Principals' change leadership and e-learning effectiveness: The mediating role of teachers work commitment and attitudes toward change

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ABSTRACT

The purpose of this study was to determine the effect of the principals' change leadership on the effectiveness of online-based learning, with teacher work commitment and teacher attitudes towards change as mediator variables, using a quantitative approach. The population in this study were principals and teachers of public elementary schools, with a total sample of 378 respondents. The analytical technique used in this study is the Structural Equation Model (SEM), with the help of the Amos 24.0 program. The results of the study showed that the principals' change leadership has a direct effect on the effectiveness of online-based learning as well as an indirect effect through teacher work commitment and teacher attitudes towards change. This research contributes both theoretically and practically, where the change leadership demonstrated by the principal can ideally encourage teacher work commitment and teacher attitudes towards change, which in turn can promote the effectiveness of the implementation of online learning to better meet the students' learning needs.

Keywords: change leadership, e-learning effectiveness, teacher work commitment, attitudes toward change

INTRODUCTION

Scholars from developed as well as developing countries have extensively researched the topics of leadership change in principals and online learning (Ghasemy et al., 2018; Kondakci et al., 2017; Tang et al., 2014; Uğur & Koç, 2019). For example, research by Altunisik (2012) found that a principal's leadership can influence the success of e-learning. Meanwhile, research by Kin et al. (2017) shows that principals' change leadership competencies impact teachers' attitudes toward change. Moreover, research by Muhamad et al. (2021) shows that the successful implementation of online learning is influenced by teacher work commitment, teacher satisfaction, and stress levels during the COVID-19 pandemic. Researchers in Indonesia are also interested in studying this theme, especially because the presence of the COVID-19 pandemic in Indonesia has brought various consequences for the implementation of education in schools (Ferine et al., 2021; Gaol, 2021; Nurabadi et al., 2021). One of them is the change in the implementation of learning, which was previously carried out face-to-face but has now been changed to online-based learning (Bubb & Jones, 2020; Butnaru et al., 2021; Onyema et al., 2020).

In a rapidly changing era, accompanied by the COVID-19 pandemic, changes in the world of education have become one of the most important tasks to improve student performance in schools (Huber & Helm, 2020; Thohir et al., 2021). In an effort to keep up with such rapid changes and optimize the successful implementation of online-based learning, innovative leadership in schools is needed (Edge et al., 2021; Juharyanto et al., 2021; Rehman et al., 2019). Therefore, how to realize the effectiveness of the implementation of online-based learning to meet the learning needs of students is a new challenge for school principals.

Recent research related to online learning has mostly focused on evaluation mechanisms, selection of learning media, development of learning platforms, and increasing teacher competence through online courses (Holland, 2019; Liu & Zhang, 2021; Tsiotakis & Jimoyiannis, 2016; Yanson & Johnson, 2016; Yavuzalp & Bahcivan, 2021). In addition to these focuses, it seems that several factors, such as change leadership demonstrated by school principals, teacher work commitment, and teacher attitudes towards change, must be considered given the importance of online learning to be implemented effectively.

Efforts to achieve effective online learning and change leadership competencies for school principals are very important (Altunisik, 2012; Hanafi et al., 2021; Ramos-Pla et al., 2021). A successful change leader helps create a new environment that is conducive to learning and sharing experiences and knowledge. Principals are expected to play a vital role in encouraging teachers to respond positively to change. Research by Kin et al. (2017) shows that principals who have change leadership competence can influence teacher attitudes towards change. Teachers' attitudes towards changes in the current digital era are related to their willingness to deal with the application of ICT in learning activities in schools (Hatlevik, 2017; Roblin et al., 2018).

The online learning model requires commitment from all parties (Lie et al., 2020; Maisyaroh et al., 2021; Muhamad et al., 2021). Ironically, the ineffective implementation of online-based learning is always associated with teachers, who should be responsible for achieving the effectiveness of online learning. In fact, this is a shared responsibility, including that of the principal as a leader in schools (Corry & Stella, 2018; Scherer et al., 2021). Therefore, principals and teachers need to adapt, often prepare for any changes, and always try to increase knowledge in various aspects. Teacher commitment is the key to the successful implementation of online-based learning in the pandemic era (Pham et al., 2021; Scherer et al., 2021). The encouragement given by the principal enables teachers to have a high work commitment (Lo et al., 2010; San-Martín et al., 2020; Smith et al., 2022), which can further increase the effectiveness of online-based learning implemented in schools (Pham et al., 2021; Ranadewa et al., 2021; San-Martín et al., 2020).

Although there have been many studies examining the leadership role of school principal changes, there are still few that examine the impact of principal change leadership on the effectiveness of online-based learning. For example, research by Kin et al. (2017) only examines the competence of school principals and teachers' attitudes towards change with the mediating role of teacher change beliefs and does not examine other variables. Meanwhile, research by Nurabadi et al. (2021) shows that leadership changes in principals with other leadership styles, namely instructional leadership and spiritual leadership, can affect teacher performance and student achievement. Furthermore, research by Chopra et al. (2019) only examines the effectiveness of e-learning portals according to student perceptions without examining the factors that influence them. This study tries to complete the previous research gap, namely, to examine the effect of changing principals' leadership on the effectiveness of online-based learning. This research provides insight into at least three things. First, from a theoretical standpoint, this study complements the research conducted by Kin et al. (2017), Kondakci et al. (2017), Nurabadi et al. (2021), and Pollock (2020) by examining the variables of teachers' work commitment and attitudes toward change as mediating variables, which many other researchers have not examined. Second, it gives relevant parties useful advice on how to use predictor variables to improve the effectiveness of online learning. Third, it can serve as a starting point for other scholars working on relevant subjects in different contexts. In developing countries, the use of technology in education does not always produce improvements that are directly proportional to student learning outcomes, but there is always hope behind the problems (Butnaru et al., 2021; Sayaf et al., 2021).

Therefore, it is important to investigate the determinants of the effectiveness of implementing online-based learning in schools, especially during the current pandemic. Based on this description, the authors propose the following hypothesis:

H1: Principal change leadership has a direct effect on teachers' work commitment.

H2: Principal change leadership has a direct effect on teacher attitudes toward change.

H3: Principal change leadership has a direct effect on the effectiveness of online learning.

H4: Teachers work commitment has a direct effect on their attitudes toward change.

H5: Teacher attitudes toward change have a direct effect on the effectiveness of online learning.

H6: Teachers work commitment mediates the relationship between principal change leadership and the effectiveness of online learning.

H7: Teacher attitudes toward change mediate the relationship between principal change leadership and the effectiveness of online learning.

METHOD

Research Design

A quantitative approach using structural equation modeling is used in this study. This study uses numerical data on the principals' and teachers' perceptions related to the variables studied through survey techniques. In accordance with the research objectives that have been formulated, this study developed a structured online questionnaire. The variables in this study include principal change leadership, teacher work commitment, teacher attitudes toward change, and the effectiveness of online learning. The research framework is presented in Figure 1.
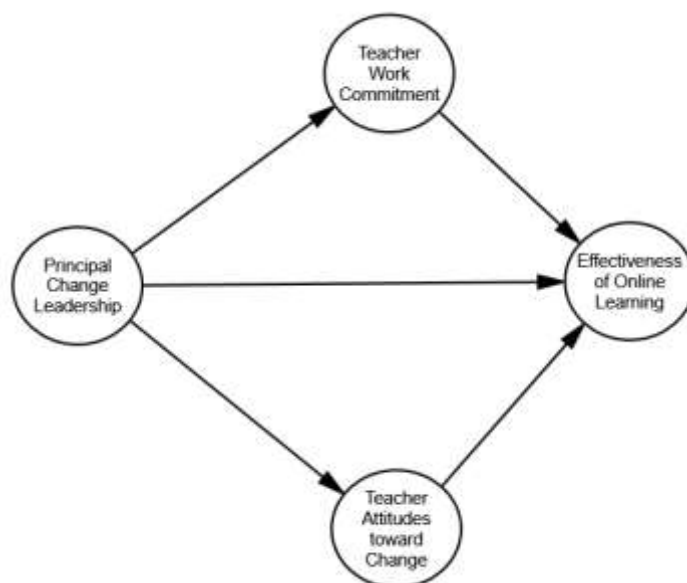

Figure 1. The Theoretical Framework

Population and Sample

Respondents in this study were principals and teachers at public primary schools in Malang City, Malang Regency, and Batu City, East Java Province. The population in this study was 13,522 principals and teachers. The number of samples was determined following a formula by Isaac and Michael (1995) with a 95% confidence limit. Based on this formula, the number of samples was 378 principals and teachers. The proportional random sampling technique is used in sampling because samples from each population can be taken proportionally. Descriptions of the population and sample are presented in Table 1. An online questionnaire was used to collect information from respondents from October to December 2021. The demographics of respondents in this study consisted of gender, male: 137 (36.24%) and female: 241 (63.76%); age, < 25: 112

(29.63%), 26-35: 146 (38.62%), 36-45: (17.73%), and > 45: 53 (14.02%); and educational qualifications, diploma: 51 (13.49%), bachelor: 238 (62.96%), master degree: 73 (19.31%), and postgraduate/PhD: 16 (4.24%).

Table 1. Population and sample

No.	City/Regency	Population	Sample
1	Malang City	3789	106
2	Malang Regency	8762	245
3	Batu City	971	27
Total		13522	378

Research Instruments

This study involves four variables, namely principal change leadership (PCL), teacher work commitment (TWC), teacher attitudes toward change (TATC), and the effectiveness of online learning (EOL). Each respondent was asked to assess aspects of the principal's leadership behavior related to change leadership competencies, as well as teacher aspects related to teacher work commitment, teacher attitudes toward change, and also the effectiveness of online learning.

The instrument for measuring PCL was adapted from the indicators developed by Kin et al. (2017). The indicators are goal framing (3 items), capacity building (3 items), defusing resistance and conflict (3 items), and institutionalizing (3 items) (Kin et al., 2014, 2017). The instruments for measuring TWC were adapted from indicators that have been developed by Devos et al. (2014), Mowday et al. (1979), and Muhamad et al. (2021). The indicators include solving complex environmental problems (2 items), practicing effective communication (1 item), having flexibility (2 items), applying the latest technology (1 item), combining old and new concepts (2 items), and becoming a change facilitator (2 items). The instrument for measuring TATC is an adaptation of the Attitudes to Change Scale developed by Dunham et al. (1989) and further refined by Kin et al. (2017) in their research. The indicators used to measure TATC include cognitive reactions to change (3 items), affective reactions to change (2 items), and behavioral reactions to change (3 items). Furthermore, to measure EOL, this study uses a 5-item questionnaire adapted from Butnaru et al. (2021) and Dixson (2015).

The questionnaire used in this study is a five-point scale ranging from 1 ("never") to 5 ("always"), which is tested for validity and reliability based on the corrected-item total correlation and Cronbach's alpha. As recommended by De Vaus (2013), Cronbach's alpha coefficient >0.7 can be used, while variables with a corrected-item correlation <0.3 will be excluded. Table 2 shows that the data collection instrument can be declared valid and reliable.

Table 2. Validity and reliability test

Scales of Measurement	Encode	Corrected-Item Total Correlation range	Cronbach's Alpha
Principal Change Leadership	PCL	0.87 – 0.53	0.92
Teacher Work Commitment	TWC	0.83 – 0.57	0.88
Teacher Attitudes toward Change	TATC	0.93 – 0.64	0.90
The Effectiveness of Online Learning	EOL	0.82 – 0.51	0.85

Data Analysis

The analytical technique used in this study is the Structural Equation Model (SEM), with the help of the Amos 24.0 program. This study has one exogenous variable (EOL) and three endogenous variables (PCL, TWC, and TATC). To determine the suitability of the empirical framework, this study uses the recommended criteria by Byrne (2016), Hu and Bentler (1999), and Kline (2015): the p value should be insignificant (p > 0.05), and the CMIN/df value should be less than 3.00. Furthermore, the GFI, TLI, and CFI values must be above 0.90, while the RMSEA index value must be less than 0.08. The normality test and outlier test for the data assumption test were also carried out in this study.

FINDING AND DISCUSSION

Finding
Evaluation of normality and outlier assumptions

The assumption test is carried out using the normality test and the outlier test. The assumption test is a prerequisite before performing a complete SEM model analysis. The results of the normality test show that the critical ratio (c.r) value for skewness and kurtosis of each indicator is not greater than ±2.58. Meanwhile, the value of c.r in the multivariate kurtosis line is 2.186. This means that the data are normally distributed at the univariate and multivariate levels, as recommended by Byrne (2016). Then the outlier test was carried out, and based on the recommendation of Blunch (2013), if the Mahalanobis distance (MD) value (< chi-square),there is no multivariate outlier problem. Based on the analysis, the chi-square value of this study was obtained at 177.340, while the largest MD value was 81.131.

Evaluation of measurement model

The analyses of convergent validity and discriminant validity were carried out after the assumption test. The Average Variance Extracted (AVE), Composite Reliability (CR), and Loading Factor were used to determine the validity of the convergence (Hair et al., 2010; Nurabadi et al., 2021). Referring to Table 3, all constructs have an AVE value greater than 0.50, where this value is in accordance with the recommendations of Bagozzi and Yi (1988). Based on Awang's (2014) recommendation, the CR value is significant if (> 0.60), and it can be seen in Table 3 that the CR value of each construct is greater than 0.60. Table 3 also shows the loading factor values ranging from 0.70 to 0.93, and according to Byrne (2016) and Hair et al. (2010), the load factor should exceed 0.50.

Table 3. Validity and reliability of construct

Construct	Encode	Loading > 0.50	AVE > 0.50	CR > 0.60
Principal Change Leadership (PCL)	PCL1	0.821	0.681	0.895
	PCL2	0.739		
	PCL3	0.893		
	PCL4	0.840		
Teacher Work Commitment (TWC)	TWC1	0.714	0.685	0.928
	TWC2	0.758		
	TWC3	0.933		
	TWC4	0.830		
	TWC5	0.881		
	TWC6	0.831		
Teacher Attitudes toward Change (TATC)	TATC1	0.908	0.728	0.889
	TATC2	0.850		
	TATC3	0.799		
The Effectiveness of Online Learning (EOL)	EOL1	0.872	0.633	0.895
	EOL2	0.700		
	EOL3	0.822		
	EOL4	0.704		
	EOL5	0.861		

Rönkkö and Cho (2020) explain discriminant validity by showing the independent construct measurement model of overlapping items. Discriminant validity is reviewed by comparing the correlation between the constructs and the AVE value for each construct (Fornell & Larcker, 1981;

Rönkkö & Cho, 2020). Referring to Table 4, it is known that discriminant validity was achieved because the AVE value was greater than the correlation value between constructs, as recommended for discriminant validity assessment criteria (Fornell & Larcker, 1981).

Tabel 4. Discriminant validity of constructs

Construct	(1)	(2)	(3)	(4)
1. Principal Change Leadership	**0.681**			
2. Teacher Work Commitment	0.291	**0.685**		
3. Teacher Attitudes toward Change	0.148	0.161	**0.728**	
4. The Effectiveness of Online Learning	0.088	0.276	0.197	**0.633**

Furthermore, an evaluation of the measurement model is carried out. The criteria for evaluating the goodness of fit of the measurement model use the criteria recommended by Byrne (2016), Hu and Bentler (1999), and Kline (2015). Referring to Table 5, it is known that all indices are within the recommended criteria, including (a) p-value = 0.061; (b) CMIN/df= 1.822; (c) RMSEA= 0.047; (d) GFI= 0.925; (e) CFI= 0.968; and (f) TLI= 0.956.

Table 5. Summary of measurement model match statistics

Fit Statistics	Result	Minimum Index
p-value	0.061	> 0.050
CMIN/df	1.822	< 3.000
RMSEA	0.047	< 0.080
GFI	0.925	> 0.900
CFI	0.968	> 0.900
TLI	0.956	> 0.900

Interpretation of structural model and hypothesis testing

The interpretation of the model is carried out after the evaluation of the measurement model has been completed. The results of the SEM test are shown in Figure 1. The Sobel test was carried out to test the mediation hypothesis (Sobel, 1982), and if the p value was < 0.05, it showed that the mediation effect was statistically significant. The Sobel test was used to determine the effect of the mediator variable, namely teacher work commitment and teacher attitudes toward change, in mediating the influence of principal change leadership on the effectiveness of online learning.
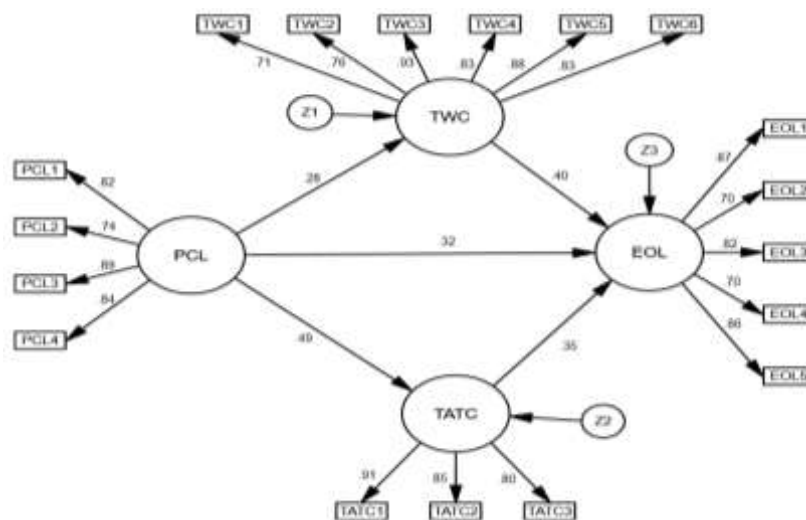

Figure 2. SEM Test Results

Table 6 shows the results of hypothesis testing and a summary of the effects of principals' change leadership on the effectiveness of online learning and indirect effects through teacher work commitment and teacher attitudes toward change. The effect of principals' change leadership on the effectiveness of online learning shows significant results. The effect is also significant when teacher work commitment and teacher attitudes toward change are added to the model as mediators. The total indirect effect of principal change leadership on the effectiveness of online learning is 0.284; when combined with direct influence, the total effect of principal change leadership on the effectiveness of online learning is 0.603. The indirect effect of principal change leadership on the effectiveness of online learning through teacher work commitment is 0.113, which accounts for 18.7% of the total effect. Meanwhile, the size of the principal change leadership mediating effect on the effectiveness of online learning through teacher attitudes toward change is 0.170, which is 28.2% of the total effect. In short, the mediation effect reached 46.9% of the total effect, which means that principals' change leadership can significantly increase the effectiveness of online learning in various scenarios, including through teaching through teacher work commitment and teacher attitudes toward change.

Table 6. Summary of size of effect and hypothesis testing

Model pathways	β	p	Cut of Value	Decision
PCL → TWC	0.281	0.003	0.050	H1 Accepted
PCL → TATC	0.487	0.000	0.050	H2 Accepted
PCL → EOL	0.319	0.001	0.050	H3 Accepted
TWC → EOL	0.403	0.000	0.050	H4 Accepted
TATC → EOL	0.350	0.000	0.050	H5 Accepted
PCL → TWC → EOL	0.113	0.000	0.050	H6 Accepted
PCL → TATC → EOL	0.170	0.000	0.050	H7 Accepted
* Total indirect effect PCL → EOL, β= 0.284				
* Total effect of PCL → EOL, β= 0.603				

Discussion

Learning is a process that starts with different inputs (content, learning environment, teacher, student) through a transformation process (student-teacher interaction, delivery of lectures, practice, assessment, feedback) and leads to certain outputs (knowledge, skills, attitudes, and behavior) (Chopra et al., 2019). Innovation and change are the keys to success in facing all challenges during the pandemic. In order to meet the needs of students in learning during the pandemic, the implementation of online-based learning (e-learning) is one solution that must be implemented.

Principals who are open to change are important in implementing and maintaining online-based learning, which is a complex process. This study shows that principals' change leadership has a direct effect on the effectiveness of online learning. Research by Kin et al. (2017) explains that principals are leaders of change in schools, where these changes involve shared responsibility and teamwork to anticipate the needs of students facing a technology-driven future.

As it is known that the COVID-19 pandemic has brought massive changes, the rapid transition of technology in schools creates various problems (Garad et al., 2021; Mukhtar et al., 2020; Thohir et al., 2021). A study conducted by Stewart et al. (2012) in the state of Minnesota, USA, which is one of the most developed countries in the world, even showed that 80% of supervisors agreed that their district had behavior patterns that were resistant to school reform. Various studies state that the effectiveness of the implementation of online-based learning requires good planning, high organizational commitment, and strong leadership (Butnaru et al., 2021; Che Ahmad et al., 2017; Deitte et al., 2021).

The need for effective implementation of online learning requires the high work commitment of teachers (Pham et al., 2021; Scherer et al., 2021). Teacher work commitment is simply described as a teacher's voluntary decision to become an integral part of a school and be

actively involved in efforts to improve school quality (Mohammadtaheri, 2011; Thien et al., 2014). Several experts identified the profile of teachers who have high work commitment, including (1) a highly dedicated teacher looking for new challenges; (2) a problem-solving attitude; (3) demonstrating enthusiasm for leadership; (4) showing the fulfillment of work and profession; and (e) tending to do their best in every job (Jones & Kessler, 2020; Scherer et al., 2021; Wullur & Werang, 2020). Such a teacher profile can increase the effectiveness of the implementation of online-based learning. Seeing the importance of teacher work commitment, school principals still play a very important role in determining the level of teacher commitment (Altunisik, 2012; Maisyaroh, Juharyanto, et al., 2021; Mulyani et al., 2020).

Change leadership competence is needed for a school principal to influence teacher attitudes in working towards achieving change goals through skills, knowledge, and behaviors that show good performance. School leadership is the key to change in schools in responding to the challenges that exist in the midst of the increasingly massive acceleration of digitalization as a result of the pandemic, which is ultimately related to efforts to achieve school achievement (Fullan, 2014; Nurabadi et al., 2021). In order to plan and implement school change effectively, principals must be able to encourage teacher attitudes towards change (Deitte et al., 2021; Hargreaves & Ainscow, 2015; Kin et al., 2017). It is important for principals to encourage positive teacher attitudes towards change so that any changes are effective.

The results show that principals' change leadership can significantly increase the effectiveness of online learning in various scenarios, including through students,teacher work commitment, and teacher attitudes toward change. Change leadership behavior exhibited by school principals can be the difference between failure and success in implementing changes in schools such as online learning (Pollock, 2020; Wiyono, 2017). In challenging and even unpredictable situations, the most successful school leaders are optimistic, persistent in pursuit of goals, ready to learn from others, open-minded, flexible, and resilient. The COVID-19 pandemic has forced a shift to online learning in almost all schools worldwide, requiring teachers to adapt their teaching in a very short time (Gopal et al., 2021; König et al., 2020; Ranadewa et al., 2021). Students must be ensured to get effective online-based learning. Therefore, it is necessary for school principals to encourage increased teacher work commitment and positive attitudes of teachers towards change through change leadership behavior exhibited by school principals (Altunisik, 2012; Kebritchi et al., 2017; Kin et al., 2017; Mohammadtaheri, 2011).

CONCLUSION

Meeting the needs of high-quality learning for students must always be pursued. The online-based learning that is carried out is a consequence of the presence of the COVID-19 pandemic, whose effectiveness must always be strived for. The results of the study show that the leadership of school principal changes has a direct effect on the effectiveness of online-based learning as well as an indirect effect through teacher work commitment and teacher attitudes towards change. Various scenarios can be carried out by principals as leaders of change in schools, including by encouraging an increase in teacher work commitment and positive attitudes of teachers towards change, to increase the effectiveness of online-based learning. The results of this study should be viewed considering some limitations and require further examination and additional research. First, this study was approached with a quantitative approach, with principals and teachers as respondents. Further research can be carried out over a longer time span, as well as by combining several data collection techniques such as surveys, interviews, and observations. Second, the location and population of the study were selected for the study. Future research could replicate this study in low-performing or mediocre primary schools to examine the research findings across different samples and the extent to which they can be generalized. Third, the findings of this study can serve as a steppingstone for further research on the same topic, for example, by adding some variables not examined in this study. It is hoped that their findings can enrich the findings of this research both theoretically and practically. Despite the limitations, the results of this study provide insight into the importance of change leadership practices demonstrated by school principals to ideally encourage teacher work commitment and teacher

attitudes towards change, which in turn can increase the effectiveness of online learning implementation as an effort to meet the learning needs of students.

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