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Readiness to Adopt New Technology: The Role of Psychological Capital and Technology Readiness

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Abstract: The industrial revolution has been the main driver in accelerating the use of technology. The use of technology in automation or data analytics has fundamentally changed the way of working, including at school. The research objective is to highlight the readiness of individuals to adopt new technologies, exploring the important role of psychological capital and technology readiness in this context. The main focus is on the influence of psychological capital, as well as technological readiness, on the likelihood of an individual adopting new technologies. The theories used as the basis of the research are psychological capital and technology readiness. The research was conducted on 403 teacher respondents in Indonesia using a nonprobability sampling method, namely quota sampling. Respondents were obtained by distributing online questionnaires. This research is non-experimental correlational research that is processed quantitatively. The measuring instrument used the Psychological Capital Questionnaire which has been adapted into 4 dimensions and 12 items and the Technology Readiness Index 2.0 which was adapted into 4 dimensions and 8 items. There is a positive correlational relationship between the two variables. An increase in psychological capital increases teachers' technology readiness scores, meaning teachers' positive psychological state can increase their propensity to adopt technology.

Keywords: Psychological Capital; Teacher; Technology Readiness; Technology Adoption

Introduction

The presence of the industrial revolution, especially with technological breakthroughs in Industry 4.0, has an urgent need for technology integration in education, especially for educators. The rapid and constant transformation of technology has changed the demands on teachers. Information and Communication Technology (ICT) has maintained a crucial role in improving the quality of education. Policymakers recognize and realize the significance that ICT should be integrated into education systems (Unesco, 2007). Integration of ICT into education is defined as using ICT effectively and efficiently in all dimensions of the educational process including the necessary infrastructure, curriculum, and teaching-learning environments (Kim et al., 2013). Teachers are not only expected to teach material that is broader and relevant to technological advances but also become facilitators who can guide students to utilize this technology creatively and productively in the teaching-learning process (Dinc, 2019). Changes to the curriculum to adapt to technological advances also place teachers as key agents in integrating this technology into the classroom environment (Backfisch et al., 2021). In addition, the COVID-19 pandemic drastically changed the educational landscape by forcing the use of technology in distance learning. This not only increases the need for teachers' digital competence but also clarifies the urgency to integrate technology as an indispensable part of effective and flexible teaching methods (Bui, 2022).

Teachers need the right technological tools to facilitate adaptive and dynamic learning in the face of this industrial revolution (Raygan & Moradkhani, 2022).

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Technology provides access to unlimited educational resources, allows curriculum adaptation to the latest developments, and expands the scope of learning through online platforms (Backfisch et al., 2021). This creates new challenges that require increasing technological competence in teachers, not only in the use of technological tools, but also in the ability to design learning experiences that are connected to the digital world.

Currently, the development of information technology, especially in Indonesia, is growing. Information and communication technology can make it easier for us to learn and get the information we need from anywhere, anytime, and from anyone. In the world of education, the development of information technology is starting to have a positive impact because the development of information technology in the world of education is starting to experience significant changes (Hardi, 2023). Currently In addition, in the face of curriculum changes that focus on 21st century skills, technology is the main support for developing critical, creative, communicative, and collaborative skills in students (Unesco, 2007). Technology facilitates students to learn independently and explore their skills. In learning science, students must be equipped with real-life experiences (Rahmat et al., 2023).

In the content of Natural Sciences lessons, it is highly recommended and implemented to take advantage of learning media, as a substitute for the role of the teacher to provide information or deliver material on science learning, learning media should be simple and practical. So in general, the learning media in the science learning process has a function to (1) aid for more effective learning (2) parts that are integral in teaching situations (3) Use concrete basic concepts to reduce misunderstanding of students in receiving material (4) and motivation of students to be more enthusiastic in participating in learning (Alika & Radia, 2021). All of this requires the ability of teachers to adopt technology in their teaching and learning activities.

However, the demand to adopt technology encounters various obstacles even though the situation and environment require teachers to be able to adopt new technology (Nuryanna et al., 2021). Barriers to technology integration continue to make it difficult for teachers to use educational technologies to transform education and improve teaching and learning (Dinc, 2019) (Francom, 2019). These barriers have been classified in various ways. One way to classify such barriers to technology integration is to create a distinction between first-order and second-order barriers (Okur & Hamutoğlu, 2023). First-order barriers to technology integration include those barriers that are external to the teacher and may include resources, training, and support. In contrast, second-order barriers include those barriers that are internal to the teacher, including personal self-efficacy for technology use and beliefs about the value of technology for learning (Francom, 2019; Okur & Hamutoğlu, 2023).

This research was conducted to examine the second-level problems felt by teachers in adopting new technology, namely in terms of psychological capital and teacher technology readiness. Psychological capital is defined as a person's positive psychological condition towards development indicated by having the confidence (self-efficacy) to face and give effort to succeed in doing challenging work, making positive attributions (optimism) regarding current and future success, striving for goals and when needed, changing the direction of goals (hope) to succeed, and to be able to persevere and rise (resiliency) when facing problems and challenges to succeed (F. Luthans et al., 2006; F. Luthans, Youssef, et al., 2007; B. C. Luthans et al., 2012).

To measure Psychological Capital, the questionnaire referred to four major and positive psychological state-like traits of humans such as self-efficacy, optimism, hope, and resilience (F. Luthans & Youssef, 2004). Self-efficacy refers to the individuals' level of self-confidence in performing a challenging task. Therefore, individuals with a high level of self-efficacy will accept a challenging task, believe in their abilities, and nurture self-motivation to invest the necessary effort to achieve a visualized goal. Optimism refers to the individuals' positive attributes toward their current or future situations. Therefore, highly optimistic individuals can frame their conditions positively and buoyantly.

Hope refers to individuals' willpower to pursue their goals persistently. Individuals who have high hopes are always determined to achieve their goals. They will not limit themselves to a single solution and create alternative routes to accomplish their goals. Resilience refers to the ability to rebound from hardship despite a rocky ride or setbacks in the process of achieving a goal. Highly resilient individuals will not give up easily. They will put in more effort to accomplish the goals (Youssef & Luthans, 2007). This can be seen in Figure 1.

Technology *readiness* is defined as a person's tendency to accept and use new technology to achieve goals in life at home and work (Parasuraman & Colby, 2015; Parasuraman, 2000a). Technology readiness is defined as "people's propensity to embrace and use technologies for accomplishing goals in home life and at work" (Parasuraman, 2000a; Matthing et al., 2006). It is a combination of both positive and negative feelings of individuals about new technological products and services. The dimensions of the Technology Readiness Index are defined (Parasuraman, 2000a; Bakirtas, 2017). Optimism and Innovativeness are drivers of Technology Readiness. Optimism is a positive view of technology and a belief that it offers people increased control,

flexibility, and efficiency in their lives. Innovativeness is a tendency to be a technology pioneer and thought leader. However, others are inhibitors of technology readiness. Discomfort, a perceived lack of control over technology and feeling of being overwhelmed by it. And also insecurity, as a distrust of technology and skepticism about its ability to work properly. This can be seen in Figure 2.

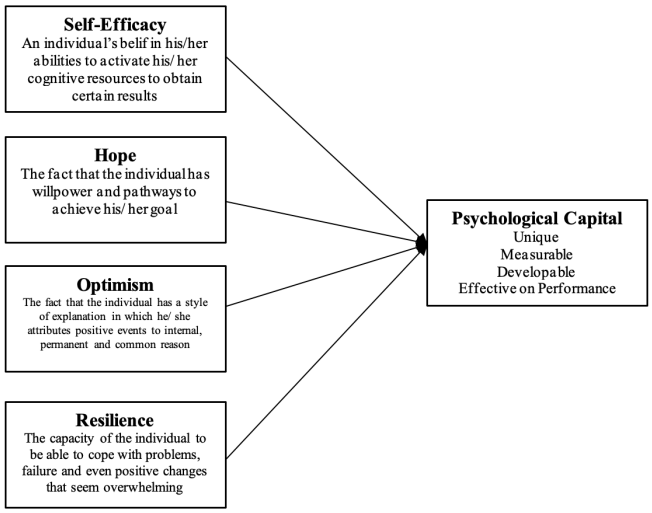

Figure 1. Components of Psychological Capital

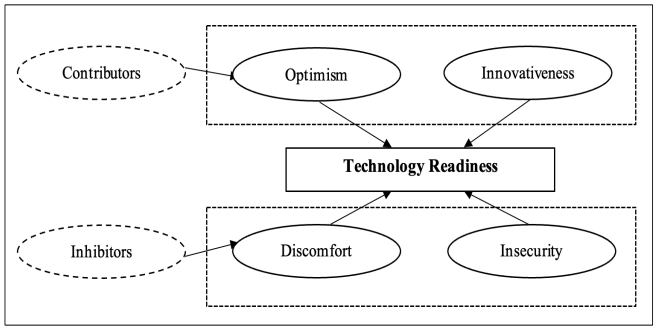

Figure 2. Contributors and Inhibitors of Technology Readiness

However, new technology-based products and services are immediately not embraced and adopted by people. The reason for this is people's beliefs and attitudes. As regards technology, there are two beliefs including people's positive and negative beliefs. The beliefs are different according to individuals. The technology readiness index (TRI) was developed to measure people's general beliefs as regards technology by Parasuraman (2000). The construct was comprised of four dimensions such as optimism, innovativeness, discomfort, and insecurity. The dimensions affect people's tendency to embrace and use new technologies (Bakirtas, 2017).

Good psychological capital quality can help teachers to improve the quality of teaching and learning using technology. One of the important things to adopt in developing strategies in this era is the use of technology. Technology readiness as one of the predictors of technology use is an aspect that needs to be improved in teachers. Increased psychological capital and increased technology readiness will have an impact on the use of technology and improve teacher performance. However, there is still no research that examines the relationship between psychological capital and technology readiness, especially in the context of high school teachers. High school teachers have different student characteristics, where students are already in the adolescent stage and have experience in using technology. This will make it easier for students to follow the development of technology adopted by their teachers in the teaching and learning process at school. The study was conducted to describe the condition of psychological capital and technology readiness in high school teachers. The hypothesis of this study is "There is a relationship between psychological capital and technical readiness in teachers in adopting new technology."

Method

This study used a quantitative research approach with a non-experimental approach The data collected in this study are demographic data that includes respondents' identity (gender, age, regional origin, and last education) and research data measured by adaptation of the Psychological Capital Questionnaire (B. C. Luthans et al., 2012) and Technology Readiness Index (Parasuraman, 2000b).

The population of participants in this study were high school science teachers. The sample characteristics needed in this study are high school teachers, who teach science, in both public and private high schools in Bandung, West Java. This study used non-probability sampling with a quota sampling technique. The number of samples in this study was 403 respondents. The population of high school teachers in the city of Bandung in 2022 is 3606 people (BPS, 2022). By using the simple random sampling method, the results of the minimum number of respondents were 348 people. To increase the probability of distributing questionnaires to random high school teachers as many as 500 pieces both online and offline to schools, and questionnaires that returned as many as 403 questionnaires.

Data collection in this study was carried out using online and offline questionnaires in several high schools. The data obtained were tested statistically to show a general picture of psychological capital and technology readiness variables. The Psychological Capital measurement tool has a reliability seen from Alpha's Cronbach of 0.892 which is classified as very high. A high-reliability value means that this

measuring tool measures psychological capital consistently (Sugiono, 2014). The Technology Readiness measuring instrument has an Alpha's Cronbach magnitude of 0.78 which is relatively high, where this measuring instrument measures technology readiness consistently (Sugiono, 2014). Then a correlation test was carried out to see the relationship between psychological capital variables and technology readiness.

Result and Discussion

How the teacher's ability to adopt technology that can help him in carrying out tasks both administratively and in teaching and learning activities can be examined by looking at the mental processes that teachers have. This is analyzed by analyzing the psychological capacity of teachers and their readiness to face technology. It is necessary to know what is the level of psychological capital possessed by teachers and how is the level of readiness to face technology, which consists of supporting and inhibiting factors.

Based on the measurement results, there is a picture of psychological capital in general and per dimension which can be seen in Table 1, and an overview of technology readiness in general and per dimension which can be seen in Table 2.

Table 1. Descriptive Statistical Test of Psychological Capital

	Min	Max	Mean	Std. Deviation
Psychological Capital	33	60	48.43	6.04
Hope	7	15	11.86	1.88
Self-Efficacy	6	15	11.76	1.91
Resilience	6	15	11.90	1.82
Optimism	9	15	12.90	1.54

Table 1 shows that the minimum total score obtained is 33, which is still categorized as low, and the maximum is 60, and belongs to the high category. The mean score of the total item (N = 403) is 48.43 (SD = 6,040), which is in the high category, which means that in general, respondents have the perception that the state of psychological capital is at a high level. The frequency distribution shows that out of a total of 403 respondents, 52 people belong to the low category and 351 respondents (98%) are in the high category. This is in line with the mean data, which shows that the majority of respondents have a high level of psychological capital. Positive psychological capital means how teachers can effectively channel people's talents, strengths, and psychological capacities toward achieving worthwhile productive, ethical, and sustainable outcomes and resulting in competitive advantage (F. Luthans & Youssef, 2004).

Optimism has the highest score among other dimensions of psychological capital. Optimism has been researched and applied by Seligman at (Elsafty et al., 2020) and others in the positive psychology movement. Optimism involves a positive explanatory style that attributes positive events to internal, permanent, and pervasive causes, and negative events to external, temporary, and situation-specific ones. This allows teachers as individuals to take kredit for favorable events in their lives, boosting their self-esteem and morale. It also allows them to distance themselves from unfavorable life happenstances, shielding them from depression, guilt, self-blame, and despair.

The smallest score is self-efficacy. The most effective approach to developing employees' self-efficacy and confidence is to allow them to experience success, which self-efficacy researchers such as Bandura (Bandura, 1998) refer to as mastery experiences. Actual performance attainments boost employees' confidence in their ability to accomplish the specific tasks that their jobs entail (Griffin & McClish, 2011). However, for employees to experience frequent success that is conducive to their efficacy development, they need to work toward challenging but achievable, concrete, specific, proximal goals (Bandura, 2010).

Experiential exercises, on-the-job training, and coaching have been found to contribute to building self-efficacy through ''guided mastery experiences.' (Abdullah, 2019). Another approach that has been found to enhance self-efficacy is vicarious learning or modeling. In situations when success experiences are unavailable or prohibitively too expensive or too risky to provide (e.g., pilot flight training), shadowing a successful mentor or watching a relevant model (similar to the developing employee and dealing with a similar situation) effectively handling a realistic situation has been found to also help in building the observer's self-efficacy.

Even when actual role models are not available, ''imaginal experiences,'' in which a person can imagine him/herself succeeding in effectively dealing with difficult situations and challenges, be effective substitutes, and enhance self-efficacy. In other words, an imagined successful self can act as one's relevant role model! Other previously discussed approaches that have also been found to enhance self-efficacy are social persuasion, positive feedback, and psychological and physiological health and arousal.

Table 2 shows that the minimum total score obtained is 16, which is still categorized as low, and the maximum is 40, and belongs to the high category. The mean score of the total items (N = 403) is 28.11 (SD= 4.846), which is in the high category, which means that in general, respondents have a perception that the condition of technology readiness themselves is at a high level.

Table 2. Descriptive Statistical Test of Technology Readiness

	Minimum	Maximum	Mean	Std. Deviation
Technology Readiness	16	40	28.11	4.85
Motivator	8	20	16.11	2.85
Inhibitor	4	20	11.99	3.63

The answer to the hypothesis was proposed, and then a correlation test was carried out whose results can be seen in Figure 3 and Table 3.

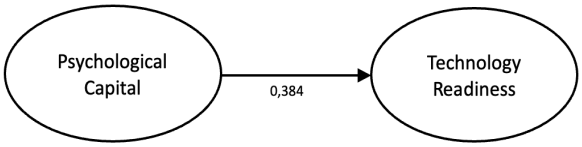

Figure 3. Correlation between Psychological Capital and Technology Readiness

Table 3. Correlational Test Result of Psychological Capital and Technology Readiness

Variable	Correlation coefficient	p-value	Decision
Psychological Capital & Technology Readiness	0.384	0.000	accepted

A correlation test was also conducted between the total psychological capital score and the score per technology readiness category (motivator and inhibitor). Table 4 shows the results of the correlation test between psychological capital both per dimension and in total to technology readiness per category. The total score and per dimension of psychological capital have a significant relationship with the motivator category in technology readiness (p-value = 0.000). The results of the correlation test of the total psychological capital score and the technology readiness motivator category have a moderate relationship (r = 0.650), stronger than the correlation test results between the total psychological capital score and the total technology readiness score. This is because the results of the correlation test between psychological capital and the technology readiness inhibitor category showed no relationship (p-value = 0.668, r = 0.043). The results of the psychological capital correlation test per dimension and the category of inhibitor technology readiness all showed no relationship between them. Meanwhile, the motivator category has a moderate positive relationship with the dimensions of hope, self-efficacy, and resilience, and a weak relationship with the dimension of optimism.

Hope can be interpreted as the willingness to find, clarify, and look for ways to succeed (F. Luthans, Youssef, et al., 2007). Teachers with high levels of hope will show high energy in their process in teaching, and have flexibility in achieving their teacher performance targets by adjusting targets or changing their strategies to fulfill their deadline.

Table 4. Psychological Capital and Technology Readiness per Dimension and Category

	Technology Readiness			
	Motivatior		Inhibitor	
	p-value	r	p-value	r
Psychological Capital	0.000	0.650	0.668	0.043
Hope	0.000	0.610	0.636	-0.047
Self-Efficacy	0.000	0.603	0.795	0.026
Resilience	0.000	0.563	0.637	0.047
Optimism	0.000	0.444	0.265	0.111

Teachers also showed high levels of self-efficacy. Self-efficacy is described as the belief in oneself to use motivation, cognitive resources, and the ability to perform actions needed in a situation (Luthans et al., 2007). Teachers with high self-efficacy can jump through obstacles by taking and completing tasks with proper processing of resources and performing actions that are needed. Teachers with a degree of self-efficacy see obstacles and risks as challenges and things that can and must be faced because they assess that their abilities are adequate to handle those obstacles.

Resilience describes an individual's capacity to rise from failure, change, and negative conditions, as well as from positive changes such as progress and increased responsibility (B. C. Luthans et al., 2012). The results of statistics and frequency distribution show that teachers have a high level of resilience. A person will have increased resilience after going through difficult times (Djalante et al., 2020). Positive emotions also can strengthen resilience in difficult times (F. Luthans et al., 2006). Teachers have obstacles during teaching activities to adopt new technology, as well as the pandemic which has an impact on their overall teaching performance (Ferreira et al., 2014). Teachers stated that they can face difficult times and obstacles because they have experienced difficult times before. Teachers face their obstacles and difficulties calmly because of their experiences that support their level of resilience.

The optimism dimension is the dimension with the highest mean and the highest frequency distribution in the high category. Optimism is described as how individuals associate positive attributions with circumstances, where these positive attributions include positive emotions and realistic motivations (Patton et al., 2004). Teachers with high optimism are aware of their limits and have positive attribution in dealing with problems as they arise, where they do not allow negative attribution and negative emotions to interfere when things do not go according to plan and interfere with the achievement of their goals in entrepreneurship.

The level of psychological capital by teachers is high, which means they have conditions following individuals with high hope, self-efficacy, resilience, and optimism (F. Luthans, Avolio, et al., 2007). Among the four dimensions, optimism is the dimension with the highest score, which means that teachers especially possess the characteristics of high optimism.

The motivator category score is included in the high category with the majority frequency distribution in the high category. These results indicate that teachers have a high driving factor for technology use, consisting of dimensions of optimism and innovativeness. The high dimension of optimism means that teachers have a view that technology has a positive influence on the implementation of teacher responsibilities in teaching, such as increased control, efficiency, and flexibility in life. Teachers with high optimism tend to use technology by stating that technology helps improve the productivity and quality of their business. Another dimension of the motivator category, namely innovativeness, discusses the tendency of individuals to be pioneers in the use of the latest technology (Matthing et al., 2006). Teachers with high innovativeness scores are more likely to discover and use new technologies related to teaching and learning. This teacher became a pioneer among others in adopting new technology.

The inhibitor category score is in the low category with a higher distribution in the low category. This means that teachers have high inhibiting factors, which means that teachers have the perception that technology brings discomfort and insecurity to them. The discomfort dimension means that teachers feel overwhelmed and lack control over technology in teaching and learning activities (Park & Zhang, 2022). Teachers with high levels of discomfort feel uncomfortable and feel that technology is not designed for them. Teachers with high discomfort find it difficult to understand technology and are confused by the possibility of sudden technological changes. Another dimension in the inhibitor category is insecurity, which talks about feelings of uncertainty about the performance of technology to work as it functions and concerns about the negative effects of technology (Matthing et al., 2006). Teachers with high insecurity feel that the use of technology in teaching activities can be excessive and reduce their work performance. Teachers with high insecurity scores also felt unsure that using technology performed better than not using it.

The classification of Technology Readiness which is included in the high category is caused by the high value of the motivator category compared to the inhibitor category. This means that despite having barriers to the tendency to use technology, the driving factor for teachers is higher so their tendency to use technology is high. Technology Readiness is an attitudinal scale that is "individual-specific" (Lin & Kim, 2020). It has been developed to measure "people's propensity to embrace and use new technologies for accomplishing goals at home and work" (Parasuraman & Colby, 2015). If the technology readiness of someone is high, it means they have a motivator to adopt new technology and fewer barriers to distrust new technology. Teachers have optimism about adopting new technology, which is a positive view of technology and a belief that it offers them increased control, flexibility, and efficiency in their lives as a teacher. Teachers have innovativeness, which is a tendency to be a technology pioneer and thought leader as a teacher.

The weak correlational results between psychological capital and technology readiness in teachers accept the hypothesis that there is a relationship between psychological capital and technology readiness in teachers. This means that an increase in psychological capital will increase technology readiness for teachers, and otherwise. Teachers still consider the use of technology to have many obstacles indicated by high inhibitor perception, so positive psychological drivers and conditions are needed that can support the use of technology in teaching activities. For leaders or policymakers, it is necessary to provide the training needed by employees to improve performance such as the ability to manage web and study program journals, computer training, data processing, calibration, and computational laboratory training. Teamwork and IT training, work techniques in micro laboratories, technical guidance, and management in the field of microbiology. Leadership policies to develop tacit to explicitly are urgently needed, leadership as one that can improve employee performance (Ermiana et al., 2022).

Psychological capital as a positive psychological condition of a person toward development and change has many relationships with specific psychological aspects of change and development in oneself (Obschonka & Stuetzer, 2017). With the relationship between psychological capital and technology readiness, teachers can improve their psychological capital condition to increase technology readiness which will help in the use of technology and improve performance in teaching.

The relationship between psychological capital and technology readiness has not been studied before. The reason for the relationship between psychological capital and technology readiness in this study can be seen from the results of specific correlations to motivator categories in technology readiness which then increases the strength of the relationship between the two variables. The motivator category is a driving factor for technology readiness, which is composed of dimensions of optimism that discuss a positive view of technology, and innovativeness which discusses a person's tendency to become a pioneer and initiator of ideas (Summak et al., 2010). These two aspects make the motivator

category closely related to the discussion of psychological capital. Psychological capital discusses how the positive psychological conditions of teachers deal with change and development. A person's psychological capital state is a psychological condition that comes from within, in line with a positive assessment of technology (optimism) and also a person's tendency to be a pioneer (innovativeness). Meanwhile, the absence of a relationship with the inhibitor category which is a perception of barriers to technology, is because inhibitors have less predictor power against the use of technology and other consequence factors (Park & Zhang, 2022). Teachers have less discomfort with adopting new technology, which is a perceived lack of control over technology and a feeling of being overwhelmed by it as a teacher. They also have less insecurity, which means distrust of technology and skepticism about its ability to work properly.

Conclusion

Based on research, it can be concluded that psychological capital and technology readiness in teachers are correlate. Teachers have a high level of psychological capital, especially in the dimension of optimism, and the level of technology readiness of teachers is high, especially in the motivator aspect, which consists of dimensions of optimism and innovativeness and acts as a supporting factor for technology readiness. Suggestions that can be given regarding subsequent research on psychological capital and technology readiness to conduct further research, namely taking a more controlled sample with the probability sampling method so that the results obtained are more representative of the population and stronger in statistics because they meet the requirements for using parametric statistics, and can re-conduct research on the effects of demographic and cultural factors on both Psychological Capital and Technology Readiness with a more adequate sample percentage weight. Practical advice for the Ministry of Education and Culture is to be able to train and maintain the condition of psychological capital as well as high technology readiness to be able to live the teaching process as teachers become better by boldly adopting new technology.

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Conceptualization and methodology, writing original draft preparation, review and editing, ALK, and statistical analysis and collecting data, and visualization, AP. ALK and AP have agreed to the published version of the manuscript.

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Conflicts of Interest
The authors declare no conflict of interest.

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