School Principals' Self-Efficacy beliefs and Level of Technology Integration in Moroccan Public Schools

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Abstract

An essential and prima facie component for effective technology integration in education and management of schools is the sense of efficacy of the school principal. This promising, but largely unexplored avenue in research was the aim of this study that sought to expose the seemingly conditions for a better understanding of school principals' sense of efficacy and its impact on the level of technology integration in Moroccan public schools. The study employed a quantitative method design using two instruments to collect data of 167 school principals. The Principal Sense of Efficacy Scale (PSES) (Tchannen-Moran & Gareis, 2004) to measure sense of efficacy and Level of technology integration (LoTi) Moersch (1999) to measure the various levels of technology integration. Findings of the study demonstrated that Moroccan school principals have a moderate sense of efficacy at (PSES) scale and low sense of efficacy at the sub-scales wherein moral –efficacy (M = 24.40, SD = 3.96), management –efficacy (M = 30.72, SD = 3.60) and finally instructional efficacy levels (M= 28.85, SD = 4.14). These significant differences in descriptive statistics reached significance in the inferential analyses as well to support the main result of this research that came out with only a modest relationship between self- efficacy and school principals' Level of technology integration

Principios de Autoeficacia y Nivel de Integración Tecnológica en las Escuelas Públicas de Marruecos

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Resumen

Un componente esencial y a primera vista para la integración eficaz de la tecnología en la educación y la gestión de los centros escolares es el sentido de la eficacia del director del centro. Esta vía de investigación prometedora, pero en gran medida inexplorada, fue el objetivo de este estudio, que pretendía exponer las condiciones aparentes para una mejor comprensión del sentido de eficacia de los directores de escuela y su impacto en el nivel de integración de la tecnología en las escuelas públicas marroquíes. El studio empleó un diseño de método cuantitativo utilizando dos instrumentos para recoger datos de 167 directores de escuela. El Principal Sense of Efficacy Scale (PSES) (Tchannen-Moran & Gareis, 2004) para medir el sentido de eficacia y el Level of technology integration (LoTi) Moersch (1999) para medir los distintos niveles de integración tecnológica. Las conclusions del estudio demostraron que los directores de escuela marroquíes tienen un moderado sentido de la eficacia en la escala (PSES) y un bajo sentido de la eficacia en las subescalas de eficacia moral (M = 24,40, SD = 3,96), eficacia de gestión (M = 30,72, SD = 3,60) y, finalmente, los niveles de eficacia de instrucción (M = 28,85, SD = 4,14). Estas diferencias significativas en los estadísticos descriptivos alcanzaron la significación en los análisis inferenciales para apoyar el resultado principal de esta investigación que salió con sólo una modesta relación entre la autoeficacia y el nivel de integración de la tecnología de los directores de escuela.

Palabras clave: Liderazgo Tecnológico, Integración Tecnológica, Directores Escolares, Creencias de Auto Eficacia

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Public interest about the quality of education in general and school effectiveness in particular have sparked increased interest in holding schools accountable for the outcomes of the education they provide. This rising interest in these issues and the evolving nature of school environment has put great pressure on school principals as leaders to provide direction, coordination and leadership within their school. Moreover, and because of the increasing changes taking place worldwide, the behavior and beliefs of educational leaders emerged as a sine qua non to the creation and facilitation of an effective teaching and learning environment and decisions vis-a-vis the adoption and use of an innovation or information and communication technologies in a school.

The implementation and management process of an innovation in a school refers to the wide range of strategies and stages that an innovation passes through before it is implemented and accepted by the school faculty and staff members. This long and complex process necessitates planning and compatibility between the educational environment, values and culture of the organization and change, and most important of all, the motivation and self -efficacy of the school leader and the end users. Given the suggested requirement of the success of an innovation in a school, an innovation is not determined by the innovation's merit alone. Without an effective implementation and management plan, visionary leadership, self-perception competency, and above all, an agreement and self-efficacy of all members of the organization (school principal, teachers and students) on the need for change (Fullan, 1982), even a great innovation might fail (Surry & Ely, 2002).

To innovate, from this perspective, is not about using a new technology alone. It currently has to do with the capacity to develop new ideas to make progress and be able to face new and unprecedented challenges (Serdyukov, 2017). According to Organization for Economic Cooperation and Development (OECD), an innovation is "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)" (OECD/Eurostat, 2018). An innovation,

accordingly, is the implementation of new information and communication technologies and new collaborative approaches to learning and learning outcomes (Finsterwald et al., 2013; Rehm et al., 2020). Specifically, it is the operationalization of self-regulated learning (e.g. Garcia et al., 2018; Rovers et al., 2019) and personalized learning experiences and environments through the use of technology (Prain et al., 2013; Richardson, 2019) to improve the quality of education in general and modernize the educational system to keep track of the rapid changes that are occurring in societies in particular (OECD, 2016).

A meaningful predictor of a school principal's ability and willingness to use an innovation and support and engage teachers and learners through innovative twenty-first-century instruction is self-efficacy (Kent & Giles, 2017). According to many research studies, school principals' self-efficacy influence self-efficacy beliefs of teachers and learners at the same time to a large degree (Dimmock & Hattie, 1996; Leithwood & Janzi, 2008; Tschannen-Moran & Gareis 2004, 2005).Without the leadership and self- efficacy of the principals, it is impossible to advance the school toward its major goal, which is to improve students' achievements, increase school performance (Tschannen-Moran & Gareis, 2004) and deal better with organizational chaos and uncertainty (Thompson, 2017).

Similarly, teachers and students' positive self-efficacy beliefs contribute to higher levels of learners' achievement and school performance since there is evidence of a relationship between principals' sense of efficacy and school improvement and effectiveness (Goddard, Sook Kim, & Miller, 2015; Leithwood & Jantzi, 2008; Tschannen-Moran & Woolfolk Hoy, 2007). Accordingly, supporting school principal self-efficacy beliefs can positively influence the future success of schools and the appropriate use of technology therein (Leithwood & Janzi, 2008). Put differently, school principals play a central role in cultivating a school environment that supports, facilitates and enables the implementation and use of technology in teaching and learning that yield high performing schools (Klar & Brewer, 2013).

A persuasive body of research has been conducted for understanding technology integration and management in schools and

classrooms; but studies on self - efficacy of school principals has received little attention and concern within the field of educational research and educational leadership and management studies (Brama, 2004; Sierman Smith, 2007; Smith & Guarino, 2005; Tschannen-Moran & Gareis, 2004, 2005), especially if compared to studies done in the area of student self-efficacy (Bandura, 1994; Schunk & Meece, 2005), teacher self-efficacy (Skaalvik & Skaalvik, 2007) and collective teacher efficacy (Bandura, 1997; Goddard et al., 2000; Skaalvik & Skaalvik, 2010). Therefore, there is a need to investigate the association between school principals' self-efficacy beliefs and level of technology integration in schools, which makes this research a promising line of future research (Dimmock & Hattie, 1996; Fisher, 2014; Leithwood & Jantzi, 2008; Tschannen-Moran & Gareis, 2004, 2005).

The present study, hence, is an attempt to fill this gap in research and explain how self-efficacy beliefs impact school principals' potential to effect change or affect others by adopting and using technology in school. The objective of the study, therefore, is to expose the prima facia conditions for a better understanding of school principals' sense of efficacy and its impact on the level of technology integration in Moroccan public schools. To accomplish this objective, the following research questions were investigated:

1- What is the general level of self-efficacy beliefs of school principals?
2- What is the relationship between school principals' self-efficacy beliefs and their level of technology integration in school?
3- What is the relationship between age, administrative experience and school principals' self-efficacy beliefs?

Review of the Literature

Self-efficacy is a concept that has been used since the early 1980s'. It was developed by Albert Bandura as an essential component of social cognitive theory to emphasize people's beliefs in and perceptions of their ability to perform certain tasks (Bandura, 1977). This concept has been studied and used in a wide range of disciplines like athleticism

(Gearity & Murray, 2011; Vargas-Tonsing & Bartholomew, 2006; Zagorska & Guszkowska, 2014), nursing (Robb, 2012; Roberts, 2010; Zulkosky, 2009), business and career choice (Almeida, 2011; Dutt, 2010; Kim & Miner, 2007; Anderson & Betz, 2001; Bandura & Locke, 2003; Hackett & Betz, 1981) and helth care and traitment (Robb, 2012; Warner, Schuz, Knittle, Ziegelmann, & Wurm, 2011).

In education, it has been studied in a number of ways and multiple contexts. A large amount of research has been conducted on self-efficacy and teachers' effectiveness (Bandura, 1993; Bautista, 2011; Hagen, Gutkin, Wilson, & Oats, 1998; Plotnic, 2004; Wang, Ertmer, & Newby, 2004) and Self –efficacy and learners' performance or achievement (Askew & Field, 2007; Bandura, 1977; Bandura, 1993; Cox, McKendree, Tobin, Lee, & Mayes, 1999; Hampton & Mason, 2003; Jackson, 2002; Tschannen-Moran & Woolfolk Hoy, 2007). However, only a few studies exist that focus on school principals as the main sample (Smith, 2007; Smith & Guarino, 2005; Tschannen-Moran & Gareis, 2004, 2005). In fact, the majority of research focuses on self-efficacy beliefs and outcome achievement (Anderson & Betz, 2001); though, throughout the wide variety of research on self-efficacy, very few studies have focused on the relationship between self-efficacy and level of technology integration.

Evidence from the literature, trial research and controlled field confirmed that our beliefs and ability to do something contributed significantly to the motivation, decision-making and actions we take, which are important elements for individual self-efficacy (Bandura, 2009). Put differently, self-efficacy influences the way people think, act, decide and motivate themselves to do a number of actions and decisions in their environments (Bandura, 1993; Zulkosky, 2009). That is said, self - efficacy should not be confused with or looked at as a substitute of other concepts such as self-esteem, self-value, self-worth, confidence and motivation, which are designed to describe personality qualities. Self-efficacy, contrastingly, is about belief in oneself to successfully show specific behaviors on a specific present and future task (Goddard et al., 2004; Robb, 2012; Zulkosky, 2009).

Bandura (1977, 1986, 1997, 1999), well known for his social cognitive theory, defined self- efficacy as the foundation of human

agency in which individuals are producers of experiences and shapers of events. (Bandura & Wessels, 1997; Takahashi, 2011; Kleinsasser, 2014). It generally concerns "people's judgments of their capability to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986: 391). It also refers to an individual's conviction and confidence about his or her abilities to mobilize the motivation, cognitive resources, and courses of actions needed to successfully perform certain tasks within a given organization.

Within the framework of social cognitive theory, the concept of self-efficacy is identified as a significant variable for predicting an individual's behaviour (Bandura, 1977). In this regard, self-efficacy affects one's goals and behaviour and is influenced by one's actions and conditions in the environment or context. For Bandura "People's beliefs in their efficacy affect almost everything they do: how they think, motivate themselves, and behave" (Bandura, 1977: 53). Following this reasoning, self-efficacy is believed to have a great impact on people's motivation, decisions and personal accomplishments. A low sense of self-efficacy is associated with depression, anxiety, and helplessness. Individuals with low sense of efficacy have generally low self-esteem and motivation, and harbor pessimistic thoughts regarding their ability to perform tasks and accomplish goals when it comes to the adoption and use of an innovation such as a computer and other related technologies. Accordingly, Social Cognitive Theory (SCT) proposes that individuals do not simply respond to environmental influences, but rather actively seek and interpret information related to that context (Nevid, 2009). Individuals, hence "function as contributors to their own motivation, behaviour, and development within a network of reciprocally interacting influences" (Bandura, 1999: 169).

Self-efficacy, accordingly, has a strong impact on many decisions in an individual's life. According to Rogers (1995), a task is usually chosen according to the degree and level of self-efficacy possessed. If an individual's self-efficacy is low, related tasks are most often avoided (Bandura, 1995). For example, people who perceive a task or innovation as difficult and challenging, they will be very reluctant to embrace that innovation or new technology. Conversely, high degree or level of sense of efficacy toward a task of innovation usually leads to

high motivation, enthusiasm, and persistence to use it and perform its related tasks. In other words, and when applied to the integration, use and management of an innovation in a school, Bandura's social cognitive theory suggests that people with higher levels of self-efficacy would engage easily and more frequently in technology related activities that may persist for long time. Whereas those with lower self-efficacy would tend to escape technology integration, avoid technology use and can even give up using and/or talking about technology easily in front of others.

All things considered, self-efficacy of a school principal refers to "their judgment of their ability to successfully carry out behaviors that will bring about desired results, under burdensome conditions" (Friedman, 2011, p161–172). It could have a predictive impact and positive effect on the successful integration and management of technology in school and could influence respectively even the effort of principals and their work persistence as well as resilience in the face of setbacks like arduous tasks and stressful and incredibly challenging practices within schools and classes (Tschannen-Moran & Gareis 2004; Hodges et al., 2020; Marshall et al., 2020; Tate, 2020). Moreover, evidence from the literature suggests that there are various factors that influence school principals' adoption and use of technology. These factors range from the school's physical facilities (Ertmer, 2005) to attitudes towards computer use (Teo, 2009), to self-efficacy, which has repeatedly been reported as a sine qua non in understanding individuals' degree of use and level of technology integration (Sure, 2009). Similarly, research findings showed that technology integration in schools for meaningful classroom use or school management remains among the greatest challenges facing today's school principals and teachers (Cennamo et al., 2010; Fioriello, 2011; Slutsky, 2016). Thus, there is a need to investigate the association between principals' self-efficacy and their level of technology integration into their schools.

Methodology

This paper discusses a study that explores the relationship between principal self-efficacy and their level of technology integration in school as a learning organization. It tries to identify and assess the general level of technology integration self-efficacy of school principals and the way this affects technology integration in school. Specifically, this study seeks to investigate the existing relationship between self-efficacy and level of technology integration in Moroccan public schools through the exploration of the conditions and the existing relationships between age, administrative experience and self-efficacy beliefs, and the way they operate together to foster and/or hinder technology integration in Moroccan public schools. Basically, this study is quantitative correlational in nature that relies on a positivist paradigm.

Participants

The targeted research population for this study concerns Moroccan school principals working in elementary, lower secondary and upper secondary levels of education in public schools. According to statistics of the Ministry of National Education (2014-2015), the overall general number of Moroccan school principals is 10542, with 7602 in elementary, 1854 in lower secondary, and 1086 in upper secondary education.

The total number of participants in this study reached (n= 167) with only 6 females (3.6%) and 161 male (96.4%). The majority reached already the retirement age (58/59 years old) in 2019, with 118 principals (70.7%) were over 50, 36 (21.6%) between 46 and 50, nine (5.4%) between 41 and 45, and only 4 (2.4%) were between 36 and 40 years. The highest number of participating school principals (56) (26.6%), had between 11 and 15 years of administrative experience as a principal, 38 (22.8%) had between 16 and 20 years, 21 (12.6%) had between 1 and 5 years and 11 (6.6%) principals had been occupying leadership positions for more than 21 years. Around 78% were holders of only the Baccalaureate degree, 23% were holders of university degrees (undergraduate studies) obtained in academic university subjects such

as Arabic studies, History and Geography, Physics and others. The rest of the participants did not hold any other university qualifications and none were holders of any Masters or Ph.D degrees.

Concerning, training and professional development in technology integration and use, only 16 principals (9.6%) had no training of whatever sort in technology use, while 151 principals (90.4%) had training and can manage technology for instruction and management purposes. Similarly, 128 principals (76.6%) had been using technology for more than 10 years, 19 principles (11.4%) from 8 to 10 years, 13 principals (7.8%) from 6 to 8 years and only 6 principals (3.6%) had been using technology from 4 to 6 years. Surprisingly, only one school principal had been using technology for a period that is less than 4 years (2–4 years).

Instruments

This study is based on the assumption that there is a relationship between school principals' sense of efficacy and the level of technology integration in Moroccan public schools. To expose the prima facia conditions for a better understanding of school principals' sense of efficacy and its impact on the level of technology integration in Moroccan public schools, the present study utilizes two pre-determined survey instruments to yield statistical data. The instruments chosen are standardized instruments with established validity and reliability. Their scales were adapted to fit and respond to the requirements and objective of the study. The first instrument is The Principal Sense of Efficacy Scale (PSES) (Tchannen-Moran & Gareis, 2004) to measure school principals' self-perceptions of their capability to accomplish various aspects of school leadership. The second instrument is Level of technology integration (LoTi) for assessing the various levels of technology integration (Moersch, 1999) to measure school principals' level of technology integration.

Data Collection Techniques

Data for the present study were collected using quantitative measures and opting for snowball, volunteering and networking techniques. These strategies made the distribution of the questionnaires

more practical, effective and less consuming in terms of time and efforts since it was based on cascading referrals in which everybody who was requested to help in distributing the questionnaire encouraged in turn others to do likewise. This technique, though it seems somehow informal, helped a lot in augmenting the rate of participation and increased the response rate, especially that the majority of participants received the questionnaire through individuals who have credibility in their professional communities and regions.

Data Analysis

The collected data was processed using SPSS (21.0). Descriptive statistics were utilized first to describe and summarize the properties and characteristics of the mass of data collected from school principals, describe the properties of the population involved in the study and calculate Mean scores, standard deviations and percentages. Correspondingly, various statistical techniques like correlation analysis, one way between groups analysis and two –way between groups analysis of variance, were also utilized to explore the link between different variables and gauge the differences between groups to look at the individual and joint effect of two independent variables on one dependent variable such age and experience in principalship and the extent to which they affect school principals' self-efficacy beliefs and technology integration in Moroccan public schools.

Results

School Principals' General Level of Self-Efficacy Beliefs

To respond to the first research question *(What is the general level of school principals' self-efficacy beliefs?)*, descriptive statistics were utilized first. Particularly relevant here are the mean values and the standard deviations to see how the respondents responded to the self-efficacy measure with three subscales: Moral Efficacy, Management Efficacy, and Instructional Efficacy. The results of this descriptive analysis are presented in table 1.

Table 1*: Mean scores for sense of Efficacy sub-scales*

	N	Mean	Std. Deviation	Minimum	Maximum
Moral Efficacy	167	24.4012	3.96226	12	30
Management Eff	167	30.7246	3.60499	21	40
Instructional Eff	167	28.8563	4.14536	19	35

According to results obtained and as reported in table 1, individual scores in self-efficacy scale ranged from a minimum score of 58 to a maximum score of 105 with a mean score of 83.98 and a standard deviation of 10.40 on the overall principals' sense of efficacy scale. The sub-scales (Moral efficacy, management efficacy, and instructional efficacy) indicated important findings as well. For moral efficacy, the mean and standard deviation scores reached *(M = 24.40, SD = 3.96)*, management efficacy *(M = 30.72, SD = 3.60)* and instructional efficacy *(M= 28.85, SD = 4.14)*. Based on these descriptive statistics, the respondents had a low sense of efficacy, which might affect negatively their level of technology integration in schools.

Self- Efficacy: A critical Factor in School Principal's Level of Technology Integration

The purpose of this study was to examine school principals' sense of efficacy and its impact on the level of technology integration in Moroccan public schools. Based on descriptive statistics and to further investigate the claim that Moroccan school principals have a low sense of efficacy, which might affect negatively their level of technology integration in schools and in order to answer the second research question *(What is the relationship between school principals' self-efficacy beliefs and level of technology integration in school?)*, a Pearson Product Moment correlation analysis was conducted to measure the relationships between school principals' sense of efficacy (independent variable) as measured by principals' sense of efficacy scale (PSE), and their level of technology integration as measured by

(LoTi) (dependent variable). The correlational results are presented in the matrix below.

Table 2: *Correlation between school principals' sense of efficacy and level of technology integration*

Total Loti Score	Pearson Correlation	1
	Sig.(2-tailed)	
	N	167
Overall sense 1	Pearson Correlation	**.658****
of - efficacy	Sig.(2 tailed)	.000
	N	167
167		

∗∗ Correlation is significant at 0.01 level (2-tailed).

According to the correlational results obtained, there is a statistically significant correlation between school principals' sense of efficacy and their level of technology integration. The *p* value (= 0.000) is inferior to the threshold value of 0.05 and as a consequence indicates a highly significant positive result. Pearson's r *(r = -0.65)* suggests a moderate positive correlation *(r = .65, n = 167, p < .0005)* between the two variables concerned. In this respect, the more a school principal has a high sense of efficacy, the more he or she is likely to use and boost technology integration in his/her or her school. In other words, school principals' success in this new technology-changed environment requires two elements: first, the need for school principals to update their skills in technology and second to perceive themselves as capable of doing so through a strong belief in their self-efficacy.

To explore in more depth the relationship between the three self-efficacy sub-scales (efficacy for moral leadership, efficacy for management, and efficacy for instruction) and the dependent variable (principals' level of technology integration), the Pearson product moment correlation test was conducted to explore this relationship, the results of which are presented in table 3.

Table 3*: Correlation between PSF sub-scales and LoTi scale*

		Total LOTI score
Moral Efficacy	Pearson Correlation	**.632****
	Sig. (2-tailed)	**.000**
Management Efficacy	Pearson Correlation	**.475****
	Sig. (2-tailed)	**.000**
Instructional Efficacy	Pearson Correlation	**.634****
	Sig. (2-tailed)	**.000**

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

The results of the correlation between school principals' sense of efficacy (PSE) sub-scales and the principals' level of technology integration (LoTi) as measured by the LoTi exhibited a moderate positive correlation as well. Efficacy for moral leadership was positively associated with level of technology integration with a moderate index *(r = .63, n = 167, p < .001)*. Efficacy for instruction reached a similar relationship *(r = .63, n = 167, p < .001,* while management efficacy generated a weaker or the weakest relationship *(r = .47, n = 167, p < .001)*. Apparently, the results obtained from the correlation tests revealed that there was a significant correlation between school principals' sense of efficacy and their level of technology integration in schools. The higher the respondents' sense of self-efficacy is, the stronger their tendency is to use and integrate technology into their schools. In other words, actions that are perceived as successful tend to raise self-efficacy, whereas actions that are perceived as failures tend to lower it. Similarly, there was a moderate positive correlation between the three Principal Sense of Efficacy (PSE) sub-scales (efficacy for moral leadership, efficacy for management, and efficacy for instruction) and school principals' level of technology integration.

School Principal's Age and Administrative Experience and their impact on Self-Efficacy beliefs

The third research question seeks to explore the relationship between age, and administrative experience and the impact they have on school principals' self-efficacy beliefs. Put differently, the third research question (*What is the relationship between age, administrative experience and school principals' self-efficacy beliefs?*) seeks to cast some light on school principal's age and administrative experience and the impact they have on self-efficacy beliefs.

In order to explore age differences in the responses to the principal sense of efficacy scale, a one way between groups ANOVA was conducted. The preliminary descriptive analysis for the four age groups [Group 1: (36-40), Group 2: (41-45), Group 3: (46-50)] is summarized in table 4:

Table 4: *Mean scores of principals' sense of efficacy for age groups*

Age	N	Minimum	Maximum	Mean	Std. Deviation
36-40	4	77.00	102.00	**92.2500**	**10.96586**
41-45	9	58.00	100.00	**75.1111**	**13.59636**
46-50	36	63.00	99.00	83.5556	10.00413
over 50	118	63.00	105.00	84.5085	9.95781

To start with, the second age group (41- 45) scored the lowest *(M= 75.11, SD = 13.59)*, while the youngest age group (36-40) had the strongest sense of self-efficacy *(M= 92.25, SD = 10.96).* The other age groups: group 3 (46-50) and group 4 (50+) scored almost the same in mean scores. *(M= 83.55, SD = 1)* for age group 3, and (M = 84.50, SD = 9.95) for age group 4 (50 +).

To determine whether these differences in the mean scores are significant to gauge the impact of age on school principals' sense of efficacy, a one way between groups ANOVA was conducted, the results of which are presented in table 5.

Table 5: *One-way ANOVA for age and PSE scores (sig)*

		Sum of Squares	df	Mean Square	F	Sig.
Within Groups	(Combined)	1020.927	3	340.309	3.274	**.023**
Between Groups		16944.019	163	103.951		
Total		17964.946	166			

The results of the ANOVA analyses indicated that there was a statistically significant difference at the *p< .05* level in the PSE scale for the four age groups *[F (3,163)= 3.27, p= 0.23]* as shown in table 65 above. A Tukey HSD post hoc comparison test was used to confirm which groups exhibited the differences. The results of the post hoc comparison test using the Tukey HSD are presented in table 6:

Table 6: One-way ANOVA for age and PSE score (Tukey HSD)

(I) age	(j) age	Mean I	Mean J	Mean Difference (I-J)	Std.Error	Sig.
36-40	41-45		75.1111	17.13889*	6.12682	**.029**
	46-50	92.2500	83.5556	8.69444	5.37357	.371
	over50		84.5085	7.74153	5.18350	.444
41-45	36-40		92.2500	-17.13889*	6.12682	**.029**
	46-50	75.1111	83.5556	- 844444	3.79969	.122
	over 50		84.5085	- 9.39736*	3.52577	**.042**
46-50	36-40	83.5556	92.2500	-8.69444	5.37357	.371
	41-45		75.1111	844444	3.79969	.122
	over 50		84.5085	-.95292	1.94125	.961
Over 50	36-40	84.5085	92.2500	-7.74153	5.18350	.444
	41-45		75.1111	9.39736*	3.52577	**.042**
	46-50		83.5556	.95292	1.94125	.961

 * The mean difference is significant at the 0.05 level.

The results of the post hoc test revealed that the mean score for group 2 (41-45) was significantly different from all other 3 age groups. The mean score for this age group was *(M = 75, SD = 13.59)*, which is the lowest mean score. Similarly, group 1 (36-40), which is considered the youngest age group, was also significantly different from all other groups. The mean score for this group was *(M= 92.25, SD = 10.96)*, which is the highest mean score. Group 3 and 4, however, did not differ

significantly from each other. For group 3, the mean score was *(M= 83.55, SD = 10)* and for group 4 it was *(M = 84.50, SD = 9.95)*. These results show that younger school principals have more self-efficacy than their older counterpart. Based on the results of the present study, the more school principals get older, the less they believe in their capabilities to organize and execute the courses of action required to manage prospective situations.

In addition to the age effect detected in the previous analysis, the total years of administrative experience as a principal or seniority in principalship was also examined for similar effects on differences in self-efficacy beliefs. To achieve this objective, a one way between groups analysis of variance was performed. The principals' age groups were entered as an independent variable and self-efficacy served as the dependent. As customary, the descriptive will be presented first before moving to the ANOVA analysis proper.

As can be seen from table 7, the lowest mean score was *(M= 82.50, SD = 10.39)* and concerned school principals with an experience of (6-10 years). The highest mean scores, however, were *(M= 85.82, SD = 9.29)* for school principals with an experience of (11-15), and *(M= 85.32, SD = 8.60)*, for school principals with an experience of (16-20 years).

Table 7: *Mean scores for administrative experience as a principal on the PSE scale*

	N	Mean	Std.Deviation	Std.Error	Minimum	Maximum
1-5	36	83.1111	12.79459	2.13243	58.00	105.00
6-10	58	82.5000	10.39441	1.36485	63.00	102.00
11-15	39	85.8205	9.29593	1.48854	63.00	103.00
16-20	34	85.3235	8.60838	1.47633	71.00	101.00
Total	167	839820	10.40301	.80501	58.00	105.00

These results indicated that the mean score for all participants in terms of administrative experience as a school principal do not differ extremely. The mean score for school principals who had an experience between (6-10) years was slightly different from that of school principals with an experience that ranged from (1-5) years. However,

respondents with an administrative experience as a principal that ranged between (11-15) and (16-20) scored almost the same in mean scores.

In order to determine whether the differences between respondents' sense of efficacy based on their administrative experience as a school principal are statistically significant or not, a subsequent one-way analysis of variance (ANOVA) was conducted, the results of which are presented in table 8.

Table 8: *One-way ANOVA for years of administrative experience as a school principal and the PSE scale score (sig)*

			Sum of Squares	df	Mean Square	F	Sig.
Between	Groups	(Combined)	347.706	3	115.902	1.072	**.362**
Within Groups			17617.240	163	108.081		
Total			17964.946	166			

As the descriptive above suggested, the one-way ANOVA analysis revealed that the differences between respondents were not statistically significant with a *p* value was well over .005 (*p>.005*). *[F (3.163) = 1.07, p = .362]*. Thus, there was no need to study the results of the post-hoc comparisons using the Tukey HSD test.

Discusion

Moroccan school principals in the present study demonstrated a moderate sense of efficacy, which has strong impact on their level of technology integration in school. Findings from descriptive analyses indicated that there were significant differences in mean scores between school principals' sense of efficacy as measured by the Principal Sense of Efficacy Scale (PSES) and their level of technology integration as measured by Level of Technology Integration (LoTi). The analyses of sense of efficacy subscales (efficacy for moral leadership, efficacy for management and efficacy for instruction) revealed important outputs as

well in descriptive analyses regarding the relationship between school principals' sense of efficacy and their level of technology integration. According to results obtained, the highest mean score was recorded in Management efficacy, followed by Instructional efficacy, and finally Moral efficacy scored the lowest. These differences in favor of school principals' sense of efficacy in descriptive analyses survived the inferential tests and reached significance as well. The findings obtained from a Pearson Product Moment Correlation revealed that there was a moderate positive correlation between school principals' sense of efficacy scale and sub-scales and school principals' level of technology integration.

This finding is in consonance with that of McCormick (2001) who found that leaders with strong self-efficacy beliefs positively affect the goals of an organization as well as follower motivation. Likewise, (Tschannen-Moran & Gareis (2007) suggested that principal self-efficacy determines how leaders function and the influence they exert on others in the school. In a study commissioned by the Wallace Foundation, Seashore-Louis et al. (2008), determined that principals with strong self-efficacy are more likely to accept and persevere through the challenges of school improvement processes; and that efficacious leaders develop and promote a sense of collective efficacy that positively affects teaching, learning and management. Finally, this finding tunes also well with Bandura's (1997) view on self-efficacy and its role in achieving a goal or a task. According to social cognitive theory, self-efficacy plays a key role in raising motivation and behavioral change. The higher the self-efficacy, the more an individual tends to set higher goals, expands more efforts, perseveres more on challenges, and becomes more resilient to failures (Bandura, 1991, 1993; Bandura & Adams, 1977). Contrastingly, when individuals are less enthusiastic and less confident in their skills, knowledge and abilities, they demonstrate lower levels of self-efficacy since they doubt their ability to cope with change and new situations.

The results obtained from the Pearson Moment Correlation test showed that there was a statistically significant correlation between school principals' sense of efficacy and the level of technology integration. The more a school principal has a high sense of efficacy, the more he or she is likely to use and boost technology integration in

school. This finding supports the results reported in a persuasive body of research that targeted teachers' self-efficacy and technology integration. Koh and Frick (2009), for example found a positive relationship between a teacher's computer self-efficacy and technology integration in the classroom. McCormick and Ayers (2009) revealed that the stronger the teachers' beliefs were in their capabilities to teach in new ways, the stronger their beliefs were in their capability to use technology to do so.

Moreover, and according to the regression model, and on the basis of the criterion of the higher the beta value, the greater effect of the predictor on the criterion variable, technical competency makes the major contribution to the prediction of school principals' level of technology integration. According to the findings obtained in this research, there is a strong positive correlation between the technical competence of school principals and their level of technology integration. Similarly, there is a strong positive correlation between instructional efficacy and school principals' level of technology integration. This indicates that both technical competency and instructional efficacy have strong effect on school principals' level of technology integration. This shows that for school principals to be effective technology leaders and strong proponent of technology integration in schools, they need to have technical skills and knowledge (competence) at hands first, which cannot be obtained unless there is specialized training and ample professional development opportunities. Contrastingly, the relationship between management efficacy and school principals' level of technology integration was low, though the correlation proved to be a moderate positive correlation. This explains that Moroccan school principals are still facing a lot of difficulties regarding using technology for school management, especially in terms of managing and analyzing large amounts or big school data using technology.

This finding is consistent with previous studies that identify management efficacy as the most challenging efficacy type that school principals must develop since it is essential for a school management and correspondingly school effectiveness (Fisher, 2011). Management efficacy, hence, requires the necessary skills and knowledge to exploit

school data to improve instructional practices, plan curricula, and provide assessment of instruction and student learning (Elias, Cafolla, & Schoon, 2000, pp.123-131). According to Delors (1997):

School principals are one of the factors, if not the most significant one, who determine the school effectiveness. Sometimes a good school principal, capable of building up an effective team, and who is considered to be competent and ready to support new ideas, substantially improves the school's quality of work. (p.142)

A critical task for the school principal, accordingly, is to formulate, communicate and operationalize the school's vision by being a technology leader and role model and manager himself first. According to national educational technology standards (NETS) of the International Society for Technology in Education (2018), technology leaders work jointly with stakeholders to build school culture and develop a shared vision, which "embraces the notion that schools cannot operate effectively without an important partnership with the larger community" (Robbins & Alvy, 2004, p. 5). That is said, school principals need to mobilize resources and promote collaborative activities among partners to achieve the organization's goals. Generally, effective school leaders need to attract competent people to enhance the organization's capabilities and realize its vision by cultivating and focusing the strengths of colleagues to achieve the shared vision.

Bush and Jackson (2002) claim that one of the most important requirements for successful schools is high quality leadership and effective school management. Following this line of though, school principalship requires well-developed social and leadership skills, mercantile skills, instructional and administrative skills (Benestad & Pleym 2006). Additionally, principals should experience high levels of self-efficacy in these areas in order to deal efficiently with their tasks and mange their schools effectively.

As for moral efficacy, the level of the correlation was almost strong, and the findings indicated a stronger correlation, which can be interpreted as sign of school principals' higher perceived leadership self-efficacy that affect positively the level of technology integration,

school climate including management, and teachers and students' performance.

Self-efficacy was also compared in terms of the age of the school principals, the results revealed that the youngest age group (36-40) had the highest mean score. In addition to this, the post hoc test yielded the same results and revealed that the mean score for this youngest age group was the highest mean score obtained from the analyses. These findings, supports the existence of age-related differences in self–efficacy, technology leadership, and school principals' level of technology integration. Moreover, these findings concur well with previous studies indicating that school principals who are younger in age are associated with stronger beliefs of self-efficacy and higher expectations (Robinson & Edwards, 2012; Bosscher & Smits, 1998). Younger individuals have the possibility of using intrinsic personal power such as expertness, informing and reference. They rely on personal power resources rather than politics, procedures or legal regulations in order to influence others within the school (Lyons & Murphy, 1994). Accordingly, consideration of these differences can guide decision makers to help with technology integration in schools on the basis of the relationship between age, self-efficacy and technology integration.

Contrastingly, many researches suggested that age does not correlate with self-efficacy because people vary greatly in how efficaciously they manage their lives (Bandura,1995). Jenks (2004) conducted a comprehensive study on the effects that age, sex, and language proficiency have on self-efficacy levels. Findings from his study revealed that age showed no statistically significant relationship with levels of self-efficacy as evaluated by a chi-square analysis.

Overall, there is a lack of research that correlates age specifically with self-efficacy either concerning school principals and/or teachers. Studies that reports this correlation, usually contains conflicting results because self-efficacy is always ever-changing and evolving. Bandura (1994) recognized that age does not affect self-efficacy, but life periods that correspond with specific age ranges present changes in self-efficacy consistently.

There exist many studies that report conflicting results regarding whether experience plays a role in self-efficacy at all or if self-efficacy fluctuates over the course of a carrier. In this regard, a new array of research has emerged to suggest that self-efficacy actually fluctuates over the course of one's career. According to Gregersen et al. (2014), Individuals at the beginning of their carrier with high perceived efficacy are likely to perform occupational roles innovatively, whereas those of low perceived efficacy are prone to process occupational duties conventionally with little personal embellishment. Similarly, Klassen and Chiu (2010) suggested that teachers increase in self-efficacy through their early years and into the mid-career years but decrease in efficacy as they enter the last stages of their careers. Gu and Day (2007) yielded similar results by finding that most principals and teachers in mid-career experience increases in motivation and commitment, whereas school principals and teachers who are later in their careers experience a decline in motivation and commitment, and thus their self-efficacy decreases and begins a period of serenity that is characterized by disengagement, disappointment and a spur in enthusiasm and self acceptance. Bandura (1997), in this respect, suggested that self-efficacy may not be uniform from early to late adulthood. It may change over the course of a career due to life events and career challenges. Put differently, self-efficacy is not static, it is believed to be a situational rather than a stable trait. It reflects a lifelong dynamic process of development that changes according to circumstances and experience (Klassen & Chiu, 2010).

Following this line of reasoning, and on the basis of the results obtained, school principals in their mid –carrier with an experience of (11- 15) had the highest mean scores, (M= 85.82, SD = 9.29), while school principals with an administrative experience as a principal that ranged between 20 years and over scored a lower mean score. This finding reveals that there is a decline in motivation interest and commitment and by the same token there is a turn down in self-efficacy, which in turn affect leadership and technology integration in school. That is said, self-efficacy influences people's performance, persistence and motivation when carrying out tasks (Bandura 1977, 1997, 2006). Previous studies on school principal self-efficacy have shown that this later is negatively related to burnout, but positively related to job

satisfaction (Evers et al. 2002; Friedman 1995, 2002; Skaalvik & Skaalvik, 2010). This explains that early and/or mid-carrier school principals have developed a pleasurable or positive emotional state resulting from the appraisal of one's job (Locke,1996), which led automatically to high self –efficacy. Conversely, school principals in their late carrier have developed emotional exhaustion, depersonalization, and reduced personal accomplishment because of occupational stress, routines and pressure from education authorities, parent and other sources. Burnout is thus associated with decreased motivation, job performance and reduced job commitment (Tomic & Tomic, 2008), which highly and directly affect self-efficacy, which in turn impact successful school leadership development.

Conclusions and Recommendations for Practice

School principals have a major role to play in initiating and integrating technology inside schools for instruction and/ or management purposes. However, there is not enough information about and evidence on the current status of technology use and integration by Moroccan school principals and the extent to which personal self-efficacy affects and captures the multiple roles school principals' have in technology integration in schools either for instruction and /or management.

The current study was intended to fill in this gap and expose the prima facia conditions for a better understanding of school principals' sense of efficacy and its impact on level of technology integration in Moroccan public schools. Findings from the study revealed that there was a modest relationship between self-efficacy and school principals' Level of technology integration since the correlation between self-efficacy and level of technology integration was not statistically significant. This finding was unexpected, raises many questions and calls, accordingly, for rethinking school principals' preparation and training policy and programs.

As the role of the principal changes because of the acceleration of change and its pervasiveness over schools across the globe, so too must

school principals preparation programs and the policies that guide them. Put differently, and in order to be adequately prepared for the demands of 21st century schools, school principals must be well prepared in a number of domains like students' management affairs, instructional, transformational and technology leadership, interpersonal relations in addition to building operations, planning and setting goals and visions. Following this reasoning, school principals' preparation should be based on a broad view of leadership in school that can promote a working climate inspired by openness, reflection, collaboration, communication and learning.

The purpose of the training should focus in the first place on deepening principals' knowledge and increasing their understanding of the national school system, the national goals of the school and the role of the school in the society and the local community. This type of training will allow principals to deepen their knowledge of the role of leadership in a school system managed by objectives and results, as well as develop their self-efficacy beliefs that help in planning, implementing, evaluating and developing school activities through the use of technology. Moreover, school principals' preparation should focus on effective organization and management of the school to improve organizational structures and functions that lead to the creation of an effective and safe learning environment or the building of a successful institution through effective collaboration and communication with others in and outside school.

To crown it all, Moroccan principals' work is often described as challenging, demanding and unpredictable, partly because the educational policy often is subject to change. Such work environment requires principals to be updated at any time in order to act efficaciously as school leaders. Self-efficacy in this context contributes positively to this functioning, because it affects performance of the principals' through mechanisms like choice, effort and perseverance. Increasing principals' self-efficacy is therefore an important objective for decision-makers who are responsible for school effectiveness, quality education and the improvement of the quality of leadership and management in Moroccan public schools.

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