The Influence of Knowledge of Information and Communication Technology,Gender, and Education Level on the E-Management of the Principals

Desi Eri Kusumaningrum[1], Bambang Budi Wiyono[2]
[1,2]Universitas Negeri Malang, Indonesia, `desi.eri.fip@um.ac.id`[1], `bambang.budi.fip@um.ac.id`[2]
Rusdinal[3]
Universitas Negeri Padang, Indonesia, `rusdinal@fip.unp.ac.id`
Aan Komariah[4]
Universitas Pendidikan Indonesia, `komariahaan@yahoo.com`
Rohaida Binti Mohd Saat[5]
University of Malaya, Malaysia, `rohaida@um.edu.my`

Abstract - **Today, there is a massive change in school education management. Principals are required to apply E-management in leading schools. This study aims to explore gender, the level of education, and mastery of information and communication technology (ICT) and its influence on the E-Management of the principals. The research was conducted in Tulungagung, Indonesia. Data collection techniques use questionnaires and documentation and are analyzed by descriptive statistics, t-tests, and Pearson Product Moment correlation. The results showed that the principals' mastery of ICT was adequate with using WhatsApp, Zoom, Google Forms, Email, Telephone, Facebook, Video Recording, and Websites as the primary communication techniques in implementing E-management. There is no relationship between the level of education and implementation of E-management of the principals. The level of mastery of ICT affects the implementation of the Principals' E-management. There is no difference in applying E-management of the principals by gender.**

***Index Terms -* e-management; information and communication technology; education; gender; school principal.**

INTRODUCTION

Today, there is a massive change in the education management system at schools. One factor that determines school management's success is the principal's leadership. In the global era, producing quality resources and being on trust and cooperation is also good leadership and management. The principal is the education leader in the school who is fully responsible for mobilizing all school resources and coordinating the implementation of education in schools.

If the principal can apply management and leadership well, then the implementation of education in schools will run well, and it can achieve educational goals optimally. On the other hand, if the principal cannot apply his management and leadership well, he will not achieve educational goals optimally. Several research results in the last decade show a robust relationship between leadership and organizational effectiveness [1].

Regarding the development of information and communication technology, the demands of school management have also changed. The principals are not only required to implement good school management but also to master the use of ICT to support management activities. ICT includes two aspects, namely information technology and communication technology. Information technology is everything related to processes, use of tools, manipulation, and management of information. Meanwhile, communication technology is everything associated with the use of tools to process and transfer data from one device to another. Principals must utilize ICT in school management. In other words, principals have to implement good e-management.

E-management integrates all management components, whether organizational, administrative, or supervisory, with information and communication technology [2]. E-management can also be interpreted as the process of monitoring all issues related to information technology operations [3]. E-management is associated with the integration of the utilization of ICT with all administrative

processes of an organization to increase productivity and efficiency.

There are two dimensions in e-management practices, namely, themanagerial dimension and the technological dimension. The managerial dimension refers to improving management functions in the use of information and communication technology. The technological dimension refers to efforts to combine information and communication technology systems with ICT strategies [2]. E-management is a dynamic process that ensures the relationship between management components and ICT to improve organizational performance. Principal e-management means the application of information and communication technology in managing the substance of educational management in schools [4][5].

Many tasks must be carried out by the principal in school management. Ubben, Hughes, and Norris suggest five substances, namely curriculum development, teaching improvement and human resources, student service management, school finance and facilities management, and school community relations management. Carry out supervision activities for teachers or other school officials, including tasks in the field of improving human resources [6].

However, Sergiovanni distinguishes the duties into two, namely, the duties of the administrative process or administrative function and the tasks of the areas or fields. The tasks of planning, organizing, coordinating, communicating, influencing, and conducting evaluations are the components of the process tasks. School programs, students, personnel, funds, physical facilities, and community relations are components of the primary principal's field [7].

On the other hand, Kimbrough dan Burkett suggested six primary principals' duties, namely managing teaching and curriculum, managing students, managing personnel, managing school facilities and environments, managing school and community relations, and school organization and structure [8].

Based on some of these opinions, it can be underlined that there are six principal management tasks, namely learning management, student affairs, infrastructure, finance, human resources, and school community relations. The primary indicator of implementing e-management can be measured by how highly the principal uses ICT in managing the six areas of education management claim. Until now, there has not been much in-depth study of the principal's e-management. Some previous research indicated that principals had not used information and communication in program implementation at schools [9]-[13].

There are many information and communication technology tools that principals can use in managing schools. They can be utilized for sharing long or short information, blogging, or synchronous and asynchronous communication [13][14]. Principals can use Zoom, Google Meet, or Skype for synchronous communication. Principals can also utilize email or WhatsApp for sharing information.

In addition, principals can use video or audio recordings for data recording.

By using ICT, principals can manage data, desk publishing, word processing, organization, or manage social media effectively.

Desktop publishing applies ICT in the form of software to create attractive visual displays, for example, web pages, postcards, brochures, business cards, etc. Word processing is the activity of processing words using software. It is also related to activities that involve organizing data, typing, and presenting data using visual aids by creating slide shows.Principals also can use technology-based communication techniques in the implementation of e-management.

Currently, studies of principal management are still not carried out optimally. Suggestions about good school management are often provided through school management guides. However, efforts to empirically test and improve good management in line with technological developments as a basis for training principals are still not widely carried out. Even developing the competence of principals is not yet based on the results of evaluations or research but is still mainly based on considerations of rank, class, or seniority.

If it is looked further in the field, it is indicated that the management of principals is still not using information and communication technology optimally. Several research results indicate that in managing schools, there is still a low level of use of ICT devices [15][16]. They tend to handle administrative issues, monitor teacher attendance, or make reports to supervisors manually. One of the factors that cause principals to use ICT less optimally is because they lack mastery. This clearly does not reflect professional and modern principal management.

On the other hand, the need to improve the management capabilities of principals is very urgent. With the autonomy of educational management, principals are required to have higher responsibilities. The principal has to manage the school by relying on the strengths of the school and the community. The principal should manage the school using information and communication technology. Therefore, principals must be able to empower all components of school and community resources and, at the same time, be able to utilize information and communication technology optimally to support the implementation of education in schools. In other words, principals must be able to implement e-management appropriately.

Based on the rationale, this research was carried out. This research aims to describe the application of e-management by principals as shown by indicators of the application of ICT-based communication techniques in school management, which includes learning management, student affairs, infrastructure, finance, personnel, and school-community relations. Apart from that, the main aim is to examine the influence of the principal's characteristics in terms of gender, as well as the principal's level of mastery

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and education, on the principal's implementation of e-management.

The proposed hypothesis is the level of education and knowledge of ICT influence the application of e-management by principals, and there is a difference in the principals' e-management in terms of gender.

RESEARCH METHODS

This research used a descriptive correlational design. The Tulungagung Regency of Indonesia is the target population with 47 junior high schools. The principal is a unit analysis of the study. Referring to Krejcie and Morgan, the sample of this study is 39 principals through random sampling [17].

According to the data type, questionnaires and documentation were used to gather it. The characteristics of the principal were found by documentation, while their ICT mastery and their application in school management were collected by questionnaires. In addition, documentation also was used to complete data on documentary data, such as school characteristics, teachers' characteristics, students' characteristics, etc. According to the constructs measured, eight main items were developed, with details of each item consisting of three questions: a, b, and c. The answer choices use the form of a rating scale from always, often, rarely, and never, with a score of 4, 3, 2, 1. In addition, it is also equipped with a checklist form with alternative yes and no answers with a score of 1 and 0.

The instrument items were constructed correctly. The content validity was achieved by reviewing the theory construct, which underlying the variables deeply. In addition, instrument testing was also carried out to achieve good coefficients. A total of 30 subjects from the population who had the same characteristics were taken as instrument testing samples. The results of the correlation of items with the total score were obtained by a coefficient of $r > 0.3$. That means the instrument indicated excellent validity. The findings of Cronbach's Alpha analysis obtained coefficients > 0.7. Thus, reliable instruments have been achieved through trying out in the field [18][19].

Referencing the data types, descriptive statistics, t-tests, Pearson Product Moment, and multiple correlations were utilized. The first step taken in data analysis is to present the data through descriptive analysis. Analysis of t-test to test differences in the application of E-management principals based on gender. The association and effect of education level and ICT mastery on the application of e-management of principals proven by Pearson Product Moment and multiple correlation analysis. The data normality assumption test uses Kolmogorov Smirnov, and the variance homogeneity was tested by the Levene test.

RESULTS AND DISCUSSION

I. *Descriptive Analysis Results*

According to the purpose of the study, the first step was to describe the data on the use of ICT-based communication

techniques applied by principals. The results of the analysis of the principal's e-management are presented in Figure 1.
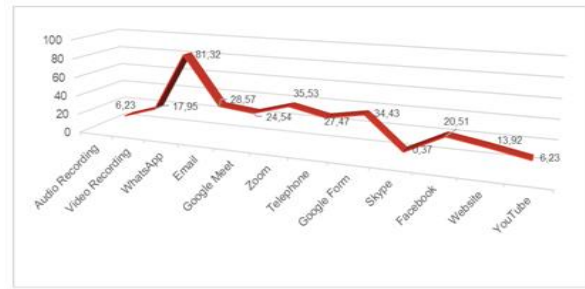

Figure 1 ICT-BASED COMMUNICATION TECHNIQUES APPLIED BY PRINCIPALS IN SCHOOL MANAGEMENT

Most principals apply WhatsApp to manage schools. Other communication techniques that are often implied are Zoom, Google Forms, Email, Phone, Google Meet, Facebook, Video Recording, and Website. A relatively few techniques used by the principals are Skype, Audio Recording, and YouTube. Furthermore, an analysis of each substance of school management is carried out, starting from learning management, student management, infrastructure management, financial management, personnel management, school community relations management, and administrative management. The utilization of ICT in learning management is described in Figure 2.
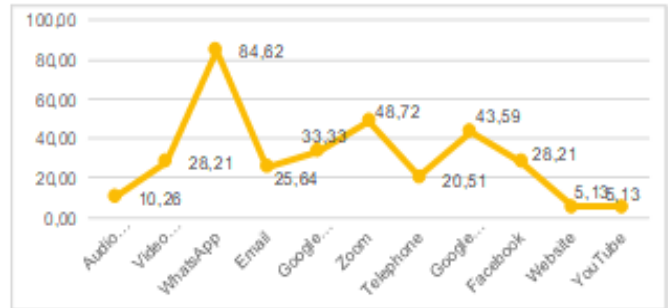

Figure 2. ICT-BASED COMMUNICATION TECHNIQUES APPLIED BY PRINCIPALS IN LEARNING MANAGEMENT

Most principals applied WhatsApp in learning management, followed by Zoom, Google Meet, Google Forms, Facebook, and Video Recording. The techniques that are relatively little used are YouTube, Audio Recording, and Websites. Furthermore, an analysis of student management is carried out. The utilization of ICT in student management is depicted in Figure 3.

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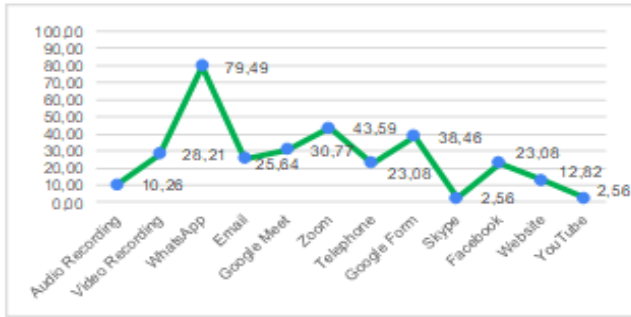**152**

Figure 3 ICT-Based Communication Techniques Used by Principals in Student Management

Most principals implied WhatsApp to manage students, followed by Zoom, Google Forms, Google Meet, Video Recording, Email, Telephone, Facebook, Website, and Video Recording. The techniques that are relatively little used are YouTube, Audio Recording, and Websites. Furthermore, an analysis of the management of infrastructure facilities is carried out. The use of ICT in infrastructure management is conceived in Figure 4.
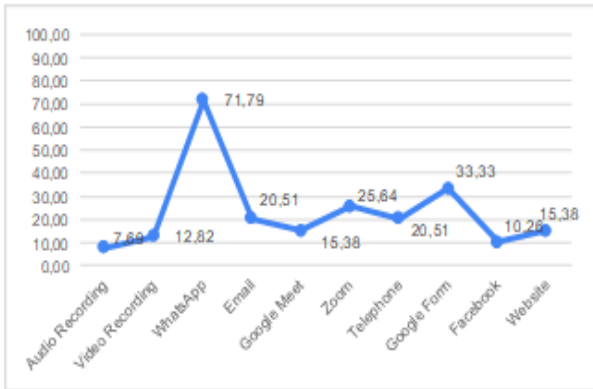

Figure 4 ICT-Based Communication Techniques Applied by Principals in Infrastructure Management

Most principals use WhatsApp to manage the workforce, followed by Google Forms, Zoom, email, Telephone, Google Meet, Website, Video Recording, and Facebook. The technique that is relatively little used is audio recording. Furthermore, an analysis of workforce management is carried out. The utilization of ICT in employment management is presented in Figure 5.
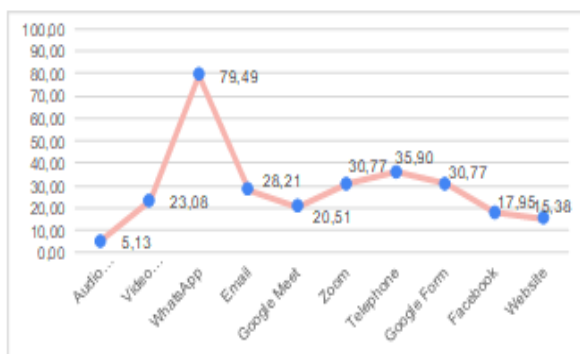

Figure 5 ICT-Based Communication Techniques Applied by Principals in Employment Management

Most principals use WhatsApp to manage infrastructure, followed by Telephone, Zoom, Google Forms, email, Google Meet, and websites. The technique that is relatively little used is audio recording. Furthermore, an analysis of financial management is carried out. The results of the financial management analysis are presented in Figure 6.
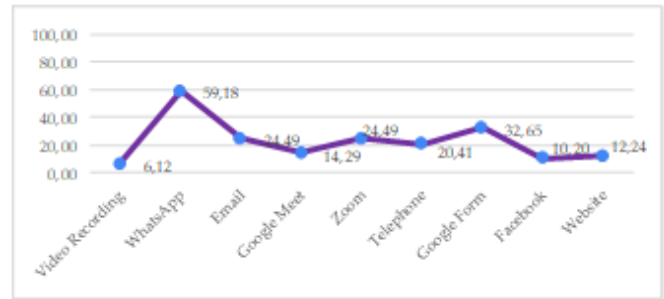

Figure 6 ICT-Based Communication Techniques Applied by Principals in Financial Management

Most principals use WhatsApp to manage finances, followed by Google Forms, Zoom, Email, Telephone, Website, and Facebook. The technique that is relatively little used is video recording. Furthermore, an analysis of the management of school-community relations is carried out. The use of ICT in community school relations management is described in Figure 7.

Figure 7 ICT-Based Communication Techniques Applied by Principals in School Public Relations Management

Most principals use WhatsApp to manage school community relations, followed by Telephone, Zoom, Email, Facebook, Google Forms, Website, and Video Recording. The technique that is relatively little used is video recording. Furthermore, an analysis of administrative management is carried out. The utilization of ICT in administrative management is presented in Figure 8.

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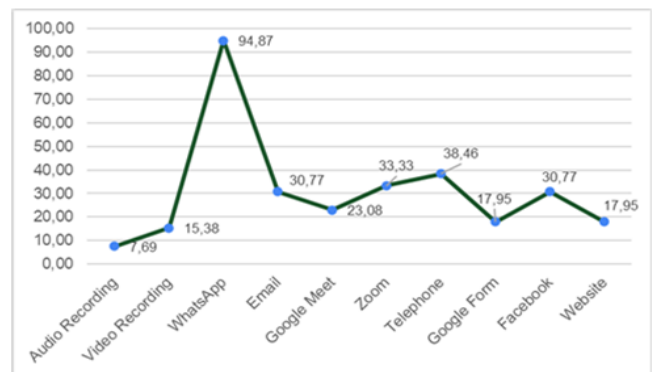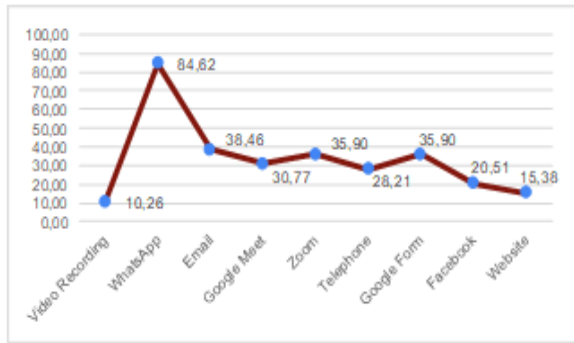**Figure 8 ICT-BASED COMMUNICATION TECHNIQUES APPLIED BY PRINCIPALS IN ADMINISTRATIVE MANAGEMENT**

Most principals use WhatsApp to manage administrative relationships, followed by Email, Zoom, Google Forms, Google Meet, telephone, Facebook, andWebsites. The technique that is relatively little used by the principal is video recording.

II. Hypothesis Testing Results

The first tested hypothesis was that there were differences in the principal's mastery of ICT based on gender. By using analysis of variance, the research finding is outlined in Table 1.

TABLE 1
DIFFERENCES IN ICT MASTERY BASED ON GENDER

Variable	t	Sig
Competences in ICT	1.805	0.079

The t value is 1.805, with $p > 0.05$. That means the null hypothesis is not rejected. There is no difference in ICT mastery between male and female principals. Furthermore, the analysis result of the frequency difference test using ICT in school management is tabulated in Table 2.

TABLE 2
FREQUENCY USING ICT BY PRINCIPALS BASED ON GENDER

Variable	t	Sig
Frequency of Using ICT	1.325	0.193

The t value is 1.325 with $p > 0.5$. Thus, it can be underlined that the null hypothesis is accepted. There is no difference in the frequency of using ICT in school management between male principals. Subsequently, the variation hypothesis was tested using ICT. The findings are conceived in Table 3.

TABLE 3.
VARIETY IN USING ICT BY PRINCIPALS BASED ON GENDER

Variable	t	Sig
Variety in Using ICT	-0.461	0.648

Table 3 indicates that the t value is -0.461, with $p > 0.05$. The null hypothesis is accepted, so there is no difference in utilizing ICT between male and female principals. Furthermore, it tests the relationship hypothesis. The results of the analysis, in general, are presented in Table 4.

TABLE 4
RESULTS OF CORRELATION ANALYSIS OF EDUCATION LEVEL, ICT MASTERY, FREQUENCY OF USING ICT, AND VARIATIONS IN USING ICT IN SCHOOL MANAGEMENT

Variables	Education Level	Competency ICT	Frequency Use ICT	Variety Use ICT
Education Level	1	0.328* p = 0.042	-0.008 p = 0.962	0.298 p= 0.066
Competence of ICT		1	0.336* p = 0.037	0.355* p = 0.026
Frequency Use ICT			1	0.241 p = 0.140
Variety Use ICT				1

The correlation between the education level of the principal and his level of mastery of ICT is 0.328, with $p < 0.05$. The results indicate the null hypothesis is rejected and the alternative hypothesis is accepted. There is a significant positive correlation between the level of education and the level of mastery of ICT of the principal. The principals' education influences their ICT mastery.

The results also indicate that the correlation between the level of ICT mastery and the frequency of utilizing ICT in school management is 0.336, with a p-value of < 0.05. The findings indicate that the null hypothesis is rejected, and the alternative hypothesis is accepted. There is a significant positive association between the principal's level of mastery of ICT and the frequency of using ICT in school management. The principals' ICT mastery influences their e-school management.

The result of the third analysis shows that the correlation coefficient of principals' ICT mastery with variations in ICT use is 0.355, with $p < 0.05$. That means that the null hypothesis is rejected, and the alternative hypothesis is accepted. That is, there is a significant positive association between the level of ICT mastery and variations in using ICT in school management. The principals' ICT mastery affects their e-school management.

III. Discussion

Principals use WhatsApp, Zoom, and Google Forms a lot in the implementation of e-school management. The findings are according to several previous research results [20]-[22]. WhatsApp is an instant messaging application that allows users to send text messages, photos, audio, video, and documents or make audio and video calls. Zoom allows users to hold conferences in real-time.

Meanwhile, Google Forms is a Google service that allows someone to create surveys, questions, and answers using an online form feature that can be customized according to your needs.

When linked to the characteristics of educational management in schools, this can be understood. WhatsApp and Zoom are very effective synchronous communication techniques and information filtering. Through these two communication techniques, effective coordination meetings can be held to manage the substance of education in schools. Meanwhile, Google Forms is widely used as a recording tool. Through Google Forms, educational data can be collected effectively.

Besides these communication techniques, principals also use a lot of email, telephone, Google Meet, Facebook, video recording, and websites in implementing e-management. The findings also support several previous studies [20]-[22]. Email is used to send and receive messages over the Internet. Telephones are used to make or receive calls, making it easier to carry out long-distance communications. Facebook makes it easy to communicate between users, either openly or privately, via Messenger. Through the use of these communication techniques, coordination and collaboration activities, internally and externally, can be carried out effectively. Meanwhile, a website is a collection of pages in a domain that contains various information that users can read and view via the Internet. Other information technology is also used, namely YouTube, video recording, Skype, and other tools, to support principals in implementing e-management.

The second finding shows that there was no significant difference in the level of mastery of utilizing ICT between male and female principals based on gender. The frequency and variations in using ICT also do not show significant differences between male and female principals. The findings also support several previous research results that gender has no effect on individual performance and are different from the results of the other studies. This depends on the characteristics of the job. Some jobs that refer to productivity show significant differences, but several other findings that are not related to this show different results. [23]-[27].

The third finding shows that there is a significant positive association between the level of education and the level of mastery of ICT. The principal's education influences his knowledge of ICT. The findings of this research strengthen the results of previous research [28][29]. The higher the education, the greater the knowledge and experience, so the more mastery of ICT.

The further findings indicate that there is a significant positive correlation or association between the level of ICT mastery and the frequency and variety of ICT use in educational management. The level of ICT mastery affects the application of e-management in school management. The research findings strengthen several previous research results [29]-[31].

On the other hand, the analysis results show that there is no direct relationship between the education level and the principal's e-management. This raises the question of whether it automatically means that highly educated principals apply e-management in school management. The research findings support many previous researches. The level of education has an indirect relationship with the principal's level of e-management. The experience of education can enhance theknowledge of ICT, and the higher the mastery of ICT, the higher the application of e-management in managing schools.

CONCLUSION

The research results show that principals use several ICT-based communication techniques in implementing e-management. The online communication technique that is widely used is WhatsApp, followed by Zoom and Google Form, Email, Telephone, Google Meet, Facebook, Video Recording, and Website. Some other techniques used are Skype, YouTube, Instagram, and Audio Recording. These techniques are used to manage all areas of school work, namely learning, student affairs, facilities and infrastructure, finance, personnel, school-community relations, and administration. Some techniques are used for direct communication, some for sending messages, written or verbal, coordinating, monitoring, and collaborating. Several techniques are used for data collection and storage. Even though they are generally the same, in the management of one field and another, there are slight differences, for example, in the management of learning and student affairs relatively using several prominent techniques. However, some management of other fields, for example finance and infrastructure, is relatively inferior. In areas of school work that require communication, for example, public school relations and administration, many use direct communication. So, the use of communication techniques is adjusted to the characteristics of the field being managed in the implementation of e-management.

The second finding shows that ICT mastery influences the implementation of e-management by principals. There are no differences in the performance of e-management based on gender, and there is an influence of education level

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on ICT mastery. Thus, the determinant of the e-management implementation tends to be dynamic. Therefore, in an effort to improve the performance and effectiveness of e-management, what needs to be done is to strengthen the abilities of principals through in-service education. Static variables, such as gender, do not have a significant influence.

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AUTHOR INFORMATION

Desi Eri Kusumaningrumisa Secretaryofthe Educational Administration Department, Faculty of Education, Universitas Negeri Malang, Indonesia. She is an IEEE member. Shehas authoredmany books and has published many articles in journals and proceedings of International conferences on topics of educational management and the use of ICT for teaching, learning, and school management.

Bambang Budi Wiyonois aProfessor atthe Educational Management Study Program and former Dean of the Faculty of Education, Universitas Negeri Malang, Indonesia. He is an IEEE member and has published many articles in international journals and international conferenceproceedings on the topics of the use of ICT in the instructional process, management information systems, and e-leadership.

Rusdinal isaProfessorat the Educational Administration Department and former Dean of the Faculty of Education, Universitas Negeri Padang, Indonesia. He also authored many books and published many articles in international journals and conference proceedings on the topics of educational management and e-leadership.

Aan Komariahis aProfessor at the Educational Administration Department, Faculty of Education, Universitas Pendidikan Indonesia, Indonesia.She also authored many books and published many articles in international journals and conference proceedings on the topics of educational administration and e-leadership.

Rohaida Binti Mohd. Saat is aProfessor at the Department of Mathematics and Sciences and former Dean of the Faculty of Education at the University of Malaya, Malaysia. She also published many articles in international journals and conference proceedings on the topics of teaching, learning, sciences, and mathematics.

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