

The use of Information Technology as a Mediator on the Effect of Transformational Leadership and Creativity towards Student Achievement

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Abstract: Transformational leadership, creativity, and information technology are expected to improve students' academic achievement in educational institutions. The purpose of this study, is to determine the direct effect of transformational leadership, creativity, and the use of information technology as a mediator towards student achievement. This is an explanatory research with data collected from 205 students of NU Senior High School 1 Gresik consisting of a total of 419 students. Data were obtained by distributing questionnaires to respondents from 6 types of extracurricular activities. The result was tested using the validity and reliability test, and processed with Smart PLS software version 3.0. The results showed that Transformational leadership, creativity, and information technology has a direct and significant effect on student achievement.

Keywords: *Transformational leadership; Creativity; utilization of information technology and student achievement.*

I. INTRODUCTION

Leadership is an important factor that influences the attitudes and behaviors of subordinates in order to achieve organizational goals. Transformational leaders tend to develop the skills and trust of their subordinates to carry out more organizational responsibilities. Yukl (2017) stated that leaders with the ability to motivate and inspire their subordinates are ever ready to provide support and assistance to maintain their interest, enthusiasm, and effort in dealing with organizational responsibilities.

According to the Islamic perspective, every human being is born a leader. Leadership is also referred to as *caliph* or *amir*, which means representative or ruler, respectively. Rivai et al. (2017) reported that the term caliph was applied after the Prophet's death. Leadership is described as the ability to articulate a vision, provide support to build relationships between subordinates, and increase their interest. Therefore, transformational leaders pay attention to the creative and innovative aspects of their subordinates and organizations. Employee creativity also plays an important factor in achieving organizational goals (Harby et al., 2019). Furthermore, a strong collaboration between leadership and management is needed for optimal effectiveness.

Organizational survival is dependent on the activities of its members; therefore, leaders play important roles in determining the factors responsible for the direction and goals. Due to the current global economy era filled with competitive industries, it is important to possess the right managerial skills in an organization. Furthermore, the various challenges faced by major organizations led them to invest in leadership programs (Supriyanto, 2019).

Leadership is widely acknowledged as one of the key determinants of student achievement. Studies across different countries and socio-economic contexts show remarkably similar traits and practices shared by effective school leaders, reinforcing the universal appeal of school leadership (Witziers et al., 2003; Hallinger, 2011). Leithwood et al. (2008) claim that school leadership is second only to classroom teaching as an influence on pupil learning. Indeed, successful schools possess an adept, strong and purposeful school leadership.

Leaders are expected to have a system designed to influence organizations, with student actions objectively measured. Organizations tend to succeed when leaders are able to anticipate and take advantage of internal or external opportunities to motivate their subordinates to achieve high levels of productivity and achievement.

According to organizational leadership studies conducted by Yongzhan et al. (2018) and Cepiku & Mastrodascio (2020), transformational leadership has a positive and significant effect on achievement. Subsequently, Hu et al. (2013) stated that transformational leadership improves achievement when supported by individual, team, and organizational level abilities. Taghrif et al. (2018) also stated that it increases achievement when supported, while Dutta and Sahney (2016); Wollah et al. (2015) reported that it does not affect achievement.

Achievement is a person's ability to be successful at a program through skill, effort, and courage. Therefore, to improve student achievement in educational institutions, principals need to encourage them through various components (Syah, 2013). Extracurricular teaching staff and trainers also play a major role in creating and increasing student success. This is because transformational leaders are more concerned with substance rather than impression, and the ultimate goal is to empower the subordinates (Sashkin and Molly, 2003).

However, student success is not solely determined by transformational leadership because creativity is also very important in the lives of millennials in the current globalization era. Therefore, it is possible for students to show meaningful and quality work that leads to personal satisfaction with high creativity. According to Listiani (2014), student creativity is included in internal factors that influence learning outcomes and the formation of individual achievements. Ramma and Gope (2015), as well as Wilda et al. (2017), stated that creativity improves achievement. However, this opinion is contrary to the study of Jabar and Budiarti (2017), which stated that creativity has no significant influence on student learning outcomes.

Student success is also determined by the success of information technology, which acts as a supporting tool capable of improving the education quality, and individual achievements. Darwis and Mahmud (2017) stated that information technology plays a significant role in the learning process of educational institutions. The availability of materials, media, and learning resources help the teaching staff and extracurricular trainers to develop and improve students' talents. Some teachers utilize relevant online learning content and services to support the teaching and learning process.

Due to the limited studies between leadership and student achievement, this study, therefore, proposes a framework for transformational leadership by mediating the information technology with models obtained from Taghrif et al. (2018) and Hu et al. (2013). Therefore, this study is intended to integrate transformational leadership, creativity, as well as the use of information technology for students to achieve success. This helps organizations to understand the role of leadership in improving students' achievement, which ultimately helps to enhance performance. The purpose of this study is to determine the effect of transformational leadership, creativity, and the role of information technology as a mediator on student achievement.

Hypothesized Model

The Effect of Transformational Leadership on Student Achievement

Effectiveness of organizations depends on the attributes and interaction among three underlying domains including the organizational environment, the behavior of employees, and the management of available resources and employee behaviors. In an educational context, the effectiveness of schools is determined by or organizational factors, leadership of school and district administrators, and behaviors of teachers and other professional employees (Kurt et al., 2012).

Transformational leadership refers to leaders that motivate and encourage their subordinates to carry out tasks beyond their limits, thereby, increasing their maturity and self-actualization levels, as well as the welfare of organizations, and the community (Hu et al., 2013). An effective leader brings change for

students to score an extraordinary achievement. According to Yongzhan et al. (2018), Cepiku and Mastrodascio (2020), transformational leadership has a significant effect on achievement.

According to the Bass' model, principals exhibiting transformational leadership behaviours will be effective in bringing about such desired outcomes as school commitment, job satisfaction, student achievement, faculty development, improved teaching and learning, collaborative decision making, and responsive and innovative environments. Schools with predominantly transformational leadership models are expected to be purposeful and collaborative, with a greater number of staff and faculty operating in empowered and leadership roles, than those with a more top-down model of leadership (Bass et al., 1987., Tajasom and Achmad, 2011).

However, student achievement is not only seen from one's thoughts, but through knowledge, understanding, analysis, application in daily activities, and behavior. Syah (2013) stated that an indicator of a student's achievement is measured through three domains, namely cognitive, affective, and psychomotor.

Based on empirical studies, the following hypothesis was formulated:

H1. Transformational leadership affects student achievement.

Effect of Creativity on Student Achievement

Creativity is the ability of a person to determine new ways to solve problems related to science, art, literature, etc. It is also the creation of new products, providing services, ideas, procedures, or processes carried out by individuals in complex social systems (Hu et al., 2013). An understanding of creativity involves aspects such as processes, products, people, and situations. by Listiani (2014); Wilda et al. (2017), stated that creativity improves achievement.

This led to the formulation of the following hypothesis:

H2. Creativity affect student achievement.

Application of Information Technology as a mediation in the effect of Transformational Leadership on student achievement.

In the globalization era, information technology provides opportunities and enables a leader to be competent in an organization. Furthermore, IT also plays an essential role in supporting learning and sharing of knowledge/information for students to achieve success.

These achievements are also obtained by leaders that enable their students to think and analyze problems from various angles. According to Syah (2013), students' achievement is measured through three domains, namely cognitive, affective, and psychomotor. Hu et al. (2013) stated that transformational leadership improves achievement when supported by individual, team, and organizational level abilities.

According to Ramma and Gope (2015), information technology plays a role in restructuring the role of humans in organizations. Therefore, a leader needs to be able to direct students in the use of information technology, to achieve success.

Based on empirical studies, the research hypothesis is as follows:

H3. Application of Information Technology as a mediation affect the Transformational Leadership on student achievement.

Application of Information Technology as a mediator in the effect of creativity on student achievement.

Creativity is a person's ability to determine new ways to solve problems related to science, art, literature,

etc. It is also seen as the basis for innovation, which leads to the production of technicians. Ramma and Gope (2015) defined visionaries as creative students that make things out of nothing, with the creativity development reviewed from social and contextual aspects.

However, achievement needs the help of sophisticated information technology to provide opportunities and support a person or an organization in carrying out tasks. It also enables students to provide new and updated information from various countries. Darwis and Mahmud (2017) defined information technology as a computer that plays a major role in helping the smooth performance of a company. Therefore, it is able to realize student's creativity by developing new business ideas to achieve success.

Based on empirical studies, the research hypothesis is as follows:

H4. The application of information technology as a mediator, affect the creativity of student achievement.

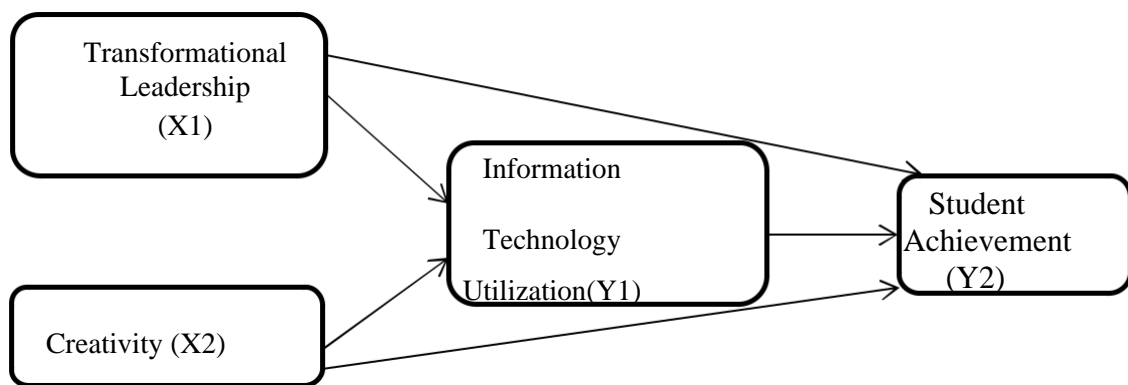


Figure 1. The Hypothesized Model

II. Methodology

Sample

This study consists of a total number of 419 students that participated in extracurricular activities using information technology. The sample was determined using the Slovin formula with 5% precision as follows: (Supriyanto and Maharani, 2013)

$$n = \frac{N}{N \cdot (e)^2 + 1}$$

$$n = \frac{419}{\dots}$$

$$419 \cdot (0,05)^2 + 1$$

$$n = 205$$

Data were obtained from 205 students in 6 types of extracurricular activities, namely broadcast, photography, graphic design, *kaiwakai*, journalism, and cinematography.

Measures

Furthermore, the data collection techniques used a questionnaire with five Likert scales. According to Bass and Avolio (2003), transformational leadership is the influence, motivation, and intellectual stimulation of subordinates. Guilford's (2009) defined creativity indicators as Fluency, Flexibility, and Knowledge expansion. Syah (2013) stated that student's achievement indicators are measured in 3 domains, namely cognitive, affective, and psychomotor. Meanwhile, Tjhay (2003) reported that information technology refers to the intensity of utilization and frequency of a device.

Descriptive statistical analysis was performed to determine the frequency distribution of respondents' answers to questionnaires with an in-depth study of the variables. Data were analyzed using Partial Least Square (PLS). Furthermore, the model was developed as an alternative and theoretical basis for designing weak indicators (Garson, 2016). Mediation testing was performed using procedures developed by Sobel with the Free Statistical Calculation. (Supriyanto et al., 2020).

III. Results

Model Evaluation

The measurement of outer models with reflective indicators is evaluated with convergent and discriminant validity. Meanwhile, the outer model with formative indicators is evaluated based on its substantial content. Furthermore, the structural or inner model is evaluated by determining the percentage of variance, namely the R² for the latent dependent construct and the magnitude of the structural path coefficient (Supriyanto and Vivin, 2013)

Outer Model (Measurement Model)

Table 1: Results of the reliability

<i>Variable</i>	<i>Cronbach's α</i>	<i>Conclusion</i>
Transformational leadership	0.845	Reliable
Creativity	0.768	Reliable
Information technology Utilization	0.859	Reliable
Student achievement	0.683	Reliable

Table 1 shows that the alpha Cronbach value of the Transformational Leadership, Creativity, Information technology Utilization and Student achievement variables are above 0.6. Therefore all variables have a good reliability value.

Table 2. Root value of Average Variance Extracted (AVE)

<i>Research Variable</i>	<i>AVE</i>	<i>√AVE</i>
Transformational leadership	0,518	0.719
Creativity	0,519	0,720
Information technology Utilization	0,587	0.766
Student achievement	0,513	0.716

Table 2 shows the results of discriminant validity testing using Average Variance Extracted (AVE). The AVE construct value has a good discriminant validity assuming it is greater than the correlation value of 0.5 (Supriyanto and Maharani, 2019). Based on Table 2, it can be seen that all constructs have fulfilled

the recommended criteria. This is evidenced by the root value of AVE above 0.5.

Table 3: The test result of *composite reliability*

Description	Composite Reliability	Results
Transformational leadership	0.882	Reliable
Creativity	0.843	Reliable
Information technology Utilization	0.895	Reliable
Student achievement	0.808	Reliable

Table 3 shows the results of composite reliability testing between the construct indicators. The composite value of all variables is ≥ 0.7 . Therefore they have good reliability values (Supriyanto and Maharani, 2019).

Table 4. *R-square Value*

Variable	R-square
Information technology Utilization	0.355
Student achievement	0.578

Table 4 shows the R-square value for the information technology utilization variable of 0.255 and the student achievement variable of 0.378. The Goodness of Fit Model is measured using Q Square (Q^2). When the Q^2 value is > 0 , it shows the model has predictive relevance with the vulnerability of $0 < Q^2 < 1$ (Supriyanto and Maharani, 2013).

The R^2 value is as follows:

$$Q^2 = 1 - (1 - R_1^2)(1 - R_2^2)$$

$$Q^2 = 1 - (1 - 0,355)(1 - 0,578)$$

$$Q^2 = 0,728$$

The Q^2 value is 0.728 or 72.8%, the contribution of data explainable by the model is 70.5%. Meanwhile, the remaining 27.2% is used to define other variables excluded in this research model.

Hypothesis Testing

Hypotheses testing and path coefficients show the direct effects of Transformational leadership affects student achievement, Creativity affect student achievement, Application of Information Technology as a mediation affect the Transformational Leadership on student achievement, The application of information technology as a mediator, affect the creativity of student achievement. The t value of statistics is shown in figure 2. Transformational leadership has a significant effect on student achievement with a path coefficient of 0.245 and t count value of $3.213 > 1.96$. The study results support H1. Creativity has a significant effect on student achievement with a path coefficient of 0.367 and a t count value of $4.827 > 1.96$. The results of study support H2.

Transformational leadership has a significant effect on Information technology Utilization with a path coefficient of 0.251 and a t count value of $3.486 > 1.96$. Information technology Utilization has a significant effect on Student achievement with a path coefficient of 0.167 and a t count value of $2.592 > 1.96$. Because the path of Transformational leadership to Information technology Utilization is significant, and path of Information technology Utilization to Student achievement is significant, it needs sobel test to know the Information technology Utilization as a mediation variable. The Sobel value was $2.068 > 1.96$ and p value $0.039 < 0.05$. It can be concluded that Information technology Utilization is a mediation variable. The study results support H3.

Creativity has a significant effect on Information technology Utilization with a path coefficient of 0.353 and a t count value of 4.602 > 1.96. Information technology Utilization has a significant effect on Student achievement with a path coefficient of 0.167 and a t count value of 2.592 > 1.96. Because the path of Creativity to Information technology Utilization is significant, and path of Information technology Utilization to Student achievement is significant, it needs sobel test to know the Information technology Utilization as a mediation variable. The Sobel value was 2.241 > 1.96 and p value 0.025 < 0.05. It can be concluded that the application of information technology as a mediator affect the creativity of student achievement. The study results support H4.

Table 5. The Direct Effects of Research Variables

	Relationship	Path Coefficients	t-value	p-value	Decision
Transformational leadership	Information technology Utilization	0.251	3.486	0.001	Significant
Transformational leadership	Student achievement	0.245	3.213	0.001	Significant
Creativity	Information technology Utilization	0.353	4.602	0.000	Significant
Creativity	Student achievement	0.367	4.827	0.000	Significant
Information technology Utilization	Student achievement	0.167	2.592	0.010	Significant

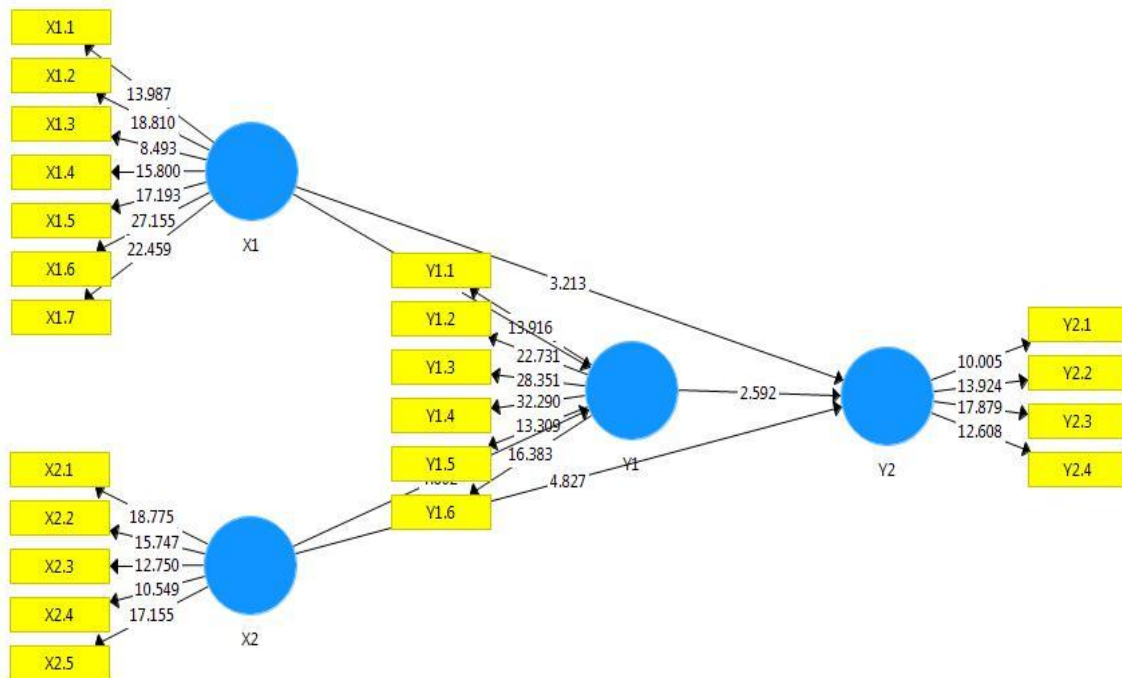


Figure 2 The Final Model

Hypothesis Testing and Path coefficient on Influence of Mediation Variables

Mediation hypothesis testing is needed to detect the position of intervening variables in the model by using a procedure developed by Sobel. The test is conducted by analyzing the effect of Islamic leadership through empowerment and innovative work behavior. This uses the free Sobel test calculator software for the significance of mediation version 4.0 as shown in Table 6.

Table 6: The Sobel Test Results

Path	A	B	SE _A	SE _B	t count	sig	Description.
TL-TI-SA	0.251	0.167	0.072	0.065	2.068	0.039	Sig
C-TI-SA	0.353	0.167	0.077	0.065	2.241	0.025	Sig

Based on the results of the Sobel test analysis for transformational leadership, on the use of information technology, the score was $2,068 > 1.96$, with a significance of $0.039 < 0.05$. Therefore, the use of information technology mediates the effect of transformational leadership on achievement.

The Sobel test analysis on creativity, shows that the use of information technology was $2,241 > 1.96$ at a significant value of $0.025 < 0.05$. Furthermore, the test results showed $t_{count} < t_{table}$ and $sig > 0.05$. Therefore, the utilization of information technology mediates the effect of creativity on achievement.

IV. Discussion

The Effect of Transformational Leadership on Students Achievement

The path analysis model showed that transformational leadership improves student achievement. The results supports the studies conducted by Yongzhan et al. (2018); Cepiku and Mastrodascio (2020), which stated that transformational leadership influences achievement. Rusmiati (2017), Purwanto (2010), and Djamarah (2006) reported that the factors influencing learning achievement were external factors from individuals such as curriculum, leaders, facilities, administration, and management of the institution, as well as internal factors, namely physiological and psychological factors. The physiological factors are related to physical conditions and the five senses, while psychological factors are talent, interest, intelligence, cognitive abilities, and achievement motivation.

This is in accordance with the study conducted by Tajasom and Achmad (2011), which stated that principals exhibiting transformational leadership behaviours will be effective in bringing about such desired outcomes as school commitment, job satisfaction, student achievement, faculty development, improved teaching and learning, collaborative decision making, and responsive and innovative environments.

In an Islamic perspective, leadership is an individual's ability to influence others to carry out activities accompanied by Islamic principles willingly. Leadership is based on efforts to implement the Islamic order and create a conducive environment for its implementation. It is also described as the ability to articulate a vision, provide support, increase interests, and build relationships with subordinates. Therefore, transformational leadership pays attention to the creative and innovative aspects of subordinates.

Effect of Creativity on Achievement

The results of the path analysis showed that creativity has a significant effect on student achievement. This is in accordance with the study conducted by Rusmiati's (2017), which stated that student achievement changes due to the learning process. The problem experienced by students in terms of creativity is lack of ability to think actively, the absence of new ideas, embarrassed when delivering arguments, willing to accept teachers' opinions without further development. Therefore, student creativity needs to be rebuilt to improve learning outcomes.

These findings are supported by previous studies conducted by Listiani (2014) and Wilda et al. (2017), which confirmed that creativity is needed to improve students' achievement. An increase in creativity further enhances the development of their talents to achieve success. Creativity is interpreted as the ability of a person to determine new ways to solve problems related to science, art, literature, etc.

Basically, it is a process of creating new products, able to provide services, application of new ideas, and processes carried out by individuals in complex social systems (Hu et al., 2013). An understanding of creativity involves various aspects such as processes, products, people, and situations. An understanding of these aspects leads to the creation of one's success in achieving set goals (Syah (2013).

The use of Information Technology as a Mediator on the Effect of Transformational Leadership towards the achievement

The hypothesis testing results show that transformational leadership directly affects the use of information technology. Previous research explains the importance of the direction of a transformational leader on the use of information technology in high school. Therefore, transformation leaders are needed in the utilization of information technology due to their ability to create trust, and motivate subordinate, without deviating rules (Yukl, 2017).

Bosamia (2013) stated that the positive impacts associated with the use of information technology are communication speed and the ability of facilities to form group discussions to encourage an increase in the intensity of science and technology. ICTs have influenced life by increasing the timely distribution of information through the media, thereby improving communication at home and work through social networks, email, etc. Overall, it has greatly improved the quality of human life.

According to Hu et al. (2013), Transformational leadership has the ability to improve achievement when supported by individual, team, and organizational level abilities. In this current globalization era, IT tends to shift the role of humans in the world of work and also contributes to the restructuring of human roles (Ramma and Gope, 2015). Therefore, a leader needs to be able to direct their students in the use of information technology to create achievements in their students.

Technology is the building foundation for civilization today. The level of information technology mastery determines every country's future. In Indonesia, IT mastery needs to be carried out by Muslims to ensure unity and integrity. Secondly, mastery of IT enables Muslims to provide solutions to people's problems.

The information technology utilization mediates Creativity toward achievement

The hypothesis testing results showed that creativity significantly influences student achievement through the use of information technology. Rusmiati's research (2017) stated that learning outcomes associated with student achievement are changes due to the learning process. Therefore, student creativity needs to be rebuilt to improve their learning outcomes. The use of information technology is expected to support or bridge the formation of creative thinking to form characters that support student achievement. Previous research has emphasized that creativity is essential in improving the achievement of student learning outcomes using information technology. An increase in student's creativity enhances the talent development required. Similarly, the stronger the use of IT towards student's creativity, the greater their ability to process information.

Creativity is interpreted as a person's ability to determine ways to solve problems related to science, art, literature, etc. According to Ramma and Gope (2015), creativity is the basis for innovations. Achievements are unable to stand alone without the help of sophisticated information technology. By utilizing information technology, students are able to discover many new insights to compete in the academic or business world (Darwis and Mahmud, 2017).

Limitations and Future Research

There are various limitations associated with this study that have not been able to provide an overall picture. The limitation is the research designs used, which is unable to eliminate the possibility of the Common Method Bias because all the data were obtained from self-reports both for independent and

dependent variables. Further studies are therefore required by adding individual characteristic variables, psychological empowerment, and intrinsic motivation.

V. Conclusion

This study provided some evidence on transformational leadership and its impact on student achievement in high schools. The results of this study indicate that transformational leadership has a direct and indirect influence on student achievement. Furthermore, a transformation leader is needed in the use of information technology to create trust, admiration, and loyal subordinates. Creativity has a direct and indirect effect on achievement through the use of information technology. The results of this study provide an understanding that the use of IT has the ability to mediate the creativity relationship toward student achievement.

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