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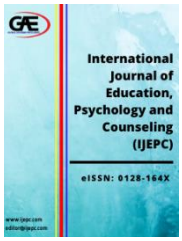

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NARRATIVE REVIEW ON INTEGRATING TECHNOLOGY INTO INSTRUCTION TO SUPPORT FOR THE NEW PEDAGOGICAL DEEP LEARNING (NPDL)

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Abstract:

The curriculum is dynamic and changes over time. Many factors impact changes in the developed curriculum, and commonly, the factors are related. The factors include changes in government policy, the requirement of the accreditation bodies, the technology advancement, the need for changes in an unexpected situation, the new skills demanded by the industries, and the current trend in education. New Pedagogical for Deep Learning (NPDL) is an example of current trends in education. The NPDL has changed from the old pedagogy, which focuses on the student mastering the content, to the new pedagogy, which focuses on students discovering and mastering the content together through deep learning. In Malaysia, NPDL has been implemented in Institut Pendidikan Guru Malaysia (IPGM) since 2016. They have developed seven modules of the Digital Tools and Resource for School Transformation Program (TS25), wherein the modules systematically nurture deep learning by benefiting the technology and digital. Technology in digital learning is one of the core elements of NPDL, and it plays an essential role in ensuring the success of NPDL implementation. Hence, this article is aimed to make a narrative review of the needs, impacts and challenges in integrating technology into instruction to support the NPDL for Malaysia case. The recommendation is also provided at the end of the article.

Keywords:

New Pedagogical for Deep Learning (NPDL), Technology Integrated Instruction, Curriculum Change, School Transformation Program, TS25

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Introduction

The curriculum is dynamic and changes over time, and in the Malaysian education setting, we also experienced curriculum changes. In primary school, Integrated Curriculum for Primary School or KBSM was implemented previously, which aims to provide good fundamental skills for students to be more proficient in reading, writing, and arithmetic from Grade 1 to Grade 3, and later in Grade 4 to Grade 6. The KBSM curriculum is designed to reinforce and master the three skills. The evaluation system is exam-based, which will be graded the student's performance based on their results. As time changed, there was a need for curriculum changes, and the Ministry of Education Malaysia introduced the Primary School Standard Curriculum or KSSR in 2011. The exam-based assessment also turns into a School-Based Assessment in which the student's evaluation is much more holistic and less exam-oriented (Lim & Chew, 2019).

Many factors impact changes in the developed curriculum, and commonly, the factors are related. The factors include changes in government policy, the requirement of the accreditation bodies, the technology advancement, the need for changes in an unexpected situation, the new skills demanded by the industries, and the current trend in education.

New Pedagogical for Deep Learning (NPDL) is one example of current trends in education. Introduced by Michael Fullan and Maria Langworthy in 2013, the NPDL is changed from the old pedagogy that focuses on the student mastering the content to the new pedagogy that focuses on students discovering and mastering the content together through deep learning (Fullan, Langworthy, & MaRS Discovery District, 2014). Deep learning outcomes in NPDL include preparing the learners with lifelong creativity, collaboratively solving problems, and contributing to the common good in an interdependent world to develop key future skills. The key future skills include character education, citizenship, communication, critical thinking and problem-solving, collaboration, and creativity and imagination (Fullan & Langworthy, 2013). In enabling deep learning outcomes, it must integrate the three core components: a new learning partnership between and among the students and teacher, deep learning tasks, and digital tools and resources (Fullan et al., 2014). This article focuses on the third core component, digital tools, and resources. According to Fullan et al. (2014), digital tools and resources have the potential to expand and accelerate learning. The technology that is integrated strategically with other components of new pedagogies will lead to deep learning.

In Malaysia, NPDL has been implemented in Institut Pendidikan Guru Malaysia (IPGM) since 2016 to support the School Transformation Program (TS25) at the end of the first phase of Malaysia Education Blueprint 2013 – 2025 (Karim et al., 2020). The IPGM have developed seven modules of the Digital Tools and Resource for School Transformation Program (TS25), wherein the modules systematically nurture deep learning by benefiting the technology and digital (Institut Pendidikan Guru Malaysia (IPGM), 2020). Since the technology integrated into pedagogies has become one of the core components of NPDL; hence, this article aims to review the integration of technology into instruction in supporting the NPDL. This article was written based on the following questions:

1. What are the needs for integrating technology into instruction?
2. What are the impacts of technology integration into instruction?
3. What are the challenges faced in integrating technology into instruction?

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Methodology in Conducting Review

A few different reviews can be conducted in producing a review article. Grant and Booth (2009) have listed 14 different types of review that can be conducted, depending on the objective and the review methodology. This article was adapted for narrative review. A narrative review is adapted because when the first attempt to find the relevant article using a systematic approach, it comes out with a limited article related to the topic; hence, it is decided to conduct the narrative review. Even though the narrative review can be biased to the author's perspective; however, it can give a good starting point to understanding the topic since it has a broad and wide criterion for searching the article to review. In writing this review, electronic databases such as Scopus, ScienceDirect and Google Scholar were selected as the database source to maintain the review's quality. The relevant and reliable articles are then gathered, and for specific information, snowballing techniques are also applied. Other than the articles, the data from the official report of relevant authorities was also used as a reference. All the data and the information gathered are then analyzed and synthesized to answer the review questions.

Review Findings

The Need for Integrating Technology into Instruction

Embedding technology into instruction is not new; it was implemented as early as 1960 when the United States of America used educational technologies such as slates, hornbooks, and blackboards to aid teaching. The technology used in the classroom has changed over time, and technology such as radio, television, film, computer, and the internet have been introduced to schools (Russel, 2006). The early introduction of technology such as radio, film and television into the classroom has caused controversy and doubts about its effectiveness in teaching. Moreover, today, we rarely see the technology implemented in instruction; even today's technologies are far superior to those introduced. Most instructors are much more comfortable maintaining the talk and chalk as an instructional method in the classroom.

In the early 2000s, most of the research found that the instructor lacked knowledge in using technology, which caused the instructor to be reluctant to integrate technology into the classroom (Abbott, 2003; Adams & Bonk, 1995; Ertmer et al., 2007). Later, when entering 2010 and above, the research results show the trend changes in technology acceptance among the teachers. In the study conducted by Ghavifekr and Rosdi (2015) on 101 respondents consisting of teachers from primary and secondary schools in Kuala Lumpur, they reported that most of the teachers realized that technology integration improves instruction and helps to design or develop interesting and engaging instruction content to students. They also reported that most teachers agree that technology integration into instruction will provide opportunities for effective teaching and enable students to be more engaged and active in learning. The study also found that the teachers are confident in learning new computer skills and open to technology integration into teaching and learning.

As we can observe from the numbers of past research conducted, there are changes in perception toward technology integration into instruction. The study conducted on 18 English language teachers in selected schools in Malaysia found that the teachers have a positive view of technology integration in teaching compared to teaching with the traditional method (Ryn & Sandaran, 2020). The respondents stated that integrating technology into instruction helped to enhance their teaching with several conditions; the technology is not complicated, and the technology must be easy to access for teachers and students.

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Even though the perception of technology integration into instruction is positive, it has occurred at a minimum level in the education system in Malaysia. The rational explanation behind this phenomenon is that 2010 is the new hand-phone era. The arrival of numerous smartphone designs with various technology bounded makes people more exposed to the technology and become technology literate; hence it has influenced the increase of positivity in perception for the technology integrated into learning or classroom. Hence, it could be said that there is barely any relation between perception towards technology integration and the level of technology integration implementation. Even though the past research showed a positive perception of technology integration, the implementation level is at the lower level for the Malaysian school system. We can observe that the technology integration was not fully implemented into the instruction. Moreover, there is no push factor to implement the technology integrated into the education system in Malaysia.

In 2020, the world witnessed history; the Covid-19 pandemic was considered a devastating event, with more than six million deaths recorded worldwide. Even though other pandemic cases recorded more people affected and had a higher death rate, Covid-19 is vulnerable since the virus can easily be transmitted through air and touch. A person affected by the virus will cause severe infection in the respiratory system and may cause a failure of function in multiple organs. In Malaysia, the cases of Covid-19 have reached more than four million confirmed cases and 11,691 confirmed death cases (Ministry of Health Malaysia (MOH), 2022). Even though the vaccination program reached 84.2% of citizens, the case of Covid-19 still shows an increment in total confirmed cases, with an average daily case of 2,328 (MOH, 2022).

Covid-19 has unintentionally changed the educational landscape tremendously. It has caused the teaching and learning activities to be conducted non-face-to-face. The Movement Control Order (MCO) enforcement intended to break the chain of Covid-19 has significantly impacted the educational systems at all levels, including primary, secondary, and tertiary education. The enforcement of MCO has not allowed the educational premise to operate and is instructed to be closed. Covid-19 and the enforcement of MCO have become the main push factor in integrating technology into instruction. Due to safety and health reasons, the Ministry of Education has instructed the teachers to conduct remote teaching. The teachers are forced to accept and change their instructional methods, from the conventional using chalk and talk to the instructional with technology integration. It can also be seen that the implementation of remote teaching due to Covid-19 has made educators more creative in creating many online contents related to the school syllabus. Hence, it can be said that the pandemic has accelerated and has become the need factor to integrate technology into instruction.

The Impact of Technology Integration into Instruction

In measuring the impact of technology integrated into instruction, we should discover how it will support attaining learning outcomes. The learning outcome is a statement that clearly outlines what a student is expected to know, achieve, and do at the lesson's end. It is crucial to ensure that students' learning experiences attain the learning outcomes, either with or without integrating technologies in teaching. This section will review the effectiveness of teaching integrated with technology to attain learning outcomes and outline the finding to show the effectiveness of teaching integrated with technology. Effectiveness in this matter means the degree to which something successfully produces the desired result.

Wekeler et al. (2020) investigated 381 higher education students to determine student engagement with and without technologies implemented in class using the Interactive

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Constructive Active Passive (ICAT) framework. The result indicated that the technologies integrated into the class encouraged students to engage in more constructive, active, and passive activities. The engagement of students has been positively associated with learning outcomes. Another research conducted by Andrew, Taylorson, Langille, Grange, and Williams (2018) on 1102 higher education students from two universities shows a relation between how frequently participants consume technology and their pleasure and perceived effectiveness. They also found that most participants think studying how to utilize technology is beneficial in the classroom as it makes learning more accessible, quicker, and more attractive. Technologies will also enable a capability to obtain information more rapidly and significantly (Andrew et al., 2018).

There is also research focusing on the subject taken in higher learning education. Research is done by Hughes, Bradford, and Likens (2018) on physical therapy educators (PTE) to see the level of acceptance for technology used to improve student learning outcomes via communication, critical thinking, and collaboration by giving PTE a 90-min session of presentation at national conferences. During the presentation, it has observed that the PTE is actively experiencing using two tech tools: Google Suite and Kahoot! Post-test data showed that PTE perceives sufficient technical assistance; they can successfully integrate tech instruments into teaching to encourage higher-order thinking and enhance student collaboration and communication within their learning (Huges et al., 2018). Mourlam, DeCino, Newland, and Strouse (2020) have examined 23 children from the Midwestern U.S to recognize children's opinions of their school-based education integrated with technology and its role in their well-being. The research found that children have encouraging experiences and are positive about educational technology at school or using an online education platform to expedite assignments and activities. They also found that children thought they supported their learning when educational technologies were used and wanted more technology-rich learning experiences at school.

Another research for middle school students was conducted by Kimmons et al. (2017) to determine whether evolving media used for student writing influences the composition of essays and compares an essay written by hand to the essay composed using Chromebooks. The participant in the research comes from three different schools. The article's author did not mention any framework used in the research, but it is similar to the SAMR Model at the substitution level. Kimmons et al. (2017) found that Chromebook essays were mostly lengthier than handwritten ones and had greater word usage complexity. It also suggests that the medium (Chromebook) affects student writing (Kimmons et al., 2017). Lin et al. (2017) investigated the effects of digital learning on learning motivation and learning outcomes of 116 students from 4 different classes. Two classes (58 students) in the experimental group proceeded with digital learning, and the other two (58 students) in the control group remained the traditional teaching method of lectures. The classes were conducted for thirty-two weeks, with three hours per week. The result showed that digital learning has better positive effects on learning motivation and outcomes than traditional teaching.

Even though many studies show the positive impact of technology integration in instruction, some studies also show the negative impact of technology integration in instruction. Hattie (2008) found that the technology integrated into instruction had a small impact on student learning compared to the other teaching and learning strategies. The finding is also in line with Cuban (2013), which mentioned that technology had had little impact on learning for the past 50 years. The range of impact identified from the previous study suggested that it is not

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technology that changes learning but how well the technology supports the teaching and learning that counts (Higgins et al., 2012). Other than that, there is also a concern about the negative effects on children's physical and social well-being and the emotional impact of digital technologies and media. For instance, researchers have discovered that certain kids use social channels to cope with loneliness and social anxiety are frequently visible to harmful subjects that can adversely affect their attitudes and behaviours. It also found that digital technologies and media will cause children to describe negative cognitive salience, assertive behaviours, and sleeping difficulties (Mourlam et al., 2020).

To summarize the impact of technology integrated into instruction, the review shows that technology positively impacts learning and helps achieve learning outcomes effectively, even though some studies show that the impact is much lower than the other intervention. The technology integrated into instruction must be cautiously applied, especially for youngsters, since there are findings on the negative impact of exposure to digital technologies and media.

The Challenge Integrating Technology into Instruction

In Malaysia, all school systems are managed by the Ministry of Education Malaysia (MOE). Until June 2020, there were about 10,220 schools in Malaysia, out of 5,895 located in urban areas, and another 4,325 schools were in rural areas (Kementerian Pendidikan Malaysia (KPM), 2020). Table 1 shows the percentage of schools located in rural areas according to the state of Malaysia. The data shows that Sarawak has the highest percentage of schools in the rural area, followed by Sabah, Pahang, Johor, and Perak.

Table 1: Numbers of School in Rural Area until Jun 2020 (KPM, 2020)

State	Number of Schools	Overall Percentage
Perlis	34	0.8
Kedah	91	2.1
Pulau Pinang	9	0.2
Perak	362	8.4
Selangor	89	2.1
Negeri Sembilan	183	4.2
Melaka	49	1.1
Johor	417	9.6
Pahang	470	10.9
Kelantan	108	2.5
Terengganu	182	4.2
Sabah	1,116	25.8
Sarawak	1,215	28.1
Total	4,325	100.0

From the view of student enrolment, it shows that the numbers of students enrolled in rural areas are higher than those enrolled in urban areas for primary schools, as shown in Table 2. Even though the number of schools in rural areas is lower than in urban areas for secondary schools, the total of schools in rural areas is still high compared to those in urban areas.

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Table 2: Students Enrolment for Schools in Malaysia until April 2022 (KPM, 2022)

	Urban	Rural
Primary	3,671	7,776
Secondary	1,794	655

Why is it significant to determine the number of schools in rural areas? The lack of an infrastructure support system constantly affects the rural area. Road systems, electricity, water supply, and ICT services are among the infrastructure affecting rural areas. Until 2012, there are about 3% of 10,000 schools did not have 24 hours electricity, and about 15% did not have a treated water supply in schools (KPM, 2012). Data provided by the MOE also shows that from 2016 to 2019, it had about 633 schools were categorized as Poor Condition, and most of the schools were located in rural areas (KPM, 2020). The number of schools is categorized as Poor Condition based on the location, as shown in Table 3 below.

Table 3: Numbers of School Categorized as Poor Condition (KPM, 2020)

State	Numbers of School	Percentage
Perlis	2	0.3
Kedah	44	7.0
Pulau Pinang	5	0.8
Perak	18	2.8
Negeri Sembilan	18	2.8
Selangor	24	3.8
Melaka	15	2.4
Johor	24	3.8
Pahang	13	2.1
Kelantan	41	6.5
Terengganu	21	3.3
Labuan	1	0.2
Sabah	172	27.2
Sarawak	235	37.1

The recent report from the mainstream media also shows that the rural area was the most impacted area during the pandemic due to the lack of internet networking. A teacher, Muhammad Nazmi Rosli from Sekolah Kebangsaan (SK) Long Sukang, had to send homework to 111 students who live in 11 rural villages in Lawas, Sarawak, due to the lack of internet access and telecommunication networks in the area. A teacher, Nazmi, had to travel nearly 200 kilometres which takes almost three to four hours every week, to meet his students who live in Kem Balak, Kampung Pa' Dadar, Kampung Long Resina and Kampung Pa' Remirang. He has to travel to four different places due to the lack of internet connectivity (Che Lah, 2020). Similarly to the English teacher at SK Pos Gedong, Bidor, Perak, Muhammad Aisham Azahar also had to send homework to his students. Aisham had to send the homework to his students due to the lack of internet access in the areas (Abd Malik & Muharam, 2020).

The United Nations Children's Fund (UNICEF) (2020) mentioned that, although remote teaching looks relatively successful in urban areas, it is not the same as in rural areas. Other than that lack of ICT services, it also reported that most students from the rural area come from the middle class and lower income, resulting in being unable to prepare for a proper learning

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DOI 10.35631/IJEPC.747065

environment and equipment for their kids. Also, in rural areas, it is reported that technology illiterate parents cannot help their children during the pandemic.

Even though the previous part of this article has reported the teachers' positive perception of technology integration into instruction and its positive impact, it is also essential to include all these challenges when deciding the type of instructional design. It is important to consider these three factors: visible support of the infrastructure system, the readiness for implementation and the availability of digital tools for every student before integrating technology into instruction. The deep learning outcomes in TS25 and NPDL will not be achieved in the absence of one of the listed factors.

Conclusion

New Pedagogical for Deep Learning (NPDL) is one example of current trends in education. Introduced by Michael Fullan and Maria Langworthy in 2013, the NPDL is changed from the old pedagogy that focuses on the student mastering the content to the new pedagogy that focuses on students discovering and mastering the content together through deep learning. In enabling the deep learning outcomes, it must integrate the three core components: 1. a new learning partnership between and among the students and teacher, 2. deep learning tasks, and 3. digital tools and resources. Technology in digital learning has become one of the core elements of NPDL. Hence, this article reviewed technology integration into instruction in supporting the NPDL based on the three questions. From the review of the need for technology integration into instruction, it can be concluded that the pandemic and MCO have become push factors in fully integrating technology into instruction. Second, for the review on the impact of technology integrated into instruction, it can be concluded that the technology integrated into instruction has had a positive impact; even if it has a negative impact, it can be controlled. Third, based on the review of the challenge faced when integrating technology into instruction, it is found that three important factors need to be considered: visible support of the infrastructure system, the readiness for implementation and the availability of digital tools for every student. The data provided shows that an infrastructure support system is lacking to facilitate technology integration into instruction, especially in rural areas. The review also shows that the pandemic impacted rural areas the most. Not only is there a lack of infrastructure, but the economic background will also influence the possibility of success if the technology is integrated into instruction. Based on the findings in the review, it is suggested to conduct a study to determine the efficacy of integrating technology into instruction for the rural area to support the NPDL. The study will determine the effectiveness level when implementing technology integration into instruction for rural areas in supporting NPDL, providing the information and data to the Ministry of Education in setting up policies in the future hence benefiting the students in the rural area.

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