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The Impacts of Principal's Transformational Leadership and Environmental Obstacles on Teachers' Job Satisfaction: The Mediation of Professional Learning Community

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Previous studies have indicated that conditions of teaching environment and principal's leadership are associated with teachers' job satisfaction (TJS). Moreover, in recent years, in order to promote teaching professional development, teachers' professional learning communities (PLC) have been established one after another. In view of the fact that TJS is influential to teaching quality, the study aimed to construct a model to explore how environmental obstacles (EO), principal's transformational leadership (PTL) and PLC influenced TJS. In the study, the data of PISA 2015 (Programme for International Student Assessment 2015) involving 2,436 senior high school teachers in Taiwan were analyzed by means of structural equation modeling (SEM) and model stability. Results showed that: (a) EO had a negative significant impact on PLC and TJS; (b) PTL had a positive significant impact on

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PLC and TJS; (c) PLC had a positive significant impact on TJS; (d) the mediating effect of PLC on the influence of EO to TJS was not statistically significant; (e) PLC was proven to positively mediate the influence of PTL to TJS. Based on the results, implications for research and practice were further discussed.

Keywords: principal leadership; educational resource; teachers' job satisfaction; professional learning community; PISA

Introduction

Globalization has tremendous impacts on worldwide education, with no exception of Taiwan. Taiwan's education reform of the 12-year National Basic Education in all aspects is therefore constantly and rapidly progressing, with all its new policies, curriculum guidelines and teaching methods requiring teachers to keep learning and advance teaching. Besides, in Taiwan, the declining birthrate leads to closure of schools and excess teachers. Under such circumstances, school teachers and principals have to make change and innovation to be competitive. Therefore, only with change and advancement of principals and teachers can the new 12-year National Basic Education successfully be carried out.

For teachers working in highly competitive atmosphere, participating in professional learning communities (PLC) can be beneficial and advantageous. PLC has a positive significant impact on teachers' wellbeing (Liang et al., 2020). Based on social support theories, when participating in PLC and exchanging information with colleagues, teachers can feel the satisfaction of being cared, respected, valued, and of belonging to a specific social group. Besides, joining PLC is a way to meet their needs of continuous learning, and the establishment of PLC can turn a school into a learning organization for a better self and better organization. However, under such challenging circumstances, with so much to do, whether the heavy workload of PLC reduces teachers' job satisfaction (TJS) is an issue to investigate. Research showed that teachers' wellbeing was beneficial for both individuals and organizations, and job satisfaction is a crucial element of wellbeing (Smetackova et al., 2019). Teachers' performance has been proven to be positively related to students' learning outcome. TJS is an important factor related to the improvement of education quality, but teachers' satisfaction with their working environment is often ignored (Toropova et al., 2020). Previous studies have shown that satisfied teachers were less susceptible to stress and burnout (Skaalvik & Skaalvik, 2011), and that they offered better and clear instruction and learning support to students (Klusmann et al., 2008). Furthermore, satisfied teachers

demonstrated stronger job commitment and were less prone to leave the profession (Blömeke et al., 2017), which is especially crucial in time of high teacher turnover (Toropova et al., 2020). Thus, in order to achieve better education quality, the investigation of how to improve TJS is the main concern of the present study.

For school leaders, they face many challenges and have responsibilities to shape the organizational culture (Chang, 1997). The current trend of education reform is oriented toward a privatized and market-based direction. Nowadays, the increased participation of parents, as well as the emphasis on school development, teachers' performance and responsibilities are so different from what was in the past. All these changes require principal's transformational leadership (PTL), which is defined as the guiding force to shape the organizational culture (Chang, 1997). PTL could build the school into a learning organization with adaptive ability to the ever-changing environment. They would fully exploit the resources in education reform to improve the quality and organizational effectiveness of the school. With transformational leadership, a principal might lead the teaching staff to create valuable and positive visions and enhance their motivation and morale for the better. Such a principal cares about TJS, so that improvement of teaching quality, learning performance and international competitiveness can be achieved. This study has two goals: (a) to explore the impact of environmental obstacles (EO) and PTL on TJS; (b) to investigate whether PLC mediates these relationships.

Literature Review

Teachers' job satisfaction (TJS)

Job satisfaction was first defined by Hoppock (1935) in his book *Job Satisfaction*, referring to the psychological and physiological satisfaction of organizational members with their environment. In short, it is the employee's subjective response to work condition. Broadly speaking, job satisfaction refers to the emotion or emotional response of individuals to their work in part or as a whole (Kreitner & Kinicki, 1995). Job satisfaction was defined from the perspective of perceived discrepancy and referred to employee's job satisfaction, derived from the cognitive differences between expectation and reality (Schuster et al., 1971). TJS also refers to the degree of which teachers' personal and professional needs are satisfied. According to Jou and Fun (2006), TJS can be defined as how teachers perceive and respond emotionally in their working environment. Lalagka (2017) pointed out that TJS involved personal feelings and evaluation of their work, including administrative leadership,

internal interaction with the school, remuneration, resources and individual psychological states. In the present study, TJS was defined as the overall condition of school teachers in terms of their work or their subjective perceptive responses in all aspects. As adopted from PISA 2015 (Programme for International Student Assessment 2015), satisfaction is the overall feelings toward the current job and profession in general sense.

Environmental Obstacles (EO)

According to Li and Huang (2004), it was found that primary and middle school teachers were relatively satisfied with salary, work nature, and social interaction, comparing to physical condition, development and promotion, and administration. It was believed that teachers can be more satisfied if the school improves working condition, development opportunities, participation in management and relief of oppression. It was also found that working condition is an influential factor to TJS (Ma & MacMillan, 1999). Ma and MacMillan claimed that workplace condition positively affected teachers' satisfaction, and the measurements included teaching competence, administration control and organizational culture. In the School Questionnaire of PISA 2015, teachers were asked if their schools were in a reduced capacity to provide instruction due to the shortage of educational resources and staff. The questions in the aspect of EO thus include inadequate or poorly qualified teaching staff and assisting staff, educational materials and physical infrastructures.

Principal's Transformational Leadership (PTL)

Transformational leadership refers to a leader who can motivate and inspire members to achieve specific results, and can cultivate the leadership potential in members during the process (Bass & Riggio, 2006). Transformational leadership is defined as an approach by a designated leader to cause changes in individuals and social system that in its ideal form, it stimulates valuable and positive changes in the followers with the ultimate goal of developing leadership quality in them (Yukl, 1999). A leader would grow with members to improve each other's morality and motivation, bringing out the best of them to achieve organizational goals. A transformational leader can inspire members to do more by increasing their confidence and enhancing the value of their work result beyond their own expectation (Bass & Riggio, 2006). Operationally, PTL primarily involves achieving a consensus with all staff when defining priority and goals for the school, as well as being

aware of colleagues' needs, inspiring new ideas for professional learning and respecting each other as a professional.

Professional Learning Community (PLC)

International evidence showed that education reform to improve student's learning depends on teachers' individual and collective capacity and the link with school's capability. Such kind of capacity building therefore becomes critical, especially with the establishment of PLC, holding a considerable promise of sustainable improvement in school environment (Stoll et al., 2006). PLC refers to a group of educators with similar mindset in the school who are committed to promoting better learning outcome for students. They uphold a common belief, value or vision, through their frequent dialogues to explore, learn and share for improvement. Through collaborative learning and discussion, teachers put efforts to talk and reflect on professional development and growth. The concept of PLC was first proposed by Little (1997). It was suggested that the improvement in teaching must be connected with the improvement of learning atmosphere, in which Little advocated that teachers could stimulate or even initiate education reform through such collaboration. It was claimed that the establishment of a PLC for teachers would promote organizational change and the growth in students' learning and achievement (Sheehy et al., 2015). Its purpose is to improve teachers' teaching, which in turn benefits students' learning in a positive way. In this study, PLC was defined as the collaboration of teachers in groups, with equality and mutual trust to carry out professional dialogues, cooperative learning and reflective discussion. In PLC, teachers can share knowledge and experiences to improve teaching as a profession. In the School Questionnaire of PISA 2015, teachers were asked whether they exchange teaching materials, work with others, attend team conferences, and take part in collaborative professional learning.

The Relationship Among EO, PTL, TJS, and PLC

EO to TJS

Many empirical studies indicated working condition as an influential factor to TJS, teacher retention and attrition as well. Ma and MacMillan (1999) investigated how background characteristics and working conditions affect TJS. Darling-Hammond (2003) claimed that four factors influenced teachers' retention, including working conditions, salaries, preparation, and mentoring support, particularly in the early years of teaching. Sims

(2017) analyzed data on teachers in 35 countries from Teaching and Learning International Survey (TALIS 2013) in an international study of school learning environment. He indicated that working condition in an educational environment played a role in affecting TJS (Toropova et al., 2020). In the survey of PISA 2015, the operative definition of EO included inadequate or poorly qualified staff, educational materials and physical infrastructure. Based on previous studies, it is known that good working conditions can positively influence TJS. In the present study, the first hypothesis is that EO would negatively influence TJS:

H_1: *EO has a direct and negative impact on TJS*.

EO to PLC

As observed in practice, PLC was indicated to have these characteristics, such as shared leadership, common vision, collective cooperative learning, shared teaching approach, organizational support, professional growth, and continued program of courses (Wu, 2014). For the organizational support, it might include physical working conditions, school support, and leadership. Nelson (2000) revealed that environmental factors such as support from colleagues and principals had an impact on teachers' practice of profession. Ding (2014) conducted a study of PLC, focusing on students' achievement, and one of the research findings was that school environmental factor was influential to PLC practice. Therefore, in the study, it is assumed that EO would deter the development of PLC:

H_2: *EO has a direct and negative impact on PLC.*

PTL to PLC

PTL stimulates teachers' professional learning and collaboration among teachers (Thoonen et al., 2011). Tsai (2014) conducted a study to investigate the relationships among principal's leadership, PLC and teacher's professional development. It was found that principal leadership, PLC, and teachers' professional development were strongly related with the correlation coefficient ranging from .29 to .39. Moreover, it was found that the exemplary leadership of a principal might directly and significantly affect the PLC for teachers (Tsai, 2014). Sjoer and Meirink (2016) did a study on examining a PLC of primary school teachers and principals, who tempted to develop a joint school-based curriculum for science and technology (S & T) education, and during the process, they shared ideas, visions and leadership. Sjoer and Meirink explored the outcomes of the team's collaboration in

terms of leadership and their curriculum innovation goals. Based on the above studies, it is assumed that PTL would yield a direct and positive impact on PLC:

H_3: *PTL has a direct and positive impact on PLC.*

PTL to TJS

Bogler (2001) concluded that PTL directly and indirectly affected TJS. In Taiwan, Jou and Fun (2006) also conducted a study to investigate the relationships among PTL, principal's transactional leadership and TJS in elementary schools. It was found that there were positive and significant correlations among all dimensions of PTL and job satisfaction (Jou & Fun, 2006). Therefore, in the study, it is assumed that PTL has a direct and positive impact on TJS:

H_4: *PTL has a direct and positive impact on TJS*.

PLC to TJS

More and more teachers are willing to participate various PLC on or off campus, since the communities emphasize the equality of teachers on the basis of reciprocity, democracy and openness. Based on the mutually exclusive domains of satisfaction and dissatisfaction in Two-factor Theory (Herzberg et al., 1959), Dinham and Scott (2000) had investigated the third outer domain of TJS, in which teachers and school executive feel uniformly dissatisfying. Dinham and Scott claimed that teachers, schools, and others with an interest in education need to build bridges, forge partnerships and actively participate in educational discourse with members of this outer domain. Studies related to PLC and investigating the factors to influence TJS had been proposed (Ackerman, 2011; Al Nuaimi et al., 2015; Zhang et al., 2020). PLC not only stimulates teaching to an enthusiastic level but also provides teachers with psychological satisfaction, and moreover, TJS is regarded as the mental aspect of motivation. This study would try to explore teachers' satisfactory effects on their jobs after they participate PLC:

H_5: *PLC has a direct and positive impact on TJS*.

PLC as the mediator in the relationship between EO and TJS

H_1 hypothesizes that EO would have negative impacts on TJS due to the feelings of insufficient and low-quality staff and materials. However, PLC might impact TJS as the

mediating factor between EO and TJS. Ackerman (2011) conducted a study to describe to what extent teacher collaboration in a PLC affect TJS with theoretical foundations previously proposed by DuFour (2004). Ackerman proved that TJS would change depending on a PLC environment. Thus, in this study, it is assumed that PLC has a mediating effect between EO and TJS:

H_6: *PLC has a mediating effect on the influence of EO to TJS.*

PLC as the mediator in the relationship between PTL and TJS

Griffith (2004) claimed that principals' behaviors can be described in terms of the three components of transformational leadership: inspiration or charisma, individualized consideration, and intellectual stimulation. PTL showed an indirect effect on staff's job satisfaction. PLC could bring positive impacts on school improvement and might indirectly affect TJS (Carpenter, 2015). In this study, it is hypothesized that PLC has a mediating effect between PTL and TJS:

H_7: *PLC has a mediating effect on the influence of PTL to TJS*.

Method

Research Framework

This study aimed to construct a generalized theoretical framework to elaborate on the influencing process of EO and PTL on TJS, as shown in Figure 1. The supporting references for hypotheses were listed in Table 1.

Figure 1: Research Framework

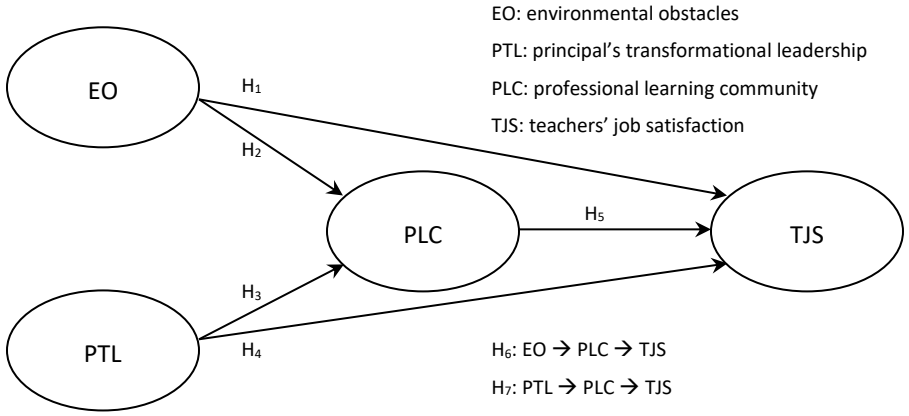


Table 1: Hypotheses and Related Empirical Studies

Hypotheses	Variable relationship	Theoretical and empirical studies
H_1	EO→TJS	Toropova et al. (2020)
		Amin (2015)
		Darling-Hammond (2003)
		Ma and MacMillan (1999)
		Sims (2017)
H_2	EO→PLC	Ding (2014)
		Wu (2014)
H_3	PTL→PLC	Thoonen et al. (2011)
		Tsai (2014)
		Sjoer and Meirink (2016)
H_4	PTL→TJS	Amin (2015)
		Bogler (2001)
		Jou and Fun (2006)
		Thoonen et al. (2011)
H_5	PLC→TJS	Zhang et al. (2020)
		Ackerman (2011)
		Dinham and Scott (2000)
		Al Nuaimi et al. (2015)
H_6	EO→PLC→TJS	Ross and Gary (2006)
		Ackerman (2011)
		DuFour (2004)
H_7	PTL→PLC→TJS	Wahlstrom and Louis (2008)
		Griffith (2004)
		Carpenter (2015)

Samples

This study investigated the PISA 2015 Teacher Questionnaire data of 4,746 teachers in Chinese Taipei. The statistical software, SPSS (Ver. 24, 32-bit Chinese) and Amos (Ver. 24, 32-bit English), were used for structural equation modeling (SEM) analyses. After deleting the missing and incomplete data, the researchers conducted two logical checks to see if the total seniority was less than the current service seniority and if the seniority of all subjects (seniority of 20) was less than 18. Finally, 2,436 questionnaire data were analyzed. The descriptive statistics were shown in Table 2.

Table 2: Background Information of Subjects (*N* = 2,436)

Background	*N*	%
Gender		
Female	1,619	66.5%
Male	817	33.5%
Age		
Less than 30	223	9.2%
31–40	880	36.1%
41–50	985	40.4%
51–60	307	12.6%
More than 60	41	1.7%
Highest education level		
bachelor	1,074	44.1%
master	1,304	53.5%
doctor	58	2.4%
Employment status		
subject teacher	2,145	88.1%
substitute	173	7.1%
part-time	118	4.8%
Number of schools served		
1	553	22.7%
2	753	30.9%
3	531	21.8%
4	315	12.9%
More than 5	284	11.7%
Years in present school		
Less than 10	1,250	51.3%
11–20	836	34.3%
21–30	301	12.4%
31–40	49	2.0%
Total seniority		
10	752	30.9%
20	962	39.5%
30	612	25.1%
31–40	110	4.5%

Questionnaire

The PISA 2015 Questionnaire included a broad scope of context factors for different objects. The Teacher Questionnaire was implemented in PISA 2015 for the first time as an international option and all the content was newly developed. In 2015, 19 countries had taken the Teacher Questionnaire. For the content, 9 of 20 derived variables were scaled using the IRT model when the scale reliability (Cronbach's α coefficients) of derived variables of the 19 participating countries was presented. The Cronbach's α of Chinese Taipei was between .761 to .921 in PISA 2015 Technical Report.

However, the questionnaire dimensions in PISA 2015 were not designed for the present study. The researchers, based on the literature review, decided the four latent variables (EO, PTL, PLC, TJS) and the research framework as well. Thus, EFA (exploratory factor analysis) verification was firstly performed to make sure the reliability and validity of the observed variables. A total of 233 subjects of the data (10%) were randomly chosen for EFA (see Table 3). The result showed that: factor loading of EO was between .632 and .748; factor loading of PTL was between .752 and .864; factor loading of PLC was between .631 and .825; and factor loading of TJS was between .709 to .832. The eigenvalues of the four latent variables were between 2.445 and 3.666. The explainable variation was between 48.461% and 66.760%. The Cronbach's α value was between .781 and .909. Thus, the result proved the validity of all aspects in this present study.

Results

This study followed the two-step approach of SEM proposed by Anderson and Gerbing (1988) to estimate the measurement and structural model. The first step was to examine the reliability and validity of the measurement model by using confirmatory factor analysis (CFA), and the second was to check the path effect and the significance of the structural model. In the formal questionnaire analysis, after deducting EFA and excluding the 233 pieces of data, the remaining 2,203 pieces of questionnaire data were randomly divided into two groups, including one group of 1,096 pieces for formal test analysis, and another group of 1,107 pieces for cross-validation model stability verification test.

Table 3: Exploratory Factor Analysis (*n* = 233)

Items		Factor loading	Eigenvalue	Explainable variation	Cronbach`s α
1. Environmental obstacles (EO)					
EO1	Inadequate or poorly qualified teaching staff.	.649	2.445	48.461	.781
EO2	Inadequate or poorly qualified assisting staff.	.747			
EO3	Inadequate or poor-quality educational material (e.g., textbooks, IT equipment, library or laboratory material).	.748			
EO4	Inadequate or poor-quality physical infrastructure (e.g., building, grounds, heating/cooling, lighting and acoustic systems).	.632			
2. Principal's transformational leadership (PTL)					
PTL1	The principal tries to reach a consensus with all staff when defining priorities and goals in school.	.837	3.666	66.760	.909
PTL2	The principal is aware of my needs.	.864			
PTL3	The principal inspires new ideas for my professional learning.	.826			
PTL4	The principal treats teaching staff as professionals.	.752			
PTL5	The principal encourages our involvement in decision making.	.802			
3. Professional learning community (PLC)					
PLC1	Exchange teaching materials with colleagues.	.631	3.224	55.924	.860
PLC2	Join discussion about specific student and his learning.	.734			
PLC3	Work with other teachers in my school to device a common standard in evaluation of student's progress.	.768			
PLC4	Attend team conferences.	.767			
PLC5	Take part in collaborative professional learning.	.825			
4. Teachers' job satisfaction (TJS)					
TJS1	I enjoy working at this school.	.794	2.802	60.281	.855
TJS2	I would recommend my school as a good place to work.	.766			
TJS3	I am satisfied with my performance in this school.	.709			
TJS4	All in all, I am satisfied with my job.	.832			

Convergent Validity

Fornell and Larcker (1981) proposed three indices for assessing convergent validity of the measurements. They are: (a) item reliability of each measure or square multiple correlation; (b) composite reliability of each construct; and (c) the average variance extracted. In a construct, composite reliability refers to the internal consistency of reliability of all indicators. As shown in Table 4, all standardized factor loadings of the questions were ranged from .613 to .878, which demonstrated convergent validity. The composite reliability of the constructs ranged from .804 to .920, which exceeded the value of .7, as recommended by Nunnally and Bernstein (1994), indicating the internal consistency of the latent variables. Lastly, all average variance extracted (AVE) was from .507 to .698, over the value of .5, as suggested by Hair et al. (1998). According to Fornell and Larcker's standards, it could be concluded that all constructs had adequate convergent validity.

Table 4: Results for the Measurement Model

Construct	Item	Significance of estimated parameters				Item reliability		Construct reliability	Convergence validity
		Unstd.	*SE*	Unstd./*SE*	*p*	Std.	SMC	CR	AVE
EO	EO1	1				.733	.537	.804	.507
	EO2	1.027	.048	21.290	***	.743	.552		
	EO3	1.066	.052	20.410	***	.704	.496		
	EO4	1.157	.059	19.489	***	.667	.445		
PTL	PTL1	1				.850	.723	.920	.698
	PTL2	.989	.026	37.372	***	.878	.771		
	PTL3	.938	.027	34.271	***	.833	.694		
	PTL4	.846	.027	31.106	***	.783	.613		
	PTL5	1.010	.030	34.169	***	.831	.691		
PLC	PLC1	1				.620	.384	.853	.539
	PLC2	1.165	.064	18.198	***	.682	.465		
	PLC3	1.256	.065	19.464	***	.750	.563		
	PLC4	1.170	.058	20.310	***	.801	.642		
	PLC5	1.213	.060	20.322	***	.802	.643		
TJS	TJS1	1				.854	.729	.857	.604
	TJS2	1.088	.033	33.266	***	.870	.757		
	TJS3	.609	.028	21.370	***	.613	.376		
	TJS4	.771	.028	27.520	***	.744	.554		

*** p <.001

Note: Unstd. = unstandardized factor loading; Std. = standardized factor loading; SMC = square multiple correlation; CR = composite reliability; AVE = average variance extracted

Discriminant validity

For the discriminant validity, the square root of the AVE of a given construct was compared for correlations with other constructs (Fornell & Larcker, 1981). If the square root of the AVE of a construct was greater than the off-diagonal elements in the corresponding rows and columns, it implied a closer relationship of the indicator to the construct than with the others.

In Table 5, the figures in bold in the diagonal direction represent the square roots of AVEs. Because all the numbers in the diagonal direction were greater than the off-diagonal numbers, discriminant validity appeared to be satisfactory for all constructs.

Table 5: Discriminant Validity for the Measurement Model

	AVE	EO	PTL	PLC	TJS
EO	.508	**.712**			
PTL	.698	–.531	**.836**		
PLC	.539	–.221	.266	**.734**	
TJS	.604	–.479	.535	.236	**.777**

Note: The figures in bold in the diagonal direction represent the square roots of AVEs; the off-diagonal elements are the correlation estimates.

Structural Model Analysis

In this study, the structural model analysis was performed to examine the hypothesized relationship of the proposed model with the maximum likelihood method. Model fit indicator determines whether the sample data fit with the proposed structural equation model. Kline (2011) and Schumacker and Lomax (2010) suggested a variety of standards to determine the fitness of a structural model. Jackson et al. (2009) reviewed 194 CFA studies in the American Psychology Association journals from 1998 to 2006 and concluded a set of model fit report guidelines, including χ^2, *df*, χ^2/df ratio, GFI, AGFI, RMSEA, SRMR, CFI, TLI (NNFI), and so on.

Table 6 presents the model fit indicators, as well as the recommended thresholds. RMSEA was .074, less than .08; SRMR was .040, less than .08; TLI (NNFI) was .915, greater than .9; CFI was .928, greater than .9; while GFI was .910 (greater than .9), AGFI was .881, which was less than but close to .9. Hu and Bentler (1999) suggested that instead of evaluating each index independently, more strict combination rules should be applied to

model fit indices to control type I error. The model fit indicators as seen in Table 6 satisfied most of the independent level of recommended fit and combination rule. Thus, it was proven that in the proposed model, most of the constructs have a good model fit.

Table 6: Model Fit

Model fit	Criteria	Model fit of research model
RMSEA	< .08	.074
SRMR	< .08	.040
TLI (NNFI)	> .9	.915
CFI	> .9	.928
GFI	> .9	.910
AGFI	> .9	.881

Bivariate Association

Table 7 shows the results of path coefficients. It showed that EO to PLC (β = –.173, p = .011) and PTL to PLC (β = .247, p < .001) were statically significantly verified. Thus, H_2 and H_3 were supported by this research. EO (β = –.293, p < .001), PTL (β = .321, p < .001) and PLC (β = .056, p = .012) significantly influenced TJS, which implied that H_1, H_4 and H_5 were supported by this study. As seen in Table 7, the results supported the research questions regarding the validity of the research model. While 8% of PLC could be explained by EO and PTL, 34.5% of TJS could be explained by the three constructs of EO, PTL and PLC. The results of path coefficients are shown in Figure 2.

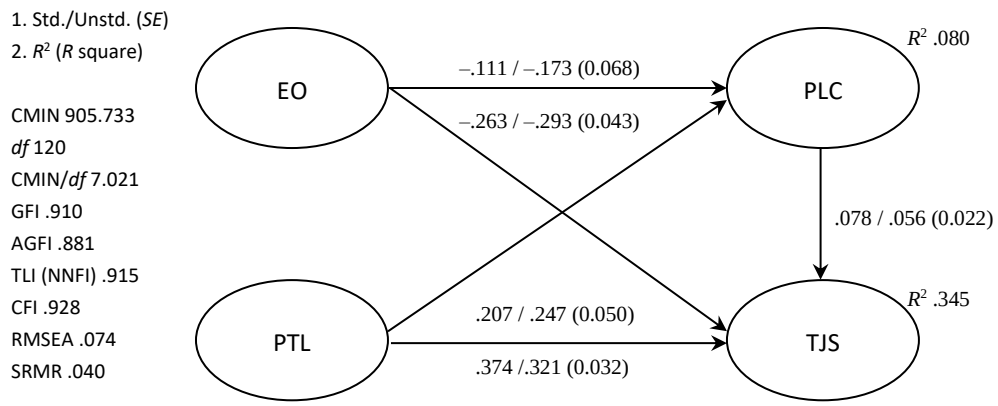
Table 7: Research Hypothesis Verification

DV	IV	Unstd.	*SE*	Unstd./*SE*	*p*	Std.	R^2
PLC	EO	–.173	.068	–2.545	.011*	–.111	.080
	PTL	.247	.050	4.952	***	.207	
TJS	EO	–.293	.043	–6.751	***	–.263	.345
	PTL	.321	.032	10.066	***	.374	
	PLC	.056	.022	2.513	.012*	.078	

*p < .05, ** p < .01, *** p < .001

Note: DV = dependent variable; IV = independent variable

Figure 2: Theoretical Model Parameter Estimation



Mediating Effect Analysis

Table 8 shows that in the indirect effect of EO→PLC→TJS, when bootstrap method was performed, the confidence interval included 0, in the range [–.024, .000], indicating non-existent direct effect or simply meaning no existence of the mediating effect. Therefore, regarding the sixth hypothesis (EO→PLC→TJS), EO had no positive effect on TJS through taking PLC as the mediator. Thus, H_6 was not supported by this study. In the indirect effect of PTL→PLC→TJS, the confidence interval did not include 0, with the interval [.002, .029]. It implied an indirect effect (i.e., mediating effect). The study supported H_7: PTL had a positive impact on TJS through the mediating effect of PLC.

Table 8: Mediating Effect Analysis

Effect	product of coefficients			Bootstrap 5,000 times			
				Bias-corrected CI 95%		Percentile CI 95%	
	Point estimate	*SE*	*z*	Lower bound	Upper bound	Lower bound	Upper bound
Total							
EO→TJS	–.303	.047	–6.447	–.395	–.213	–.395	–.212
Indirect							
EO→PLC→TJS	–.010	.006	–1.667	–.026	–.001	–.024	.000
Direct							
EO→TJS	–.293	.046	–6.370	–.386	–.205	–.385	–.204
Total							
PTL→TJS	.335	.037	9.054	.263	.407	.264	.407
Indirect							
PTL→PLC→TJS	.014	.007	2.000	.003	.029	.002	.029
Direct							
PTL→TJS	.321	.037	8.676	.249	.394	.249	.394

Cross-validity

Anderson and Gerbing (1988) suggested that after a comprehensive SEM model analysis with model fit reaching a specific level, cross-validity analysis can be conducted to prove the model stability of the study. In Table 9, all models were not significant. Cheung and Rensvold (2002) suggested that the practical standard $\Delta CFI \leqq .01$ qualify the standard. Moreover, Little (1997) also proposed $\Delta TLI \leqq .05$ as the standard with no difference between the nested structure models. In this study, the research model met the requirements of the two standards and had model stability.

Table 9: Verification of Model Cross-validation

Model	Δ*df*	ΔCMN	*p*	ΔNFI	ΔIFI	ΔRFI	ΔTLI	ΔCFI
Measurement weights	14	22.939	.061	.001	.001	–.004	–.004	.001
Structural weights	5	2.772	.735	.000	.000	–.002	–.002	.000
Structure covariance	3	1.532	.675	.000	.000	–.001	–.001	.001
Structural residuals	2	2.544	.280	.000	.000	–.001	–.001	.000
Measurement residuals	18	24.476	.140	.001	.001	–.005	–.005	.001

Conclusion and Discussion

EO Has a Negative Impact on TJS and PLC

The result of the present study indicated that EO negatively affected TJS and PLC. Other studies showed similar results about environmental conditions. Tang (2020) concluded that working conditions has influences on TJS. When a teacher faces the problems of EO (such as insufficiency or lacking staff and teaching materials), they would lead to low TJS. Soto-Pérez et al. (2020) studied the factors to improve job performance and school effectiveness, and they proposed two kinds of TJS, intrinsic and extrinsic job satisfaction. They claimed that teachers with more intrinsic job satisfaction tend to be highly productive and result-oriented. Intrinsic job satisfaction is the key factor, and it is more influential than extrinsic job satisfaction to teachers' performance. Thus, the practical implication of this study for principals is to enhance staff's intrinsic satisfaction, such as giving encouragement to teachers to arouse motivation. Leadership can have the best effects when intrinsic satisfaction is accomplished with extrinsic satisfaction such as sufficient educational resources. In the study, EO had a negative significant effect both on TJS and PLC. Moreover, when PLC was functioning as a mediator between EO to TJS, the

mediating effect was not significant. Results implicated that the senior high school teachers in Taiwan think EO as an important factor, which has negative significant effect on their participation of PLC and their job satisfaction. As a consequence, the investment of educational resources, including human and material resources, is regarded as the support, serving as an influential factor for TJS.

PTL Has a Positive Impact on TJS and PLC

The results of the study showed that PTL had a positive significant effect on both TJS and PTL. PTL was proven to be beneficial to increase TJS. Bogler (2001) also examined the effects of principal's leadership styles, namely transformational and transactional, on TJS by involving 930 Israeli teachers, with 745 responses. It was found that teachers' occupation perceptions strongly affect their TJS. PTL affects TJS both directly and indirectly through their occupation perceptions. Comparing to Bogler's study, PTL also had positive impacts on TJS in the study. Besides, Amin (2015) involved 100 Indonesian teachers to analyze the relationship between job satisfaction, working conditions, teaching motivation and job performance. It was concluded that positive improvement of teachers' performance is influenced by all the mentioned factors. TJS is still the key factor as that in our study. Moreover, Thoonen et al. (2011) concluded in their research about 502 elementary school teachers in the Netherlands that PTL stimulates teachers' professional learning and motivation. To conclude, it is proven that PTL is an important force to empower both teachers and schools to promote professional communities and to increase TJS.

PLC Has a Positive Impact on TJS

This study proved that PLC had a significant positive effect on TJS, and the result was similar to previous studies (Ackerman, 2011; Al Nuaimi et al., 2015; Dinham & Scott, 2000; Zhang et al., 2020). For example, Zhang et al. (2020) performed the study on 982 school teachers to explore the effects of PLC on teachers' self-efficacy and job satisfaction in Shanghai, China. They claimed that there are two kinds of PLCs, with characteristics of teacher-centric and of organization-centric. The result indicated that both kinds of PLCs significantly and positively affect TJS. The previous studies and the present study both proved the benefits and tendency to increase TJS.

Mediating Role of PLC for the relationship of EO to TJS

Insufficient or poor environmental conditions truly affect both PLC and TJS. That is to say, educational resources are so important for teaching practitioners. Even though PLC was proven to be very advantageous in many aspects, suitable personnel and teaching materials were also regarded as very crucial. The result of the present study was similar to Ross and Gary (2006), in which they studied the relationship of PTL to organization values, and took collective teacher efficacy as the mediator. They found the mediating effect of teacher efficacy partial and not significant as expected. The result of the present study reminded the authority the importance of educational resources.

PTL Can Be More Influential to TJS through PLC

PLC as the mediator was supported by the present study, which means a principal of transformational leadership can indirectly increase TJS by encouraging teachers to join PLC. As Wahlstrom and Louis (2008) indicated, when principal-teacher relationship and teacher-teacher interactions were explored to examine the relationships among PLC, trust, efficacy, and shared responsibilities, the value of PLC seemed to be crucial. The present study not only stressed the importance of PTL to TJS, but also provided insights into the mechanism of PTL-TJS relationship through the mediating role of PLC. PLC is definitely the key factor for the overall improvement of instruction and "school culture revolution."

Implications and Suggestions

The findings of this study have some implications. First, it can be imagined when teachers feel a sense of resistance from working conditions, the EO (such as insufficient or poor staffing and teaching materials) will in turn lead to lower job satisfaction and lower motivation for PLC. The findings remind educational authorities and school leaders of the importance of human and material resources. If the education budget provides sufficient human resources, educational materials and physical infrastructures, it can be helpful for teachers with PLC and job satisfaction, and for the schools to practice the new educational policies and reform. Second, regarding leadership, a transformational leader creates valuable and positive changes in followers with the ultimate goal to develop them to become leaders. Participation in PLC is a form of shared leadership, and it is also a process for all the members to keep learning. Moreover, in a PLC, teachers share common values and visions,

get connected, and collaborate with one another. PLC then serves as a supportive system at a high mental level for individuals, and it can improve teachers' psychological satisfaction. Third, it is valuable that PTL has a positive impact on TJS, especially through promoting PLC for teachers. A school leader plays the role model to be transformative and leads the school to establish PLC for continuous learning, which is of practical value, especially in this era of education reform.

Here are some suggestions for school leaders. First, to think of ways to reduce the negative impact of EO, and to think of ways to get sufficient educational resources. Second, to become a transformational leader because the leadership style can directly and indirectly brings benefits and positively influence TJS and PLC. Furthermore, with most teachers engaging in PLC, the school can become a learning organization, which can survive under any circumstance and in the ever-changing environment due to globalization or competitive forces. On the other hand, when promoting PLC, teachers' psychological states should be positively taken care of, and TJS can thus be improved. Therefore, teaching professional development, school efficacy, and education quality can all be better achieved.

Limitations

Even though this study adopted the PISA 2015 Teacher Questionnaire to construct a model of PTL, EO, PLC and TJS with some valuable research results, there are still some limitations. First, the main measurement of this study is the PISA 2015 Questionnaire involving Taiwan school teachers of various types of schools, including senior high schools, vocational high schools, five-year colleges, and so on. It might not be applied to different education systems. Second, this study merely used samples in Taiwan, and there are still differences among different countries or regions. Therefore, subsequent studies can adopt data from different countries or regions for cross-region comparability.

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校長轉型領導與環境阻礙對教師工作滿意度之影響：以教師專業學習社群為中介

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摘 要

過往研究顯示教學環境和校長領導與教師工作滿意度有關聯。再者，近年為促進教師專業發展，教師專業學習社群相繼成立。鑑於提升教師工作滿意度對增進教學品質有很大助益，本研究從環境因素、校長轉型領導和教師專業學習社群來建構三者影響教師工作滿意度的模型。本研究以 2015 年「國際學生能力評量計畫」（Programme for International Student Assessment, PISA）中 2,436 名台灣高中教師為樣本，並使用結構方程模式（structural equation modeling, SEM）及模型穩定性（model stability）分析進行驗證。研究獲致以下結論：（1）「環境阻礙」會負向影響「教師專業學習社群」與「教師工作滿意度」；（2）「校長轉型領導」會正向影響「教師專業學習社群」與「教師工作滿意度」；（3）「教師專業學習社群」會正向影響「教師工作滿意度」；（4）關於「環境阻礙」透過「教師專業學習社群」影響「教師工作滿意度」，沒有發現統計上的顯著差異；（5）「校長轉型領導」會透過「教師專業學習社群」中介影響「教師工作滿意度」。最後，本文依研究成果提出研究和實務建議。

關鍵詞：校長領導；教育資源；教師工作滿意度；教師專業學習社群；PISA

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