

Category 4 Resource Development

Group 4-012

Project Enrich

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Project Enrich is a project that aims to provide lesson packages to help a select group of Primary 6 students from Geylang Methodist School (Primary). The students selected have been identified to be struggling with Mathematics and are from lower income families that are not able to afford tuition. To assist them, the lesson packages are shaped to meet the needs of the students, reinforce important concepts and are designed to be engaging and meaningful.

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Abstract

Project Enrich is a project that aims to provide lesson packages to help a select group of Primary 6 students from Geylang Methodist School (Primary). The students selected have been identified to be struggling with Mathematics and are from lower income families that are not able to afford tuition. To assist the students, the lesson packages are shaped to meet the needs of the students, reinforce important concepts and are designed to be engaging and meaningful. The lesson packages were quickly converted to online resources due to the COVID-19 situation which allowed the liaising teacher to convert it into SLS lessons.

1. Introduction

1.1 Rationale

These students were identified by the school who are struggling with the mathematics syllabus. Feedback from the teachers highlighted that these students are not adapting well to the traditional teaching methods. Many require personalised attention to help them understand and internalise concepts. The failure to cope in the mainstream has resulted in the poor self-esteem and low self-confidence issue which further hinder their ability and will to learn. With the project, the students can receive additional assistance to help meet their needs.

1.2 Objectives

The objectives of this project is as follows:

1. Address the needs of academically weaker students who do not respond to traditional methods of teaching
2. Reinforce important concepts taught in school through fun and engaging means
3. Curate a friendly and welcoming environment for students in order to improve self-esteem, inspire a passion for learning and nurture students into resilient and independent learners
4. Develop and test lesson packages for teachers to reduce their workload

1.3 Target Audience

The target audience of the project is a select group of P6 students from Geylang Methodist School (Primary). According to feedback, the students are restless, easily distracted and inattentive during lessons. Some have also lost motivation in their studies due to low self-esteem or a lack of self-confidence.

1.4 Products

The products of the project would be lesson packages based on the chapters and contents of the 6A Foundation Mathematics Textbook. Each package would contain a worksheet and an answer key. Within the worksheet would be online games, exercise questions created by the team and recommended Youtube videos.

2. Literature Review

2.1 Self-confidence and its Effects on Student Performance

Oskar Ku, Sherry Y. Chen, Denise H. Wu, Andrew C. C. Lao, & Tak-Wai Chan (2014) stated students often perceive mathematics as a difficult subject, with low confidence being one of the critical reasons that culminates in students giving up on mathematics. Oskar Ku et al. (2014) also stated that self-confidence can be a predictor of a student's performance and those with high self-confidence may attain better performances in tasks while those with low self-confidence tend to avoid calling for help. Besides, students who lack confidence tend to lose faith in their studies as they do not believe they can succeed (Hosogi et al. 2012). This makes rendering assistance to those with low self-confidence imperative. In Singapore, this is even more so due to the "high pressure" of the education system which can detrimentally affect the self-esteem of a student (Teo, 2018).

2.2 Learning Methods Compatible with Lesson Packages

Past studies have shown digital games have the potential to enhance a student's confidence (Cunningham, 1994; Radford, 2000). Furthermore, digital games can also enhance the student's learning motivation and performance. (Ke & Grabowski, 2007). This is in line with Wood, E., & Attfield, J. (2005)'s statements that learning through games which allow students to play enhances learning experience. Meanwhile, Hosogi et al. (2012) found that to allow students to recover from low self-esteem, it is important for them to accumulate a series of successful experiences to create a positive concept of self. The projects believe by utilising digital games to allow students to gain the necessary successful experiences, the students' self-esteem and self-confidence will be boosted and their concepts reinforced.

2.3 Workload of Teachers

Wang, John C. K. Pyun, Do Young Koh, Koon Teck Kwon, Hyungil Harry (2017) stated that a majority of teachers experience a great amount of occupational stress, which leads to turnover intention and decrease in performance. Wang et al. (2017) also stated teachers in Singapore are more susceptible to burnout due to the emotionally-draining nature of teaching. Besides, Faris (2019) stated Singaporean teachers work more hours than the OECD average. This is supported by Tan (2019), who found out teachers claimed to work an average of 56 hours per week, far higher than the OECD average given by Faris (2019).

3. Methodology

3.1 Needs Analysis

According to Mrs Ho, the liaising teacher-in-charge, “We (Teachers) face difficulty catering to the specific individual needs of every student. They find it easier to ask questions when they are with individuals around the same age group. They are not hindered by the “teacher” mental model thus are more willing to accept help and advice. Online packages can be one very good way of using ICT (infocomm tech) and help[ing] [them] improve their Math at the same time.”

Mr Lim, the math teacher of the students, also mentioned that foundation students are generally very weak in fractions. Despite teachers repeatedly teaching in class, the students are unable to retain the concepts and when it comes to word problems thus many students do not do well because they have already given up. Based on feedback from teachers, many of these students are also restless, easily distracted and inattentive during lessons. Some have also lost motivation in their studies due to low self-esteem in themselves.

3.2 Development of Resources

Using the students' textbooks and past year PSLE papers as reference, mathematics questions were created. Questions were varied in nature; mechanical questions were placed in the online games and worksheets to reinforce concepts while word problems gave students a chance to apply concepts. Step-by-step answers, using similar methods and wordings taught to them, were provided to help students independently understand.

5. Ali had some books for sale. In March, he sold $\frac{1}{4}$ of the books.
- In April, she sold $\frac{5}{9}$ of the remaining books.
- (a) What fraction of the books did he sell in April?
- (b) At the end of March, Ali had 81 books. How many books did Ali have at first?

Figure 1 - Question adapted from PSLE 2017 Paper 2, Q17

Session 1: Fractions Revision

Thinking Questions

1. What are fractions?

2. How can fractions be applied to daily life?

You may watch these videos for ways to remember how to deal with fractions.
 Dividing a fraction by a whole number: <https://www.youtube.com/watch?v=RMKPuotfF8>
 Dividing a whole number by a fraction: <https://www.youtube.com/watch?v=povqzkcV5mU>
 Dividing a fraction by a fraction: <https://www.youtube.com/watch?v=nMZJKGyu-Kk>

Key Ideas:

1. To divide by a fraction, **keep** the fraction/number in front, **change** the sign and **flip** the second fraction (divisor) around
 Example: $2 \div \frac{1}{3} = 2 \times 3$ or $\frac{2}{5} \div \frac{2}{3} = \frac{2}{5} \times \frac{3}{2}$

2. When dividing a proper fraction by whole number, **keep** the whole number and **change** the sign, and **flip/convert** the whole number to fraction
 Example: $\frac{1}{4} \div 3 = \frac{1}{4} \div \frac{3}{1} = \frac{1}{4} \times \frac{1}{3}$

Remember: Keep (the first item), change (the sign), flip (the divisor)

Access the link to practice your skills with a game!
 Link: <https://tinyurl.com/2020package1>
 Do feel free to refer to the above concepts when playing the game.

Practice Questions

1. Find the value of
 (a) $\frac{8}{11} \div 6$
 (b) $27 \div 4$

a) $\frac{8}{11} \div 6 = \frac{8}{11} \times \frac{1}{6}$

2. Find the value of
 (a) $\frac{3}{4} \div \frac{1}{9}$
 (b) $3 \div \frac{9}{12}$

Ans: (a) _____
 (b) _____

Ans: (a) _____
 (b) _____

Figure 2 - Sample of Worksheet

Session 1: Fractions Revision : Answer Key

Change

Flip

1.

a) $\frac{8}{11} \div 6 = \frac{8}{11} \times \frac{1}{6}$
 $= \frac{8}{66}$
 $= \frac{4}{33}$

b) $27 \div 4 = \frac{27}{1} \times \frac{1}{4}$
 $= \frac{27}{4}$

2.

(a) $\frac{3}{4} \div \frac{1}{9} = \frac{3}{4} \times \frac{9}{1}$
 $= \frac{27}{4}$

(b) $3 \div \frac{9}{12} = \frac{3}{1} \times \frac{12}{9}$
 $= \frac{3}{1} \times \frac{4}{3}$
 $= \frac{12}{3}$
 $= 4$

To divide by 6 means to multiply by $\frac{1}{6}$.
 Recall: Keep, change (the sign), flip (the divisor)

$4 = \frac{4}{1}$. To divide by 4 means to multiply by $\frac{1}{4}$.
 Recall: Keep, change (the sign), flip (the divisor)

To divide by $\frac{1}{9}$ means to multiply by $\frac{9}{1}$

$\frac{9}{12}$ can be simplified to $\frac{3}{4}$ by dividing both numerator and denominator by 3
 To divide by $\frac{3}{4}$ means to multiply by $\frac{4}{3}$

3. John has $\frac{3}{4}$ kg of beans. He consumes $\frac{1}{8}$ kg of beans per week. How many days can the beans last him?

Number of weeks the $\frac{3}{4}$ kg of beans can last = $\frac{3}{4} \text{ kg} \div \frac{1}{8} \text{ kg}$
 $= \frac{3}{4} \times \frac{8}{1}$
 $= \frac{24}{4}$
 $= 6$

The $\frac{3}{4}$ kg of beans can last 6 weeks.
 1 week has 7 days. 6 weeks have 42 days.

Ans: _____ 42 _____

4. Douglas has 250 chairs. He divided $\frac{9}{10}$ of his chairs amongst his 3 friends. How many chairs did each friend receive?

$\frac{9}{10}$ of 250 chairs = $\frac{9}{10} \times 250$
 $= 225$

He gave 225 of his 250 chairs to his 3 friends
 $225 \div 3 = 75$

Each friend received 75 chairs from Douglas.

Ans: _____ 75 _____

To divide by $\frac{1}{8}$ means to multiply by $\frac{8}{1}$

Underline keywords when attempting the question. Note question is asking for days

To find $\frac{9}{10}$ of the chairs, multiply 250 with $\frac{9}{10}$.

Is the answer reasonable? 75 is lesser than 250, so it is reasonable.

Figure 3 - Sample of Answer Key

Videos featuring songs about the related mathematics topic were also taken to provide visual support to the worksheets and make learning more memorable and interesting.

Online games are created by the team for the students. The questions in the games are mainly mechanical questions. Different game modes were used to retain the student's interest and attention.



Figure 4 - Sample of game used



Figure 5 - Sample of game used

3.3 Pilot Test

Resource packages were administered regularly to the select groups of students on a weekly basis. The liaising teacher-in-charge received the resource packages and subsequently passed it on to the mathematics teacher and students.

4. Outcomes & Discussion

The project has successfully created 7 online packages and corresponding comprehensive answer keys to each of the packages.

4.1 Teacher Feedback

Based on the feedback received, the lesson packages were in general helpful. The students looked forward to the online lesson packages and doing the worksheets. Mrs Ho has also indicated that they are appreciative of the efforts put in and the students are happy to receive the materials. This shows the lesson packages have been packaged in a meaningful and engaging manner.

However, Mr Lim has also feedbacked that the lesson packages can be improved in the following ways:

- Greater focus on mechanical questions before moving on to word problems
- Simplify the questions
- Use manageable numbers in practice questions
- More scaffolding can be provided to lead the students in doing the questions

4.2 Limitations

The project has been handicapped by the current COVID-19 situation, as there are many restrictions to adhere to. The lack of physical lessons or basic face-to-face interaction has rendered the project incapable of effectively reaching out to the students on an emotional basis and a welcoming environment cannot be effectively curated.

The team is unable to effectively reach out for feedback from the students and understand their needs. This results in the project becoming more generic, the team being less able to capture the specific needs of every student and improve the packages on a weekly basis.

4.3 Future Expansions

The project can refine the current lesson packages and create new ones that includes a greater diversity of games and mechanical questions. The packages can also be sent out more frequently and the topic of each package can be focused on a particular sub-topic rather than entire textbook chapters.

There is potential for the project to carry out online face to face lessons on online platforms such as Google Meet and even physical lessons, depending on the COVID-19 situation and the capacity of the school.

5. Conclusion

Stepping into the shoes of an educator, a valuable lesson learnt is that to cater to the students' needs, it is essential to understand their strengths and weaknesses so as to guide them in learning effectively. In the pandemic, it is more challenging to reach out for the students and to create lesson packages that can truly captivate them. The process of creating questions and games, taking time to create diagrams and packaging it nicely is an eye opener to the challenges teachers have to face on a daily basis. Amongst groupmates, effective communication and setting out clear roles and tasks was the cornerstone of smooth functioning.

6. References

1. Abrams, A. (2017). 8 steps to improving your self-esteem. Retrieved April 4, 2020 from <https://www.psychologytoday.com/us/blog/nurturing-self-compassion/201703/8-steps-improving-your-self-esteem>
2. Ackerman, C. E. (2020, April 2). 18 Self-Esteem Worksheets and Activities for Teens and Adults (PDFs). Retrieved April 4, 2020, from <https://positivepsychology.com/self-esteem-worksheets/#kids>
3. Cai, H., Brown, J. D., Deng, C., & Oakes, M. A. (2007). Self-esteem and culture: Differences in cognitive self-evaluations or affective self-regard?
4. Chew, D. (2016). Early childhood education: Importance of learning through play. Retrieved April 4, 2020 from: <https://www.straitstimes.com/singapore/education/early-childhood-education-importance-of-learning-through-play>
5. Cunningham, B. (2019, October 4). The Importance of Positive Self-Esteem for Kids. Retrieved from <https://www.understood.org/en/friends-feelings/empowering-your-child/self-esteem/the-importance-of-positive-self-esteem-for-kids>
6. Faris, M. (n.d.). *Singapore teachers working fewer hours, but still more than international peers: OECD survey*. TODAYonline. <https://www.todayonline.com/singapore/singapore-teachers-working-fewer-hours-still-more-international-peers-oecd-survey>
7. Hosogi, M., Okada, A., Fujii, C., Noguchi, K., & Watanabe, K. (2012, March 20). Importance and usefulness of evaluating self-esteem in children. Retrieved April 4, 2020, from <https://www.ncbi.nlm.nih.gov/pubmed/2243338>
8. Oskar Ku, Sherry Y. Chen, Denise H. Wu, Andrew C. C. Lao, & Tak-Wai Chan. (2014). The Effects of Game-Based Learning on Mathematical Confidence and Performance: High Ability vs. Low Ability. *Journal of Educational Technology & Society*, 17(3), 65-78. Retrieved August 16, 2020, from www.jstor.org/stable/jeductechsoci.17.3.65

9. Sinnakaruppan, R. (2017, March 27). Why Singapore's education system needs an overhaul. Retrieved April 4, 2020, from <https://www.todayonline.com/daily-focus/education/why-spores-education-system-needs-overhaul>
10. Strong Links between Self-Confidence and Math Performance. (2011). Retrieved April 4, 2020, from <https://singteach.nie.edu.sg/issue29-mathed/>
11. Tan, J. (2019, June 01). Commentary: Teachers love their jobs and feel valued but face immense challenges. Retrieved August 16, 2020, from <https://www.channelnewsasia.com/news/commentary/singapore-teachers-challenges-love-their-jobs-feel-valued-parent-11579006>
12. Teo, Y. Y. (2018, February 4). When kids say 'I lazy what'. Retrieved April 4, 2020, from https://www.straitstimes.com/opinion/when-kids-say-i-lazy-what?utm_campaign=Echobox&utm_medium=Social&utm_source=Facebook&xitor=CS1-10
13. Vming. (2016, April 13). Early childhood education: Importance of learning through play. Retrieved April 4, 2020, from <https://www.straitstimes.com/singapore/education/early-childhood-education-importance-of-learning-through-play>
14. Wang, C.K.J., Pyun, D.Y., Koh, K.T., & Kwon, H.H. (2017). Teacher Burnout and Teaching Effectiveness in Singapore. (NIE Research Brief Series No. 16-013). Singapore: National Institute of Education.
15. Yang, C. (2016). Long hours, stress cited as reasons for leaving teaching force. Retrieved March 31, 2018 from <http://www.straitstimes.com/singapore/education/long-hours-stress-cited-as-reasons-for-leaving-teaching-force>