Digital Literacy in STEM Education: A Study in Malaysian Context

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Abstract

STEM education aims to produce students who are literate in STEM knowledge and skills so that they can identify, apply, and integrate STEM concepts or components. Thus, it is crucial to understand STEM teachers' competencies related to STEM education. However, the question arises as to the extent to which the planned implementation of STEM education can be accepted by teachers as implementers of STEM education curriculum in schools. Thus, this study aims to provide a preliminary view of the competencies amongst STEM teachers who have undergone Continuous Professional Development (CPD) provided by the Ministry of Education (MOE) Malaysia. A STEM Teacher Competency Assessment Instrument was developed based on the STEM Teacher Competency document approved by MOE Malaysia. In this study, a self-assessment instrument was used and was implemented online. A total of 5470 STEM teachers were involved in this study. The raw data obtained were analysed descriptively using statistical software 'Statistical Packages for the Social Sciences (SPSS version 25). Overall, the achievement of STEM field teachers for Data Literacy, Digital and Technology competencies were at a high level. A total of 2812 teachers have achieved a high level of Data Literacy, Digital and Technology competencies which is equivalent to 51.31%. Data Literacy, Digital and Technology competencies play a great role in promoting STEM teachers' attitudes and cultural beliefs in STEM education. Therefore, future study should focus on developing and testing Data Literacy, Digital and Technology design principles for effective technology adoption in educational practices.

Keywords: STEM; Data literacy; Digital; Technology; Competencies; Teachers

Introduction

The goal of STEM education is to produce STEM literate students who are able to identify, apply and integrate STEM concepts or components. STEM education also enables students to understand and solve problems creatively as well as innovatively in a real world context by using hands-on and open exploration approach. Furthermore, the integration of STEM education as an effort to incorporate some or all of the disciplines of science, technology,

engineering and mathematics into a classroom or unit of study based on the relationship between subjects and real world problems (Jusup & Sharif, 2021).

The national education system through Malaysia Education Blueprint 2013-2025 emphasizes on quality schools and student's outcomes to meet the six aspirations of students, namely knowledge, thinking skills, leadership skills, bilingual skills, ethics, and spirituality as well as national identity (Ministry of Education Malaysia, 2012). Teachers, on the other hand, need to be empowered with the latest pedagogical competencies in line with the challenges of 21st century education as well as the advent of the 4th Industrial Revolution (Huda & Teh, 2018).

Low student achievement is due to low level of understanding in science concepts thus proving that low ability students are not able to maintain knowledge for longer and unsatisfactory science achievement in international assessments such as the Program for International Student Assessment (PISA) and The International Mathematics and Science Study (TIMSS) is a challenge for the country (Bahrum & Samsudin, 2021). There is also a trend of students at the secondary school level increasingly neglecting STEM subjects in the selection of subject packages they take as they seen to be less interested in STEM (Amatan, Han & Pang, 2021).

Beside, Siew et al. (2015) stressed the need for educational institutions, especially through teachers to play a significant role in the implementation of STEM education curriculum in line with PPPM 2013-2025, not to mention STEM education initiatives that should currently be in the second and third waves of implementation domain of revision of existing curriculum and implementation of new curriculum. This situation if not addressed can have a detrimental effect on the country's ability to compete in the provision of professional human resources, especially in the field of STEM. Taking into account the problems that have been discussed, the question arises as to the extent to which the planned implementation of STEM education can be accepted by teachers as implementers of STEM education curriculum in schools.

Therefore, a STEM Teacher Competency document has been developed as a reference to all teachers, leaders, and managers of schools/institutions/education agencies as well as stakeholders involved in the field of STEM education. This document can be used as a special guide for STEM teachers to identify STEM competencies, plan for the need for Continuous Professional Development (CPD), as well as improve strategies for the development of teacher education and the teaching profession in the future.

Problem Statement

The Higher Education Planning Committee has set a gradual transition of student enrollment in Science / Technical to Literature since 1970 from a ratio of 45% of students in Science / Technical and 55% in Literature to 60% of students in Science / Technical and 40% in the field of Literature since 1980 (Sirat & Da Wan, 2016). The Committee has also recommended that this projection applied to student enrollment at the upper secondary and tertiary levels. However, until now the target has not been achieved.

The following Table 1 shows the enrollment of declining students in the Science / Technical stream from 2012 to 2018.

Table 1 The Declining Enrolment of Students in the Science/Technical Stream from 2012 to 2018

Year	Percentage of Students Enrolment in Science/Technical (%)
2012	48.15
2013	46.96
2014	46.33
2015	No data
2016	47.82
2017	45.74
2018	44.36

(Source: Ministry of Education Malaysia, 2019)

The Education Planning and Research Division (EPRD) conducted a STEM awareness study to students, teachers, school administrators and parents. Findings from this study have shown that the construct of 'teacher commitment' is at a high level, the construct of 'effectiveness (ability)' of teachers is at a moderate level while the construct of 'positive perception of support for teachers' is at a low level (Ministry of Education Malaysia, 2019). However, the overall findings of the study showed that the readiness of teachers to implement STEM approach in teaching and learning is at a moderate level.

Lack of in depth knowledge in STEM implementation methods is the cause of ineffective teaching. The readiness of teachers to implement new teaching practices is a major factor influencing the improvement of education (Hata & Mahmud, 2020). The experience of STEM integration in indirect teaching will be able to increase students' engagement, confidence, curiosity and understanding of integrated STEM disciplines. In addition, STEM integration activities in the teaching process can also provide positive opportunities for students in cultivating attitudes and beliefs about their ability to succeed in STEM (Mahmud, 2021).

Thus, the implications of these findings revealed various related issues, including declining student interest or enrollment factors in STEM subjects, teacher simplicity in mastering the latest teaching methods as well as low teacher ability to integrate STEM in daily real-life context.

Objectives

The development of STEM Teacher Competency Assessment Instrument may provide a preliminary view on the competencies amongst STEM teachers who have undergone Continuous Professional Development (CPD). Consequently, the importance of teachers' readiness to implement STEM is a priority in this study to ensure that 'the problem of teachers not ready to implement STEM' can be reduced especially on STEM teachers' digital literacy. It is an important process to assess the strengths and weaknesses of teachers in terms of their knowledge and attitudes to conduct STEM education through teachers' readiness level profiles.

Therefore, the objectives of this study are:

i. To develop and validate instrument on STEM teachers' digital literacy

ii. To identify the level of STEM teachers' perception on digital literacy

Research Questions

i. Is the instrument developed valid to measure digital literacy competencies among STEM teachers?

ii. What is the level of STEM teachers' perception on digital literacy?

Literature review

Science, Technology, Engineering, Mathematics (STEM) Learning Goals

According to Honey et al. (2014), STEM educational learning goals include STEM literacy, 21st-century competence, and STEM workforce readiness that are ability to make connections between STEM disciplines, interests and involvement. Students are involved in the engineering design process for each subject to make connections with the real world. According to Melvina and Jamaludin (2010), teachers' skills and knowledge are moderate in educational technology. This problem occurs because educators do not know the applications available in Web 2.0 as a tool to help them carry out teaching and learning (Yu et al., 2012).

This is also supported by Habibah and Vasugiammai (2011), whereby a high computer knowledge among teachers is a strength to implement technology in teaching and learning. The results show that teachers are ready, knowledgeable, and skilled in using MOOC applications in education. Under the school improvement program (PIPP, 2006-2010), ICT in teaching and learning is integrated. In line with this, the Malaysian Ministry of Education (Kementerian Pendidikan Malaysia or KPM) has provided infrastructures such as computer labs and computer hardware such as chrome books for teaching and learning well as training relevant ICT instructors. However, some schools have not received notebooks or chrome books while there are schools that accept both notebooks or chrome books and smartphones to facilitate their teaching.

A survey conducted by Belawati (2003) found that only the Klang Valley and Kuala Lumpur schools were equipped with this facility. Nevertheless, more than 1000 schools outside the area of Selangor do not have telephone lines and even internet networks.

However, with Web 2.0 applications, administrators' role in ensuring the Internet infrastructure and computer facilities is a significant challenge. The use of technology in educational institutions is profoundly impacted by those institutions' hardware and broadband facilities (Habibah & Vasugiammai, 2011).

Data Digital Literacy

A broad definition of digital data literacy includes the ICT, information, media and visual literacy, providing additional inquiry in the digital world. Martin (2008) defines digital literacy as "the ability to access and utilize the electronic infrastructures that make the twenty-first-century world possible". Besides, mastery of using these electronic tools is necessary to become successful in the digital world. The ability to acquire and use knowledge, strategies and personal qualities is a digitally literate a person. It also comprises the personal ability to

propose, perform and assess digital activities to improve life tasks. To become digitally literate, a person must know how to (a) access and evaluate, (b) utilize and manage, (c) analyse, create and interact using digital resources (Martin, 2008).

Digital literacy requires the ability to produce and analyse knowledge utilizing technology that incorporates electronic literacy skills. It thus works together to develop the talents and literacy of students. Digital literacy has become a fundamental definition of literacy in the media education sector. Digital literacy or media literacy requires reading and writing skills and poses specific significant information technology problems (Jenkins & Deuze, 2008). Literacy, data, digital and technology also facilitate better learning for students. Most students who enter the educational environment make the learning process meaningful by using digital devices in the digital environment. Teachers and school administrations have an important role to play in preparing future generations to mingle with a rapidly changing global society.

Challenges in STEM and Digital Literacy

In Australia, several policies, strategies, and projects are currently in place to resolve STEM and digital literacy challenges. Examples are The National Innovation and Science Agenda (2015), the National STEM School Education Policy (2015), the integration of 'New Innovations' to the Australian Curriculum, and the Melbourne Statement on Educational Goals for Young Australians (which contains a target of supplying students with the capabilities to become 'creative and active technology users')(Commonwealth of Australia, 2015). Based on a framework developed by the UK Forum on Computing Education, the Foundation for Young Australians explores how these technical skills could be required in the Australian workforce. The results show that more than 50 percent of the population would need to use technical capabilities at a pace that goes beyond regular contact, data and purchases (Deloitte Access Economics, 2014).

Several international organizations, including the OECD, the World Bank, the United Nations Educational, Research and Cultural Organization (UNESCO), the European Union (EU) and the International Association for the Evaluation of Educational Achievement (IEA), are also focused on STEM issues (Marginson et al., 2013). Literacy, data, digital and technology promote student competitiveness and better opportunities in today's digital world especially in the wake of the industrial revolution. In tasting these technological advances, science has become a very great tool in analysing, exploring and discovering new concepts and ideas relevant to the present generation. The ability to access, process, understand and create information or media content in a digital environment is known as digital literacy (Knaus, 2020). The ability to find and use, create, and communicate digital content, while at the same time using a critical appraisal process is a practice involved in the quest to become digital literate.

There is a known need for individuals with high-level technological competence to design and build innovative technology at the other end of the continuum. Durrant-White et al. (2015) note that there must be an emphasis on the deeper learning of technological abilities in modelling and assessing, in addition to teaching basic skill sets. These fields will create employment for Australia in the future. The critical role of ICT in Australia will be to change existing industries and current business ways. Although, as with STEM, there are indicators that, despite people getting access to technology from a young age, Australians' technical literacy and competence are declining. In Years 6 and 10, the National Evaluation Program tests students' ICT literacy, evaluating their ability to better access, manage, incorporate, and analyse content, learn new

understandings, and interact with others to engage successfully in society. Data from 2014 reveal that since 2011, the proportion of students meeting a professional standard has declined in all year groups. Nationally, despite 98 per cent reporting access to a home computer, only over 50 per cent of students may be called 'IT competent' (Australian Curriculum, Assessment and Reporting Authority, 2015).

Methodology

Research design and Sampling

This study involved survey research that employed a quantitative method. Due to Covid-19 pandemic, the data were collected online. In response to the first research question, this study was conducted with the aim of looking at validity and reliability of the instrument in terms of the content and construct including Cronbach Alpha value obtained through pilot study among the samples who were mainly educators involved in STEM education. The instrument was developed with items constructed based on review of related literature. These items were later reviewed by a panel of experts concerned to ensure content and construct validity. Quantitative data collected from the pilot study were analyzed by determining the value of the Cronbach Alpha coefficient.

Then, for the second research question, the questionnaires were distributed within the samples selected for this study who were teachers or educators in STEM that have attended Continuing Professional Development (CPD) courses between 2016-2020 organized by Divisions in Ministry of Education (MOE), State Education Department (*Jabatan Pendidikan Negeri* or JPN), District Education Division (*Pejabat Pendidikan Daerah* or PPD), public universities, private universities, and related organizations. An estimated 11,893 teachers attended various CPDs organized by numerous parties during that time. However, each teacher is also likely to attend more than one CPD. Therefore, the number of 11,893 cannot be used to measure the actual value of teachers who have attended CPD. However, a total of 5470 or 45.99% of the questionnaires were administered and used for the analysis of data.

Instrument

The development of STEM Teacher Competency Assessment Instrument was based on the STEM Teacher Competency document that the Malaysian Ministry has been approved. This document is used as a reference and guide to all relevant stakeholders, especially teachers, to identify competencies and find space to improve planning of the development needs of personal professionalism. This document sets out six competencies that need to be achieved by every teacher in the field of STEM namely (a) Belief in STEM Learning, (b) STEM Content Skills and Knowledge, (c) STEM-related pedagogy, (d) STEM and Non-STEM Integration Ability, (e) Real World Applications and Data Literacy, (f) Digital and Technology.

However, as technology plays a crucial role during the pandemic, this study only focused on data literacy, Digital and Technology. The STEM Teacher Competency Instrument developed consists of two parts. Part A is a questionnaire related to the respondents' demographics, namely teachers' name, identification card number, name of school/educational institution, type of school, state, race, gender, age, job grade and courses that been attended. Meanwhile, Part B is the questionnaire that consists of items on data literacy, digital and technology competencies of STEM.

This survey is an instrument of self-assessment and was administered online. The instrument has six items. This instrument uses a 5-point Likert scale. Each point starts from the lowest value (strongly disagree), which is 1 to the highest value (strongly agree), which is 5. Each level of the competency is set based on the average score value obtained, which are 1.00 - 2.33 (low), 2.34 - 3.66 (moderate) and 3.67 - 5 (high). The final result for each respondent, whether they are competent or not, was examined with at least three (3) out of six (6) competencies at a moderate level.

Data Collection and Analysis Procedures

Malaysia has been affected by the COVID-19, the first wave was from imported cases reported on 25th January 2020. The number of cases was relatively low until the second wave in March, 2020, which most infection cases linked to a religious gathering event held in Kuala Lumpur late in February. According to the Ministry of Health Malaysia (MOH) (2020), as for 5th April 2020, the number of confirmed cases was 3662 with 61 deaths reported. The number has been increasing from day to day, but there is a sign of flattening the normal curve distribution with the number of a new reported cases maintain within the range of 100 to 200 (MOH, 2020).

In the advent of COVID-19 pandemic, isolation and social distancing has been implemented in order to stop its spread and transmission, these modes of content delivery are not practicable. Thus, the distribution of questionnaires was only implemented using google form with the help of dissemination through the National STEM Centre, Malaysian Institute of Teacher Education (*Institut Pendidikan Guru Malaysia* or IPGM), Curriculum Development Division (*Bahagian Pembangunan Kurikulum* or BPK) and Boarding School Management Division (*Bahagian Pengurusan Sekolah Berasrama Penuh* or BPSBP), Ministry of Education Malaysia. The survey method was chosen because it is easy to administer, process, analyse, and obtain information directly from the respondents in a short time (Marcucci, 2011). Moreover, the data collection procedure is performed without manipulation to ensure that the data analysed is not biased. The raw data obtained were analysed descriptively using statistical software 'Statistical Packages for the Social Sciences' (SPSS version 25).

Data Analysis and Result

For the first research questions in developing and validate instrument on STEM teachers' digital literacy, the instrument's content validity was analysed by 10 expert from various local public university who were involved in STEM research area. They were chosen to validate the instrument in order to fulfil the expert validation process. The results of the construct validity of the accepted questionnaire was based on data literacy, digital and technology for STEM Teacher Competency Instrument involved examination of items by the 10 experts that were found suitable to be used to measure the constructs studied after a few rectification phases. Then, the reliability test that focused on the items was conducted as a pilot study among 76 respondents among STEM field educators at various levels from Johore. The Cronbach Alpha reliability value for the constructs in this study was 0.970.

The factor analysis conducted to obtain construct validity showed that the factor load value for each item was above 0.50 as specified (Hair et al., 2010). These results confirmed that all items were valid for use in conducting the actual study while reliability value of the instrument was Cronbach Alpha = 0.970, which is very good and effective with high consistency. The development and validation of this Questionnaire has taken into account the review of experts in the field and is supported by the results of the analysis. The validity and reliability of the

questionnaire developed proves that this questionnaire is suitable to function as a research tool that has high validity and reliability.

Next, in order to identify the level of STEM teachers' perception on digital literacy, the questionnaires have been distributed within 5470 samples selected for this study who were teachers or educators in STEM who have attended CPD courses between years 2016 to 2020**.** Table 2 shows 3033 respondents (55.45%) are teachers who teach at secondary school (*Sekolah Menengah Kebangsaan* or SMK), while 1691 (30.91%) are teachers from primary school (*Sekolah Kebangsaan* or SK). There are also 6 respondents who are teachers from Indigenous (Orang Asli) School and 8 respondents who are Form 6 College teachers.

Table 2 List and Type of School

Type of School	Frequency	Percentage	Cumulative Percentage
Form 6 College	8	0.15	0.15
Primary School – Chinese medium (SJKC)	319	5.83	5.98
Primary School – Tamil medium (SJKT)	107	1.96	7.93
Primary School – Indigenous (Asli)	6	0.11	8.04
Primary School - National (SK)	1691	30.91	38.96
Secondary School – Religious (Agama)	111	2.03	40.99
National Secondary School (SMK)	3033	55.45	96.44
Secondary Technical School	13	0.24	96.67
Primary School (Religious – Government Funded)	15	0.27	96.95
National Primary School (SRK)	18	0.33	97.28
Others	149	2.72	100.00
Total	5470	100.00	

Table 3 showed that two state education departments contributed to the highest number of respondents which is 2183 people or 39.91% from Selangor, followed by 885 respondents or 16.18% from Sarawak. The least is 9 respondents from Perlis (0.16%).

Table 3 List of State Education Department

State Education Department	Frequency	Percentage	Cumulative Percentage
Johore	275	5.03	5.03

Kedah	186	3.40	8.43
Kelantan	396	7.24	15.67
Malacca	62	1.13	16.80
Negeri Sembilan	66	1.21	18.01
Pahang	52	0.95	18.96
Perak	40	0.73	19.69
Perlis	9	0.16	19.85
Penang	42	0.77	20.62
Sabah	163	2.98	23.60
Sarawak	885	16.18	39.78
Selangor	2183	39.91	79.69
Terengganu	614	11.22	90.91
WP Kuala Lumpur	437	7.99	98.99
WP Labuan	55	1.01	100.00
Total	5470	100.00	

As shown in Table 4, a total of 5470 respondents answered the questionnaire given. Of these, 71.94% are Malay, Chinese is 14.59%, while 4.50% is Indian. There are also other races answering the questionnaire which is a total of 491 people or 8.98%.

Table 4 Distribution of Respondents by Race

Race	**Frequency**	**Percentage**	**Cumulative Percentage**
Malay	3935	71.94	71.94
Chinese	798	14.59	86.53
Indian	246	4.50	91.02
Others	491	8.98	100.00
Total	5470	100.00	

Table 5 shows the breakdown of respondents by gender. A total of 1199 people or 21.92% were male while 4271 people or 78.08% were female.

Table 5 Breakdown of Respondent by Gender

Gender	**Frequency**	**Percentage**
Male	1199	21.92

Female	4271	78.08
Total	5470	100.00

Referring to Table 6, a total of 76.60% or 4190 respondents aged between 31 to 50 years old. While only 5.37% or 294 respondents are under 30 years old.

Table 6 The Age Range of Respondents

Age	Frequency	Percentage
<= 30 years	294	5.37
31 – 50 years	4190	76.60
>50 years	986	18.03
Total	5470	100.00

From the list of teacher grades in Table 7, it was found that 52.85% of the respondents were in Grade DG44, while 15.39% and 15.14% were in Grade DG48 and Grade DG41 respectively. There are also respondents in Grade DG54 which is 0.82% and other grades of 9.52% or 521 respondents.

Table 7 Distribution of Respondents by Grade

Grade	Frequency	Percentage
DG41	828	15.14
DG44	2891	52.85
DG48	842	15.39
DG52	343	6.27
DG54	45	0.82
Others	521	9.52
Total	5470	100.00

Table 8 shows the constructs for Data, Digital and Technology Literacy with an overall mean of 3.70 with a standard deviation of 0.748. The highest mean is 3.87 which is the item "*I make sure students use technology ethically"*. The item with the lowest mean of 3.56 is "*I am skilled in the use of technology in teaching and learning"*.

Table 8 Teachers' Perception on Digital Data Literacy According to the Construct for Data Literacy, Digital and Technology

No	Item	Mean	Standard Deviation
A1.	I am skilled in the use of technology in teaching and learning.	3.56	0.76
A2.	I encourage students to use technology in self-discovery activities.	3.75	0.744

A3.	I encourage students to use technology in collaborative activities.	3.73	0.743
A4.	I am able to encourage students to use technology in problem solving.	3.67	0.735
A5.	I am able to provide guidance related to the use of technology during teaching and facilitation.	3.59	0.766
A6.	I make sure students use technology ethically.	3.87	0.737
	Total	**3.70**	**0.748**

Discussion

Overall, the achievement of STEM field teachers for Data Literacy, Digital and Technology competencies were at the high level percentage and a total of 2812 teachers have achieved high level of Data Literacy, Digital and Technology competencies which is equivalent to 51.31%. STEM learning in schools as well as in higher learning institutions is implemented in an integrated manner with emphasis on practicality and reality. STEM education is an exploration that takes place in the teaching and learning process, involving any two components of STEM or more.

However, with the advent of COVID-19 Pandemic, isolation and social distancing has been implemented in order to stop its spread and transmission. To fill this gap and ensure the much needed STEM education continues despite fear of this pandemic spread, various method and delivery mode has been adopted (Mambo & Omusilibwa, 2020). The various barriers in learning STEM during this pandemic have not stopped educators from remaining silence and there is a great chance that STEM project-based learning and other activities can be carried out online by students (Zulirfanet al., 2020) and can be reflected from the data collected with positive results during pandemic as shown in Table 7.

The finding from this study is concurred with several findings from review of literature. Data Literacy, Digital and Technology promotes students' competitiveness and better opportunity in today's digital world especially as an indicator for industrial revolution progress. A study from Baterna et al. (2020) recommends that the implementation of digital literacy working group could enhance students' digital proficiency and equip them with the challenges of the industrial revolution. Teachers may likewise utilize digital devices as well as information effectively and responsibly towards developing digitally literate citizens. This is supported by Rahmawati et al. (2020) from their study that shows there is an increase in data literacy abilities after accomplice learning with the STEM approach through simple technology.

Conclusion

Summary and Limitations

The results or findings from the administration of these STEM field teachers for Data Literacy, Digital and Technology competencies were able to provide a preliminary explanation related to the competency of STEM teachers. However, this instrument can be improved in terms of item quality and its mode of administration. Besides, this instrument is a self-assessment and it requires the honesty of the respondents to get more accurate results so that it can be applied

by all STEM field teachers of various specializations and levels including school management or leadership.

Implications and the Way Forward

Basically, to see the competency of a teacher, periodic monitoring is also strongly encouraged because the results of teacher competency are not obtained only by assumption, it also through complemented by monitoring reports that refer to the knowledge, skills as well as culture and practices of teachers in teaching in schools. Apart from that, the evaluation of the program needs to be implemented in order to relate that the competencies of a teacher that are closely related to the input obtained through the attended program. Teaching STEM with new methods is challenging. Among the challenges is the readiness of teachers to teach the STEM curriculum that is also one of the issues that should be focused on. Teacher readiness is influenced by several factors including teacher confidence, STEM teaching effectiveness and teachers' attitude towards teaching method reform.

This study revealed finding which brings the implication that although Data Literacy, Digital and Technology competencies is very important, extroversion/introversion on teachers' attitudes and cultural beliefs should be considered to ensure the effectiveness of its directions (Fatimahet al., 2021). Future research should focus on constructing and testing Data Literacy, Digital and Technology design principles for effective professionalization of teachers in adopting technology in their educational practices. This initiative is the best first step to see the competency of teachers after various efforts made by the Malaysia Ministry of Education to improve the ability of teachers in the field of STEM in order to face the greater challenges ahead.

Significance and Contribution in Line with Philosophy of LSM Journal

This article provided a preliminary view of the ‘digital and technology competencies’ among STEM teachers who have undergone Continuing Professional Development (CPD) provided by the Ministry of Education (MoE) Malaysia. The development of STEM Teacher Competency Assessment Instrument that served as self-assessed instrument as well as teachers’ perception on ‘digital data literacy’ required for teaching and learning during pandemic was reported in this study.

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