯ 口頭讚賞 intangible rewards (verbal reinforcement)
   - ◯ 禮物頒授 tangible rewards (rewards)

- [ ] 口頭讚賞 + 禮物頒授 tangible rewards (verbal reinfocement) + intangible rewards (rewards)

5. 我認為教師給予學生_____的獎勵能有效提高我的學習動機。
   I think teachers offering the rewards _____ is the most efficient way to enhance my learning motivation.

   - [ ] 即堂 immediately after class
   - [ ] 每星期一次 once a week
   - [ ] 每月一次 once a month
   - [ ] 每學期一次 once a semester

6. 我認為教師於_____給予獎勵能有效提高我的學習動機。
   I think teachers offering the rewards _____ can enhance my learning motivation efficiently.

   - [ ] 上課前 before class
   - [ ] 完成指定項目 after students complete certain behavior
   - [ ] 上課後 after class
   - [ ] 其他 other : _____

7. 請為以下常用於獎勵式教學的獎品排序。(1為<u>最希望</u>收到, 並最有效提升學習學機, 4為<u>最不希望</u>收到, 並較低效提升學習學機)
   Which rewards do you want to receive? (1 : **<u>Extremely likely</u>** and the **<u>MOST</u>** efficient reward to enhance my learning motivation. 4 : **<u>Not at all likely</u>** and the **<u>LESS</u>** efficient reward to enhance my learning motivation)

	1	2	3	4
書藉 book	⬭	⬭	⬭	⬭
書券 book voucher	⬭	⬭	⬭	⬭
零食 snacks	⬭	⬭	⬭	⬭
文具 stationary	⬭	⬭	⬭	⬭

其他 other: _____ ⬭ ⬭ ⬭ ⬭ ⬭

8. 你認為教師應如何更有效地推行獎勵式教學, 以提升學生的學習動機。
What do you think teachers can do to adopt reward-based learning effectively in order to enhance students' learning motivation?

_____

_____

_____

_____

Appendix 2

Questions for focus group interviews

1. Under reward-based learning, are you willing to ask questions in class?
2. Under reward-based learning, are you willing to participate in class activities?
3. Under reward-based learning, are you willing to have self-learning time after school?
4. What is your preference in reward frequency?

   (immediately after class / once a week / once a month / once a semester / others)

   (before class / after students complete certain behaviour / after class / others)
5. What do you think teachers can do to adopt reward-based learning effectively in order to enhance students' learning motivation?

Appendix 3

Teacher Observation Checklist

Class:_____ Group:_____ Date:_____ Duration:_____

Please put a "✓" in the corresponding box. (1 is strongly agree, 4 is strongly disagree)

Question	Observation items	Strongly Agree (1)	Agree (2)	Disagree (3)	Strongly Disagree (4)
1	Students are more willing to ask questions in class.				
2	Eye-contact between teacher and students has increased.				
3	Students are more willing to participate in class activities (e.g group discussion).				

Remarks:

Have students' learning motivation been enhanced in general?

THE END

Appendix 4

Focus Group Interview Script

Group 1 (Students from higher learning ability group)

Participants:

Interviewer: Miss LAM Yu Ching Polly

Interviewee 1&2: Students from higher learning ability group

Content:

Interviewer: Welcome to the focus group interview regarding reward-based learning. The aim for this study is to investigate the effectiveness of reward-based learning on enhancing students' learning motivation in Hong Kong secondary school. All data will be treated confidentiality and will be destroyed after the study. Do you agree to take part in this interview? If yes, if sign your name on the form.

Interviewee 1&2: Yes. Thank you.

Interviewer: Firstly, I would like to ask under reward-based learning, are you willing to ask questions in class? Could you tell me the reasons as well?

Interviewee1: Yes, I am more willing to ask questions in class so as to attract teachers' attention. I think this may increase the chance for me to receive rewards and build up a positive impression in teachers' minds.

Interviewee 2: I am more willing to ask questions in class as well because I want to understand more on different topics and win the rewards. I think reward-based learning can enhance our motivation in asking questions in class because students want to fulfil teachers' requirements in different ways.

Interviewer: Thank you for your ideas. Let's move on to the second question. Under reward-based learning, are you willing to participate in class activities?

Interviewee 2: Yes, I am more willing to participate in class activities. As I mentioned that students would try their best in fulfilling teachers' requirements. Therefore, students are willing to take part in class activities.

Interviewee 1: I agree with that.

Interviewer: Thank you for your opinions. May I know under reward-based learning, are you willing to have self-learning time after school?

Interviewee 1: Yes, I usually have self-learning time once a week as a weekly revision section. In order to receive the rewards, I want to perform better in class. Therefore, I usually have self learning time 3 times a week under reward-based learning

Interviewee 2: I agree with interviewee 1. Losing a reward also reminds me to work harder next time. Therefore, my motivation towards self-learning increased.

Interviewer: I can observe that both of you have a positive attitude towards reward-based learning. May I know more about your preference in reward frequency? Please select a reward frequency. (Immediately after class / once a week / once a month / once a semester / others) Besides, please select a reward timing. (Before class / after students complete certain behaviour / after class / others)

Interviewee 2: I would like to receive rewards immediately after class as this can strengthen my memories towards the issues and knowledge that I learnt in that lesson. Also, receiving rewards immediately can further make the learning atmosphere soar as most of the students enjoy receiving positive surprise at once.

Interviewee 1: I would like to receive rewards once a week after students complete certain behaviour. Receiving rewards after students complete certain behaviour can let us know what is the exact positive behavior that teachers appreciated us for. For example, students may receive rewards for being polite, well academic achievement or excellent leadership skills. Offering rewards once a week can lower the frequency of rewarding and avoid students losing excitement towards reward-based learning.

Interviewer: Thank you for the suggestions. Here is the final question. What do you think teachers can do to adopt reward-based learning effectively in order to enhance students' learning motivation?

Interviewee 1: Teachers should be aware of the type of rewards. Both tangible and intangible rewards should be adopted in enhancing students' learning motivation. Teachers may take turns in adopting tangible and intangible rewards in class so as to keep the learning atmosphere fresh.

Interviewee 2: I agree with that. Besides, every teacher has different measures in carrying out reward-based learning which may affect the effectiveness of the programme.

Interviewer: Thank you for taking part in the interview today. I have received many valuable ideas towards reward-based learning from you. Thank you very much.

Appendix 5

Focus Group Interview Script

Group 2 (Students from lower learning ability group)

Participants:

Interviewer: Miss LAM Yu Ching Polly

Interviewee 1&2: Students from lower learning ability group

Content:

Interviewer: Welcome to the focus group interview regarding reward-based learning. The aim for this study is to investigate the effectiveness of reward-based learning on enhancing students' learning motivation in Hong Kong secondary school. All data will be treated confidentiality and will be destroyed after the study. Do you agree to take part in this interview? If yes, if sign your name on the form.

Interviewee 1&2: Yes, we understand. Thank you.

Interviewer: Firstly, I would like to ask under reward-based learning, are you willing to ask questions in class? Could you tell me the reasons as well?

Interviewee 1: Yes, I am more willing to ask questions in class. Although I do not always have a question to ask, questions from other students inspire me and the active learning atmosphere motivates me to ask.

Interviewee 2: I agree with that. Besides, I am more willing to ask questions in class so as to receive a sense of identity from teachers.

Interviewer: Thank you for your ideas. Let's move on to the second question. Under reward-based learning, are you willing to participate in class activities?

Interviewee 2: I am more willing to participate in class activities as I want to gain a better understanding towards the topics and receive rewards. For example, I can learn more about

certain topics through group discussion.

Interviewee 1: I want to take part in class activities as I think this may be counted as part of the assessment in winning the reward.

Interviewer: Thank you for your opinions. May I know under reward-based learning, are you willing to have self-learning time after school?

Interviewee 1: I do not have a self-learning habit. However, I practice self-study if I know that certain topics or chapters will be tested and a reward-based learning scheme is adopted.

Interviewee 2: I agree with that.

Interviewer: I can observe that both of you have a positive attitude towards reward-based learning. May I know more about your preference in reward frequency? Please select a reward frequency. (Immediately after class / once a week / once a month / once a semester / others) Besides, please select a reward timing. (Before class / after students complete certain behaviour / after class / others)

Interviewee 2: I prefer to receive rewards immediately after class as this acts as an encouragement for students to work harder in the next lesson. If we receive rewards after a long time, students may have already forgotten the reasons for rewarding.

Interviewee 1: I share the same opinion as interviewee 2. Besides, receiving rewards immediately after class can help students build up a sense of accomplishment, just like winning a game.

Interviewer: Thank you for the suggestions. Here is the final question. What do you think teachers can do to adopt reward-based learning effectively in order to enhance students' learning motivation?

Interviewee 1: Teachers should provide equal opportunity for students in different learning abilities under reward-based learning. For example, the assessment level for students with lower learning ability should be modified and a bit easier for this group of students.

Interviewee 2: I agree with that. Besides, the "Great Progress Rewards" helps me in ensuring my ability and appreciation for my hard work.

Interviewer: Thank you for taking part in the interview today. I have received many valuable ideas towards reward-based learning from you. Thank you very much.

Appendix 6

Focus Group Interview Script

Group 3 (Students from group of extreme positive attitudes towards intangible rewards)

Participants:

Interviewer: Miss LAM Yu Ching Polly

Interviewee 1&2: Students from group of extreme positive attitudes towards intangible rewards

Content:

Interviewer: Welcome to the focus group interview regarding reward-based learning. The aim for this study is to investigate the effectiveness of reward-based learning on enhancing students' learning motivation in Hong Kong secondary school. All data will be treated confidentiality and will be destroyed after the study. Do you agree to take part in this interview? If yes, if sign your name on the form.

Interviewee 1&2: Yes, we understand. Thank you.

Interviewer: Firstly, I would like to ask under reward-based learning, are you willing to ask questions in class? Could you tell me the reasons as well?

Interviewee 1: I am more willing to ask questions in class as I think asking questions in class can help me gain encouragement and inspiration from teachers.

Interviewer: May I ask specifically? How did you gain encouragement from your teacher?

Interviewee 1: Praising from teachers helps me in building up learning confidence.

Interviewee 2: I agree with that. Besides, a sense of accomplishment can be built up from teachers' praise.

Interviewer: Thank you for your ideas. Let's move on to the second question. Under

reward-based learning, are you willing to participate in class activities?

Interviewee 2: Yes, as I think participating in class activities can let us gain a better impression from teachers.

Interviewer: Why do you wish to gain a better impression from teachers?

Interviewee 2: Because teachers tend to praise students or offer rewards to students with better impressions in their mind. Therefore, gaining a better impression from teachers is important.

Interviewee 1: I agree with that.

Interviewer: Thank you for your opinions. May I know under reward-based learning, are you willing to have self-learning time after school?

Interviewee 1: Yes, the first step to gain a better impression from teachers is to have a better understanding on certain topics or chapters. Therefore, self-learning time after school is necessary.

Interviewee 2: Yes, I have the same opinion as you.

Interviewer: I can observe that both of you have a positive attitude towards reward-based learning. May I know more about your preference in reward frequency? Please select a reward frequency. (Immediately after class / once a week / once a month / once a semester / others) Besides, please select a reward timing. (Before class / after students complete certain behaviour / after class / others)

Interviewee 1: I think offering rewards once a week after class is the best arrangement for reward-based learning. If teachers offer rewards before class, students will only focus on the rewards during class, such as discussing the rewards with classmates during class instead of focusing on the class content.

Interviewee 2: I also agree with that. But it is important for teachers to keep promises to

offer rewards to students. Disappointment and negative impressions towards reward-based learning will be created in students' mind if teachers do not offer rewards at the end.

Interviewer: Thank you for the suggestions. Here is the final question. What do you think teachers can do to adopt reward-based learning effectively in order to enhance students' learning motivation? Do you have any ideas especially towards intangible rewards?

Interviewee 2: As I mentioned above, teachers should keep their promise to offer rewards to students according to the schedule.

Interviewee 1: The usage of intangible rewards can enhance our learning motivation since it brings a sense of accomplishment to us.

Interviewer: Thank you for taking part in the interview today. I have received many valuable ideas towards reward-based learning from you. Thank you very much.

Appendix 7

Focus Group Interview Script

Group 3 (Students from group of extreme negative attitudes towards intangible rewards)

Participants:

Interviewer: Miss LAM Yu Ching Polly

Interviewee 1&2: Students from group of extreme negative attitudes towards intangible rewards

Content:

Interviewer: Welcome to the focus group interview regarding reward-based learning. The aim for this study is to investigate the effectiveness of reward-based learning on enhancing students' learning motivation in Hong Kong secondary school. All data will be treated confidentiality and will be destroyed after the study. Do you agree to take part in this interview? If yes, if sign your name on the form.

Interviewee 1&2: Yes, we understand. Thank you.

Interviewer: Firstly, I would like to ask under reward-based learning, are you willing to ask questions in class? Could you tell me the reasons as well?

Interviewee 1: Yes, I am more willing to ask questions in class because I want to win the prize.

Interviewee 2: I agree with that.

Interviewer: Which one do you prefer, tangible or intangible rewards?

Interviewee 2: I prefer tangible rewards as it is more functional and practical. For example, I can enjoy the snacks or use the stationery.

Interviewer: Thank you for your ideas. Let's move on to the second question. Under reward-based learning, are you willing to participate in class activities?

Interviewee 2: Yes, I am more willing to participate in class activities as it may enhance the chance for me to win the rewards.

Interviewee 1: Same here. I am more willing to take part in class activities as I think my performance in class may affect teachers' decision to offer the rewards to me or not.

Interviewer: Thank you for your opinions. May I know under reward-based learning, are you willing to have self-learning time after school?

Interviewee 1: Yes, reward-based learning could be one of the push factors for students to work harder. However, the adoption methods and details of reward-based learning may affect the effectiveness of reward-based learning.

Interviewee 2: I agree with that.

Interviewer: I can observe that both of you have a positive attitude towards reward-based learning. May I know more about your preference in reward frequency? Please select a reward frequency. (Immediately after class / once a week / once a month / once a semester / others) Besides, please select a reward timing. (Before class / after students complete certain behaviour / after class / others)

Interviewee 1: I prefer to receive rewards once a week and immediately after class. Students will expect the continuous increase in the value of rewards if rewards are given too frequently. For example, students may expect to receive snacks or stationeries at the beginning of the programme and end at expecting a smartphone or other luxury goods as rewards. Therefore, offering rewards once a week is the most appropriate option.

Interviewee 2: I agree with offering rewards once a week. Besides, offering rewards once a week can lower the frequency of rewarding and avoid students losing excitement towards reward-based learning. Besides, I think rewards should be offered after class as I think students will only focus on the rewards during class if teachers offer rewards before class.

Students may discuss the rewards with classmates during class instead of focusing on the class content. Also, receiving rewards after class is the best timing of reward as teachers can have better time management in teaching context. This may help separating the teaching section and rewarding section more clearly.

Interviewer: Thank you for the suggestions. Here is the final question. What do you think teachers can do to adopt reward-based learning effectively in order to enhance students' learning motivation? Do you have any ideas especially towards intangible rewards?

Interviewee 2: Teachers should keep the promise to offer rewards to students on time.

Interviewee 1: I agree with that and teachers should inform students of the system of reward-based learning before adopting it in class.

Interviewer: Thank you for taking part in the interview today. I have received many valuable ideas towards reward-based learning from you. Thank you very much.