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Technological Pedagogical Content Knowledge, Commitment and Motivation of Physics Teachers to Implement Online Teaching and Learning during COVID-19 Pandemic

Samsul Juwait[1], Siew Nyet Moi[2*], Mad Noor Madjapuni[3]

[1]Fakulti Psikologi dan Pendidikan, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia.
Email: samsuljuwait@gmail.com
[1]Fakulti Psikologi dan Pendidikan, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia.
Email: sopiah@ums.edu.my
[1]Fakulti Psikologi dan Pendidikan, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia.
Email: mdnoormj@ums.edu.my

CORRESPONDING AUTHOR (*):
Siew Nyet Moi
(sopiah@ums.edu.my)

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ABSTRACT

Most educational institutions were closed as one of the measures to deal with the COVID-19 pandemic. Teachers are mobilized to adapt online teaching and learning (OTL) methods to continue the educational process. However, previous studies have found that teacher motivation is affected due to this pandemic. Therefore, a quantitative study using questionnaire was conducted to examine the influence of Technological Pedagogical Content Knowledge (TPACK) and commitment on Physics teachers' motivation to implement OTL. A total of 77 male and 109 female Physics teachers in Sabah were selected using a stratified random sampling method. Descriptive analysis using SPSS found that teachers' level of TPACK, commitment, and motivation in implementing OTL is high. Multiple regression analysis found that the constructs of Content Knowledge and Technological Pedagogical Content Knowledge in TPACK have a significant relationship and influence on the motivation to implement OTL. The commitment constructs: Commitment to School, Commitment to Teaching, and Commitment to Profession, were also found to have a significant relationship and influence on the motivation to implement OTL. This study is helpful to stakeholders in understanding the situation of Physics teachers while carrying out essential tasks in the context of the Covid-19 pandemic to formulate relevant policies and programs for the survival of the national education system.

Contribution/Originality: This article contributes to the relevant existing literature about the Technological Pedagogical Content Knowledge, commitment, and motivation of Physics teachers while carrying out online teaching and learning during Covid-19 pandemic

1. Introduction

The COVID-19 pandemic has changed the landscape of daily life, including the field of education. Although the rate of infection of this epidemic varies in each country, at least 1.3 billion children in 186 countries are affected by the closure of educational institutions in the wake of this pandemic (UNESCO, 2020). Most educational institutions are taking steps to adopt online teaching and learning (OTL) strategies (Flores & Gago, 2020; Bao, 2020). In Malaysia, the Ministry of Education decided to close all schools nationwide during the lockdown to help the government break the COVID-19 virus transmission chain (Ministry of Education, 2020).

As a driving force in the education system and the implementation of online learning, teachers must be able to adapt to all the instructional components involved. This includes knowledge related to technology, pedagogy, and the subject matter content. This covers instructional methods, the media to be used in learning, the duration of the instructional process, and social and psychological factors. All of these instructional components can affect teachers' motivation. Han and Yin (2016) stressed that teacher motivation is an important component in ensuring that learning takes place effectively.

Motivation is often associated with the commitment aspect of an employee (Meyer et al., 2004). In education, the level of commitment of a teacher can influence the success of a school (Fink, 1992). According to Fink (1992), there are two reasons why commitment among teachers should be emphasized. First, commitment becomes a force within a teacher who requires greater responsibilities and challenges in a career as their level of education, knowledge, and skills evolve. Secondly, commitment acts as an external force that requires high standards and accountability. Studies prove that commitment among teachers is important to predict the quality of education and teachers' job performance (Tsui & Cheng, 1999).

Physics education often gets the attention of researchers. This involves two main branches: Physics education as a branch of the community of Physicists and as a branch of the community of science education (Yun, 2020). The first branch focuses more on developing the content of Physics itself, for example, those involving the theory and laws of Physics. The second branch emphasizes more on pedagogical aspects regarding the teaching of Physics, such as the preparation and delivery of Physics content to students. Studies related to the teaching and learning of Physics are essential to enhance and optimize students' understanding of Physics concepts. This includes studies on Physics teachers who delivered education to students. Griffiths (1997) states that any teaching method requires a good teacher, and such a good teacher is hard to find. This is because teaching tasks require complex skills and involve various dynamic aspects based on the current situation (Wells et al., 1995).

Some issues arise when it comes to OTL for Physics subjects. For example, Mishra et al. (2020) explained how teachers expressed concerns regarding practical activities such as experiments and field studies during the curfew period due to COVID-19. This opens up suggestions such as the use of simulation techniques using specific software and demonstrations through video presentations to aid student understanding. Most of the past studies have focused more on the issue of teacher readiness in the implementation of teaching and learning with the application of technology in general and not specific to online teaching and learning. The application of technology in the instructional process can be carried out in the context of the classroom by using technology that does not

involve internet access lines. Venkatesh et al. (2003) recommended that future studies should attempt to examine aspects related to the acceptance and adaptation of technology in OTL.

Given how teachers and students are forced to adapt to online teaching and learning, it is essential to understand the factors that can influence the motivation of groups involved in the education system. Mishra and Koehler (2006) claim that quality teaching and learning requires a thoughtful interweaving of all three key sources of knowledge: technology, pedagogy, and content, which they referred to as Technological Pedagogical Content Knowledge (TPACK). Very few studies have been conducted to specifically examine the influence of TPACK and commitment on the motivation of Physics teachers to implement online teaching and learning during the COVID-19 pandemic. Therefore, this study is expected to fill gaps in the literature.

1.1. Purpose of Study

The main purpose of this study was to find out the level of TPACK, commitment and motivation of Physics teachers to implement online teaching and learning (OTL). The relationship between TPACK and commitment to the motivation of Physics teachers to implement OTL was also studied. In addition, this study also determined whether there is an influence of TPACK and commitment on the motivation of Physics teachers to implement OTL. Thus, the three research questions that guide this study were:

i. What is the level of TPACK, commitment and motivation of Physics teachers to implement OTL?
ii. Do TPACK and commitment have a relationship with the motivation of Physics teachers to implement OTL?
iii. Do TPACK and commitment influence the motivation of Physics teachers to implement OTL?

2. Literature Review

2.1. Technological Pedagogical Content Knowledge (TPACK) framework

Mishra and Koehler (2006) proposed Technological Pedagogical Content Knowledge (TPACK) as a framework for teachers to teach effectively using technology. The TPACK framework emphasizes the connections, interactions, affordances, and constraints between and among content, pedagogy, and technology. This study focuses on four constructs of the TPACK framework: Content Knowledge, Pedagogical Knowledge, Technological Knowledge, and Technological Pedagogical Content Knowledge (Mishra & Koehler, 2006). Content Knowledge is the knowledge about the subject matter that is to be learned or taught, while Pedagogical Knowledge is deep knowledge to plan instructional processes, deliver learning, monitor and manage students, and address individual differences. Technological Knowledge is the knowledge about standard technologies and more advanced technologies, such as the internet and digital video. Besides, Technological Pedagogical Content Knowledge is the knowledge of how to support student learning of specific content through appropriate technology and pedagogy applications. The rationale for selecting these constructs is mainly to examine whether a separate and independent set of knowledge of content, pedagogy, and technology or interplay of these three bodies of knowledge influences teacher motivation in OTL.

2.2. Teacher Commitment

Thien et al. (2014) explained four dimensions of teacher commitment: Commitment to School, Commitment to Students, Commitment to Teaching, and Commitment to the Profession. Commitment to School is the teacher's acceptance of the goals and values of the school. It can be manifested through the efforts of teachers to realize the purpose of maintaining membership in the school. Next, Commitment to Students is the teacher's involvement and responsibility toward students' learning. Commitment to Teaching is the willingness of teachers to be associated and involved in teaching tasks, while Commitment to the Profession is seen through attitude, loyalty and involvement to improve the teaching profession. Altun (2017) states that teachers who have a high level of commitment will adhere to the values and goals toward achieving excellence for the organization.

2.3. Teacher Motivation

Miller et al. (1988) proposed three types of motivation that influence human attitudes and behaviors: Intrinsic Motivation, Extrinsic Motivation, and Demotivation. Intrinsic Motivation is fully influenced by the joy and self-satisfaction that result from one's accomplishments. These attitudes and behaviors are carried out voluntarily without the influence of external rewards and constraints. Intrinsic motivation is born from a person's need to feel competent and have determination (Deci & Ryan, 1985).

Extrinsic motivation is an attitude and behaviour gained not from within oneself but to obtain a reward or avoid punishment (Deci, 1975). There are four types of extrinsic motivation: External Influence, Introjection Influence, Identification Influence and Integration. External Influence refers to attitudes or behaviors controlled through external sources such as rewards and constraints given by others (Deci & Ryan, 1985). Next, Introjection Influence describes the origins of external motivation that have become prevalent in the self and makes the existence of real external factors no longer necessary. Typically, these attitudes and behaviors are reinforced through internal forces such as feelings of guilt, anxiety or emotions related to self-confidence (Ryan & Connell, 1989). While the Identification Influence is an attitude or behavior that arises because it is in line with self-values and goals (Deci & Ryan, 1985) and is still considered as extrinsic motivation, at the same time influenced internally.

The third component of motivation is known as Demotivation. Individuals will feel a loss of motivation when unable to see the relationship between the action and the outcome of the action. It creates a sense of lack of competence and control over what happens (Deci & Ryan, 1985). This type of motivation is characterized by a person engaging in any activity but not clearly understanding why the activity is being carried out.

In short, the motivational element plays a vital role in developing teachers' competencies and abilities in using digital technology (Lauermann & König, 2016). Individuals motivated by a task or activity will be more engaged, accept the task as a challenge, and adapt to new approaches to increase achievement (Ryan & Deci, 2000).

3. Research Methodology

3.1. Research location, population and sample

This study was conducted in government secondary schools and government-aided secondary schools in Sabah, Malaysia. In Sabah, there are 227 government secondary schools and government-aided secondary schools. This number includes 66 schools in urban areas and 161 schools in rural areas. However, only 198 schools offer Physics subjects to Form 4 and Form 5 students. 343 teachers teach Physics subjects throughout the state of Sabah. The researcher used two-layer stratified random sampling to select the study sample. The sampling process begins by determining the total number of Physics teachers throughout the state of Sabah. Out of 343 Physics teachers in Sabah, 186 respondents were selected randomly based on the formula of Krejcie and Morgan (1970). As a result, 77 male Physics teachers and 109 female Physics teachers were involved.

3.2. Instrument

The questionnaire in this study is divided into four main sections, namely Section A, B, C, and D. It contains 54 closed items in total to measure the main variables in the study and the demographics of the respondents. For all items of the questionnaire in Sections B, C, and D, it requires respondents to mark the response to each item based on a five-point Likert scale starting from score 1 ('strongly disagree'), score 2 ('disagree'), score 3 ('neutral'), score 4 ('agree') and score 5 ('strongly agree'). All items in Sections B, C, and D had good face validity, construct validity, and content validity assessed by two lecturers who are experts in psychology and education while the instrument's reliability was tested using Cronbach's alpha values through the results of a pilot study conducted on 30 teachers.

Section A is devoted to obtaining information regarding the background and demographics of the respondents, such as gender, length of service and category of a school where the teacher serves, either in urban or rural areas. Meanwhile, Part B measures the level of TPACK of Physics teachers, where the researcher adapts the instrument used by Schmidt et al. (2009) and Valtonen et al. (2017). The instrument contains four constructs and 23 items. Cronbach's alpha values indicate that each construct has a very high reliability value (Technological Knowledge = 0.928; Pedagogical Knowledge = 0.948; Content Knowledge = 0.995; TPACK = 0.960; Overall = 0.948).

Next, Section C was used to measure the level of commitment of Physics teachers by adapting the instrument used by Thien et al. (2014). This instrument contains four constructs and 13 items. The Cronbach alpha values for all constructs had at least a high reliability value (Commitment to school = 0.869; Commitment to students = 0.898; Commitment to Teaching = 0.872; Commitment to Profession = 0.932; Overall = 0.626).
Part D is a modified instrument from the study of Fernet et al. (2008) who measured the level of motivation of Physics teachers. This instrument contains five constructs and 15 items. Cronbach alpha values for all constructs also had at least a high reliability value (Intrinsic Motivation = 0.964; Identification Influence = 0.956; Introjection Influence = 0.763; External Influence = 0.975; Demotivation = 0.919; Overall = 0.879).

3.3. Data Analysis

The collected data were analyzed using Statistical Package for Social Sciences (SPSS) software version 26.0. Descriptive statistics involving mean values and standard

deviations were used to look at the level of TPACK, commitment, and the level of motivation of Physics teachers implementing OTL. The mean score level is divided into five categories: Very Low (1.00 - 1.89), Low (1.90 - 2.69), Medium (2.70 - 3.49), High (3.50 - 4.29), and Very High (4.30 - 5.00).

The Pearson Correlation Test was used to test whether TPACK and commitment had a relationship with the motivation of Physics teachers to implement OTL Multiple regression analysis was used to test whether constructs in TPACK and commitment influenced the motivation of Physics teachers to implement OTL. The multiple linear regression analysis tested two models. In the first model, the TPACK serves as a predictor variable for the motivation of Physics teachers to implement OTL. While in the second model, commitment serves as a predictor variable for the motivation of Physics teachers to implement OTL. The significance values were set at p = 0.05 (Ferreira & Patino, 2015).

The data were tested for linearity and normality assumptions before the data analysis. Results from the Skewness and Kurtosis tests indicate no evidence of deviation from the normality of the data because all results are in the range between -2.0 and +2.0 (Chua, 2009). The assumption of linearity was checked through the scatter plot analysis among the variables, which confirmed that there is no relationship between the residual (residual) and the predicted variable (homoscedasticity), which indicates linearity.

4. Findings

4.1. Research Question 1

Based on the analysis, the TPACK of Physics teachers is at a high level (M = 3.94, SD = .374), as shown in Table 1. This high level involves all constructs in TPACK, with the construct of TPACK recorded the highest mean (M = 4.03, SD = .538), while the Pedagogy Knowledge construct recorded the lowest mean (M = 3.85, SD = .480).

Table 1: Mean and Standard Deviation of Each Construct in the TPACK of Physics Teachers

Construct	M	SD
Technological Knowledge	3.87	.447
Padagogy Knowledge	3.85	.480
Content Knowledge	4.01	.442
TPACK	4.03	.538
Overall	3.94	.374

Referring to Table 2, all constructs in the teacher commitment were at a high level, with Commitment to Students having the highest mean value (M = 4.18, SD = .609) and Commitment to School having the lowest mean value (M = 3.63, SD = .571). This leads to the level of commitment of Physics teachers collectively being at a high level (M = 3.99, SD = .443).

Table 2: Mean and Standard Deviation of Each Construct in Physics Teacher Commitment Variables

Construct	M	SD
Commitment to School	3.63	.571
Commitment to Student	4.18	.609
Commitment to Teaching	3.96	.533
Commitment to the Profession	4.13	.657
Overall	3.99	.443

This study found that teachers' motivation to implement OTL was high (M = 3.90, SD = .369). This results from a combination of mean values that carry high-level meanings in all five constructs in this variable (Table 3). A low mean value for the demotivation construct means that the factor that reduces motivation is low since all items are negative and have inverted scores.

Table 3: Mean and Standard Deviation of Each Construct in Teacher Motivation Implementing OTL

Construct	M	SD
Intrinsic Motivation	3.64	.742
The Influence of Identification	4.05	.524
The Effect of Introjection	4.12	.599
External Influences	4.18	.587
Demotivation	3.52	.836
Overall	3.90	.369

4.2. Research Question 2

Based on the analysis results shown in Table 4, TPACK had a moderately significant relationship with the motivation of Physics teachers to implement OTL (r = .552, p < .05). Furthermore, correlation analysis showed that teacher commitment also had a moderately significant relationship with teacher motivation to implement OTL (r = .514, p < .05).

Table 4: Pearson Correlation Analysis between TPACK and Commitment with Motivation in Implementing OTL

		Teacher Motivation
TPACK	Pearson correlation Sig. (2-tailed)	.552 < .05
Teacher Commitment	Pearson correlation Sig. (2-tailed)	.514 < .05

4.3. Research Question 3

Based on Table 5, Content knowledge significantly explained the 59.0% (R^2 = .590) variability of motivation variable. It was found that only the Content Knowledge construct (β = .369, t = 5.285, p < .05) was a significant predictor of teacher motivation to implement OTL. Nevertheless, the TPACK construct was found to have an almost significant p-value (β = .106, t = 1.953, $p \approx .05$). Therefore, the TPACK construct was also

taken as the second significant predictor because the significant value of $p < .05$ cannot be considered a rigid value. Significance values close to 0.05 can still be accepted as significant and may open the door for further studies (McCluskey & Lalkhen, 2007).

Table 5: Multiple Regression Analysis of TPACK on Teacher Motivation to Implement OTL

Predictor Variables	*β*	*t*	*p*
Constant	1.718	7.309	< .05
Technological Knowledge	.095	4.792	.121
Pedagogical Knowledge	-.023	-.347	.729
Content Knowledge	.369	5.285	< .05
TPACK	.106	1.953	.052

The commitment variable significantly explained the 61.6% ($R^2 = .616$) variability of motivation variable. Furthermore, based on Table 6, there are three constructs that are significant predictors in this study, namely Commitment to School ($\beta = .367$, $t = 6.176$, $p < .05$), Commitment to Teaching ($\beta = .221$, $t = 3.912$, $p < .05$), and Commitment to the Profession ($\beta = .116$, $t = 2.519$, $p < .05$).

Table 6: Multiple Regression Analysis of Commitment on Teacher Motivation to Implement OTL

Predictor Variables	*β*	*t*	*p*
Constant	2.481	11.927	< .05
Commitment to school	.367	6.176	< .05
Commitment to students	-.074	-1.307	.193
Commitment to teaching	.221	3.912	< .05
Commitment to the profession	-.116	-2.519	.013

5. Discussion

5.1. Level of TPACK, Commitment, and Motivation of Physics Teachers

This study shows that Physics teachers in Sabah have a high level of TPACK, which indicates that Physics teachers perceive they can integrate technology effectively in the OTL of Physics. In addition, the level of knowledge of Physics teachers in all TPACK constructs is also high. The Technological Pedagogical Content Knowledge construct recorded the highest mean value, while the Pedagogy Knowledge level recorded the lowest mean value.

These findings align with the study of Juanda et al. (2021), who found that Physics teacher trainees had a satisfactorily high level of knowledge in TPACK and its all constructs. Teacher trainees typically noted that they acquire the knowledge needed for the teaching and learning process through 'trial and error methods and individual reflection methods on teaching practices (Garrahy et al., 2005; Hativa, 2000). Based on a study of approximately 17 years on content pedagogy knowledge and integration of computer and technology use, Pierson (2001) found that teachers who can integrate technology effectively can deliver content knowledge and pedagogical knowledge by incorporating technological knowledge.

As for the evaluation of the level of teacher commitment, the researcher found that overall, the level of commitment among Physics teachers in Sabah is high. Details of the findings also show a high level in all four commitment constructs. The highest mean value was recorded on the Commitment to Students construct, while the lowest mean value was recorded on the Commitment to School construct. Similar results were found through a study of 42 full-time instructors in a college in education, which showed that instructors have a high commitment (Cortez et al., 2021). Similarly, the findings by Heikka et al. (2021) showed a high level of commitment in studies conducted using the mixed-mode method. However, a descriptive analysis in Chanana's (2021) study involving 181 teachers in private schools in Haryana showed that the level of commitment among teachers was low during the Covid-19 pandemic.

The study also found that the level of motivation of Physics teachers to implement OTL was high. The descriptive analysis of the five constructs in motivation also showed high levels in all constructs. The External Influence construct showed the highest mean level, while the Demotivation construct showed the lowest mean level. These findings support the findings of the study of Panisoara et al. (2020), who found that teacher motivation and desire to continue the online instructional process during the Covid-19 pandemic were high. The high level of motivation in OTL during a pandemic may be due to an urgent need, and only such methods can be implemented as face-to-face learning is not allowed. Interviews in the study of Beardsley et al. (2021) found that there are teachers who view OTL as an exciting challenge, while from another angle, there are also teachers who feel burdened when it comes to choosing the digital methods and technologies to use and the time to spend to deliver personal feedback to students. However, these findings contradict the study by Rasmitadila et al. (2020), who found that teachers were less motivated to implement online teaching and learning. This is because teachers find face-to-face meetings more enjoyable and coupled with problems such as lack of readiness in terms of technological equipment, resources and materials that can be adapted during the online instructional process.

5.2. Relationship between TPACK and Commitment with Motivation of Physics Teachers to implement OTL

This study found a moderately significant relationship between TPACK and the motivation of Physics teachers to implement OTL. The results support previous studies that found a significant relationship between teachers' technological knowledge and literacy with motivation to implement online instructional processes (Fives, 2003). However, the findings of this study are not in line with the results of Depaepe and König (2018), who stated that there is no significant relationship between teacher trainees' knowledge and motivation. This is likely because teacher trainees are less likely to have sufficient experience implementing teaching and learning in an authentic setting, either face-to-face or virtually.

Furthermore, this study found a significant moderate relationship between teacher commitment and motivation to implement OTL. The results align with a quantitative study by Olurotimi et al. (2015), who found that a significant relationship exists between teacher commitment and motivation in general. However, Olurotimi et al. (2015) found that commitment has a significant negative relationship with teacher motivation. This is likely because the motivational aspects do not focus specifically on OTL but more on general motivational aspects such as rewards, promotions, and encouragement present as a result of courses and training attended by teachers. The findings from this study

support Kanter's theory of commitment (Kanter, 1968) which describes commitment as an aspect that is multidimensional and a link between individuals and goals in an organization. In other words, individual commitment will make a person continue practices and tasks. In the context of this study, the organization refers to schools, while practices and assignments refer to OTL activities by teachers.

5.3. The Influence of TPACK and Commitment on the Motivation of Physics Teachers to Implement OTL

This study explains that knowledge of content and knowledge of TPACK significantly influence teachers' motivation to implement OTL. In other words, the higher the content knowledge and TPACK of the teachers, the teachers will be more motivated to conduct OTL. In line with the study of Yu et al. (2021), the motivation and drive to implement innovative teaching is found to be directly influenced by the level of knowledge and skills of teachers, especially in the context of OTL.

This study found that TPACK significantly influences teacher motivation to implement OTL. This may be due to the need for a teacher to master the required technology. According to Li et al. (2020), teachers are considered the first group to use technology. They are also considered those who bring innovation to education and are required to constantly improve technical knowledge and skills that can support student learning. In addition, the subsequent multiple regression analysis showed that commitment significantly influenced teachers' motivation to implement OTL. Of the four commitment constructs in this study, three are the main predictors of teachers' motivation to implement OTL: Commitment to School, Commitment to Teaching, and Commitment to Profession. This means that motivation to implement OTL can be enhanced by increasing teachers' commitment to the school, teaching, and profession.

From a different angle, previous studies have mostly found that teacher motivation is an element influencing commitment. However, the discussion focused more on motivation as a general element rather than motivation to implement OTL. For example, Faruq et al. (2021), through a study of 180 lecturers, stated that there is an increased direct effect of motivation on the commitment to the organization. A similar finding is explained by Sinclair (2008), who states that commitment to teaching among teachers is influenced by motivation, one of the teacher's personal factors. The study of Olurotimi et al. (2015) also describes the existence of various forms of incentives as motivation can increase teachers' level of commitment. In conclusion, motivation and commitment are interrelated in a teacher's performance. This performance may be manifested in the form of behaviours and activities carried out by teachers in the classroom (Ali, 2021) or in virtual teaching and learning.

6. Conclusion

This study has provided an overview of the level of TPACK, commitment, and motivation of Physics teachers to implement online teaching and learning, one of the main methods adopted in most countries during the Covid-19 pandemic. This vital input can be used by the relevant stakeholders, especially the Ministry of Education, in planning appropriate strategies to ensure the continuity of education in the country. This includes using this data to evaluate and plan financial allocations, whether to run teacher professional development programs or prepare for infrastructure and digital support development. Continuous efforts need to be made to maintain the momentum of incorporating TPACK

into OTL. Therefore, the current competencies of teachers should be taken into account when designing the courses and workshops in future.

Ethics Approval and Consent to Participate

The researchers used the research ethics provided by the Research Ethics Committee of Universiti Malaysia Sabah (RECUMS). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee. Informed consent was obtained from all participants involved in the study.

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Conflict of Interests

The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

References

Ali, A. K. (2021). Contribution of The Principal's Transformational Leadership and School Climate on Teacher Performance through Work Motivation. *Journal of K6 Education and Management*, *4*(1), 81-90.

Altun, M. (2017). The Effects of Teacher Commitment on Student Achievement. *International Journal of Social Sciences & Educational Studies*, *3*(3), 51-54.

Bao, W. (2020). COVID -19 and online teaching in higher education: A case study of Peking University . *Human Behavior and Emerging Technologies*, *2*(2), 113-115.

Beardsley, M., Albó, L., Aragón, P., & Leo, D. H. (2021). Emergency education effects on teacher abilities and motivation to use digital technologies. *British Journal of Educational Technology*, *52*(4), 1455-1477. https://doi.org/10.1111/bjet.13101

Chanana, N. (2021). The impact of COVID-19 pandemic on employees organizational commitment and job satisfaction in referenceto gender differences. *Journal of Public Affairs*, *21*(4), 1-12.

Chua, Y. P. (2009). *Statistik Penyelidikan Lanjutan* [Advanced Research Statistics]. McGraw Hill.

Cortez, A. O., Galman, S. M. A., Amaranto, J., Tomas, M. J. L., & Rufino, M. V. (2021). Teacher's Job Satisfaction and Its Relationship with Their Work Performance, Professionalism, and Commitment. *Open Access Library Journal*, *8*, 1-10.

Deci, E. L. (1975). *Intrinsic Motivation*. Plenum Press. https://doi.org/10.1007/978-1-4613-4446-9

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Springer. https://doi.org/10.1007/978-1-4899-2271-7

Depaepe, F., & König, J. (2018). General pedagogical knowledge, self-efficacy and instructional practice: Disentangling their relationship in pre-service teacher education. *Teaching and Teacher Education*, *69*, 177-190.

Faruq, U., Sujanto, B., & Abdullah, T. (2021). The Influence of Work Team, Trust in Superiors andThe Influence of Work Team, Trust in Superiors and Achievement Motivation on Organizational Commitment of UIN Sultan Syarif Kasim Riau Lecturers Achievement Motivation on Organizational Commitment of UIN S. *American Journal of Multidisciplinary Research & Development*, *3*(5), 20-33.

Fernet, C., Sencal, C., Guay, F., Marsh, H., & Dowson, M. (2008). The Work Tasks Motivation Scale for Teachers (WTMST). *Journal of Career Assessment*, *16*(2), 256-279.

Ferreira, J. C., Patino, C. M. (2015). What does the p value really mean?. *The Brazilian Journal of Pulmonology, 41*(5), 485.

Fink, S. L. (1992). *High commitment workplaces*. Quorum Books.

Fives, H. (2003). What Is Teacher Efficacy and How Does It Relate to Teachers' Knowledge? A Theoretical Review. In: *American Educational Research Association Annual Conference (pp. 1-59). Chicago: The University of Maryland.*

Flores, M., & Gago, M. (2020). Teacher education in times of COVID-19 pandemic in Portugal: national, institutional and pedagogical responses. *Journal of Education for Teaching*, *46*(4), 507-516.

Garrahy, D. A., Cothran, D. J., & Kulinna, P. H. (2005). Voices from the Trenches: An Exploration of Teachers' Management Knowledge. *The Journal of Educational Research*, *99*, 56-63.

Griffiths, D. J. (1997). Millikan Lecture 1997: Is there a text in this class? *American Journal of Physics, 65,* 114. https://doi.org/10.1119/1.18777

Han, J., & Yin, H. (2016). Teacher motivation: Definition, research development and implications for teachers. *Cogent Education*, *3*, 1-19.

Hativa, N. (2000). Becoming a Better Teacher: A Case of Changing the Pedagogical Knowledge and Beliefs of Law Professors. *Instructional Science*, *28*(5), 491-523.

Heikka, J., Pitkäniemi, H., Kettukangas, T., & Hyttinen, T. (2021). Distributed pedagogical leadership and teacher leadership in early childhood education contexts. *International Journal of Leadership in Education*, *24*(3), 333-348.

Juanda, A., Shidiq, A. S., & Nasrudin, D. (2021). Teacher Learning Management: Investigating Biology Teachers' TPACK to Conduct Learning during the Covid-19 Outbreak. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 48-59.

Kanter, R. M. (1968). Commitment and Social Organization: A Study of Commitment Mechanisms in Utopian Communities. *American Sociological Review*, *33*(4), 499-517.

Krejcie, R. V., & Morgan, D. W. 1970. Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, *30*(3), 607-610.

Lauermann, F., & König, J. (2016). Teachers' professional competence and wellbeing: Understanding the links between general pedagogical knowledge, self-efficacy and burnout. *Learning and Instruction*, *45*, 9-19.

Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Ren, R., Leung, K. S. M., Lau, E. H. Y., Wong, J. Y., Xing, X., Xiang, N., Wu, Y., Li, C., Chen, Q., Li, D., Liu, T., Zhao, J., Liu, M., … Feng, Z. (2020). Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. *New England Journal of Medicine*, *382*, 1199-1207.

McCluskey, A., & Lalkhen, A. G. (2007). Statistics IV: Interpreting the results of statistical tests, *Continuing Education in Anaesthesia Critical Care & Pain*, *7*(6), 208-212.

Meyer, J. P., Becker, T. E., & Vandenberghe, C. (2004). Employee commitment and motivation: A conceptual analysis and integrative model. *Journal of Applied Psychology*, *89*(6), 991-1007.

Miller, K. A., Deci, E. L., & Ryan, R. M. (1988). Intrinsic Motivation and Self-Determination in Human Behavior. *Contemporary Sociology*, *17*(2), 253.

Ministry of Education. (2020). *Surat Pemakluman Pelaksanaan Pengajaran dan Pembelajaran di Rumah (No. Rujukan KPM100-1/3/1 Jld4(7)*. KPM.

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*, *1*, 100012. https://doi.org/10.1016/j.ijedro.2020.100012

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017-1054.

Olurotimi, O. J., Asad, K. W., & Abdulrauf, A. (2015). Motivational Factors and Teachers Commitment in Public Secondary Schools in Mbale Municipality. *Journal of Education and Practice*, *6*(15), 117-122.

Panisoara, I. O., Lazar, I., Panisoara, G., Chirca, R., & Ursu, A. S. (2020). Motivation and continuance intention towards online instruction among teachers during the COVID-19 pandemic: The mediating effect of burnout and technostress. *International Journal of Environmental Research and Public Health*, *17*(21), 8002.

Pierson, M. E. (2001). Technology integration practice as a function of pedagogical expertise. *Journal of Research on Computing in Education*, *33*(4), 413-430.

Rasmitadila, R., Aliyyah, R. R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., & Tambunan, A. R. S. (2020). The perceptions of primary school teachers of online learning during the covid-19 pandemic period: A case study in Indonesia. *Journal of Ethnic and Cultural Studies*, *7*(2), 90-109.

Ryan, R. M., & Connell, J. P. (1989). Perceived Locus of Causality and Internalization: Examining Reasons for Acting in Two Domains. *Journal of Personality and Social Psychology*, *57*(5), 749-761. https://doi.org/10.1037/0022-3514.57.5.749

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1),68-78. https://doi.org/10.1037/0003-066X.55.1.68

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (Track): The development and validation of an assessment instrument for preservice teachers. *Journal of Research on Technology in Education*, *42*(2), 123-149.

Sinclair, C. (2008). Initial and changing student teacher motivation and commitment to teaching. *Asia-Pacific Journal of Teacher Education*, *36*(2), 79-104.

Thien, L. M., Abd Razak, N., & Ramayah, T. (2014). Validating Teacher Commitment scale using a Malaysian sample. *SAGE Open*, *4*(2), 1-9.

Tsui, K. T., & Cheng, Y. C. (1999). School organizational health and teacher commitment: A contingency study with multi-level analysis. *International Journal of Phytoremediation*, *5*(3), 249-268.

UNESCO. (2020). *COVID-19 Impact on Education.* UNESCO. https://en.unesco.org/covid19/educationresponse

Valtonen, T., Sointu, E., Kukkonen, J., Kontkanen, S., Lambert, M. C., & Mäkitalo-Siegl, K. (2017). TPACK updated to measure pre-service teachers' twenty-first century skills. *Australasian Journal of Educational Technology*, *33*(3), 15-31. https://doi.org/10.14742/ajet.3518

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). Technology Acceptance Model - Research. *MIS Quarterly*, *27*(3), 425-478.

Wells, M., Hestenes, D., & Swackhamer, G. (1995). A modeling method for high school physics instruction. *American Journal of Physics*, *63*(7), 606-619.

Yu, H., Liu, P., Huang, X., & Cao, Y. (2021). Teacher Online Informal Learning as a Means to Innovative Teaching During Home Quarantine in the COVID-19 Pandemic. *Frontiers in Psychology*, *12*, 2480. https://doi.org/10.3389/fpsyg.2021.596582

Yun, E. (2020). Review of Trends in Physics Education Research Using Topic Modelling. *Journal of Baltic Science Education*, *19*(3), 388-400.