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Learning stations in enhancing remedial pupils' basic numeracy post-pandemic: A case study

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Abstract

This case study aims to explore the usage of learning stations to teach basic numeracy and to engage level one remedial pupils to learn basic numeracy after pandemic. After the pandemic, many factors will determine whether remedial pupils struggle to grasp basic numeracy skills, especially in light of the new educational norm that the COVID-19 pandemic has provoked. However, learning stations can assess pupils' understanding through its unique features, improving pupil's learning numeracy, especially in this post-pandemic COVID-19. Data was collected from three remedial officers via interview and five remedial primary level one pupils in Sandakan, Sabah through observations. On top of that, analysis of documents such as APDM data and numeracy screening data were performed to gain a comprehensive picture of this usage of learning stations. Findings reveal that learning stations were potentially useful to teach basic numeracy for that remedial primary level one pupil, in particular, 30.95% of the remedial pupils passed the numeracy screening test after learning at the learning stations. At the end of this study, that remedial pupil was able to achieve the learning goals through learning stations.

Keywords: remedial pupils, numeracy, learning stations, post-pandemic

INTRODUCTION

The unanticipated COVID-19 pandemic established a new norm that fundamentally transformed peoples' social interactions and way of life, as well as the educational industry (Radzi, 2022). The COVID-19 pandemic forced many schools and universities in Malaysia to suspend operations and transform to online teaching and change the learning environments drastically (Radzi, 2022). Due to Covid-19's unanticipated happen, which altered Malaysia's educational system, the Ministry of Education Malaysia (MOE) has been dealing with several difficulties for the past three years (Abu Bakar et al., 2021). A child's struggles with learning fundamental numeracy skills will depend on several variables, particularly in light of the new educational standard that the COVID-19 pandemic has prompted (Engzell et al., 2020). Supported by Buchanan et al. (2022), they discovered that the children's well-being had been negatively impacted by the absence of schooling as usual, but in the process, the children's standpoint on education had changed because they had skipped being a part of something greater than themselves in a setting that offered interactions, configuration, and intention after the pandemic. Learning station is one of the differentiated instructions that may help children in different level to create their best learning experience (Tomlinson, 2017). Therefore, this paper is a probe into the way of stimulating remedial pupils to learn basic numeracy skills post-pandemic.

LITERATURE REVIEW

Mathematics is one of the core subjects in Malaysian schools and international education institutions (KPM, 2017; DfE, 2014). Pupils can execute demanding, enjoyable, meaningful, and exciting tasks in mathematics, which helps to stimulate their interest in learning new things (KPM, 2017). Also, mathematics acts as tools to provides students with essential skills to solve their daily life problems as they launch to adulthood, such as problem-solving skills and recognising quantities (DfE, 2014; KPM, 2017). Number is one of the core strands in mathematics in the National Standard-Based Curriculum for Malaysia (KPM, 2017). It includes skills such as concept of numbers, basic calculation skills, simple mathematical ideas, and competency in applying mathematical knowledge and skills. In Malaysia, schools are required to teach numbers and operations from the early years and throughout all primary and secondary school (KPM, 2017). The term "numeracy" is applied to refer to early number skills in the current study because it is more frequently used in the research literature to describe fundamental number skills. (Raghubar & Barnes, 2016). In order to find a solution to motivate our remedial pupils, we proposed using learning stations as one of the teaching strategies to help them to learn numeracy skills post-pandemic.

The learning stations, which were originated on Montessori's early 1900s ideas and later reshaped by Dewey's philosophy of education, Piaget's theories, and Vygotsky's constructivist theories, became a famous design in the 1960s and 1970s (Bulunuz & Jarret, 2010). The multiple intelligences theory supports the implementation of the learning stations approach in our modern educational system as a teaching strategy that addresses differences between individuals (Bulunuz & Jarret, 2010). Learning stations is a cutting-edge approach that allows students to work autonomously, employ a variety of tools and resources, participate actively in the learning process, and retain more of the knowledge (Pho et al., 2021). Parallel with the findings of the meta-analysis show that learning stations-based teaching strategies substantially outperform conventional teaching strategies in terms of classroom success (Aydogmus & Senturk, 2019). Also, Pho et al. (2021) indicated that the Learning stations have improved teaching quality and increased passion for learning, autonomy, and innovation, which over time shapes their satisfaction, enthusiasm, and originality in their academic pursuits.

Learning stations can be designed to teach any of the subjects in a primary school curriculum. These stations can be used to review, reinforce, or enrich the curriculum (Tomlinson, 2017). For instance, general stations like a vocabulary station, a mathematics station, a music station might be set up in a classroom. In other classrooms, stations might be more curriculum-based, like in science, where they might involve experiments, data gathering, recording, and analysis, among other things (Tomlinson, 2017). With the clear guidelines, pupils use the learning stations to complete a series of learning tasks in places established during the teaching and learning process either independently and collaboratively, in order to learn or evaluate a topic (Batman et al., 2019). It is a student-centered approach in which the class is split into teams and the subgroups are instructed to contribute to the projects completed by earlier groups and to accomplish partial projects (Tomlinson, 2017). Pupils can engage in various topics simultaneously at the stations, which are compact learning and activity spaces. (Tomlinson, 2017).

Pupils are able to work independently on knowledge, understandings, or skills at learning stations (Tomlinson, 2017). In addition, pupils also can collaborate in small groups with the supervision of their instructor, take charge of their own learnings, have rich learning opportunities, engage in a variety of learning activities and utilize variety of learning resources, and experience affirmation of the information they've learned (Wright et al., 2014). Learning stations have more resources and a longer lifespan than other types of facilities. Learning stations are less formal portions of a room that are designated for shorter times. In the stations, materials come and go as pupils work there starts and concludes. To address pupils' readiness, language, engagement, and learning needs, teachers can modify learning station settings and learning station activities. They are also beneficial for creating or putting into reality significant concepts, as well as for practicing knowledge and skills (Tomlinson, 2017)

Learning station activities should last 15 to 20 minutes and assist learners in learning a certain skill or gain insight into a specific subject or idea (Sejnost, 2009). Depending on the specific the teacher's goals for the tasks and the dynamics of the classroom, pupils can be dispatched either individually or together to the multiple learning stations (Sejnost, 2009). Simply because it involves pupils in active, on-task learning, employing learning stations is a successful method. Pupils are free to

move around and engage in hands-on activities rather than being forced to sit quietly and listen to a lesson (Sejnost, 2009).

Putting it into our context, we propose to organize learning stations during a remedial academic carnival through four core topics. The topics were carefully selected to connect the pupils' remedial mathematics content and learning skills to the real world. There are four main topics included in these learning stations: pre numbers, arithmetic, money, and time. The first topic is about pre numbers which focuses on teaching the subtopics for example, counting, matching, ordering, sorting, patterning and so on. The second topic is arithmetic, which covers the skills of addition, subtraction, multiplication, and division. The third topic is about money, which emphasis on recognize money, addition and subtraction involve money. The last topic is time, which includes calendar, reading time and so on.

METHODOLOGY

To collect pertinent qualitative data for this study, a single case study research design was used. It was put into practise in a school hall in the Sandakan district, Sabah. In this study, three remedial officers were chosen purposely: Remedial Officer 1 (RO1), who had taught remedial classes for more than 20 years, Remedial Officer 2 (RO2), who had taught Bahasa Malaysia for more than 17 years and Remedial Officer 3 (RO3), who had taught mathematics for more than 10 years. They participated voluntarily in this study. The informed consent letter and a letter with study details were delivered to the participants to seek their consent for this study's purposes. Observation, interviews, and document analysis were used to gather data. The purpose of this study is to investigate how learning stations assist remedial students in learning basic numeracy. Hence the research questions for this study are 1) How does the remedial officers implement learning stations to teach basic numeracy to remedial pupils? 2. To what extent does the implementation of learning stations support the achievement of the intended learning outcome, which is being able to pass the remedial numeracy screening? To address the aforementioned research objectives, the researchers gathered data from a single case study, which they then integrated evaluated. The researcher gathered all pertinent documents, including official letters, reports, and meeting minutes.

RESULTS

Two main themes emerged in the present study: (1) Learning stations are organized collaboratively with remedial teachers; and (2) Learning stations appear to be a potentially useful differentiated instructional based teaching method for teaching basic numeracy to the remedial pupils. This section provides a case profile of two remedial officer's organizing learning stations process. The case description clarifies how they implemented learning stations to teach basic numeracy to remedial pupils in their remedial academic carnival.

Theme 1: Learning stations are organized and planned in a systematic way.

The results presented in this section are used to answer the first research question. Learning stations are organized and planned in a systematic way. The two remedial officers organized the learning stations into three distinct phases, pre- learning stations, during- learning stations, and post- learning stations.

Pre- learning stations

In the interview, RO1 elaborated that:

We took about 3 months to do the planning and organized the whole learning stations. Firstly, we drafted the paperwork on 1 June, then we proposed our idea to the head of academic department on 7 June. Observation data also showed that the three remedial officers proposed their paperwork to their head of academic department (see Figure 1).

Figure 1: Three remedial officers propose their paperwork to their head of academic department.

RO1, RO2 and RO3 called up a meeting with remedial teachers in Sandakan district (see Figure 2). Remedial teachers were divided into 4 groups. Each group takes care of one numeracy learning station with different topic.

Figure 2: RO1, RO2 and RO3 called up meeting with remedial teachers

In the interview, RO1 indicated that:

> We also meeting with school's principal on 15 July to inform them the aims and the benefits of these learning stations during the remedial academic carnival.

From the interview transcript, RO3 said:

> "…Also, we always report the preparation of learning stations to our chief officer of the Sandakan education office."

Parallel to the observation data showed that the three remedial officers reported the progress to the chief officer of the Sandakan education office as well on 12 August (see Figure 3).

Figure 3: The three remedial officers reported the progress to the chief officer of the Sandakan education office

In the interview, RO2 extended her explanation:

> "…We collaborated with our remedial teachers to set up the learning stations the day before the carnival on 14 August"

In addition, observation data showed that the learning stations have been set up nicely (see Figure 4).

Figure 4: Numeracy learning station

During- learning stations

From the observation data, the remedial teacher built her remedial pupil's number concepts at the numeracy learning stations on 15 August (see Figure 5). After the teacher's guidance, the pupil was motivated to learn, she tried to learn the number sequence at the learning station (see Figure 6).

Field note taking data also showed that:

> Teacher A: "Ain, please have a try to count how many pears are they?"
> Pupil A: "Let me try to count."

Figure 5: Teacher A guides Pupil A to build her number concept at the learning station

Figure 6: Pupil B tried to learn the number sequence at the learning station

Observation data also indicated that remedial pupils could move around the stations and learn collaboratively in small groups or individually (see Figure 7). Remedial pupils can engage in various numeracy activities, for example, counting games, fishing numbers, telling time and so on, simultaneously at the stations, which are compact learning and activity spaces (see Figure 8).

Figure 7: Pupil C and Pupil D learn numeracy collaboratively at the learning station.

Figure 8: Pupil E tried to learn quantities with fishing games at the learning station.

Post- learning stations

Document analysis data showed that three remedial officers do keep record for this learning stations through written news on 17 August 2022 (see Document 1), RTM news on 19 August 2022(see Document 2), one page report (see Document 3), and post-mortem for the learning station on 15 September 2022(see Document 4).

Kerjasama semua penting bantu pelajar berkeperluan khas

Winnie Kasmir

SANDAKAN: Kerjasama semua pihak, terutamanya ibu bapa dan penjaga, penting dalam membantu menjayakan program pemulihan bagi pelajar berkeperluan khas.

Ketua Penolong Pengarah Kanan Sektor Pembelajaran Jabatan Pendidikan Negeri Sabah, Awang Jaya Awang Damit berkata, peranan semua pihak ini perlu kerana pemulihan dan proses pembelajaran bersambung ke rumah.

"Mendidik anak-anak berkeperluan khas ini kita tidak boleh serahkan 100 peratus kepada guru-guru di sekolah sahaja tetapi ibu bapa perlu juga memainkan peranan penting dalam memastikan anak-anak ini mendapat pendidikan sewajarnya.

"Ibu bapa dan penjagalah yang akan menyambung tugas dan peranan mendidik itu di rumah mereka masing-masing.

"Begitu juga dengan Pertubuhan Bukan Kerajaaan (NGO) lain perlu memberikan kerjasama misalnya dari segi memberikan dana dan sokongan yang lain seperti alat bantu mengajar serta pembelajaran kepada anak-anak berkeperluan khas ini," katanya.

Beliau berkata demikian ketika ditemui media selepas mewakili Pengarah JPNS, Tah Nia Jaman merasmikan Karnival Mesra Pemulihan Khas di Dewan SMKA Tun Juhar Sandakan pada Isnin.

Karnival sehari itu merupakan anjuran Unit Pemulihan Khas Pejabat Pendidikan Daerah (PPD) Sandakan dan Majlis Guru Pemulihan Khas Daerah Sandakan, dan turut dimeriahkan dengan kehadiran lebih kurang 400 murid berkeperluan khas sekolah rendah dari sekitar daerah Sandakan.

Dalam pada itu, Awang Jaya memuji usaha PPD Sandakan dalam melaksanakan karnival itu yang menghimpunkan pelbagai bahan bantu mengajar yang kreatif dan inovatif.

Beliau turut berharap karnival seumpama dapat diteruskan pada masa akan datang selain diperluas dan dicontohi oleh PPD lain di negeri ini.

Sementara itu, Pegawai Pendidikan Daerah Sandakan, Dr Dalmansa Tahil berkata, penganjuran karnival itu antara lain mendedahkan murid pemulihan khas kepada pembelajaran di luar bilik darjah serta guru-guru mengenai akses penggunaan alat bantu mengajar.

Selain itu, mendedahkan ibu bapa serta masyarakat akan kepentingan pengajaran dan pembelajaran murid berkeperluan khas di daerah ini.

Document 1: Written news about learning stations in helping remedial pupils to learn numeracy

Document 2: RTM news about the learning stations

Document 3: One-page report about the implementation of learning stations.

Document 4: Post- mortem about the implementation of learning stations.

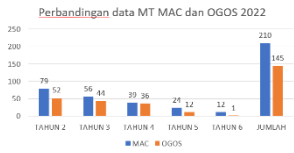
Theme 2: Learning stations are potentially useful teaching strategies to help remedial pupil to learn basic numeracy.

The researchers compare the screening results of Mac 2022 with August 2022 via portal APDM (see Document 5). The document analysis showed that there are decrease in the number of remedial pupils in August 2022 compared to March 2022. In details, 27 primary years two, 12 primary years three, 3 primary years four, 12 primary years five and 11 primary years six remedial pupils passed the numeracy screening test. The descriptive statistical data show that there are a total number of 65 remedial pupils out of 210 remedial pupils in Mac 2022 have passed the numeracy screening test, which means that there is 30.95 % improvement compared to the results of Mac 2022 (see Document 6).

Document 5: Display of remedial data in APDM.

JUMLAH MURID PEMULIHAN KHAS BAGI MATA PELAJARAN MATEMATIK PEMULIHAN

	MAC	OGOS	BEZA
TAHUN 2	79	52	27
TAHUN 3	56	44	12
TAHUN 4	39	36	3
TAHUN 5	24	12	12
TAHUN 6	12	1	11
JUMLAH	210	**145**	65



Document 6: Comparison remedial numeracy data of Mac and August 2022.

DISCUSSION

This study provides a significant window into the way that three remedial officers demonstrated how to implement learning stations that involved three main phrases. Firstly, they began with planning, prepared the paperwork, and got the permission from their head of academic department. Then, they called up meeting with remedial teachers and work out the framework and identify the contents of the learning stations. According to Tomlinson (2017), the content is the input that the teachers want to instruct pupils in and hope they will learn. After the formal meeting, the meeting members all agreed to put the four main topics into the learning stations: pre numbers, arithmetic, money, and time which compatible to the remedial numeracy syllabus. After that, the three remedial officers reported their progression to the chief officer and then set up the learning station the day before the remedial academic carnival. From this, we can notice that a successful program (learning stations) needs collaboration with many parties which involves remedial teachers, school principals, chief officer, and head of academic department. During the day, the observation data showed that one of the remedial teachers built her remedial pupil's number concepts at the numeracy learning stations. After the teacher's guidance, the pupil was motivated to learn, she tried to learn the number sequence at the learning station. Observation data also indicated that remedial pupils could move around the stations and learn collaboratively in small group or individually. Remedial pupils can engage in various numeracy activities simultaneously at the stations, which are compact learning and activity spaces. Parallel to Tomlinson (2017), pupils can work independently on knowledge, understandings, or skills at learning stations. Also, Wright et al. (2014) also stated that pupils also can collaborate in small groups with the supervision of their teacher, take responsible of their own learnings, have more learning chances, engage in a variety of learning activities, and utilize variety of learning resources, and experience affirmation of the information they have learned. In the post learning station phase, the three remedial officers kept full record of the process for learning stations by one-page report, written news, RTM news and post- mortem about the implementation of learning stations.

At the end of the implementation of the learning stations, 65 out of 210 remedial pupils were able to pass the August 2022 numeracy screening test. This shows that there are 30.95% improvement if compare with data Mac 2022 numeracy screening test. The findings are consistent with the study of Pho et al. (2021) that Implementing the learning station has improved teaching standards and increased students' initiative, autonomy, and creativity, which over time shapes their academic satisfaction, enthusiasm, and inventiveness. Pho et al. (2021) aimed to identify the impact of learning station method according to competency development of elementary students in Vietnam. They focused on investigating and recommending that primary schools implement the Learning Station Method for designing electrical lectures whereas the present study focused on how to organize learning stations that can help remedial pupils in learning basic numeracy by collecting qualitative evidence. The present

study fills the gap in the evidence by focusing on the remedial pupils to learn basic numeracy using learning station.

CONCLUSION

Learning stations were divided into three phases by three remedial officers: pre-learning stations, during-learning stations, and post-learning stations. Evidence from this study suggests that learning stations did assist partially remedial pupils pass their numeracy screening test, which was the targeted learning outcome. There are undoubtedly gaps in the study. There are certain consequences that are obvious even when taking into account the study's very narrow focus and the sample size restrictions for the remedial officers. The three remedial officers were effective in helping 30% of the remedial students pass their numeracy screening test using learning stations method. Learning stations, as previously highlighted in research (Pho et al., 2021; Aydogmus & Senturk, 2014), can assist students in making progress in their academic pursuits. The learning stations, which have the potential to be an effective strategy for assisting remedial students in learning basic numeracy, are the study's major contribution. To examine the efficacy of learning stations in instructing remedial students in literacy and numeracy, additional study should be conducted with a greater sample size and a wider content focus.

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