A Study on the Relationship between the Principals' Change Leadership and Construction of Teachers' Professional Capital

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Abstract

The purpose of this study is to elucidate the relationship between principals' change leadership and teachers' professional capital. Adopting a teacher perspective, the researchers of this study investigated teachers' views on the effects of principals' change leadership on establishing teachers' community, respecting teachers' decisions, participating in school decision-making, and incorporating information technology. In this study, 485 elementary and secondary school teachers from Taipei, Taiwan were interviewed using a questionnaire. Relevant data were collected using a principals' change leadership scale and teachers' professional capital scale. The results of a canonical correlation analysis indicated a significant positive correlation between principals' change leadership style and teachers' professional capital ($\rho = .90$). Among the styles of principals' change leadership, teachers viewed transformational leadership most highly and agreed that establishment of a professional community contributes to social capital. This study indicated that according to teachers' views, principals adopting transformational leadership styles, acknowledging teachers' knowledge and expertise, promoting teachers' professional community, developing teaching practices, respecting teachers' teaching decisions, encouraging teachers' participation in school decision-making, and encouraging application of technological media in teaching are all conducive to the generation of teachers' professional capital

Keywords: Principals' Change Leadership, Teachers' Professional Capital, Human Capital, Social Capital, Decisional Capital, Information Capital, Teachers' Professional Community

Introduction

Many studies have discussed the effects of principals' change leadership on teachers (Bogler, 2001; Hauserman et al., 2013; Abubakar et al., 2017; Winingsih & Sulistiono, 2020). However, the purpose of this study is to elucidate the relationship between principals' change leadership and the development of teachers' professional capital from a teacher perspective. To do so, the two main themes of the current study, namely principals' change leadership and teachers' professional capital, must first be clarified.

The definition of principles' change leadership used in this study was based on the full range leadership model of Bass and Avolio (1997). The model comprises three types of principals' change leadership: laissez-faire, or no leadership; transactional, or distribution of rewards and punishments for teacher performance according to norms and disciplinary traditions; and transformational, or establishment of a vision and teacher community for the school with consideration for teacher personalization, encouragement of innovation in teaching, fostering motivation to obtain new knowledge, and improving teacher quality. Bass et al. (2003) suggested that change leadership can be ranked from low to high, and Menon (2014) indicated that teachers are closely related to a full range leadership model. In Balyer et al. (2015), transformational leadership was identified as positively affecting teachers' professional engagement. When teachers perceive themselves to have professional power, the relationship between the principals and teachers strengthens. In a study conducted by Bredeson (2000), principals' transformational leadership was found to be related to teachers' professional capital.

The definition of teachers' professional capital used in this study was first provided in Andy Hargreaves and Michael Fullan's *Professional Capital: Transforming Teaching in Every School*. Hargreaves and Fullan suggest that, for teachers to invest in education and change, they must have professional capital. Hargreaves and Fullan's definition of teachers' professional capital includes three dimensions: human, social and decisional capital (2012). Human capital refers to teachers' knowledge, skills, and teaching effectiveness. Such capital is represented

through quantitative indicators, such as a sufficient number of teachers, a teacher's competence, professional level, and expertise. To cultivate human capital in schools, principals should create and maintain an environment in which teachers can develop their teaching skills (Bredeson, 2000). Teachers' professional learning can facilitate their acquisition of knowledge and skills, which will then improve students' academic achievement (Day et al., 2016). A study by Latham and Vogt (2007) demonstrated that, if principals provide opportunities for teachers' professional development, teacher turnover rates decrease. Li et al. (2016) indicated that school human capital incorporated into professional educational environments leads to teachers developing teaching skills that improve teaching efficiency. These findings indicate that, when teachers' professional needs are met, teaching innovation can flourish (Hairon & Dimlock, 2012; Kalman & Arslan, 2016). Social capital refers to the relationships and social structures that exist between individuals, which generally serve as intangible and abstract resources. Social capital can be defined as collective assets in the form of common norms, values, beliefs, trust, social networks, and social relations that promote organizational cooperation and collective action and are mutually beneficial (Burt, 2000). A practical reason for principals developing social capital is to influence the structure of the school through the formation of groups (Minckler, 2014; Ng et al., 2015). The influence of a group is greater than that of an individual. A perception of community fosters specialization within the school, which enables the school to create an environment conducive to cooperation and support (Hargreaves & Fullan, 2012; Vincenzo & Mascia, 2012; Spillane & Sun, 2020). Teachers' professional community is a community based on mutually beneficial relationships, improving teaching skills, and improving student learning outcomes (McCallum & O'Connell, 2009; Pil & Leana, 2009; Vincenzo & Mascia, 2012; Tam, 2015). Decisional capital originated in the legal field; it was established to assist individuals in making reasonable judgments (Highhouse, 2002). Decisional capital involves gradual improvement of judgment through shared experience, practice, and reflection (Fischhoff & Broomell, 2020). Teachers' decision-making experience originates from their living environment and is cultivated through long-term social experience (Vanlomel et al., 2017). Many teachers reflect on past experiences to improve their future decision-making (Urhahne & Wijnia, 2021). Therefore, teacher specialization must empower teachers to utilize their experience to make teaching decisions and participate in discussions of school affairs (Sachs, 2001; Willemse et al., 2015; Urhahne & Uijnia, 2021; Dodillet et al., 2019). The International Society for Technology in Education, in 2008, defined the index of teachers' information competency to cope with the new generation of students who had been exposed to information technology from birth (i.e., digital natives). In the modern age, the ability to effectively use information technology is an essential form of capital for teachers (Willis et al., 1999; Baek et al., 2008; Rakhmawati & Kusuma, 2015). Therefore, for teachers, information capital indicates use of computer multimedia, network technology, and online video teaching to establish information technology as a tool for teaching (Ghavifekr & Rosdy, 2015; Xu & Chen, 2016). Based on the aforementioned literature, teachers' professional capital in this study was categorized into four dimensions: human, social, decisional, and information capital.

In the modern age, teachers' professional awareness has increased, and, as discussed in the aforementioned literature, development of teachers' professional capital can be effectively applied within a teaching context to improve student learning outcomes. Furthermore, principals' change leadership is likely a key factor affecting teachers' instruction. However, whether a correlation exists between principals' change leadership and the generation of teachers' professional capital remains unclear. Therefore, to address this question, the researchers have proposed the following hypothesis: principals' change leadership is closely correlated to the generation of teachers' professional capital.

Materials and methods

Research structure

Based on a review of the relevant literature, the variables selected for this study were transformational, transactional, and laissez-faire leadership for principals' change leadership (independent variable) and human, social, decisional, and information capital for teachers' professional capital (dependent variable). The principals' change leadership served as the control variable, and teachers' professional capital served as the criterion variable. A canonical correlation and a path analysis between the two variables were carried out.
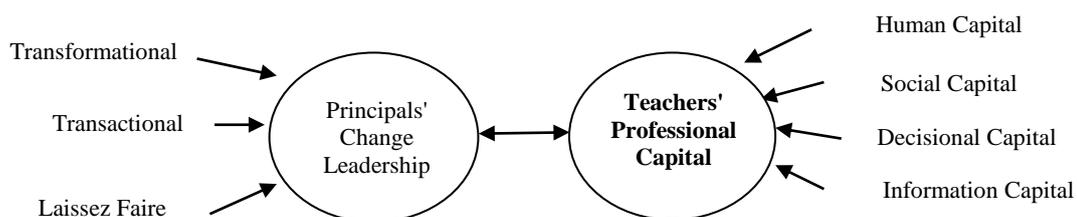
Figure 1 Research structure Participants

For this study, the researchers interviewed 500 teachers from elementary and secondary schools in Taipei using a questionnaire survey method. A total of 491 questionnaires were returned. After excluding 6 invalid questionnaires, a total of 485 valid questionnaires were included for analysis, which resulted in an effective response rate of 97.0%.

Materials

The questionnaire designed in this study was named "The questionnaire of principals' change leadership and generation of teachers' professional capital." This questionnaire was divided into three parts: background variables, a principals' change leadership scale, and a generation of teachers' professional capital scale.

For background variables, after the questionnaire was validated by experts, the background variables of sex, age, and years of teaching were included.

For principles' change leadership scale, with reference to the Bass and Avolio (1997) "Multifactor Leadership Questionnaire," a principles' change leadership scale was developed for this study. The scale was scored using a five-point Likert scoring system, with participants indicating their degree of agreement with the given items. After a pilot questionnaire survey was administered, a statistical analysis was immediately performed. An item analysis was first conducted; if the composite reliability (CR) of the analysis reached significance ($\alpha = 0.05$), this indicated that the item could accurately identify the degree of agreement from the participant and could be included in the topic selection. If the CR did not reach significance, this indicated that the item could not accurately identify the degree of agreement and should be removed. After analysis, 16 items were included in the questionnaire. Reliability, validity, and factor analyses were then performed. The results were divided into three categories: transformational, transactional, and laissez-faire. The values of Cronbach's α for transformational, transactional, and laissez-faire leadership were $\alpha = 0.884$, 0.835, and 0.812, respectively. The internal consistency (α) of the total scale was 0.852, which fell within the acceptable range, indicating that the scale had good reliability.

For the scale for generating teachers' professional capital, reference was made to Hargreaves and Fullan's (2012) professional capital and Jian Ruchen's (2020) "Teachers' Professional Capital Scale." The scale was scored using a five-point Likert scoring system, with participants indicating their degree of agreement with the listed items. After a pilot questionnaire survey was administered, a statistical analysis was immediately performed, with an item analysis being conducted first. If the item had a large CR value that reached significance ($\alpha = 0.05$), this indicated that the item could accurately identify the degree of agreement of the participant and could be included in the topic selection. If the item did not reach significance, this indicated the item could not accurately identify the degree of agreement and should be deleted. After analysis, 28 items were included. Reliability, validity, and factor analyses were then performed. The results were divided into human, social, decisional, and information capital as the main variables. The values of Cronbach's α for human, social, decisional, and information capital were $\alpha = 0.822$, 0.912, 0.846, and $= 0.817$. The internal consistency (α) of the total scale fell within the acceptable range, indicating that the scale had good reliability.

Data analyses

In this study, the Chinese SPSS 23.0 statistical software package was used for statistical analyses, and significance was set as $\alpha = 0.05$. The statistical methods employed were descriptive statistical analysis, one-way analysis of variance (ANOVA), and canonical correlation analysis.

Results

Differences among factors for the scales

First, three factors were extracted from the principals' change leadership scale, namely, transformational, transactional, and laissez-faire leadership. To identify potential significant differences among the factors of this scale, a one-way ANOVA was performed, the results of which are presented in Table 1. The statistical result was $F = 19.36$, $p < 0.05$, which indicates that teachers have significantly different perceptions of principles' change leadership styles. The least significant difference (LSD) was determined for post hoc comparison. As presented in Table 2, teachers' ranked transformational leadership the highest, followed by transactional leadership and laissez-faire leadership, which was perceived to be the worst of the principles' change leadership styles.

Source of variation	SS	df	MS	F
Subject SSs	116.16	484	0.24	
Independent variable SSa	4.26	2	2.13	19.36[*]
Error term SSsa	106.48	968	0.11	

[*]p<0.05

Table 1 Summary of variation analysis of principal's change leadership

Factor	Mean	Post hoc tests			Rank
		V1	V2	V3	
V1. Transformational leadership	4.07	-	*	*	1
V2. Transactional leadership	3.48		-	*	2
V3. Laissez faire leadership	2.51			-	3

*p＜0.05

Table 2 Post hoc results and rankings of principals' change leadership

Four factors were extracted from the teachers' professional capital scale, namely human, social, decisional, and information capital. To identify potential significant differences among these factors of the scale, a one-way analysis of variance was performed, the results of which are presented in Table 3. The statistical results were $F = 5.44$, $p＜0.05$, which indicates a significant difference in principals' perceptions of teachers' professional capital. The LSD was determined for post hoc comparison. As presented in Table 4, principals ranked human capital highest among the four factors, followed by social capital and information capital, which were ranked second. Decisional capital was ranked last.

Source of variation	SS	df	MS	F
Subject SSs	150.04	484	0.31	
Independent variable SSa	5.22	3	1.74	5.44*
Error term SSsa	464.64	1452	0.32	

*p＜0.05

Table 3 Summary of variance analysis of teachers' professional capital

Factor	Mean	Post hoc tests				Rank
		V1	V2	V4	V3	
V1. Human capital	4.12	-	*	*	*	1
V2. Social capital	4.04		-	-	*	2
V4. Information capital	4.04			-	*	2
V3. Decisional capital	3.88					3

*p＜0.05

Table 4 Post hoc results and ranking of teachers' professional capital

Canonical correlation analysis

In this study, the three forms of principals' change leadership (transformational, transactional, and laissez-faire) were used as the control variable (independent variable), and four factors of teachers' professional capital (human, social, professional, and information capital) were used as the criterion variable (dependent variable).

A canonical correlation analysis of principals' change leadership with teachers' professional capital is presented in Table 5. The diagram of the canonical correlation and path analysis is displayed in Figure 2. The analytical results revealed a canonical correlation coefficient ($\rho = 0.90$) and the coefficient of determination ($\rho^2 = 0.81$), which indicates that the control variable (χ^1) could explain the 81% of the total variation in the criterion variable (η^1) for the canonical factors.

The canonical factors extracted from the control variable (χ^1) accounted for 72.65% of the total variation. The control variable and criterion variable had an overlap of 58.74% regarding canonical factors (η^1), indicating that the canonical factors of the control variable could explain 58.74% of the total variation. The canonical factors extracted from the criterion variable (η^1) accounted for 84.15% of the total variation. The overlap between the criterion variable and control variable (χ^1) was 68.04%, indicating that the canonical factors of the criterion variable could explain 68.04% of the total variation.

For the canonical correlation structure, the canonical factors (χ^1; transformational, transactional, and laissez-faire leadership) and control variable (x variable: principals' change leadership) were highly correlated. The loads for the transformational, transactional, and laissez-faire leadership were 0.84, 0.78, and 0.75, respectively. The canonical factors (η^1; human, social, decisional, and information capital) were highly correlated with the criterion variable (y variable: teachers' professional capital). The loads for the human, social, decisional, and information capital were 0.85, 0.91, 0.83, and .88, respectively. Therefore, the canonical correlation between the control variable and the criterion variable was likely mainly caused by the canonical factors of the control variable (principals' change leadership; χ^1). The canonical factors affected teachers' professional capital (η^1). From the positive and negative signs of the factor load, principals' change leadership is indicated to have a positive relationship with the generation of teachers' professional capital.

The results indicate that, through a canonical correlation analysis between principals' change leadership and teachers' professional capital, a set of canonical factors can be obtained, indicating that principals' change leadership was correlated with generation of teachers' professional capital ($\rho = 0.90$). According to the canonical correlation coefficient, principals' transformational change leadership (0.84) had the highest correlation with generation of teachers' social capital (0.91). In addition, laissez-faire change leadership (0.75) had the lowest correlation with the generation of teachers' decisional capital (0.83). The results of this study support the hypothesis that principals' change leadership is closely correlated to the generation of teachers' professional capital.

Control variable (X)	Canonical factors χ^1	Criterion variable (Y)	Canonical factors η^1
Transformational	0.84	Human capital	0.85
Transactional	0.78	Social capital	0.91
Laissez faire	0.75	Information capital	0.83
		Decisional capital	0.88
Extract the variance (%)	72.65		84.15
Overlapping (%)	58.74		68.04
ρ^2	0.81		
ρ	0.90**		

**p$<$0.01

Table 5 Canonical correlation analysis between principals' transformational leadership and teachers' professional capital
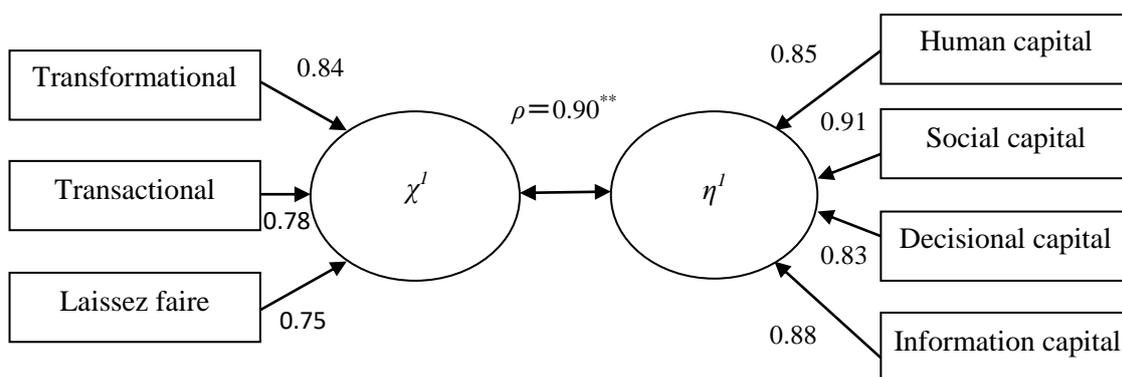

Figure 2 Canonical correlation and path analysis

Discussion

Research has indicated that teachers support transformational change leadership in principals and that the role of a principal should evolve from manager to teaching leader (Bredeson, 2000; Wanzare & Da Costa, 2001; Leithwood & Sun, 2012; Bush, 2014; Adams et al., 2020). If principals address school affairs in a manner that establishes social relationships with teachers, this may motivate teachers to pursue higher organizational goals (Raman et al., 2015; Sibomana, 2020). Studies have also demonstrated that, rather than transactional leadership, teachers prefer a transformational leadership style. Principals who adopt such a leadership style will elevate teachers' motivation (Geijsel et al., 2002) whereas principals who adopt transactional leadership will develop a relationship with teachers through role clarification, work requirements, and reciprocity (Mahdinezhad et al., 2013). Particularly, active management by exception has the most negative effect on principals generating teachers' professional capital (Xenikou, 2017). This is because active management by exception requires principals to monitor and identify the shortcomings of teachers and to then adopt immediate corrective measures. Principals actively monitoring teachers for mistakes may lead to teachers feeling dissatisfied or defensive; therefore, the score for this style of leadership was the lowest on the questionnaire (mean = 2.87, SD = 0.81). When principals adopt a laissez-faire change leadership style, they adopt naturalistic and free administrative behaviors (Robert & Vandenberghe, 2020). This study indicated that teachers with more than 20 years of teaching experience agree with adoption of a laissez-faire change leadership style. Senior teachers or teachers who concurrently perform administrative work have high levels of teaching skills and knowledge and are able to work independently. These teachers can complete tasks with little guidance, and for them, laissez-faire change leadership can be effective (Aruzie et al., 2018). Past studies have also indicated that principals who adopt a transformation change leadership style are able to assume the role of teaching leaders, which enables them to effectively improve teaching efficiency and generate teachers' professional capital

to thereby improve students' academic outcomes (Bush, 2013; Kwan, 2016). Kin et al. (2018) suggested that leaders' behaviors were directly related to teachers' teaching behaviors and that teachers can clearly recognize the positive (or negative) effects leaders will have on their work. In addition, most teaching staff are aware of effective leadership behavior in principals and develop clear opinions regarding the effectiveness of utilization of human and social resources (Okeke & Mtyuda, 2017; Daly et al., 2020).

A key element of student learning is the necessity of receiving high quality instruction (Akareem & Hossain, 2016). Generation of teachers' human capital (teachers' knowledge and skills) can improve teaching quality and students' academic outcomes. Relevant studies have demonstrated the necessity of principals generating human and social capital in teachers (Galli & Mueller-Stewens, 2012; Gillies, 2015); this includes teachers consistently receiving training and participating in professional seminars, establishing a teachers' professional community, creating a harmonious working environment with respect to evaluating teaching practices, and collaborating with colleagues to develop teaching practices (Hallinger et al., 2014). Furthermore, principals can participate in teachers' training and meetings and provide constructive criticism (Wermke et al., 2018). All of these activities can increase teachers' human and social capital. One study reported a case of a principal who viewed the generation of human capital negatively. The researcher of the study indicated that the principal had never participated in the dialogue with the teachers' professional community and the teachers; the teachers at that school generally viewed the principal's practices negatively (Mestry, 2017). Therefore, principals are key factors in generating teachers' human capital. Principals should periodically observe teachers to understand their practices; this will enable them to provide teachers with specific or meaningful teaching feedback and guidance (Blase & Blase, 1999; Gawlik, 2018).

Many relevant studies have revealed that schools should generate more than human capital (McCallum & O'Connell, 2009; Evangelinos & Jones, 2009; Puntscher et al., 2014; Mendo-Lázaro et al., 2018). Social capital is also an essential resource for developing teaching. Baker-Doyle and Yoon (2020) found that social capital can predict teachers' success in teaching; the study also reported that social capital has a stronger prediction ability than human capital. To generate teachers' social capital, the peer relationship between teachers should be promoted (Minckler, 2014). This requires long-term cooperation between teachers and their colleagues to develop teaching practices. In addition, principals should support teachers learning from each other and cultivate a harmonious and consultative teaching environment (Seonghee & Boryung, 2008; Wennergren & Blossing, 2017). Scholars have found that perceived possession of a social network can professionally beneficial teachers (Wahlstrom & Louis, 2008; Baker-Doyle & Yoon, 2020; Endres & Weibler, 2020). When teachers have numerous social relationships, these relationships facilitate professional discussions, establishment of a teachers' professional community (Moolenaar, 2012; Wennergren & Blossing, 2017), and enhancement of the quality of social network and relation. These relationships ultimately provide teachers with professional learning networks and an excellent means of gaining knowledge and professional status (Price & Moolenaar, 2015). Other studies have indicated that the strength of teachers' social capital is positively correlated with students' academic performance (Pil & Leana, 2009; Daly et al., 2020). As school teaching leaders, principals should be able to recognize high quality teaching and lead all teachers in establishing a professional learning community (Wahlstrom & Louis, 2008; Tracy et al., 2011; Mendo-Lázaro et al., 2018; Schaap & de Bruijn, 2018; Parlar et al., 2019). The most effective and common method for principals to influence schools is to cultivate a positive teaching environment. Principals should provide teachers with an adequate teaching venue, such that the teachers can utilize their teaching skills to the fullest, gain the trust of their colleagues, and develop a willingness for collaboration (Subramony et al., 2018; Drossel et al., 2019).

The results of this study indicated that, with respect to the average of each type of teachers' professional capital, the average of teachers' decisional capital (mean = 3.88, SD = 0.77) was the lowest. Most teachers did not agree that principals fail to respect teachers' teaching decisions (mean = 3.84, SD = 0.83). A key purpose for generating teachers' decisional capital is to develop teachers' professional autonomy as well as improve students' academic outcomes (York-Barr & Duke, 2004). In schools, principals and teachers should act cooperatively. Principals should limit their exercise of administrative discretion, and teachers should have the power to participate in decision-making (Ingersoll, 1996); teachers must not only participate in teaching but also in school affairs, including in decision-making meetings, such as meetings regarding school matters and those of curriculum development committees (Lawson, 2004; Wadesango, 2012). Relevant research has demonstrated that principals should actively invite teachers to participate in goal formulation and implementation to ensure teachers feel they have autonomy in making teaching decisions, which is an essential aspect of teachers' decisional capital (Lundström, 2015; Parker, 2015). In addition, if principals do not participate in teachers' decision-making processes, they will be unable to provide relevant feedback that might enable teachers to learn from their successes or failures and to improve teaching decisions in the future (Skaalvik & Skaalvik, 2014; Paulsrud & Wermke, 2020). However, if a principal does not generate teachers' decisional capital, communication between the principal and teachers may be impaired; this then exacerbates the principal's application of ineffective practice because teachers are unable to express their opinions and establish a consensus with the school.

According to the results of the current study regarding the teacher information capital, most modern principals encourage teachers to implement information technology tools in teaching. Principals also encourage teachers to create multimedia digital teaching materials that can be used in online video conference meetings and online teaching. Implementation of information media in teaching is a prevailing modern trend (Hamidi et al., 2011). The technological media used by teachers generally include school networking platforms, multi-information communication platforms, and personal teaching blogs (Çaglar & Akçin, 2016). In addition to providing two-way interaction and a medium for curriculum, these media serve as a platform for an information learning community of teachers, enabling teachers to share experiences and troubleshoot problems. Furthermore, technological media can also serve as a teacher–student feedback mechanism and a test of teachers' abilities to self-teach. Auyeung (2004) proposed that an online learning community is essential to development of professional skills and that every member of society should belong to one. Relevant studies have reported that online community is means of knowledge sharing. Through interactions and exchanges of knowledge, the spread of knowledge gradually develops into a learning community (Tu & Corry, 2012). Teachers can gradually expand their learning experience from traditional learning environments to online learning communities through use of e-mail, online discussion boards, and other tools; opportunities for cooperative learning can then be created through discussions between teachers (Schaap & de Bruijn, 2018). The benefits that can be derived from such discussions illustrate the key role information capital plays in generating teachers' professional capital.

Conclusion

Principals' change leadership affects the generation of teachers' professional capital. In change leadership, principals should adopt a transformational leadership style to guide teachers toward their goals through demonstrating integrity, respect, encouragement, and professional stimulation. Teachers' professional capital should be generated based on four dimensions, namely human, social, decisional, and information capital. Furthermore, a high correlation exists between principals' transformational leadership and generation of teachers' professional capital. Principals' transformational leadership can enhance generation of teachers' professional capital through the following actions: (1, human capital) acknowledging teachers' knowledge and teaching skills to improve students' academic outcomes; (2, social capital) promoting collaboration in the teachers' professional community for codevelopment of teaching practices; (3, decisional capital) respecting teachers' teaching decisions and attaching importance to teachers' participation in school decision-making; and (4, information capital) encouraging teachers to incorporate technology media in teaching and managing curriculum.

Authors' contributions
Kuang-Chung Wang, Wei-Yang Huang conceived and designed the experiments. Cheng-En Wu analyzed the data. Kuang-Chung Wang, Wei-Yang Huang wrote the paper. All authors contributed to reading and approved the final manuscript.

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