

TRANSFORMATIONAL LEADERSHIP AND TECHNOLOGY LEADERSHIP IN GEARING TOWARD THE 21ST CENTURY EDUCATION

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Abstract

This descriptive-correlation study primarily aimed to provide inputs to fine-tune leadership roles in order to amplify technology integration to keep up with the pace of change and innovation in gearing toward 21st-century education. Data were drawn from the relationship of transformational leadership attributes and technology leadership proficiency of school heads. The study also intended to reveal the difference in the transformational leadership attributes and technology leadership proficiency of school heads in terms of their demographics: sex, educational attainment, age, and the number of years as school heads.

The respondent school heads, who were principals or head teachers designated as officers-in-charge of the schools, were selected through criterion-referenced total population sampling technique. The Total School Leadership survey instrument, a standardized tool, was used to determine school heads' transformational leadership attributes, while the Principal Technology Leadership Assessment survey, also a standardized tool, was utilized to measure their technology leadership traits. T-test of independent samples, one-way ANOVA, Tukey's HSD test, Pearson product-moment correlation, and coefficient of determination were used as statistical methods.

It was found that transformational leadership attributes and technology leadership proficiency has a very high correlation. This result may fine-tune and expand the leadership roles of school heads in setting vision, developing people, and redesigning the organization. A significant correlation was also found between the transformational leadership attributes and all the sub-dimensions of technology leadership which implies that a transformational leader is also a technology leader. It was also verified that the school heads' educational attainment might create variance in their transformational leadership attributes. Likewise, the technology leadership proficiency of school heads varies in terms of their educational attainment and their number of years as school heads.

These findings may be used to calibrate the leadership roles of school heads and to amplify technology integration in schools to keep pace with change and the demands of 21st-century education.

Keywords: transformational leadership, technology leadership, change management, innovation, 21st-century education

INTRODUCTION

The world drastically evolves where changes and innovations rapidly carve the social landscape with new models of leadership in the 21st century (Mueller, 2009).

Change transcends in every situation; it may happen in a natural or intentional way (Maxwell, 2005). It would always have two stages. One is the previous or old stage, and the other is the new or the post-change stage. Furthermore, controlling change is never simple. Rather than confronting an equal rival over the table, it is more as though everyone is going up against a super force called "the status quo." One of the roles of leaders is to lead the conventional limits of their organization that involves proactively driving change for the shared advantage of the organization and more extensive society (Gitsham, Wackrill & Baxter, 2012).

Duffy (2010) argued that now is not the time for tinkering and for small, incremental changes; society needs fundamental and systemic change. Making big, bold changes entails an awareness of mission and purpose and a well-defined vision. Changes do not just happen by accident. Leaders with vision, boldness and the ability to attract others must go together to lead these changes.

A phenomenon, a process, a state, or a concept brought by the ever-changing world is globalization. Although not a new concept, it has been around for hundreds and, arguably, thousands of years (Dollar, 2004). According to the Levin Institute, globalization is a process of interaction and integration among people of different nations, a process driven by worldwide activities.

Brooks, Weatherson, and Wilkinson (2010) detailed that there are both costs and benefits and advantages and disadvantages in globalization. Gemma (2014) posited that the purpose of globalization should always be examined. While the majority of the purpose of globalization lies in business, it brought rapid advancement in processes for profound paradigm shifts in almost every area of the society – so much so that keeping the advantage in a globalized society now demands going beyond conventional modes of education. "This being [the] case, global community now faces the daunting task of preparing youth to fulfill the challenges of an ever-transforming world" (Bonk, 2011 p. 92).

In relation to globalization are the skills that should be developed to sustain relevance in the changing world; these are called 21st-century skills. In today's knowledge-based, globally-competitive economy, the types of skills needed to succeed are very different from those in the past. The basics of Math, English, and Science remain important, but with extensive access to information via the Internet, rote memorization of facts is not the skill set that is needed. Reimers (2014) summarized the type of skills necessary to prepare learners for the workforce of the future. They are critical thinking and problem-solving, creativity and innovation, collaboration, question formulation, global awareness, communication skills, and technology skills.

Twenty-first-century skills are also incorporated in the changes of curriculum for basic education. This is to ensure the global competitiveness of graduates. The Department of Education (DepEd) formulated the design and details of the curriculum for it to be contextualized and globalized (R.A. No. 10533, 2013). This suggests the will of leaders and policymakers in highlighting the need for 21st-century skills, which guarantee the learners' acquisition of necessary competencies and skills to be globally competitive; hence a shift to 21st-century education requires a change of viewpoint from the people. Nothing will change if there is no shift of viewpoint. New skills will only be squeezed to fit with the current conventional skills (Macaulay, 2009).

Given the pace and scale of change in the 21st century, there is increasing pressure for individuals and societies to be flexible and continually learn. A 12-year study on leadership showed that innovating is another key factor in keeping up with the ever-changing world (Zennouche & Zhang, 2014). Additionally, Shin and Zhou (as cited in De Jong, 2003) presented in their study that a leader, who brings change, innovates to and for the organization, and focuses on each subordinate of the organization, finds success in his endeavor.

Schleicher (2015) posited that innovation in a learning environment is using the resources available to create something new to equip learners with 21st-century skills. It is also a means of transforming organizational relationships and dynamics to make them relevant to the 21st century. Innovation could be new ideas, new devices, or new processes. It is something original and new being introduced to the world (Gosmire & Grady, 2007). Innovation is not incremental to something that already exists but rather a creation of a new value. Its roots are with the determination of needs. Through innovation, these determined needs are being satisfied.

Dumont, Instance, and Benavides (2010) enumerated the building blocks of an innovative learning environment: cooperative learning, service learning, home-school partnership, formative assessment, inquiry-based approaches, and learning with technology. These building blocks generally come up on how to implement innovation in schools.

Leadership is seen as a fundamental component in sustainable educational growth, such as bringing out change and innovation (Hargreaves & Fink, 2006). Furthermore, Gkolia, Belias, and Koustelios (2014) stated that principals hold the main position in deciding the way a school works. The principal, through the teachers, can bring out change and innovation (Boberg, 2013). It is the principal's leadership role that causes positive change either directly or indirectly on teachers (Herrera, 2010).

The primary role of school heads in the local setting is to set the mission, vision, goals, and objectives of the school, create an environment conducive to the teaching-learning process, implement, monitor, and assess the school curriculum and is accountable for higher learning outcomes (DepEd Order No. 2 s. 2015). There is no specification on the role of school heads in keeping up with the pace of change and innovation. Moreover, the Results-based

Performance Management System (RPMS), a guideline that stipulates the specific mechanisms, criteria, and processes for schools and offices, covering all school personnel in the DepEd, detailed the key results areas (KRAs). These are general areas of outcomes or outputs to which a school head is responsible for focusing. The key result areas are the following: instructional leadership; learning environment; human resource management and development; parents' involvement and community partnership; and school leadership management and operations. Although keeping up with the pace of change and innovation can be incorporated in each key result area, there is still a dearth of information on the roles of school heads in bringing out change and innovation to ensure schools are attuned to the demands of 21st-century education.

Results-based Performance Management System (RPMS) included plus factor, which is considered as a key-result area for the additional accomplishments of school heads, which are not covered within their regular duties and responsibilities. Keeping up with the pace of change and innovation may be considered as a plus factor, which may or may not be a focus of a school head.

Ahmad (2015) suggested that leaders should always be particular in their role to achieve greater organizational success. The role of a school head is critical in order to keep pace with the changes and innovations that emerge in the 21st century.

Studies agree that leadership is the most important factor in the effective management of school change (Leithwood & Riehl, 2005; Nash, 2012; Ayiro, 2014; Bass & Riggio, 2006). Moreover, Khan, Rehman, and Fatima (2009); Jung, Chow, and Wu (2003) found a positive and significant relationship between leadership, particularly transformational leadership, and organizational change. Gumusluouglu and Ilsev (2009a) asserted that transformational leadership is a successful factor of change and innovation. Kouzes and Posner (2007) revealed that leaders who employ transformational leadership practices make exemplary changes in an organization. The study of Chi, Chung, and Tsai (2011) showed that transformational leadership promotes innovation resulting in the improvement of the organization. Hoy and Miskel (2006) stated that traditional models of leadership repress the limit with regard to change, while transformational leadership uses the power of relationships to transform an organization. In addition, Brown and Moshavi (2005) said that it is a practice of leaders to use the power of relationships to communicate vision, to help subordinates achieve this vision, and to guarantee that subordinates are inspired to perform tasks more than their own expectations.

Empirical research indicates that effective and capable transformational leaders are essential to the success of reform efforts (Al-Omari & Sharaah, 2012). In addition, transformational leaders are capable of creating positive change in people and in the culture within an organization (Wildy, Pepper, & Guanzhong, 2010). Transformational leadership causes change and innovation (Leithwood, Harris, & Hopkins, 2008). It is a standout amongst contemporary approaches to leadership in relation to change and innovation (Moolenaar,

Daly, & Peter, 2010). It is also known as a leadership style that can make an organization innovate to achieve its vision (Bass, 1985).

Transformational leadership is spreading influence with a focus on crafting shared goals and societal commitment to constructive change (Hallinger, 2003). Moreover, Pradhan and Pradhan (2014) reported that transformational leadership is unique from the other leadership styles with regard to empowering or enabling subordinates. The leader involves the subordinate in a way where both of them excel to a higher level of motivation and reliability. Hirtz, Murray, and Riordan (2007) asserted that an important component of transformational leadership is leader behavior. Followers see the behavior of the leader as a motivation to get the work done. Commitment capacity and engagement in attaining goals increase as transformational leadership of the leader exemplifies to subordinates (Leithwood & Jantzi, 2006; Marks & Printy, 2003). They are motivated as they surpass what is expected from them, resulting in the greater achievement of work (Bass, 1985; Bass & Avolio, 1994). The accomplishment of a transformational leader is shown both by incremental results and how much the subordinates build up their own particular leadership potentials and abilities (Moolenaar et al., 2010). Transformational leaders show appreciation of and confidence to subordinates, demonstrate accountability, and take risks in embracing new methodologies (Leithwood & Jantzi, 2006). Each member of the organization is essential to the success of the organization. Fang, Tsai, and Chang (2005) detailed that a subordinate's contribution through leadership greatly expresses the success or failure of the organization. Achievement happens if everyone in the organization has a joint vision of bringing change and innovation (Hargreaves & Fink, 2006; Kennisnet, 2011).

Leithwood, Patten, and Jantzi (2010) claimed that transformational leadership is the most effective leadership style in education. Thus, an effective school head uses transformational leadership to manage schools. Transformational leadership works better in school for it fits all the aspects of school management where it taps the full potential of the main players of the school - the teachers (Sergiovanni, 2006). However, more effective leaders employ multiple styles of leadership when deemed necessary (Avolio & Bass, 2002).

Ng (2008) and Nash (2012), in their studies, used the model of transformational leadership of Leithwood and Jantzi (2006) with the four (4) sub-dimensions. They developed a transformational leadership model with interrelated factors in education specifically: (1) direction setting comprises of constructing a vision for the school, communicating specific goals and objectives, and setting high expectations; (2) developing people includes coherent incitement, proposing personal support, and demonstrating proficient practices and values; (3) redesigning the organization refers to building a cooperative school environment, initiating practices to raise participation in school decisions and keeping a helpful stakeholders relation; and (4) improving the instructional program includes the foundation of established routines, practices, and arrangements to support change.

One of the utmost ways of keeping up with change and innovation is technology integration in the educational process (Yee, 2000). Moreover, OECD (2013) identified

technology integration as one of the sources of generating innovation. Technology has enormous capability when it reshapes the different components of a learning environment. According to Shar (2014) and Prokopiadou (2012), technology integration in schools is one of the greatest contributions of the 21st century that brings effectiveness and efficiency in managing schools and achieving students' success. Initially, teachers are the ones who integrate technology in the classroom (Dexter, 2011), but school heads are the ones who implement change and innovation through leadership in all the processes in schools (Afshari, Abu-Bakar, Suluan, SayFooi, & Abu-Samab, 2012), thus, also responsible in bringing technology integration in classrooms.

"Technology is a changing phenomenon that has become contextualized in daily living" (McCoy-Thomas, 2012, p. 61). Furthermore, Ahmad (2015) defines technology as the use of computers, laptops, tablets, smartphones, and any other electronic devices with internet access in doing the usual activities. These tools have been an integral part of work, school, and day-to-day activities. Technology has enhanced the teachers' way of teaching (Okojie, Olinzock, & Okojie-Boulder, 2005), learners' way of learning (Mbangwana, 2008), and school heads' way of managing schools (Creighton, 2003). Changes in curriculum standards are also linked to the changes brought about by technology (Geijssel, 2001). Being familiar with the emerging technologies will enable leaders of 21st-century schools to maintain an active awareness of globalization and 21st-century skills (Perrin, Daniels, Jefferson, Blauth, Marone, O'Sullivan & Moran (2010); Boyatzis, 2008).

Technology has been a game-changer with regard to leadership in education (Collins & Halverson, 2010). As technology increasingly becomes part of the routine in schools, leadership is a must to support, strengthen, and regulate the use and implementation of technology (Richardson, Bathon, Flora, & Lewis, 2012). Thus, technology leadership emerges. Technology leadership is a style of leadership that focuses on the development, regulation, management, and application of technology to different organizational processes so as to achieve the vision (Townsend, 2013).

Richardson et al. (2012) suggested that there is a need to respond to the changes that are happening in schools and that the school heads are the front liners to respond to the impact of technology. Technology leadership in schools of today is totally essential (Seyal, 2015). School heads are the role models of technology integration in schools. Technology leaders' role is multifaceted and vigorous (Sugar & Holloman, 2009), for they should facilitate the use of technology through technical support in pedagogical practice and in the management of technology (Malik, 2015). Moreover, Gumusluoglu and Ilsev (2009b) pointed out that the success of technology implementation in 21st-century schools lies greatly on the leadership style of the school head. This leadership style of the school head plays a prevailing role in moving the school's productivity and success. "In this time of change in education, the actions of the school leader will determine the fate of public education in the 21st century, and maintaining the status quo is not an option" (Daggett, 2010, p. 21).

Leaders are framed by standards that make it easy for effective evaluation (Wildy et al., 2010). These standards are used to improve professional practice (Richardson et al., 2012). Tan (2010), in his empirical study on technology leadership, identified four roles or areas of concern of technology leaders: infrastructural change, organizational and policy change, pedagogical and learning change, and cultural change. In addition, the International Society for Technology in Education (ISTE) established the 2009 National Educational Technology Standards for Administrators (NETS-A) that functions as a guide for the realization of technology leadership. Richardson et al. (2012); Garcia and Abrego (2014); McLeod and Richardson (2011); Sisman and Kurt (2011) used the NETS-A in their studies to identify the level of technology proficiency of school heads. Furthermore, Schrum, Galizio, and Ledesma (2011) posited that these standards are used to take into consideration the extensive role of technology within society and the need for administrators to create learning environments more aligned with technology.

The 2009 NETS-A are comprised of five sub-dimensions, each representing skills considered necessary for administrators to lead schools in a progressively technology-imbued society (ISTE, 2009). These sub-dimensions are (1) visionary leadership which centers on the proficiency of leaders to provide a technology-focused vision for all stakeholders in the educational system, (2) digital age learning culture focuses on the capability of leaders to maintain the culture of the use of technology in learning, (3) excellence in professional practice emphasizes leaders' ability to promote competent habits through the implementation of technology and digital resources, (4) systemic improvement concerns leaders competency in managing their organizations with the successful use of technology, and (5) digital citizenship focuses on the proficiency of leaders that model and understand social, ethical, and legal issues related to digital resources (ISTE, 2009).

The ISTE also developed standards that provide more detailed descriptions for each sub-dimension to better determine and achieve each sub-dimension. Like most specialized standards, 2009 NETS-A are concise statements of topical analysis and proficiency that a school head should have with regard to technology leadership (Davies, 2010).

Change and innovation in 21st-century education are accelerating, and school heads are increasingly at risk of getting left behind. To keep the advantage in a globalized society, school heads should go beyond conventional modes of leadership. Studies suggest that in order to be attuned to the pace of change and innovation of 21st-century education, the roles of school heads should be enhanced to strengthen technology integration (Dyal, Carpenter & James, 2009).

It is apparent that this role is very important to be at par with the changes that are happening in society and being in the current wave of globalization and the 21st century. Although roles of school heads in keeping up with change and innovation are not specified in their job description in the local setting, the focus should be reasonably given on this to be attuned with the demands of the 21st century (DepEd Order 2 s. 2015).

The foregoing studies surmise that transformational leadership is an effective leadership style in creating change and innovation in schools. This is a people-centered leadership style where leaders inspire the people to change their attitudes, views, and even practices toward attaining their common vision. There were also developed sub-dimensions of transformational leadership where the emphasis is more on: setting vision; focusing on the development of people; redesigning the learning organization; and improving routines, practices, and arrangements to support change. Moreover, transformational leadership, if effectively used, can potentially promote the successful generation and implementation of innovation and change (Mueller, 2009).

On the other hand, another leadership style that concerns keeping up with change and innovation in the organization is technology leadership. The core of this leadership style is on the development, regulation, management, and application of technology to different organizational processes so as to achieve the vision (Townsend, 2013). It does not merely focus on the attitude and skills of leaders in using computers and other devices but rather on the responsibility of school heads on involving everyone in the educational process on integrating technology.

The prominent basis of technology leadership proposed sub-dimensions to ensure a better perception of its focus. It emphasized: capabilities of leaders in providing technology-focused vision; maintaining the culture of technology use; promoting competent habits through the implementation of technology and digital resources; a managing organization with the successful use of technology; and modeling and understanding social, ethical, and legal issues related to digital resources (McCoy-Thomas, 2012).

Technology leadership, similar to transformational leadership, promotes the vision of the organization to change for the better (Franciosi, 2012). He also suggested that technology leadership, just like transformational leadership, is appropriate to schools characterized by change and innovation to cope with the flexible technology-driven changes and new developments of the 21st century. Transformational leadership and technology leadership also stress the importance of the involvement of every member of the organization in improving the educational process. Another similarity is the focus of the two leadership styles on redesigning the organization through improving practices or routines on the daily operations of schools. Similarities of transformational leadership and technology leadership possibly indicate a relationship between the two leadership styles. (Afshari et al., 2012).

In this sense, transformational leadership, together with technology leadership, may help in enhancing the role of school heads in amplifying technology integration in keeping up with the pace of change and innovation of 21st-century education. These two leadership styles, although not identical, share common features that, if linked, could support strengthening the existing leadership roles of school heads. Thus, this study seeks to find more on the relationship of transformational leadership and technology leadership of school heads.

This study primarily aimed to derive inputs for fine-tuning the leadership roles of school heads in order to amplify technology integration keep up with the pace of change and innovation in gearing toward 21st-century education; data were drawn from the correlation of transformational leadership attributes and technology leadership traits of school heads. It also intended to reveal possible differences between the transformational leadership attributes and technology leadership traits of school heads in terms of their demographics: sex, educational attainment, age, and the number of years as a school head. The following were the specific objectives: (1) determine the perceived levels of transformational leadership attributes and technology leadership traits of school heads; (2) find the differences between transformational leadership attributes and technology leadership traits of school heads in terms of demographics (sex, age, educational attainment and number of years as a school head); and, (3) determine if transformational leadership attributes relate to technology leadership traits and across the five NETS-A sub-dimensions: visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship.

The following hypotheses were developed to support the research objectives guiding this study: (1) there is a significant difference in the means of transformational leadership attributes of school heads in terms of their sex; (2) there is a significant difference in the mean of transformational leadership attributes of school heads in terms of their educational attainment; (3) there is a significant difference in the means of transformational leadership attributes of school heads in term of their age; (4) there is a significant difference in the means of technology leadership traits of school heads in terms of their number of years as a school head; (5) there is a significant difference in the means of technology leadership traits of school heads in terms of their sex; (6) there is a significant difference in the means of technology leadership traits of school heads in terms of their educational attainment; (7) there is a significant difference in the means of technology leadership traits of school heads in terms of their age; (8) there is a significant difference in the means of technology leadership traits of school heads in terms of their number of years as a school head; (9) there is a significant correlation between transformational leadership attributes and technology leadership traits of school heads; (10) there is a significant correlation between transformational leadership attributes and visionary leadership, a sub-dimension of technology leadership traits of school heads; (11) there is a significant correlation between transformational leadership attributes and digital age learning culture, a sub-dimension of technology leadership traits of school heads; (12) there is a significant correlation between transformational leadership attributes and excellence in professional practice, a sub-dimension of technology leadership traits of school heads; (13) there is a significant correlation between transformational leadership attributes and systemic improvement, a sub-dimension of technology leadership traits of school heads; and lastly, (14) there is a significant correlation between transformational leadership attributes and digital citizenship, a sub-dimension of technology leadership traits of school heads.

The research was conducted under these assumptions: the first assumption stated that the answers given by respondents regarding their perceptions on their attributes and traits

were honestly given and reflected voluntarily and anonymously. Informed perceptions of their transformational leadership attributes and technology leadership traits were also inevitable. The second assumption specified that the respondent sample was not biased as regards demographic factors such as sex, educational attainment, age, and the number of school years as a school head.

This study is limited to the viewpoints of the school heads. Those from subordinates and students were not made part of the data in order to put emphasis on the leadership circumstances of the school heads uninfluenced by other human factors.

The results of this study are primarily intended to provide inputs in managing 21st-century schools. These findings could be significant breakthroughs in integrating transformational and technology leadership practices to amplify the roles of school heads in making education relevant to the times. The self-assessment of school heads plays an important role in defining how they consciously manage change so that expected learning outcomes can be achieved through relevant instruction.

Through this study, it is hoped that issues and gaps in educational management would be determined and validated through the various analyses on interrelationships among the variables herein.

Management roles are defined more intricately in the light of transformational and technology leadership through further correlation with school heads' demographics. Subsequent results could offer feasible strategies for school leaders to consider in drafting relevant action plans as regards technology integration in the curriculum.

In the light of the directions and processes in this study, conceptual and operational definitions are hereby stated for the key terms:

Technology Leadership. In the study, these are a set of characteristics based on McLeod's (2009) Principal Leadership Assessment survey formed from the five sub-dimensions of technology leadership of the ISTE's 2009 NETS-A apparent of the respondent school head's self-perceptions.

Transformational Leadership. This refers to leadership features where the leader inspires and stimulates positive change. In the study, these are a set of characteristics based on the Total School Leadership survey of Leithwood & Jantzi (2006) apparent of the respondent school head's self-perceptions.

METHOD

This descriptive-correlation study primarily aimed to deliver leadership inputs in integrating technology in what are considered to be 21st-century schools. It also specifically tried to determine diverse factors that affect the management of technology in various schools based on the attributes of transformational leadership.

The study was conducted in 113 public secondary schools. The study of Seyal (2012) served as a model of its procedure. It surveyed 96 Bruneian school administrators on how they manage their schools' information and communication technologies. Due to uncontrollable circumstances, only 85 of the 113 were able to comply with the requirements of the instrument.

The number of qualified respondents was calculated with G*power (Dale, 2012). Based on the circumstances in this study, a minimum of 20 respondents were needed to ensure sufficient power of .95 for a bivariate correlational analysis with a two-tailed significance test, a medium effect size of $r_s = .55$, and alpha set at .05. In this case, the total of 85 is above the minimum.

The respondents were selected using the criterion-referenced design in which all of them were principals and/or duly designated head teachers as school heads regardless of the existence of a school technology program; hence, the total population sample was utilized.

To accomplish the objectives of this study, a survey instrument was used having three parts. The first part was a demographic survey that obtained respondents' data such as age, sex, educational attainment, and the number of years as a designated school head. Consequently, this information served as independent variables in the correlation part of this study. It is worthy to note that such variables are intriguingly essential in further defining school leadership attributes.

This study adopted the method of Izquierdol, Bevilaqua, Rossato, Lima, Medina, and Cammarota (2008), in which age groups showed significant influence on certain human processes. Meanwhile, sex was not a significant determinant of technology leadership of school heads in the studies of Teo (2008) and Leong, Yan, and Shafinaz (2015). Even so, this variable was still included in this study for further verification.

Khan et al. (2009) and Rodriguez-Campos, Rincones-Gomez, and Shen (2005) proved that the educational attainment of school heads had been a predictor of their transformational leadership behaviors and practices. This study tried to re-verify such results.

In the studies of Waxman, Boriack, Lee, and MacNeil (2013), Tanzer (2004), and Ünal, Uzun, and Karatas (2013), the number of years as school heads did not affect their transformational leadership styles. Despite this result, this study still revalidated the data and added technology leadership as a dependent variable.

The second part was a 20-item questionnaire that yielded the respondents' self-assessed transformational leadership using the Total School Leadership (TSL) survey instrument developed by Leithwood (2006). Based on the exchange of emails, the author gave his permission to have this instrument used in this study.

Lastly, the Principal Technology Leadership Assessment (PTLA) by McLeod (2009) was used to describe the school heads' technology leadership attributes. In the same way,

permission to amend and use this instrument was granted by the author.

The PTLA was slightly modified based on the standards of the International Society for Technology in Education (ISTE) in its 2009 National Educational Technology Leadership Standards for Administrators (NETS-A). Each survey item was written to operationalize these standards according to the context of this study. It utilized the format of sub-dimension questions based on (1) visionary leadership, (2) digital age learning culture, (3) excellence in professional practice, (4) systemic improvement, and (5) digital citizenship. Validity and reliability tests were replaced by content citation. The PTLA is proven a valid and reliable instrument for the said purpose based on the studies of Raman, Don, and Kasim (2014), Banoğlu (2011), Gottwig (2013), Metcalf (2012), Duncan (2011), and Grey-Bowen (2010).

Proper permission was sought to conduct data gathering. The usual procedure of distribution of questionnaires was carried out, and systematic retrieval of the same was ensured. For ethical handling of raw data, the respondents were assured of the anonymity and confidentiality of their responses by assigning each submitted form a code to ensure that no information or data could be linked back to them.

The Statistical Package for the Social Sciences (SPSS) version 23 for Mac software program was used to analyze the data gathered.

For interpretation of the level of perceived transformational leadership attributes and technology, leadership traits of school heads, the following mean range, and verbal interpretation were used (Osorio, 2015).

Table 1

Table of Interpreting the Perceived Transformational Leadership Attributes and Technology Leadership Traits of School Heads

Mean	Verbal Interpretation
3.26 - 4.00	Very High
2.51 - 3.25	High
1.76 - 2.50	Average
1.00 - 1.75	Low

The difference in the transformational leadership attributes and technology leadership traits of school heads in terms of sex was analyzed using a t-test of independent samples, while in terms of educational attainment, age, and the number of years as a school head, the one-way ANOVA was utilized. Tukey's Honest Significant Difference (HSD) test, a post-hoc analysis, was used on demographics with significant differences identified to find means that are significantly different from each other.

Pearson product-moment correlation coefficient (Pearson's r) was chosen as the

appropriate parametric analysis tool to determine the relationship between transformational leadership attributes and technology leadership traits and its sub-dimensions: visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship. Although other parametric methods can be used, Pearson's correlation is often the preferred parametric analysis by researchers as long as the assumptions to use the test are met and it is the most precise estimate of correlation (Howell, 2007).

Correlation tests were conducted to ascertain the positive or negative relationship between the variables in the study. The results from the correlation coefficient demonstrated the degree and direction of the relationship between the variables (Cronk, 2006). A verbal description used in the study of Gaur and Gaur (2009) of the correlation coefficient was adopted using this table.

Table 2

Table of Interpreting the Correlation between the Perceived Transformational Leadership Attributes and Technology Leadership Traits of School Heads

Correlation Coefficient	Description
1.00	Perfect Correlation
0.70 or 0.99	Very High Correlation
0.50 to 0.69	High Correlation
0.30 to 0.49	Moderate Correlation
0.10 to 0.29	Low Correlation
0 to 0.29	Negligible or no Correlation
Negative values	Indicate inverse Correlation

RESULTS

This section reports the results of the study and provides immediate analysis of outcomes that are organized following the sequence of the objectives: self-perceived levels of transformational leadership attributes and technology leadership traits of school heads; transformational leadership attributes and technology leadership traits of school heads in terms of demographics (sex, age, educational attainment, and the number of years as a school head); and, transformational leadership attributes in relation to technology leadership traits and across the five NETS-A sub-dimensions: visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship.

Self-Perceived Transformational Leadership Attributes of School Heads

The mean and standard deviation for self-perceived transformational leadership

attributes and technology leadership traits are presented in the subsequent tables. Additionally, mean is also verbally interpreted.

Table 3 shows that school heads consistently rate their transformational leadership attributes in terms of direction-setting to be very high. Nevertheless, demonstrating high expectations in their administrative functions tops the rest. Clarifying the reasons for improvement and giving overall purpose is not far behind. Providing assistance in setting goals, on the other hand, is at the lower limit.

Table 3
School Heads' Transformational Leadership Attributes: Direction Setting

Transformational Leadership Sub-dimension	Mean	SD	Verbal Interpretation
TSL1 - giving overall purpose	3.52	0.66	Very High
TSL2 - clarifying the reasons for improvement	3.53	0.55	Very High
TSL3 - providing assistance in setting goals	3.31	0.49	Very High
TSL4 - demonstrating high expectations	3.63	0.49	Very High
I. Direction Setting	3.50	0.38	Very High

Table 4 presents that school heads generally view their leadership attributes on developing people as high. However, it is noticeable that providing support to improve teaching banners all traits with a very high level. This quality is placed over encouragement for new ideas, modeling of good practice, and promoting an atmosphere of caring, trust, and leadership development.

Table 4
School Heads' Transformational Leadership Attributes: Developing People

Transformational Leadership Sub-dimension	Mean	SD	Verbal Interpretation
TSL5 - giving support to improve teaching	3.54	0.66	Very High
TSL6 - encouraging new ideas for teaching	3.21	0.73	High
TSL7 - modeling professional practice	3.16	0.76	High
TSL8 - developing atmosphere of caring and trust	3.11	0.75	High
TSL9 - promoting leadership development	3.11	0.62	High
II. Developing People	3.23	0.53	High

In terms of redesigning the organization, school heads give much effort in improving the school by kindling the support of the community in key activities. They give the most emphasis on human participation rather than on the tasks themselves. Data in Table 5 simply exude the people-centeredness of these education leaders by focusing on the people themselves more than the work that they can impart.

Table 5**School Heads' Transformational Leadership Attributes: Redesigning the Organization**

Transformational Leadership Sub-dimension	Mean	SD	Verbal Interpretation
TSL10 - encouraging collaborative work	3.34	0.55	Very High
TSL11 - ensuring participation in school's improvement	3.39	0.60	Very High
TSL12 - engaging parents in school's improvement	3.34	0.59	Very High
TSL13 - ensuring community support in school's improvement	3.43	0.56	Very High
III. Redesigning the Organization	3.38	0.33	Very High

On the aspect of the instructional program as the school's main endeavor, Table 6 clearly confirms that school heads emphasize the use of concrete data and information as bases for program management. They place these features on top of all the administrative and instructional concerns in their schools. They firmly believe that assessment of teaching and learning as evidenced by records and tangible information can provide a meaningful improvement in instruction and administration.

Table 6**School Heads' Transformational Leadership Attributes: Improving the Instructional Program**

Transformational Leadership Sub-dimension	Mean	SD	Verbal Interpretation
TSL14 - locating resources to improve staff their teaching	3.23	0.62	High
TSL15 - observing classroom activities	3.13	0.64	High
TSL16 - helping teachers to improve their teaching	3.24	0.76	High
TSL17 - discussing educational issues	3.25	0.69	High
TSL18 - buffering teachers from distractions	3.13	0.70	High
TSL19 - encouraging the use of data	3.40	0.66	Very High
TSL20 - encouraging data use in planning	3.28	0.50	Very High
IV. Improving the Instructional Program	3.30	0.79	Very High

Table 7 summarizes the transformational leadership attributes of the school heads in which being visionary banners all traits. Data suggest that setting the direction is not only the foremost in managing technology in school but also the round-the-clock concept of putting everything in place to keep teaching and learning moving forward. Despite being people-centered in the other sub-domains of transformational leadership, school heads do not seem to put themselves in the front line of developing their teachers. Rather, they make their organizational designs, and instructional programs work to the advantage of the teachers for the benefit of the students.

Table 7
School Heads' Transformational Leadership Attributes

Transformational Leadership	Mean	SD	Verbal Interpretation
I. Direction Setting	3.50	0.38	Very High
II. Developing People	3.23	0.53	High
III. Redesigning the Organization	3.38	0.33	Very High
IV. Improving the Instructional Program	3.30	0.79	Very High
OVERALL Transformational Leadership	3.34	0.43	Very High

Self-Perceived Technology Leadership Traits of School Heads

In Table 8, school heads view their visionary leadership, as a sub-dimension of technology leadership, to its utmost. They very much agree that using digital resources can facilitate change to maximize learning at school. This resonates with their belief that having a vision supports their plans to facilitate the change they want to happen to their schools. They see how the future exists and try all the necessary steps to get there.

Table 8
School Heads' Technology Leadership Traits Sub-Dimension: Visionary Leadership

Technology Leadership Sub-dimension	Mean	SD	Verbal Interpretation
PTLA1-facilitating change	3.48	0.68	Very High
PTLA2-engaging process	3.38	0.60	Very High
PTLA3-promoting plans	3.25	0.49	High
I. Visionary Leadership	3.37	0.45	Very High

Digital age learning culture, as shown in Table 9, being the second sub-domain of technology leadership, is believed to be of extreme significance by the school heads. They specifically find that promoting and participating in learning communities can stimulate innovation, creativity, and digital collaboration. At the same perceived level, ensuring instructional innovation focused on continuous improvement of digital learning and modeling the effective use of technology are, likewise, highly significant. On the other hand, school heads do not seem to engage much in providing the learning environment and the curriculum itself as strategic management aspects of the school's digital culture.

Table 9
School Heads' Technology Leadership Traits Sub-Dimension: Digital-Age Learning Culture

Technology Leadership Sub-dimension	Mean	SD	Verbal Interpretation
PTLA4-ensuring innovation	3.38	0.61	Very High
PTLA5-modeling and promoting the use of technology	3.29	0.63	Very High
PTLA6-providing learning environment with technology	3.25	0.67	High
PTLA7-ensuring technology infusion in curriculum	3.21	0.61	High
PTLA8-promoting and participating in learning communities that stimulate innovation	3.41	0.60	Very High
II. Digital Age Learning Culture	3.31	0.45	Very High

Table 10 presents how school heads view the third sub-dimension of technology leadership in managing technology in the area of excellence in professional practice. Data show that they give a premium to allocating time, resources, and access to ensure the ongoing professional growth of the school personnel. Likewise, updating information and practices through research is a chief priority on this aspect. In contrast, participation in learning communities and modeling communication using digital tools appear to be at a lesser focus as means to promote technology efficiency.

Table 10**School Heads' Technology Leadership Traits Sub-Dimension: Excellence in Professional Practice**

Technology Leadership Sub-dimension	Mean	SD	Verbal Interpretation
PTLA9-allocating time, resources, and access	3.49	0.66	Very High
PTLA10-facilitating and participating in learning communities that support faculty in the study and use of technology	3.17	0.63	High
PTLA11-promoting and modeling communication	3.14	0.68	High
PTLA12-staying up-to-date on the use of technology	3.43	0.66	Very High
III. Excellence in Professional Practice	3.31	0.49	Very High

Systemic improvement, as the fourth sub-domain of technology leadership, is viewed by the school heads to be below par with the rest of the sub-domains, as shown in Table 11. All of the specific characteristics of this aspect were rated significantly regular. Unlike other sub-domains, establishing infrastructure for technology may be of lesser urgency to the school heads.

Table 11**School Heads' Technology Leadership Traits Sub-Dimension: Systemic Improvement**

Technology Leadership Sub-dimension	Mean	SD	Verbal Interpretation
PTLA13-leading purposeful change to reach learning goals	3.15	0.67	High
PTLA14-collaborating to improve staff performance and student learning	3.16	0.73	High
PTLA15-recruiting highly competent personnel	3.10	0.72	High
PTLA16-establishing partnership to support systematic improvement	3.11	0.72	High
PTLA17-establishing infrastructure for technology	3.07	0.61	High
IV. Systemic Improvement	3.12	0.53	High

The last of the five sub-domains of technology leadership is being highly promoted by the school heads, as manifested in Table 12. They firmly believe that endorsing shared cultural

understanding and involvement may propel the technological stability of the school. This practice is supported by ensuring access to digital resources and upholding policies for the efficient and ethical use of ICT in the school. On the other hand, social interactions through such media appear to be not a management priority despite being considered as a good practice.

Table 12
School Heads' Technology Leadership Traits Sub-Dimension: Digital Citizenship

Technology Leadership Sub-dimension	Mean	SD	Verbal Interpretation
PTLA18-ensuring access to digital resources	3.38	0.60	Very High
PTLA19-promoting policies for the use of ICT	3.29	0.61	Very High
PTLA20-promoting social interactions related to ICT	3.20	0.59	High
PTLA21-modeling and facilitating the development of a shared cultural understanding and involvement	3.56	0.64	Very High
V. Digital Citizenship	3.36	0.44	Very High

Table 13 presents that the school heads rate their overall technology leadership traits to be very high in four of the five sub-domains. Visionary leadership and digital citizenship are paramount in technology management. Managing change appears to be focused by these leaders through having a thorough understanding of the demands and rudiments of technological administration in the school. At the same level, instruction is also emphasized in which digital-age learning culture is geared toward collaborative learning. This resonates with the updating of the faculty and personnel as regards employing digital tasks in instruction as well as in managing their other academic tasks. Noticeably, systemic improvement or the total organizational transformation is not as clearly pronounced as the other sub-domains when it comes to having deliberate efforts in technology leadership in the school.

Table 13
School Heads' Technology Leadership Traits

Technology Leadership	Mean	SD	Verbal Interpretation
I. Visionary Leadership	3.37	0.45	Very High
II. Digital Age Learning Culture	3.31	0.45	Very High
III. Excellence in Professional Practice	3.31	0.49	Very High

IV. Systemic Improvement	3.12	0.53	High
V. Digital Citizenship	3.36	0.44	Very High
OVERALL Technology Leadership	3.28	0.40	Very High

Transformational Leadership Attributes of School Heads and their Demographics

A t-test of independent samples was used to compare the scores of the transformational leadership attributes of male and female school heads.

The t-test result presented in Table 14 indicates that there is no significant difference in the mean of transformational leadership attributes of male school heads ($M=3.32$, $SD=0.38$) and female school heads ($M=3.37$, $SD=0.47$); $t(85)=-0.64$, $p = 0.53$. Thus, there is no significant difference in the mean of transformational leadership attributes of school heads in terms of sex. Male and female school heads' responses are almost similar based on the low standard deviation of their means. This also indicates that sex is not a determining factor of transformational leadership attributes of school heads.

Male and female school heads' perspectives of their transformational leadership attributes do not differ much based on the small arithmetic difference of their mean. They also both have a low standard deviation that reflects the similarities of their responses.

Table 14
Difference in Transformational Leadership Attributes of School Heads in Terms of Sex

Sex	N	Mean	SD	t	p	Interpretation
Male	41 (47%)	3.31	0.38	-0.64	0.53	Not Significant
Female	46 (53%)	3.37	0.47			

In order to find how transformational leadership attributes of school heads in terms of educational attainment, age, and the number of years as a school head, a one-way ANOVA between-groups was calculated. In addition, Tukey's HSD test, a post-hoc analysis, was also presented for demographics having significant differences. The results of the analysis are presented in the subsequent tables.

Table 15 displays the analysis of the one-way ANOVA of transformational leadership of school heads in terms of educational attainment. The calculated value indicates that there is a significant difference in the transformational leadership attributes of school heads for educational attainment groups, $F(3,83)=4.66$, $p=0.01$.

Analysis of means shows that school heads who are holders of doctoral degrees have the highest perceived transformational leadership attributes. Its standard deviation suggests that the responses are clustered near the mean of transformational leadership attributes of school heads.

Table 15
Difference in Transformational Leadership Attributes of School Heads in Terms of Educational Attainment

Educational Attainment	N	Mean	SD	F	p	Interpretation
Earned units in Master's Degree	23 (26%)	3.16	0.29	4.66	0.01	Significant
Master's Degree	36 (41%)	3.32	0.53			
Earned units in Doctoral Degree	21 (24%)	3.40	0.29			
Doctor's Degree	7 (8%)	3.80	0.15			

Post-hoc analysis was used due to the significant difference that exists among educational attainment of school heads and to validate the existing difference among the demographic groups of school heads.

The post-hoc analysis using Tukey's HSD test shows that the transformational leadership attributes of those school heads with units in master's degree are statistically different from those with units in a doctoral degree. There is also a significant difference

among school heads with master's degrees from those with doctoral degrees, between school heads with doctoral degrees, and those with units in master's degrees and with master's degrees. This confirms that the mean of school heads who are holders of doctoral degrees significantly differs from the mean of the other school heads with different educational attainment.

Table 16
Post-Hoc Analysis of Transformational Leadership Attributes of School Heads in Terms of Educational

Educational Attainment			Mean Difference	p	Interpretation
With units in master's	Master's Degree		-0.16	0.46	Not significant
	With units in Degree	Doctoral	-0.24	0.22	Not significant
	Doctoral Degree		-0.64	0.00	Significant
Master's degree	With units in Degree	Master's	0.16	0.46	Not significant
	With units in Degree	Doctoral	-0.08	0.90	Not significant
	Doctoral Degree		-0.48	0.03	Significant
With units in Doctoral degree	With units in Degree	Master's	0.24	0.22	Not significant
	Master's Degree		0.08	0.90	Not significant
	Doctoral Degree		-0.40	0.12	Not significant
Doctoral Degree	With units in Degree	Master's	0.64	0.00	Significant
	Master's degree		0.48	0.03	Significant
	With units in Degree	Doctoral	0.40	0.12	Not significant

The result of the one-way ANOVA highlighted in Table 17 shows that there is no significant difference in the mean of transformational leadership attributes of school heads for age groups, $F(3,83)=0.63$, $p=0.19$ which indicates that age is not a determining factor of transformational leadership attributes.

The descriptive statistic presents that the youngest group of school heads aged 31 to 40 ($M=3.47$, $SD=0.23$) has the highest transformational leadership attributes. The low

standard deviation of each age group signifies the homogeneity or closeness of the school heads' perspective on their transformational leadership attributes.

Table 17

Difference in Transformational Leadership Attributes of School Heads in Terms of Age

Age	N	Mean	SD	F	p	Interpretation
31-40	11 (13%)	3.47	0.23			
41-50	41 (47%)	3.24	0.41	1.63	0.19	Not Significant
51-60	27 (31%)	3.44	0.52			
61 and older	8 (9%)	3.34	0.30			

As shown in Table 18, there is no significant difference in the mean of the transformational leadership attributes of school heads by group in terms of their years of experience, $F(4,82)=2.25$, $p=0.07$, which is an indicator that years of experience as a school head does not influence transformational leadership attributes.

School heads who have been working for 11 to 15 years ($M=3.46$, $SD=0.73$) have the highest perceived transformational leadership attributes. The low standard deviation is an indication that different age group of school heads has almost similar perspectives with respect to their transformational leadership attributes.

Table 18

Difference in Transformational Leadership Attributes in Terms of Number of Years as a School Head

Number of Years as School Head	N	Mean	SD	F	p	Interpretation
Less than 5 years	35 (40%)	3.42	0.30			
6-10	22 (25%)	3.12	0.42			
11-15	14 (16%)	3.46	0.73	2.25	0.07	Not Significant
16-20	8 (9%)	3.39	0.16			
More than 21 years	8 (9%)	3.31	0.30			

Technology Leadership Traits of School Heads and their Demographics

School heads were grouped by demographics, and the difference in the means of each group was determined. The difference in terms of sex was calculated with t-test of independent samples. On the other hand, educational attainment, age, and the number of years as a school head were calculated with one-way ANOVA. Tukey's HSD test, a post-hoc analysis, was also conducted on demographics with a significant difference.

The t-test result presented in Table 19 indicates there is no significant difference in the mean of technology leadership traits of male school heads and female school heads, $t(85)=-0.42$, $p = 0.68$. This is an indication that sex could not tell which school head has better ways of leading technology in education.

In addition, male and female school heads have almost common responses based on their low standard deviation.

Table 19
Difference in Technology Leadership Traits of School Heads in Terms of Sex

Sex	N	Mean	SD	t	p	Interpretation
Male	41 (47%)	3.26	0.44	-0.42	0.68	Not Significant
Female	46 (53%)	3.30	0.36			

The results in Table 20 show that there is a significant difference in technology leadership traits of school heads for educational attainment groups, $F(3,83)=7.17$, $p=0.001$. This suggests that there are respondents with particular educational attainment who got a significant variation compared to other school heads.

In addition, school heads who are holders of a doctoral degree got the highest mean. Its standard deviation indicates an almost unanimous perspective of technology leadership traits among the educational attainment group of school heads.

Table 20
Difference in Technology Leadership Traits of School Heads in Terms of Educational Attainment

Educational Attainment	N	Mean	SD	F	p	Interpretation
Earned units in Master's Degree	23 (26%)	3.13	0.34			
Master's Degree	36 (41%)	3.20	0.41	7.17	0.001	Significant
Earned units in Doctoral Degree	21 (24%)	3.43	0.32			
Doctor's Degree	7 (8%)	3.75	0.17			

Post hoc comparisons using the Tukey HSD test in Table 21 show that the mean of school heads with doctoral degrees was significantly different from those with units only in master's degree and those with master's degree. This suggests that the higher the educational attainment, the higher the technology leadership traits of school heads. This also plainly states that the technology leadership traits of school heads with doctoral degrees significantly vary from those who are not yet doctoral degree holders.

Table 21
Post-Hoc Analysis of Technology Leadership Traits of School Heads in Terms of Educational Attainment

Educational Attainment	Mean Difference	p	Interpretation	
With units in Master's Degree	Master's Degree	-0.07	0.89	Not significant
	With units in Doctoral Degree	-0.30	0.04	Significant
	Doctor's Degree	-0.62	0.00	Significant
Master's Degree	With units in Master's Degree	0.07	0.89	Not significant

	With units in Doctoral Degree	-0.23	0.10	Significant
	Doctor's degree	-0.55	0.00	Significant
With units in Doctoral Degree	With units in Master's Degree	0.30	0.04	Significant
	Master's Degree	0.23	0.10	Not significant
	Doctor's Degree	-0.32	0.18	Not significant
Doctor's Degree	With units in Master's Degree	0.62	0.00	Significant
	Master's degree	0.55	0.00	Significant
	With units in Doctoral Degree	0.32	0.18	Not significant

Table 22 presents that there is no significant difference in the technology leadership traits of school heads for age groups, $F(3,83)=2.58$, $p=0.06$, which points out that age does not tell the technology leadership traits of school heads.

The youngest group of school heads which is composed of individuals aged 31 to 40, has the highest mean. The same age group also got the lowest standard deviation, which pertains to the almost similar responses of the young school heads. This shows that the youngest group of school heads who are the most engaged in the new technology have the highest perceived technology leadership traits.

Table 22
Differences of Technology Leadership Traits of School Heads in Terms of Age

Age	N	Mean	SD	F	p	Interpretation
31-40	11 (13%)	3.49	0.27	2.58	0.06	Not Significant
41-50	41 (47%)	3.17	0.44			
51-60	27 (31%)	3.35	0.32			
61 and older	8 (9%)	3.33	0.42			

Table 23 shows that there is a significant difference in the technology leadership traits of school heads in terms of their years of experience as grouped in terms of their years of

experience, $F(4,82)=3.42$, $p=0.01$. This suggests a variation of technology leadership traits among the group of the respondents in terms of their number of years as a school head.

Those who have been school heads for less than five years have the highest mean among the groups of school heads. The low standard deviation means that the different groups of respondents have almost similar perspectives on their technology leadership traits.

Table 23
Difference in Technology Leadership Traits in Terms of Number of Years as a School Head

Number of Years as School Head	N	Mean	SD	F	p	Interpretation
Less than 5 years	35 (40%)	3.39	0.33			
6-10	22 (25%)	3.03	0.45			
11-15	14 (16%)	3.33	0.39	3.42	0.01	Significant
16-20	8 (9%)	3.35	0.18			
More than 21 years	8 (9%)	3.34	0.43			

Post hoc comparisons using the Tukey HSD test in Table 24 indicate that the means of school heads with six to ten years of experience was statistically different from those with less than five years of experience. There is also a significant difference among school heads with a greater number of years of experience from those with less than five years of experience. This also confirms that the technology leadership of school heads with the greater number of years in service significantly varies with those with lesser years of experience.

Table 24
Post-Hoc Analysis of Technology Leadership Traits in Terms of Number of Years as a School Head

Number of Years as a School Head		Mean Difference	p	Interpretation
Less than 5	6-10	0.36	0.01	Significant
	11-15	0.07	0.98	Not Significant
	16-20	0.05	1.00	Not Significant
	21 and above	0.05	1.00	Not Significant
6-10	less than 5	-0.36	0.01	Significant
	11-15	-0.30	0.15	Not Significant
	16-20	-0.32	0.26	Not Significant
	21 and above	-0.31	0.27	Not Significant
11-15	less than 5	-0.07	0.98	Not Significant
	6-10	0.30	0.15	Not Significant
	16-20	-0.02	1.00	Not Significant
	21 and above	-0.01	1.00	Not Significant
16-20	less than 5	-0.05	1.00	Not Significant
	6-10	0.32	0.26	Not Significant
	11-15	0.02	1.00	Not Significant
	21 and above	0.01	1.00	Not Significant
21 and above	less than 5	-0.05	1.00	Not Significant
	6-10	0.31	0.27	Not Significant
	11-15	0.01	1.00	Not Significant
	16-20	-0.01	1.00	Not Significant

Relationship of Transformational Leadership Attributes and Technology Leadership Traits of School Heads

Computation results of r^2 , $r(85) = 0.78$, $p = 0.01$, reveal a very high correlation between the grouped data on the school heads' transformational leadership attributes and technology leadership traits, as shown in Table 25. This indicates the positive parallel perspective of the respondents on transformational leadership and technology leadership.

Furthermore, the coefficient of determination, $r^2=0.61$ (61%) of the proportion of the total variation in transformational leadership attributes, is explained by the variation in the technology leadership traits of school heads. This means that 61% of technology leadership traits are predicted by transformational leadership attributes of school heads and vice versa.

Table 25
Correlation Analysis for Transformational Leadership Attributes and Technology Leadership Traits

Technology Leadership	Transformational Leadership			
	r	p	r ²	Interpretation
	0.78	0.01	0.61	Very High Correlation

Relationship of Transformational Leadership Attributes and Technology Leadership Sub-Dimensions

Correlation analysis was additionally performed between transformational leadership attributes of school heads and each sub-dimension of technology leadership.

For transformational leadership attributes and visionary leadership, a high significant correlation was obtained, $r(85) = 0.60$, $p = 0.01$. In addition, the coefficient of determination $r^2=0.36$ (36%) of the proportion of the total variation in transformational leadership attributes is explained by the variation in the visionary leadership of school heads.

In terms of digital age learning culture against transformational leadership, a high significant correlation was also obtained, $r(85) = 0.62$, $p = 0.01$. Additionally, the coefficient of determination $r^2=0.38$ (38%) of the proportion of the total variation in transformational leadership attributes is explained by the variation in the digital age learning culture of school heads.

Likewise, transformational leadership attributes of school heads and their technology leadership sub-dimension excellence in professional practice posted a very high significant correlation, $r(85) = 0.70$, $p = 0.01$. This significant correlation is also proven by the coefficient of determination $r^2=0.48$ (48%) of the proportion of the total variation in transformational leadership attributes is explained by the variation in the excellence of professional practice of school heads.

There is also a high significant correlation, $r(85) = 0.68$, $p = 0.01$, between transformational leadership attributes and systemic improvement of school heads.

Furthermore, the coefficient of determination $r^2=0.46$ (46%) of the proportion of the total variation in transformational leadership attributes is explained by the variation in the systemic improvement of school heads.

Transformational leadership attributes and digital citizenship revealed a high significant correlation based on $r(85) = 0.63$, $p = 0.01$. Moreover, the coefficient of determination $r^2=0.40$ (40%) of the proportion of the total variation in transformational leadership attributes is explained by the variation in the digital citizenship of school heads.

Transformational leadership attributes have a positive correlation with all sub-dimensions of technology leadership. This plainly means that as transformational leadership attributes of school heads increase, each sub-dimension of technology leadership traits also increases.

Table 26
Correlation analysis of transformational leadership attributes and technology leadership traits sub-dimensions

	Transformational Leadership			
	r	p	r ²	Interpretation
Visionary Leadership	0.60	0.01	0.36	High Correlation
Digital Age Learning Culture	0.62	0.01	0.38	High Correlation
Excellence in Professional Practice	0.70	0.01	0.48	Very High Correlation
Systemic Improvement	0.68	0.01	0.46	High Correlation
Digital Citizenship	0.63	0.01	0.40	High Correlation

DISCUSSION

The overall analysis of the relationship between school heads' transformational leadership attributes and their technology leadership traits and implications for school management are further deliberated in this section. Certain gaps, as well as breakthroughs in innovating the schools of the 21st century, are also highlighted in this section.

The resulting significant correlation between the transformational leadership attributes and technology leadership traits of school heads in the study echoes the results in Franciosi's

(2012) and Dexter's (2011). In addition, 61% of the proportion of the total variation in transformational leadership attributes is explained by the variation in the technology leadership traits of school heads. This implies that a transformational leader can be a technology leader.

The significant correlation confirmed that the parallel features of transformational leadership and technology leadership could fine-tune the roles of school heads. With the similarities of the two leadership styles, the relationship found merges the two and contributes greater impact in enhancing the roles of school heads in strengthening technology integration.

This finding is also in line with that in the study of Ng (2008), which revealed a strong correlation between transformational leadership and ICT integration into teaching, which is an indicator of technology leadership traits. It is also consistent with the claim of Jackson (2009) in which appropriate technology leadership cannot only be very beneficial in increasing educational productivity but can also improve the effectiveness of school management. In another similar study, the key finding of Weng and Tang (2013) revealed that the overall performance of technology strategies of school leaders could significantly predict the effectiveness of school leadership.

Many schools, which are committed to developing 21st-century skills, probably want to lead the innovation curve, or at least not be lagging behind the innovation cycle. Transformational leadership and technology leadership could be the tools utilized for transformative and innovative results through technology integration. School heads as transformational leaders and technology leaders motivate and empower teachers to perform toward the accomplishment of tasks (Pradhan & Pradhan, 2014). Since transformational leadership focuses on the need to change for the achievement of goals (Hirtz et al., 2007), the school heads are recognizing that in the 21st century, technology is relatively prevailing. They are influenced to adapt and be at par to stay relevant in the trend of 21st-century education. The enhanced role may greatly benefit school heads in planning for and creating a technology-rich learning environment.

Transformational leadership, in relation to technology leadership, enhances the role of school heads in setting a vision. Self-perceived direction setting as a sub-dimension of transformational leadership and visionary leadership, as a sub-dimension of technology leadership, were both inherent to the school heads. This similarity seems to convey that school heads are futuristic. It is highly observable that they begin with the end in mind. School heads, giving emphasis on direction setting and visionary leadership, are at the standpoint of relating what they see at present with what they need to do to achieve their goals in the future (Covey, 2004). This supports the works of Weinholtz (2009) and Leithwood et al. (2010) that suggested that a leader must communicate and build a vision in order to transform and innovate the organization. In addition to setting vision, it is grounded on the principle that all things are built twice: how the leader envisioned or imagined it, then how he/she makes that vision a reality. Bhatia (2013) concluded that those leaders who established their vision should also be the ones to develop ways of attaining them. Lastly, Boyd (as cited in Balajadia, 2012) invokes that

transformational leaders bring change to the organization for mutual benefit and the common good.

Visionary leadership, on the other hand, emerged to be essential as implied in the significant correlation between transformational leadership attributes and technology leadership traits of school heads. School heads may need to prepare plans to amplify technology integration in order to adapt to the pace of change and innovation in gearing toward 21st-century education.

In the process of setting a vision, the school head has the added responsibility of making sure stakeholders are cognizant of the direction of the organization. They need to understand the new strategy so that they can determine how it will affect their work (Penuel, Frank, & Krause, 2007; Quin, Deris, Bischoff, & Johnson, 2015). Since school heads have very high direction setting and visionary leadership indices, it can be inferred that they are most inclined to develop a vision for technology integration with stakeholders. This is to give support to the use of technology and also to obtain necessary resources (Ünal et al., 2013).

For any school technology leadership strategy to succeed, school heads must build and clearly state the collective vision and actually demonstrate the desirable experience of benefiting from technology integration. One victory can trigger off a chain of shifts. It is further noted that school heads' support and clear vision have a critical impact on the technology integration process (Huang, 2010). Rutledge II (2010) added that transformational leaders are holistic thinkers implying that they have a clearer picture of the future.

It was also found that school heads as transformational leaders could be capable of developing people. This is the same with findings in Amin, Shah, and Tatlah (2013); Arokiasamy and Yap Peng Lok (2014); Aydin, Savier and Uysal (2013); Banoğlu (2011); Bülbül and Çuhadar (2012); Can (2008); Eren-Şişman (2010); Seay (2004); Sezer (2011); Sincar (2013); Tanzer (2004); Ünal et al. (2013). Moreover, Gumusluoglu (2009b) claimed that leaders with perceived transformational leadership could influence incremental people-centered development.

Data showed that school heads are also aware of what the teachers need; they understand what they must do and prepare to transform teachers through their direct or indirect actions toward the organization. This is consistent with the findings in Sezer (2011), which pointed out that the technology leadership traits of school heads influence teachers' technology proficiency. This finding may enhance the role of school heads in developing people into transformational leaders and technology leaders that directly leads to strengthening technology integration.

The significant relationship of transformational leadership attributes and technology leadership traits can also enhance the role of school heads in redesigning the organization. This suggests an intensification of providing, using, regulating, and modeling technology in the organization. This is similar to the findings of Richardson et al. (2012) where they stressed

that school heads have risen to the need of the 21st century; school heads are exploring what schools have today and finding ways to enhance the teaching and learning process through technology integration. This is a way of improving practices, routines, and processes to achieve the change toward 21st-century education.

Transformational leadership attributes and technology leadership traits sub-dimension digital age learning culture also go hand in hand. This result may also support enhancing the role of school heads in redesigning the organization, which also involves using and improving the learning environment school heads have. This is in agreement with the findings in the study of Cakir (2012), Galla (2010), Waxman et al. (2013), and Zhong (2016). With the enhanced role of redesigning the organization, school heads may try to create a culture in the school that encourages instructional innovation and learning-centered environments.

A significant relationship also exists between the transformational leadership attributes and technology leadership traits sub-dimension digital citizenship. This is similar to the study of Ünal et al. (2013). This may suggest enhancing the role of school heads in taking responsibility for using gadgets and creating rules for legal, ethical, and safe use of technology. School heads should be mindful of the issues on the standards on the conduct of the proper use of technology (Kowch, 2009). This further implies that school heads may need to be knowledgeable on how digital citizenship can affect modeling and facilitating the development of a shared cultural understanding and involvement through the use of technology.

The interrelationship between transformational leadership attributes and technology leadership sub-dimension excellence in professional practice may enhance the existing role of school heads in managing resources. This finding is in line with that of Ünal et al. (2013). It is also worthwhile to note that the study of Haughey (2006) revealed similar results, finding out that school heads, through modeling technology use, could manifest a culture of the learning environment of partnership and communication through all stakeholders. In McCombs' (2010) study, it is revealed how school leaders transform their practices into a 21st-century culture through the proper use of resources and professional development for teachers and school heads. Schools heads may enhance schools by maximizing and using their resources well. This may also focus on allocating time and access in using technology that allows professional growth to teachers and enhancement of learning among learners. School heads could also stay up-to-date on the use of technology and could follow new trends that are necessary to stay at the level of technology use and implementation. They also need to ensure that teachers are using the appropriate resources so that learners acquire the necessary competencies and skills to be globally competitive (Chhabra, 2013).

Results also show the significant relationship between the transformational leadership attributes and technology leadership traits with sub-dimension on systemic improvement. This is in agreement with the study of Brunson (2012). The relationship may strengthen the roles of school heads in improving the learning environment and community partnership. School

heads' enhanced role can probably address the coherent problem of lack of facilities. Bonifacio (2012) stated in his study that school heads have difficulty in obtaining more equipment for technology; they are still doing their part in making sure that scarce facilities can be addressed. He also added that the scarcity of technology facilities is the biggest hindrance to the improvement of technology integration. Gutterman, Rahman, Supelano, Thies, and Yang (2009) elaborated in their study that the major challenge of school heads in providing basic access to technology to teachers and learners is the negligence of policymakers or government officials in addressing schools' need for technology facilities. Nonetheless, school heads' enhanced role could make them flexible and resourceful to meet the needs of the teachers and learners toward 21st-century education. The fine-tuned role can also indicate the support of community partnership in improving the learning environment and the resources. Abrego and Pankake (2010) advised school heads to avoid focusing on a single solution on implementing technology in schools and to continue seeking new solutions.

Another concern of the study is the transformational leadership attributes and technology leadership traits of school heads in terms of their demographics: sex, educational attainment, age, and the number of years as a school head. Data revealed that male and female school heads' transformational leadership attributes do not have a significant difference. It can thus be concluded that sex is not a determining factor of transformational leadership attributes. This is also in line with the study of Platt (2010), which concluded that sex could not tell which leader could be better at managing and improving an organization.

In technology leadership, a study of both male and female school heads regarding their attitude on technology proved that male school heads have stronger positive attitudes than their female counterpart (Whitley, 1996). The finding of the current study that sex is not a significant factor in technology leadership attributes of school heads aligns with those in Teo (2008), Bell (2011), Leong et al. (2015). The absence of sex-differences narrows sex-related bias and promotes equal opportunities for every member of the organization for authentic growth and development (Platt, 2010).

Meanwhile, educational attainment turns out to be a predictor of transformational leadership attributes and technology leadership traits of school heads. This result is similar to the study of Khan et al. (2009) and of Rodriguez-Campos et al. (2005). Their findings indicate that the educational attainment of school heads has a stronger influence on their leadership attributes. School heads with doctoral degrees had the highest mean in both leadership styles. Luft (2012) found that school heads who are active in achieving academic degrees develop mostly a sense of confidence in managing schools. According to Fowler and Johnson (2014), it may be a reason why when enrolled in doctoral programs, school heads progress more in reflection, abstraction, and personal practical theories.

Transformational leaders and technology leaders do not only transform the organization but also themselves through professional growth. This could also mean that a school head who strives for continuous personal improvement conveys this to the school to meet the demands of 21st-century education (Rutledge II, 2010). On the contrary, some

studies (Sawati, Anwar & Majoka, 2013 and Hughes & Zachariah, 2001) showed that the highest academic attainment does not influence leadership styles.

Moreover, it was found that age does not reflect the transformational leadership attributes of school heads. This mirrors the studies of Leithwood and Jantzi (2006), Platt (2010), and Sawati et al. (2013) and that support a similar finding.

Interestingly, it is also discovered in the present study that age is not a critical factor in the technology leadership traits of school heads. This finding is parallel with that in the study of Dawson and Rakes (2003), which found that age does not affect the technology leadership of school heads. In addition, Weng and Tang (2013) inferred that as school heads grow older, they become better at implementing technology leadership. On the other hand, Yüksel's (2013) findings showed that younger school heads have better ways of implementing technology leadership. The contradiction in the findings of the other studies and the current study confirms that age may not be an absolute factor that determines the technology leadership traits of school heads.

In this study, it was discovered that there is no significant difference between school heads' transformational leadership attributes in terms of their number of years as school heads. Tanzer (2004) and Waxman et al. (2013) reported a similar result. They found that there is no significant difference in the leadership styles in terms of experience as being a school head. Conversely, school heads significantly differ in their technology leadership traits when grouped according to the number of years as school heads. Ünal et al. (2013), in their study, discovered the same result; however, the current study differed on having found a significant difference between school heads with zero to five (0-5) years of experience and of those with six to ten (6-10) years of experience. Papaioannou and Charalambous (2011) concluded that the younger the school head is, the more positive outlook on technology integration he/she has. In contrast, school heads with more than ten years of experience have a very high mean, which is similar to the results in Bülbül and Çuhadar (2012), Can (2008), and Ünal et al. (2013). These studies concluded that along with the career of school heads is the experience they gain in technology leadership.

It was found that transformational leadership attributes have a significant relationship with all the sub-dimensions of technology leadership: visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship. Therefore, a transformational leader is also a technology leader. It was also verified that school heads' transformational leadership attributes have a significant difference in terms of their educational attainment. On the other hand, school heads' technology leadership traits vary across their educational attainment and number of years as school heads.

The goal of education is to equip learners with the necessary competencies and skills in order to be successful in their endeavors. In the 21st century, global competency is a must, and to prepare learners to be responsive to the demands of the global community; a technology-rich learning environment is needed.

Based on the findings of this study and the reviewed literature, it can be surmised that school heads are the key factors in integrating technology in the education environment in order to keep pace with 21st-century education.

The significant relationship of transformational leadership and technology leadership may enhance the roles of school heads in intensifying technology integration. These roles lead school heads into becoming providers of a technology-rich learning environment that influences teachers to be at par or above the 21st-century education bar. Such enhanced roles include setting vision, developing people, and redesigning the organization.

School heads may be considered visionary leaders. They may include goals and plans that make technology among the imperatives in strategizing management in their respective schools.

They may need to be keen at developing people, particularly the faculty, to implement the developmental plans for the school. This entails the enrichment of the roles of teachers to be technology leaders also in their respective classrooms. Teachers' instruction may need to be spontaneously responsive to the needs and interests of their learners. The advancement of ICT integration in instruction in schools may eventually match the goals of education and the demands of globalization.

School heads' enriched task on redesigning organization focuses on re-creating practices and management routines in maximizing technology in everyday processes. This includes active inclusion and collaboration with the stakeholders as partners to make the organization better. This also includes considering the possible major problems that can be encountered in technologizing schools, such as lack of resources and scant technology integration training or seminars.

It can also be inferred that the higher the educational attainment of the school head is, the higher his/her level of transformational leadership attributes and technology leadership traits are. School heads committed to developing themselves in the process of learning show their capability of enhancing their roles in leading and managing schools of the 21st century. This may be an indication that life-long learning is a major factor in bracing management system in the school that responds to the local potentials and global exigencies.

Enhancing the existing roles of school heads in setting vision, developing people, and redesigning the organization may strengthen the technology integration in classrooms in keeping up with the pace of change and innovation toward 21st-century education. These enhanced roles could be integrated with the objectives of each Key Result Area of the Results-based Performance Management System (RPMS) of school heads.

Integration in the RPMS may fortify the practice of technology in the daily processes in schools that lead to better performance and results. This may be a new strategy in making

sure 21st-century learners attend 21st-century schools that develop their skills and competencies suited to the career paths of the future.

It may also be suggested to school heads and aspiring school heads that pursuing higher education may potentially increase not only the proficiency in transformational leadership and technology leadership but also in managing change and innovation in their respective schools. They should also be open to updated knowledge and relevant capabilities to become more adaptive and versatile leaders.

Moreover, policy-makers such as schools division superintendents, assistant schools division superintendents, and educational program specialists may organize regular programs, training, workshops, conferences, and seminars to enrich school heads' transformational leadership and technology leadership. They may focus on topics regarding the sub-dimension systemic improvement, which details school heads' ways of collaboration with all stakeholders and establishing partnerships to support systemic improvement.

In addition to systemic improvement, government officials and stakeholders may also be urged to allocate resources and strengthen support in partnership with school heads in establishing technology infrastructures in order to achieve the desired ratio of students to technology devices. In time, students benefitting from such change and innovations due to responsive leadership could contribute to local and national development.

Furthermore, although the study was based on the self-perception of school heads on their transformational leadership attributes and technology leadership traits, it is highly recommended to have a standardized assessment of transformational leadership and technology leadership of school heads in the context of institutional goals to better gauge school heads' leadership capabilities.

Lastly, conducting further research on technology leadership that focuses on the computer skills, mobile devices use, and Internet use of school heads may be considered. Other possible research areas related to transformational leadership and technology leadership are likewise suggested: a qualitative study on transformational and technology leadership, particularly among senior school heads, and perceptions of teachers or other stakeholders on the transformational leadership and technology leadership of school heads. The use of different demographics is also suggested, such as the size of the school, location of the school, number of teachers, and number of technology training attended

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