

## **Relationships between ICT Implementation at Schools and Factors Related to Transformational Leadership: A Case of primary school in Mongolia**

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### **ABSTRACT**

In recent years, Information Communication Technology (ICT) has played an essential part in the delivery of quality education. With this trend, a number of efforts have been implemented in Mongolia; however, strategic implementation is still needed to fully utilize ICT in education practice. As school leadership is one of the most influential factors for school reform, this study paid close attention to school leadership. Specifically, it looked at leadership factors related to four components of transformational leadership (Charisma or idealized influence, Inspirational motivation, Intellectual stimulation, and Individualized consideration). Correlation analysis was utilized to find how these factors are related to ICT implementation at schools in Mongolia; namely, school leaders' perceptions of ICT use in classroom teaching and funding allocation for ICT training. The data was collected from 222 school leaders from five regions in the country. The study found that the component of inspirational motivation is especially important for ICT use in classroom teaching. Teachers' collaborations which stimulate innovation is associated with both teachers' ICT use in teaching, and funding allocation for ICT training. In addition, the results support the relevance of transformational leadership for implementing ICT at the school level in the Mongolian context.

**Keywords:** *ICT; Mongolia; School Leadership; ICT integrated education*

### **INTRODUCTION**

#### **ICT for social development**

Information and Communication Technology (ICT) has become an essential part of our everyday life. In the past two decades, especially, ICT has changed our way of accessing, organizing, sharing, and archiving information and knowledge. The influence of this trend has also been found in social development, including the field of international development. For example, ICT development was identified as an important strategic tool to achieve the 8<sup>th</sup> goal in the Millennium Development Goals (MDGs)<sup>1</sup>. This trend is continued to the post-2015 development agenda, and it is expected to play even more important roles in the future (United Nations 2014; United Nations ICT Task Force 2003). For instance, ICT development was placed as one of the targets in four of the Sustainable Development Goals (SDGs)<sup>2</sup> (United Nations 2016). With such a global reach, the development

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<sup>1</sup> In addition to being considered as a strategic tool, Target 18 of Goal 8 is specifically stated as: "In cooperation with the private sector, make available the benefits of new technologies, especially information and communications" (United Nations, 2003)

<sup>2</sup> The four SDGs setting ICT as one of the target goals are: 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (4.b); 5. Achieve gender equality and empower all women and girls (5.b); 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (9.c); and 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development –Technology

of ICT skills and knowledge has become essential for a nation's capacity building. In this time, the extent of technology development can imply the degree of the social development in general (Mahmadullo 2018).

Use of ICT has been emphasized in the education sector. For example, ICT is expected to contribute to improved access and equity in education, strengthen the connections between individuals and organization, facilitate teachers' professional development, and efficient administrative management of schools (Jiang et al. 2018; UNESCO n.d.; Yuchi & Zhujun 2018). In particular, the contribution of ICT to improving the quality of teaching and learning is highly anticipated (Hepp et al. 2004; UNESCO n.d.). Indeed, a number of studies support the positive relationship between ICT integrated education and the quality of education (Hepp et al. 2004). For instance, a study found that teachers' willingness to change, influenced students' learning both in content acquisition and critical thinking skills, and this is especially related to the careful planning for the teacher's role using ICT (Baylor & Ritchie 2001). The role of ICT in education is especially important for low-income and isolated rural areas, because ICT not only enhances their learning tools and resources, but also enable teachers and students to connect outside of the community (Hepp et al. 2004). One study reports that principals of rural school in China perceived the enhancement of teaching efficacy, research ability of teachers, and students' interest in learning, after launching a project installing ICT equipped teaching centers (Yuchi & Zhujun 2018).

### **ICT development in Mongolia**

The social demand for advancing ICT is no exception in Mongolia. As a landlocked country with vast landscape and a sparse population, utilization of ICT has been key to overcoming challenges for the country's development (Sukhbaatar & Odgerel 2005). After transition from the planned economy to a market economy in the early 1990's, ICT industry was led by the private sector in Mongolia (Doodewaard 2004). In 2000, the Mongolian parliament ratified "ICT-Vision 2010" as a blueprint for the country's ICT strategy. The action plan laid out important strategies, such as expanding access to the information network, creating a system and curriculum to build ICT/computer literacy, and enhancing the skills of ICT specialists (Narantuya 2007; Uyanga 2014). In early 2010, achievement of the conceptual vision was reviewed, and the evaluation concluded that more than 85% of their target goals were met due to the effective implementation of the strategies (ICTPA of Mongolia 2011; ICTPA of Mongolia 2012). Reflecting the evaluation, further policy recommendations, such as the ICT Vision-2021, were developed (ICTPA of Mongolia 2011).

With these efforts, the progress of ICT development in Mongolia had become evident. For example, the number of Internet subscribers was dramatically increased within 5 years; 22,000 Internet subscribers in 2005 had increased to 106,000 in 2009, which is almost five times more within 4 years. Moreover, the subscription number almost doubled from 2009, and reached 199,800 in 2010 (ICTPA of Mongolia 2011). Such a development was also reflected in international indicators as well. The ICT Development Index (IDI) of Mongolia has improved rapidly and is ranked as one of "the most dynamically improved countries between 2011 and 2012" (International Telecommunication Union 2013).

ICT has been utilized in the education sector to improve the quality of learning (Arnseth & Hatlevik 2010; Hepp et al. 2004). In Mongolia, the contribution of ICT was highly expected, as the education sector has become one of the target sectors to achieve "efficient ICT integration" (Doodewaard 2004; InfoCon n.d.; Uyanga 2006). However, the education sector in Mongolia faces constant challenges due to the unique socio-cultural environment. For example, Mongolia's vast territory with the world's lowest population density and their traditional nomadic lifestyle, which involves

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(17.8) United Nations. 2016. *Sustainable development goals* [Online]. New York: Division for Sustainable Development. Available from: <<https://sustainabledevelopment.un.org/?menu=1300>>. [Aug, 8, 2016 2016].

more than 25% of the households of the country, make it difficult to deliver quality education (Mongolian Statistical Information Service 2017; UNESCO Office Beijing 2008). With the extension of education system average from 11 to 12 years in 2008, Internet service, computer technologies and ICT-based training were introduced reflecting the strategies outlined in the Education Master Plan (Uyanga 2014).

Under the “ICT Vision 2010”, the “ICT Vision 2010 in Education Sector of Mongolia” was developed by the Ministry of Education Culture and Science (MECS). It set a specific vision for ICT integration in education with four components: 1) Full utilization of ICT in training; 2) Good supply of hardware for better training and access to information; 3) Support and encouragement for teachers to develop ICT knowledge and skills; and 4) Establishing educational information and network and its accessibility (Uyanga 2014). Since 2006, the MECS had been implementing the “Framework for Incorporating ICT in Primary and Secondary Education Sector 2015”, which aimed to establish an e-network, develop e-infrastructure, and invest in human capital and flexible training systems to fully integrate ICT in schools by 2015 (UNESCO Office Beijing 2008). The “Master Plan to Develop Education of Mongolia in 2006-2016” emphasized introducing ICT, especially for training, monitoring, and evaluation (Li et al. 2018; Uyanga 2014). Responding to these initiatives, the use of ICT in education has been perceived as an important tool for improving the quality of education, as well as promoting sustainable capacity-building in Mongolia (Sukhbaatar et al. 2012). Recent reports provide evidence that use of ICT in the education sector has increased (Dari & Yura 2016). Several large scale programmes and projects have contributed to the advancement. For example, the “One Laptop per Child” (OLPC) programme was introduced in Mongolia in 2008, allowing students to learn with technology (Li et al. 2018). The government programme “One Laptop per Teacher (OLPT)”, implemented in 2015-2016, was one of the major factors for disseminating ICT in education practice (Government of Mongolia 2009; Mon-Educ Consulting LLC, 2017). While the progress has been evident in Mongolia, the environment for fully utilizing the ICT for teaching has not yet established completely (Dari & Yura 2016; Oyun 2014; UNESCO Office Beijing 2008).

The reasons behind this situation include insufficient physical resources, and a lack of knowledge and experience using ICT in education. However, the main stream of research and strategic planning to promote ICT is often focusing on external factors, such as the infrastructural environment, equipment/software, and ICT policies, especially in developing regions. The fact is, the internal factors are as important as external factors (Hepp et al. 2004). Hepp and his colleagues (2004) further claim that interventions focusing on only external factors will not produce meaningful results on student learning; rather, the focus should also be on people to achieve effective gain (Hepp et al. 2004). With this in mind, this study focuses on one of the internal factors, school leadership, and investigates its relationship to ICT implementation at primary schools in Mongolia.

## **THEORETICAL FRAMEWORK**

### **ICT integrated education and school leadership**

Although the factors influencing ICT utilization in schools can be complex, an attitude of school leaders toward ICT integrated education is one of the important factors (Afshari et al. 2012; Lai & Pratt 2004; Raj et al. 2015; Mishra et al. 2016). In fact, leadership is a critical factor for effectively implementing technology in school, because the leaders can take responsibility for initiating and implementing changes, and facilitate complex decision-making (Afshari et al. 2012; Roth & Price 2016). In addition, the leadership style plays an important role in teachers’ motivations, which can be a moderator of the changes in the practice (Eyal & Roth 2011). School leadership is relevant for implementing ICT integrated education. Several studies found that when and if school leaders support the ICT strategies, implementation in school is more effective (Afshari et al. 2012; Schiller

2003;Chen 2013). This is because school effectiveness and success is largely the responsibility of school leaders, especially principals (Becta 2003;Buabeng-Andoh 2012;Schiller 2003).

School leaders have strong influence on the likelihood of educational change, because school leaders legitimize whether changes are taken seriously and support teachers both psychologically and with resources (Fullan 2016). As ICT implementation in schools is still a relatively new agenda in school reform, understanding effective leadership for ICT implementation is urgently needed; however, studies on the role of school leaders in ICT research are still limited regardless of its importance, (Schiller 2003).

There are several leadership styles and theories in the education research field. Among them, transformational leadership not only explains the mechanism of educational innovation, but also it is claimed to be a desirable leadership style to promote ICT integration in school (Afshari et al. 2012;Chen 2013;Raj et al. 2015;Schepers et al. 2005;Yee 2000). For this reason, this study pays close attention to the leadership factors related to transformational leadership. In order to investigate the relationships, it is useful to understand the characteristics of transformational leadership.

### **Transformational leadership**

The conceptualization of major leadership styles emerged in the early 1980s. Instructional leadership, which was characterized as strong, directive, and focusing on curriculum and instruction, was considered to be an effective leadership style in early days, especially in poor urban communities. In the 1990s, the focus of leadership research was shifted from top-down to a more bottom-up approach, such as transformational leadership, which seeks empowerment of followers, shared leadership and organizational learning (Hallinger 2003;Leithwood & Poplin 1992). Transformational leaders aim to develop capacity of followers and organization to promote innovations through trust and a shared vision for school change.

Transformational leaders inspire individuals to exceed their expectations (Eyal & Roth 2011). By elevating the interest of followers, they foster followers' need, empower them, and make realize a sense of mission (Bass 1990;Eyal & Roth 2011). Transformational leaders create the conditions which enable teachers to be committed and self-motivated to work for improvement without specific direction from the top (Hallinger 2003). A practice driven approach can help to create a space for innovations, such as integration, collaboration and problem solving (Lowery & Akinola 2017). They encourage teachers to innovate and reflect on their practice, which is an important factor for successful ICT implementation (Chen 2013).

Transformational leadership is described in four components: 1) Charisma or idealized influence, 2) Inspirational motivation 3) Intellectual stimulation, and 4) Individualized consideration. By making use of these components, transformational leaders achieve educational change (Bass 1990;Bass and Steidlmeiera 1999;Schepers et al. 2005).

First, transformational leaders possess charisma or idealized influence. They provide a sense of mission by being role models, generating awareness, and demonstrating high moral standards (Bass & Avolio 1994). Charismatic leaders have great power and influence on followers, because followers have a high level of trust, faith, respect and confidence in them (Schepers et al. 2005).

Second, transformational leaders inspire followers by articulating visions. They have strong communication skills that make followers feel the purpose and meaning of the task through shared goals. They can communicate optimism about future goals. They foster a

spirit of teamwork and commitment (Hallinger 2003), and focus on the best in people, such as harmony, charity, and good work.

Third, transformational leaders stimulate followers intellectually. They try to develop followers' capacities by enabling them to see new ways of looking at old problems. For instance, they help followers to question assumptions and to generate more creative solutions. Transformational leaders encourage innovation by motivating followers.

Fourth, transformational leaders consider Individuals. They pay close attention to the difference in the needs and interests of the followers. They act as a mentor to help to achieve a higher level of performance (Avolio & Bass 1995). Transformational leaders enable the link between personal needs and the organizational goals (Hallinger 2003). By doing so, followers' motivation shift from short-term, and self-interest ones to more careful analysis of the contributions to the group or society.

As described, transformational leaders facilitate power to bring about a change, and engage individuals to help followers achieve higher levels of potential, instead of directly coordinating and controlling (Avolio & Bass 1995; Bass 1990; Eyal & Roth 2011; Hallinger 2003; Leithwood & Poplin 1992). In the school context, transformational leadership directly affects teachers' commitment, and stimulates innovation using the above mentioned components; as a result, it can bring out sustainable changes in practice (Geijse et al. 2003; Hallinger 2003; Moolenaar et al. 2010). As ICT integrated education is still a relatively new area, it is understandable that transformational leadership is considered to be an effective leadership model for implementing ICT at schools. Although there are some studies investigating school leadership and ICT integration at schools, the research on developing regions is still limited. For this reason, this study investigates how these leadership qualities are related to the ICT implementation in primary schools in Mongolia.

The purpose of this study is to find the relationships between school leaders' perception on ICT implementation at the school level and leadership factors related to transformational leadership, which is often described with four different components. It attempts to answer the following two research questions:

- 1) What are the relationships between factors related to four components of transformational leadership and leaders' perception on ICT use in classroom teaching?
- 2) What are the relationships between factors related to four components of transformational leadership and leaders' perception on funding allocation for ICT training?

## **METHODOLOGY**

### **Samples**

The quantitative data were retrieved from the baseline survey on "Quality Improvement of Primary Education Teachers through Development of Training Materials Using ICT", which was conducted in 2012-2013 in Mongolia<sup>3</sup>. Stratified sampling was employed. First, four different geographical regions, North, South (Gobi), East, and West, were identified to cover various characteristics of the country, and the one province from each region was selected. As a result, Selenge province (North),

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<sup>3</sup> The survey was conducted as a part of grassroots project, "Sustainable use of ICT for improving the quality of primary education in rural Mongolia (2012-2017)", which was funded by Japan International Cooperation Agency (JICA). The questionnaire was created by Mon-Educ Consulting, collaborating with the project team, including local education experts, government officials, and project members of Tokyo Institute of Technology.

Bayanhongor province (South), Khovd province (West), and Khentii province (East) were included. In addition, two districts from Ulaanbaatar (UB) city, reflecting different socioeconomic status, were selected to be a part of the study. Data collection was conducted from December 2012 to January 2013. The local Educational Culture Departments (ECD) distributed a set of questionnaires to a minimum of 10 schools within the respective province or district.

A total of 222 school leaders (principals and training managers) responded to the questionnaires, which accounts for approximately 15.4% of total primary school leaders in Mongolia. (Mon-Educ Consulting LLC 2012). Within the valid samples, 48.6% are school principals and 51.4% are training managers. More than 73% of school leaders were female. The mean of the participants' age was 43.8 years old ( $SD=8.42$ ), and the years in service in current position was 21.6 years ( $SD=9.32$ ). More than 74% of the participants were school leaders in village schools, while 13.7% were in province centers, and 11.8% were in Ulaanbaatar city.

### **Measures**

#### ***1. Perceived ICT implementation at school level***

In order to measure the extent of ICT implementation at schools, two aspects of school leaders' perceptions were utilized: 1) perceived use of digital content in classroom teaching by teachers, and 2) perceived funding allocation for ICT related training.

The first research question is related to ICT use in classroom teaching. Looking at the situation of use of digital content in classroom teaching is meaningful, because it illustrates depth of ICT implementation at the school level, and it is promoted as part of the national education policies in Mongolia (Ministry of Education Culture and Science of Mongolia (MECS) 2006)<sup>4</sup>. Two specific question items which measure school leaders' perceptions on use of digital content by the teacher during teaching are utilized for the analysis. The question items included in this study are: a) Our teachers do use digital contents in teaching; b) Teachers use digital teaching materials. The questionnaire asked the extent of the school leaders' agreement to the sentences. A four-point Likert scale, running from 1 (Completely disagree/is not true) to 4 (Completely agree/Completely true), was utilized for each question with higher scores indicating more perceived use of digital content in teaching. After eliminating responses with missing values, the sum score of the perceived ICT use in teaching was calculated. A total of 209 responses were available for analysis through this consolidating process.

The second research question looked at school leaders' perceived allocation of funding for ICT related training. In addition to the importance of training for technology acceptance (Schepers et al. 2005), funding is one of the main factors to integrate technology successfully in the curriculum (Roth & Price 2016). Thus, it is important to look at leaders' perception of funding allocation for ICT training. Three question items were utilized for data analysis: a) Training for increasing basic ICT skills (office program, internet, email, digital learning platform, and so on) of teachers, b) Training on the integration of ICT into different teaching methodologies, and c) Training on the integration of ICT into different subjects. Agreements on the funding allocation were measured with a four-point Likert scale, running from 1 (not at all) to 4 (to large extent), with higher scores indicating more perceived funding allocations. After consolidation of the variables, a total of 194 responses were available for analysis.

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<sup>4</sup> In the Master Plan to Develop Education of Mongolia in 2006-2015, ICT implementation at schools was promoted as "5. Connect all educational institutions, schools and kindergartens to Internet, and introduce ICT into training, information exchange, monitoring, evaluation, and registration systems. "Ministry of Education Culture and Science of Mongolia (MECS) 2006. Master plan to develop education of mongolia in 2006-2015. *In: Mecs (ed.)*. Ulaanbaatar.

The overall perceptions of the ICT implementation at school level are relatively positive. The mean scores and standard deviation of each aspect are summarized in Table 1.

**Table 1:** Descriptive statistics on perceived ICT implementation at school level (sum score)

School leaders' perceived ICT implementation at school level	N	Min.	Max.	Mean	Std. Deviation
Sum of use of digital contents in teaching by teachers	209	2	8	6.49	1.323
Sum of funding allocation for ICT training	194	3	12	7.41	2.379

## II. Perceived factors related to four components of transformational leadership

The question items were carefully reviewed reflecting on the transformational leadership theory. As a result, 12 question items associated with the four components of transformational leadership were selected: Charisma or Idealized influence, Inspirational motivation, Intellectual stimulation, and Individualized consideration. The agreement on the statements in each question items was measured in a four-point Likert scale.

For the component of charisma or idealized influence, related leadership factors, such as being a role model, showing ethical standards, having clear visions and setting higher standards, so that followers identify him/her as a leader, were considered (Afshari et al. 2012; Bass & Steidlmeiera 1999; Schepers et al. 2005). The following three question items were included in this component: 1) School has clear pedagogical vision, mission and objectives, 2) We prevent illegal and unethical use of ICT, and 3) School management requires that teachers use ICT for teaching.

For the second component, inspirational motivation, factors related to the formation and articulation of vision were considered. They inspire and motivate followers to accept and pose challenging goals and missions with optimism. The leadership behaviors provide a sense of meaning of the tasks for the good of the group (Afshari et al. 2012; Bass & Steidlmeiera 1999; Schepers et al. 2005). Five question items were included in this component: 1) We encourage experienced teachers to help other teachers, 2) In our school teachers share their experiences across different sectors/units, 3) In our school, teachers cooperate with each other very well, 4) Our teachers willingly share with each other the classroom teaching materials that they, 5) Our teachers willingly share with each other teacher training materials that they develop.

The third component, intellectual stimulation, is related to the factors which develop the capacity of teachers. Leaders provide stimulation by soliciting creative thinking, reframing problems and approaching them in innovative ways. It promotes skills in rationality and careful problem solving, and innovation. (Dionne et al. 2004; Eyal & Roth 2011; Schepers et al. 2005). Three question items are in this component were: 1) School teachers have regular meetings to develop ICT-based teaching plans, 2) We do have discussion with teachers about pedagogical use of ICT, and 3) Teachers in our school are willing to try new ideas for teaching in the classroom.

The fourth component, individualized consideration, is related to factors that provide personal care for teachers to help them achieve personal goals, such as mentoring, coaching, and providing advice (Bass 1990; Eyal & Roth 2011; Dionne et al. 2004). This component included only one question item, as the questionnaire did not contain other appropriate question items to measure leaders' individualized consideration to teachers. The one item included was: In our school teachers receive fair feedback on their performance.

A total of 12 question items related to transformational leadership were used to investigate the relationship to the situation of ICT implementation at the school level.

## DATA ANALYSIS AND RESULTS

### Procedure

Two sets of pairwise correlation coefficients were calculated to assess the relationships between the factors related to transformational leadership and ICT implementation in schools: The first set of correlation analysis examined the relationships between 12 leadership factors and a perceived use of digital content in teaching by teachers. The second set of correlations investigated the relationships between the same 12 leadership factors and school leaders' perceived allocations of funding for ICT related training. These relationships were examined using Pearson product-moment correlations, and utilized the following rule-of-thumb to characterize the strength of the correlations: weak ( $<0.1$ ), modest ( $<0.3$ ), moderate ( $<0.5$ ), strong ( $<0.8$ ), and very strong ( $>0.8$ ) (Muijs 2004).

### Results

#### ***Research Question 1: what are the relationships between factors related to four components of transformational leadership and ICT use in classroom teaching?***

A total of 12 question items related to transformational leadership were examined to find relationships to school leaders' perceived ICT use in teaching by teachers. As shown in Table 2 below, all factors on the four components of transformational leadership were related to the leaders' perceived ICT use in teaching.

For the component of charisma or idealized influence, three question items were examined. All the question items were statistically significant. Requiring the teachers to use ICT for teaching indicated moderate correlation ( $r(203) = .36, p < .01$ ) to ICT use in classroom teaching. Modest correlations were also noted for having clear pedagogical vision, mission, and objectives ( $r(204) = .26, p < .01$ ) and preventing illegal and unethical use of ICT ( $r(181) = .25, p < .01$ ) to ICT use in classroom teaching. The result indicated that this is a weaker factor-group among the four components tested in this study.

As for the component of intellectual stimulation, five question items were examined. The result showed that all of them were moderately significant to ICT use in classroom teaching. Among them, sharing experience across different sectors/unit ( $r(203) = .42, p < .01$ ) and teachers' cooperation ( $r(203) = .41, p < .01$ ) indicated relatively stronger correlations. Moderate correlations were also noted for encouraging experienced teachers to help other teachers ( $r(207) = .39, p < .01$ ), sharing training materials that they develop ( $r(205) = .36, p < .01$ ), and sharing classroom teaching materials ( $r(207) = .30, p < .01$ ).

The component of inspiring motivation, consisting of three question items, showed the strongest correlation among the four components examined. Having discussion with teachers about pedagogical use of ICT was strongly correlated to use of digital content in teaching by teachers ( $r(205) = .52, p < .01$ ). On the other hand, moderate correlations were found in two other question items; having regular meetings to develop ICT based teaching plan ( $r(206) = .44, p < .01$ ), and teachers' willingness to try new ideas in classroom teaching ( $r(204) = .31, p < .01$ ).



In terms of the component of individual consideration, the school leaders' perception on teachers' receiving fair feedback, which related to providing individual consideration, was found to be moderately significant. ( $r(202) = .31, p < .01$ )

The details of the correlation results between leadership factors and use of digital content in teaching by teachers are shown in Table 2 below.

**Research Question 2: what are the relationships between factors related to four components of transformational leadership and funding allocation for ICT training?**

The study also looked at how these 12 leadership factors are related to school leaders' perceived funding allocation for ICT training. Ten out of twelve question items were statistically significant by a modest to moderate degree.

For the component of charisma or idealized influence, school management requiring teachers to use ICT for teaching was positively significant to a moderate degree ( $r(192) = .47, p < .01$ ). Also, school having a clear pedagogical vision, mission and objectives was moderately significant to school leaders' funding allocation for ICT training ( $r(193) = .43, p < .01$ ). Meanwhile, preventing illegal and unethical use of ICT was modestly significant ( $r(169) = .24, p < .01$ ). Two of the highest degree of correlation were noted for this component.

As for intellectual stimulation, three out of five question items were statistically significant. Experience sharing among teachers across different sector/units ( $r(194) = .40, p < .01$ ), cooperation of the teachers ( $r(194) = .36, p < .01$ ), and encouraging experienced teachers to help other teachers ( $r(194) = .25, p < .01$ ) were moderately correlated. Meanwhile, sharing digital content - both teaching material and training material were not statistically related to leaders' perceived funding allocations ( $r(193) = .12, p < .05$ ;  $r(193) = .13, p < .05$ ).

In terms of the component inspiring motivation, moderate correlations were noted for two of the items: having discussion with teachers about pedagogical use of ICT, and teachers' willingness to try new ideas in classroom teaching were  $r = 0.3$ , ( $r(194) = .30, p < .01$ ). On the other hand, having regular meetings to develop ICT based teaching plan was correlated at a modest level ( $r(192) = .24, p < .01$ ).

A modest level of correlation was noted for the component individual consideration ( $r(193) = .25, p < .01$ ).

The details of all the correlation results between leadership factors and perceived funding allocation for ICT training are shown in Table 2 below.

## DISCUSSION AND IMPLICATIONS

School leaders are at the core of planning and implementing education strategies at school. Transformational leadership, which is an effective leadership style for ICT promotion (Raj et al. 2015), explains how school leaders stimulate teachers to bring out commitment and innovation. This empirical study illustrates how factors related to four components of transformational leadership are related to ICT implementation at primary schools in Mongolia. Although there are some differences in degree, the overall results suggest that these factors are correlated to both perceived ICT use in classroom teaching and also funding allocation in primary schools in Mongolia. From the results, five major findings are highlighted in this section.

**Table 2:** Correlation results between perceived ICT implementation and factors related to transformational leadership

Factors related to four components of transformative Leadership		Use of digital contents in teaching by teacher in teaching			Funding allocation for ICT training		
		r	sig	N	r	sig	N
<b>Charisma or Idealized influence</b>	School has clear pedagogical vision, mission and objectives	.263**	.000	204	.433**	.000	193
	School management requires that teachers use ICT for teaching	.359**	.000	203	.446**	.000	192
	We prevent illegal and unethical use of ICT	.250**	.001	181	.238**	.002	169
<b>Inspirational motivation</b>	We encourage experienced teachers to help other teachers	.357**	.000	205	.247**	.001	194
	In our school, teacher share their experiences across different sectors/units	.417**	.000	203	.395**	.000	194
	In our school, teachers cooperate with each other very well	.411**	.000	203	.361**	.000	194
	Our teachers willingly share with each other the classroom teaching materials that they develop	.298**	.000	207	.123	.088	193
<b>Intellectual stimulation</b>	Our teachers willingly share with each other teacher training materials that they develop	.388**	.000	207	.127	.080	192
	School teachers have regular meeting to develop ICT based teaching plans	.435**	.000	206	.241**	.001	192
	We do have discussion with teachers about pedagogical use of ICT	.522**	.000	205	.302**	.000	194
<b>Individualized consideration</b>	In our school, teachers cooperate with each other very well	.312**	.000	204	.296**	.000	194
	In our school, teachers receive fair feedback on their performance	.310**	.000	202	.251**	.000	193

\*\* Correlation is significant at the 0.01 level (2-tailed)

First, the component of inspirational motivation of leader is an important factor for leaders in regard to a positive perception for implementation of ICT at schools, and especially for ICT use in classroom teaching. All three question items for this component were positively correlated to perceived teachers' use of ICT in classroom teaching at modest to strong levels. This result may indicate that leaders who are equipped with skills to motivate teachers are effective in the promotion of ICT use in classroom teaching. Creating discussion opportunities with teachers on the pedagogical use of ICT is especially important for teachers using ICT in classroom teaching. Such opportunities can not only clarify technical issues, but also can motivate teachers to utilize ICT in their teaching activities. This type of leadership effort is important in the Mongolian context, because integrating ICT in educational activities is still new for the teachers. This finding validates a previous study which claimed that encouraging individual learning, as well as promoting collegiality, open communication and the value of professional growth are effective for successful technology integration (Hughes & Zachariah 2001).

Second, the factors related to charisma or idealized influence were relatively weaker in regard to perceived ICT use in classroom teaching; however, it had the highest degree of correlation with perceived funding allocation for ICT training. For ICT use in classroom teaching, having pedagogical vision, mission and objective, as well as preventing illegal and unethical use of ICT, indicated only modest correlations. A stronger relationship to the factor requiring teachers to use ICT for teaching was noted, but at a lower moderate degree. This result highlights attention to the higher degree of relevance with other components. It may imply that ICT use in classroom teaching is more effectively implemented using teacher-driven approaches, rather than top-down commands. This implication is supported by previous research which claimed that ownership of innovation by both leaders and teachers is essential for a change in practice (Bush 2007). On the other hand, the component charisma or idealized influence realized the most important factors related to perceived funding allocation for ICT training. Having a strong commitment to school governance is associated with making funding decisions for ICT training for teachers. This is particularly true in Mongolia, since school leaders, especially principals, are responsible for the allocation of their limited funding.

Third, after analyzing the 12 question items, the findings suggest that perceived teachers' collaboration was related to implementing ICT at school. In fact, teachers' collaborations is an important factor for implementing ICT in Mongolia because teachers often gain skills and knowledge from school level teacher training. It provides critical opportunities for teachers to clarify, discuss, test, and reflect on their trials, through the interaction with colleagues. Such training provide opportunities to develop an understanding of the pedagogical value of ICT both in theory and practice (Mon-Educ Consulting LLC 2017). Previous studies also point out the importance of pedagogical understanding of ICT, because ICT integration will not fully take place unless teachers are convinced of the usefulness of ICT in teaching (Bingimlas 2009;Cox et al. 1999). Further, a previous study found teachers' belief on pedagogical value of ICT affects the likelihood of ICT use (Lai & Pratt 2004). From this standpoint, the finding of this study is in keeping with these previous studies. Moreover, this study also reveals that school leaders who recognize teachers' collaborations are more proactive in regard to the integration of ICT in education activities.

Fourth, the study also found that perceived teachers' collaboration is important for school leaders' funding decisions for ICT training, but only if the collaborations are aiming for increasing teachers' capacity. The results interestingly revealed that there was no statistical significance between sharing digital content and funding allocation for ICT training. Teachers' collaborations, which focus merely on sharing end-products, may not motivate school leaders to further invest in teachers' ICT skills. In other words, when school leaders identify teachers' effort to be better, they may be motivated to help them by providing training, that is, securing funding for ICT training. Or visa-versa, when funding is secured and training is implemented, teachers' dialogues tend to become more active in order to apply new knowledge to teaching activities. It can be implied that teacher collaborations matter for leaders' funding decisions, in order to further implement ICT at schools in Mongolia.

Fifth, the findings of this study suggest that the effectiveness of transformational leadership for implementing ICT at school is supported in the Mongolian context. It is evident that the leadership factors which were selected based on the literature on transformational leadership, were closely related to perceived ICT use in classroom teaching, as well as to funding allocation for ICT training. The finding validates literature supporting the effectiveness of transformational leadership for implementing ICT in the education sector (Afshari et al. 2012;Chen 2013;Schepers et al. 2005).

Given the above mentioned findings, the following two points are drawn as practical implications for Mongolian education.

1. ***Disseminating pedagogical value of ICT among school leaders is suggested.***  
The finding indicates that leaders' perception on discussion opportunities with teachers about pedagogical use of ICT was strongly related to perceived use of digital content by teachers in the classroom. Discussions allow teachers to gain knowledge and skills, which is likely to stimulate their creativity to apply them in practice. This infers that although school leaders are not engaged in everyday teaching, they need to update their knowledge and have a clear understanding of pedagogical value and effective application of ICT in teaching in order to stimulate teachers' innovations. Implementation will not be successful, unless school leaders recognize the importance for their school (Raj et al. 2015). Providing training sessions for school leaders to disseminate a broad understanding of pedagogical value of ICT would help promote discussions with teachers at the school level.
2. ***Fostering transformational leaders for further ICT implementation at school level is recommended.***  
As this study found, the factors related to transformational leadership are closely related to ICT implementation at the school level in the Mongolian context; thus, to promote this type of leadership may positively influence the integration of ICT in education. As Giltinane (2013) claims, leadership skill can be advanced

through education. In fact, Bass (1990) further claims that transformational leadership can be learned and it should be the subject of leadership training. For this reason, conducting leadership training which fosters transformational leadership is suggested to further promote ICT implementation at the school level. To foster transformational leadership, it is crucial for school leaders to accept and analyze their followers' views on their leadership performance (Bass 1990). For example, providing counseling sessions to evaluate the discrepancies between a leader and his/her followers on an evaluation of leaders' transformational qualities will help increase the ability of leaders to identify areas they should improve. Including a group workshop which enables leaders to learn specific examples from other high-rated transformational leaders can also help motivate school leaders to be more transformational.

## CONCLUSION

This study intends to contribute to the knowledge base of school leadership, as it is a critical factor facilitating educational change. Paying attention to educational change is important to sustain the quality of the school. In Mongolia, where educational reforms have been important, a strong commitment of the school leader is vital to the promotion of effective educational activities at school.

The country's ICT implementation strategies, indicates a high expectation for the education sector to achieve efficient ICT integration. Through the lens of transformational leadership theory, this study investigated the relationship between the leadership factors and situations of ICT implementation at schools. The study reveals that transformational leadership is closely related to ICT implementation in Mongolia.

The study has limitations which may influence the generalizability of the results. The measurements used in this study were based on school leaders' self-reported perceptions; therefore, the situation may not be reflected accurately, as the responses may be over or under rated. The data was collected from primary school leaders in five regions in Mongolia; thus, the implications may not be applicable in different contexts or for other developing countries. In addition, the dataset utilized in this study was initially collected for a baseline survey, therefore, more direct questions to measure the extent would improve the validity and reliability of the study. Finally, it should be noted that the relationships found in this study do not indicate any causal relationships, as this is a correlation study. Further research is needed to clarify these points.

Despite these limitations, the study findings are expected to provide a meaningful starting point for provoking discussions on education planning in Mongolia, since it covers more than 15% of primary school leaders from diverse areas of the country. It can therefore be utilized as a base study, especially in the area of professional development of school leaders in Mongolia.

## REFERENCES

- Afshari, M., Abu Bakar, K., Su Luan, W. & Siraj, S. (2012). "Factors affecting the transformational leadership role of principals in implementing ICT in schools". *The Turkish Online Journal of Educational Technology (TOJET)*, vol. 11, no. 4, pp. 164-176.
- Arnseth, H. C. & Hatlevik, O. E. (2010). Challenges in aligning pedagogical practices and pupils' competencies with the information society's demands: The case of Norway. In: Mukerji, S. & Purnendu, T. (eds.) *Cases on interactive technology environments and transnational collaboration*. Hershey, PA: IGI Global.

- Avolio, B. J. & Bass, B. M. (1995). "Individual consideration viewed at multiple level of analysis: A multi-level framework for examining the diffusion of transformational leadership". *Leadership Quarterly*, vol. 6, no. 2, pp. 199-218.
- Bass, B. M. (1990). "From transactional to iransformational leadership: Learning to share the vision". *Organizational Dynamics*, vol. 18, no., pp. 19-31.
- Bass, B. M. & Avolio, B. J. (1994). *Improving organizational effectiveness through transformational leadership*, Thousand Oaks, SAGE Publications.
- Bass, B. M. & Steidlmeiera, P. (1999). "Ethics, character, and authentic transformational leadership behavior". *The Leadership Quarterly*, vol. 10, no. 2, pp. 181-217.
- Baylor, A. L. & Ritchie, D. (2001). "What factors facilitate teacher skill, teacher morale, andperceived student learning in technology-using classrooms?". *Computers & Education*, vol. 39, no. 4, pp. 395-414.
- Becta (2003). Primary schools – ICT and standards: A report to the dfes on becta's analysis of national data from ofsted and qca Coventry: British Educational Communications and Technology Agency [Becta] ICT Research.
- Bingimlas, K. A. (2009). "Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature". *Eurasia Journali of Mathematics, Science & Technology Education*, vol. 5, no. 3, pp. 235-245.
- Buabeng-Andoh, C. (2012). "Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature". *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, vol. 8, no. 1, pp. 136-155.
- Bush, T. (2007). "Educational leadership and management: Theory, policy, and practice". *South African Journal of Education*, vol. 27, no. 3, pp. 391-406.
- Chen, W. (2013). "School leadership in ICT implementation: Perspectives from singapore". *The Asia-Pacific Education Researcher*, vol. 22, no. 3, pp. 301-311.
- Cox, M., Preston, C. & Cox, K. (1999) What factors support or prevent teachers from using ICT in their classrooms? British Educational Research Association Annual Conference, September, 2-5 1999 Brighton, UK.
- Dari, C. & Yura, A. (2016). "Comparative analysis of use of ICT in pre-primary education institutions across provinces of mongolia". *American Scientific Research Journal for Engineering, Technology, and Sciences*, vol. 15, no. 1, pp. 197-209.
- Dionne, S. D., Yammarino, F. J., Atwater, L. E. & Spangler, W. D. (2004). "Transformational leadership and team performance". *Journal of Organizational Change Management*, vol. 17, no. 2, pp. 177-193.
- Doodewaard, M. V. (2004). "Mongolia: Who bridges the digital divide?". *Newsletter* [Online], no. 33, pp. 12. International Institute for Asian Studies (IIAS). [Aug, 28, 2014].
- Eyal, O. & Roth, G. (2011). "Principals' leadership and teachers' motivation self-determination theory analysis". *Journal of Educational Administration*, vol. 49, no. 3, pp.

- Fullan, M. (2016). *The new meaning of educational change, fifth edition*, Teachers College Press.
- Geijse, F., Slegers, P., Leithwood, K. & Jantzi, D. (2003). "Transformational leadership effects on teachers' commitment and effort toward school reform". *Journal of Educational Administration*, vol. 41, no. 3, pp. 228-256.
- Giltinane, C. L. (2013). "Leadership styles and theories". *Nursing Standard*, vol. 27, no. 41, pp. 35-39.
- Government of Mongolia, (2009). Education sector master plan of mongolia, 2009-2015 (updated version). Government of Mongolia.
- Hallinger, P. (2003). "Leading educational change: Reflections on the practice of instructional and transformational leadership". *Cambridge Journal of Education*, vol. 33, no. 3, pp. 329-351.
- Hepp, P. K., Hinostroza, E. S., Laval, E. M. & Rehbein, L. F. (2004). *Technology in schools: Education, ICT and the knowledge society*. Temuco: Instituto de Informática Educativa.
- Hughes, M. & Zachariah, S. (2001). "An investigation into the relationship between effective administrative leadership styles and the use of technology". *International Electronic Journal for Leadership in Learning*, vol. 5, no. 5, pp.
- ICTPA of Mongolia, (2011). White paper 2011, mongolia. ICTPA of Mongolia.
- ICTPA of Mongolia, (2012). White paper on ICT developmet, mongolia-2013. *In: Tsetseg, B. & Nurgul, C. (eds.). Mongolia: ITPTA.*
- InfoCon. (n.d.) *Annex iii . ICT vision 2010* [Online]. Ulaanbaatar: InfoCon. Available from:<[http://www.infocon.mn/english/reference/ict\\_projects/a3.html](http://www.infocon.mn/english/reference/ict_projects/a3.html)>. [Aug.31 2014].
- International Telecommunication Union, (2013). Measuring the information society. *In: International Telecommunication Union (ed.) Measuring the Information Society*. Geneva: International Telecommunication Union,.
- Jiang, Q., Li, M., Han, W. & Yang, C. (2019). ICT promoting the improvement of education quality: Experience and practice. MINISTERIAL FORUM: Global Dialogue on ICT and Education Innovation - Towards Sustainable Development Goal for Education (SDG 4), 18-19 April, 2018 2018 Moscow, Russian Federation. Moscow, Russian Federaiton: UNESCO Institute for Information Technologies in Educaiton, 158-166.
- Lai, K. W. & Pratt, K. (2004). "Information and communication technology (ICT) in secondary schools: The role of the computer coordinator". *British Journal of Educational Technology*, vol. 35, no. 4, pp. 461-475.
- Leithwood, K. A. & Poplin, M. S. (1992). "The move toward transformational leadership". *Educational Leadership*, vol. 49, no. 5, pp. 8-13.
- Li, S., Yamaguchi, S. Y. & Takada, J. (2018). "Understanding factors affecting primary school teachers' use of ICT for student-centered education in mongolia". *International Journal of Education and Development using Information and Communication Technology*, vol. 14, no. 1, pp. 103-117.

- Lowery, C. L. & Akinola, T. (2017). "A scholar-practitioner construct in transnational education: Social justice issues for school leadership in nigeria". *The African Symposium (TAS) journal*, vol. 16, no. 1, pp. 50-62.
- Mahmadullo, R. (2019). Information and communication technologies in the education system of the republic of tajikistan: Status, problems, outlook. *In: Unesco, ed. MINISTERIAL FORUM: Global Dialogue on ICT and Education Innovation - Towards Sustainable Development Goal for Education (SDG 4)*, 18-19 April, 2018 2018 Moscow, Russian Federation. Moscow, Russian Federaiton: UNESCO Institute for Information Technologies in Educaiton, 167-174.
- Ministry of Education Culture and Science of Mongolia (MECS) (2006). Master plan to develop education of mongolia in 2006-2015. *In: Meecs (ed.)*. Ulaanbaatar.
- Mishra, P., Henriksen, D., Boltz, L. O. & Richardson, C. (2016). E-leadership and teacher development using ICT. *In: Huang, R., Kinshuk & Price, J. K. (eds.) ICT in education in global context*. Berlin, Heidelberg: Springer.
- Mon-Educ Consulting Llc (2012). Report of the baseline survey of "quality improvement of primary education teachers through development of training materials using ICT" funded by jica, japan. *In: Mon-Educ Consulting Llc (ed.)*. Ulaanbaatar city, Mongolia: Tokyo Institute of Technology.
- Mon-Educ Consulting Llc (2017). Report of the impact survey of "quality improvement of primary education teachers through development of training materials using ICT" project funded by jica, japan. *In: Mon-Educ Consulting Llc (ed.)*. Ulaanbaatar, Mongolia: Tokyo Institute of Technology.
- Mongolian Statistical Information Service (2017). Mongolian statistical information service. Ulaanbaatar: National Statistics Office of Mongolia.
- Moolenaar, N. M., Daly, A. J. & Slegers, P. J. C. (2010). "Occupying the principal position: Examining relationships between transformational leadership, social network position, and schools' innovative climate". *Educational Administration Quarterly*, vol. 46, no. 5, pp. 623–670.
- Muijs, D. (2004). *Doing quantitative research in education: With spss*, Thousand Oaks, Sage Publications.
- Narantuya, J. (2007). ICT technology and education of mongolia: Present situation and future. Asia and the Pacific Regional Seminar-Workshop on Educational Technology-2007 (Tokyo 2007 Regional Seminar), 24-31 October 2007. Tokyo. Institute of Education Mongolia, 7.
- Oyun, T. (2014). *Factors affecting information communication technology (ICT) integration of primary school teachers in mongolia*. Master of Engineering Tokyo Institute of Technology
- Raj, A. A., Ghani, A. K. B. A. & Isail, A. (2015). "Correlation between cultural perceptions, leadership style and ICT usage by school principals in malaysia". *Procedia - Social and Behavioral Sciences*, vol. 176, no., pp. 319-332.

- Roth, M. A. & Price, J. K. (2016). The critical role of leadership for education transformation with successful technology implementation. *In: Huang, R., Kinshuk & Price, J. K. (eds.) ICT in education in global context*. Berlin: Springer.
- Schepers, J., Wetzels, M. & Ruyter, K. D. (2005). "Leadership styles in technology acceptance: Do followers practice what leaders preach?". *Managing Service Quality*, vol. 15, no. 6, pp. 496-508.
- Schiller, J. (2003). "Working with ICT: Perceptions of Australian principals". *Journal of Educational Administration*, vol. 41, no. 2, pp. 171-185.
- Sukhbaatar, B. S. & Odgerel, U. (2005). A study on e-government policy in Mongolia. 6th Asia-Pacific Symposium on Information and Telecommunication Technologies, November, 9-10 2005 Yangon, Myanmar. IEEE, 1-6.
- Sukhbaatar, J., Yamaguchi, S. Y., Takada, J., Bat-Erdene, R. & Orgilmaa, L. (2012). Sustainable use of ICT for teacher training in primary schools in Mongolia-phase 2. Ministry of Education, Culture, Sport, Science and Technology, Japan.
- UNESCO. (n.d.) *ICT in education* [Online]. Available from:<<http://www.unesco.org/new/en/unesco/themes/icts/>>. [April, 25 2016].
- UNESCO Office Beijing (2008). Mongolia. *In: Unesco (ed.) UNESCO National Education Support Strategy (UNESS)*. UNESCO.
- United Nations (2014). Concept note; contributions of north-south, south-south, triangular cooperation, and ICT for development to the implementation of the post-2015 development agenda. *In: Nations, U. (ed.) High-Level Event of the General Assembly*. New York.
- United Nations. (2016). *Sustainable development goals* [Online]. New York: Division for Sustainable Development. Available from:<<https://sustainabledevelopment.un.org/?menu=1300>>. [Aug, 8, 2016 2016].
- United Nations ICT Task Force (2003). Tools for development: Using information and communications technology to achieve the millennium development goals. *In: Force, U. N. I. T. (ed.)*. United Nations.
- Uyanga, S. (2006). "The current situation of informatics education in Mongolia". *Informatics in Education*, vol. 5, no. 1, pp. 113-146.
- Uyanga, S. (2014). "Baseline analysis on ICT in general education of Mongolia". *Informatics in Education*, vol. 13, no. 1, pp. 121-140.
- Yee, D. L. (2000). "Images of school principals' information and communications technology leadership". *Journal of Information Technology for Teacher Education*, vol. 9, no. 3, pp. 287-302.



Yuchi, Z. & Zhujun, J. (2019). Bridging the gap: ICT and oer for equitable and quality rural education in china. *In*: Unesco, ed. MINISTERIAL FORUM: Global Dialogue on ICT and Education Innovation - Towards Sustainable Development Goal for Education (SDG 4), 18-19 April, 2018 2018 Moscow, Russian Federation. UNESCO Institute for Information Technologies in Educaiton, 175-184.

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