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Development of a School Climate Scale Based on School Members' Shared Experiences

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School climate is a crucial factor that influences emotional and behavioral outcomes of school members. The measurement of school climate also provides beneficial evidence for school principals to identify issues relevant to school improvement. However, most of the existing scales are variable-centered measures, not person-centered. This study aims to develop a school climate scale by means of user experience (UX) approach in Thailand. The UX focuses on the emotions of teachers, students, and principals, along with their roles, perceptions, attitudes, and behavior, regarding the school climate. Applying this approach might assist in obtaining more insight from school members and yielding a person-centered scale. The newly developed school climate scale which was based on UX covered four dimensions: safety, academic, community, and institutional environment. Based on the responses of the Thai teachers from over 70 schools in Bangkok and metropolitan region (N = 220), the school climate scale showed appropriate levels of reliability and validity. The construct validity was examined; second-order confirmatory factor analysis was at satisfactory level, Chi-square (34, N=220) =43.80, p=.12, CFI=.99, TLI=.99, RMSEA=.04, SRMR =.05. Convergent and discriminant validity was at an acceptable level as well. As for the scale's reliability, evidence for internal consistency was confirmed; the Cronbach's alpha coefficients of the four dimensions of the scale ranged from .68 to .91, and the McDonald's omega coefficient was .93. The present study provides a new scale to measure school climate that has adequate psychometric properties and may be a practical instrument for stakeholders to measure and promote a positive school climate that based on the relevant experiences of the various members of a school.

***Keywords*:** school climate, user experience, school effectiveness, assessment methods and tools

School climate is defined as a multidimensional construct reflecting quality and characteristic of school. It was also described as a pattern of the experiences from school members, interactions, relationships, and structural features of the school environment (Wang & Degol, 2016). A number of studies have demonstrated that positive school climate is a crucial factors influencing stakeholders in several aspects; for instance, it is contributed to school improvement for school principals, enhancing the effectiveness of teachers, and increasing the positive outcomes of students (Berkowitz, Moore, Astor, & Benbenishty, 2017; Cohen, McCabe, Michelli, & Pickeral, 2009; Thapa, Cohen, Guffey, and Higgins-D'Alessandro, 2013;

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Wang & Degol, 2016). Several organizations have emphasized on promoting of a positive school climate to improve teachers' productivity while working, increasing students' learning environment, and preventing student negative behavior (Thapa, 2013). At school level, school principals are a major role in indicating and delivering policies for conducting school improvements (Iachini, Pitner, Morgan, & Rhodes, 2015). Information relevant to school climate enhancement for school principals should be derived from precise evidence, because policy which is based on systematic evidence can produce more effective outcomes (Antoniou, Myburgh-Louw, & Gronn, 2016). The measurement of school climate is therefore one approach to identify and provides important key points towards school improvement.

Since the 1960s, there have been several studies on the development of school climate scales; however, researchers frequently focused on a variable-centered approach more than a person-centered approach (Wang & Degol, 2016). That is, most school climate scales were developed to measure perception of variables consistently across all populations, indeed school climate perceptions are dependent on the characteristics or individual perspectives. Whereas some suggestions indicated that research on school climate using person-centered approach may provide more information in designing targeted interventions for different groups of school members (Olsen, Preston, Algozzine, Algozzine, & Cusumano, 2018; Wang & Degol, 2016). Based on mentioned arguments questions can be asked as to whether a school climate scale is able to measure insights from school members because these may provide vital information for a school principal to promote school climate for them. A scale development that is concerned with insights from school members may extend a study on the development of a school climate scale using a person-centered approach as well. According to the definition of school climate, this study inferred and defined a climate as a service experience that was perceived by all stakeholders. Research on experience of stakeholders could help to construct more significant and provide insights about the relationship between school climate and their consequences (Sly, 2013). This study therefore applied the concept of user experience (UX) research to develop a current school climate scale.

User experience research, also known as UX research, user research, or user-centered research, is a study aimed at understanding and empathizing users in order to design specific products and services to meet their needs (Hassenzahl & Tractinsky, 2006; Kuniavsky, 2003; Vermeeren, Roto, &Väänänen, 2016). The users in this study therefore refer to students, teachers, and principals who are part of the school and are affected by the climate of the school. The UX approach may help researcher to gather insights related to the experiences of the school climate and utilize this information to design a new scale which can reflect their feelings and emotions. Despite the fact that there are several dimensions of UX, this study focuses only on prevalent dimensions which was grounded in empirical research related to school climate experience, for instance, role, emotion, perception, attitude, and behavior of the users (Law, Van Schaik, & Roto, 2014; Marsh, 2016; Partal & Saari, 2015; Stern, 2016 cited in Kovatcheva, 2018). Underlying a review of previous school climate scales, the researchers found that numerous items not only designed to measure in broad terms but also designed to separately measure one-stakeholder perspective (Wang & Degol, 2016). Hence, information based on UX would assist to design the items in the new scale to measure more informative insights of school climate from school members. Benefit of research on user experience might provide

information of their emotions, behavior, and preferences which perhaps might be conducive for promoting a school climate in further process.

There has been no agreement about the dimensions of school climate; some researchers argue that the school climate construct can be framed by a perspective of the researchers (Hung, Luebbe, & Flaspohler, 2015). The researchers reviewed existing school climate constructed from diverse research articles and then adapted an existing school climate measurement model conceptualized by Wang and Degol (2016) to develop a current scale. The measurement model was defined in broadly four dimensions including safety, academic, community, and institutional environment. Various school climate scales particularly have been used to examine the perception of students (White, La Salle, Ashby, & Meyers, 2014) but development of a scale in the perspective of teachers is still limited. This study therefore extended a validation process of the scale from the perspective of teachers. However, the UX approach used for developing the items of the scale will cover the perceptions of teachers, students, and school principal on school climate because this information may provide a wider experience than particular members. Even though there are various school climate scales developed in the context of Thailand, most of them were not developed based on or covered essential dimensions of school climate; some scales were developed based on traditional methodology, as well as having inadequate of psychometric property validations such as using more advanced statistical techniques.

Therefore, the aims of this study were twofold; first, to develop a school climate scale using user experience (UX) research that included a perception of students, teachers, and principal. Secondly, to examine the psychometric properties of the school climate scale from perspective of teachers, because research on a perspective of teachers may contribute some information that are relevant to school climate which can be used for promoting the aspects or their workplace. The positive aspects in teachers may indirectly support student learning, and the social and behavioral outcomes of students along with other school members.

Theoretical Underpinnings

This section aims to explain the concept of school climate in order to identify a measurement model in scale development process as well as to describe an overview concept of user experience (UX) research in framing how methodology can be used to conduct the present study.

School Climate

Over the past decades, school climate was defined in several aspects. Based on literatures, a typical features of school climate definition can be concluded into two aspects. Firstly, researchers defined school climate as characteristic or personality of a school, that occurs from environment, norms, values, structures, and a social system formed by a relationship of people within the school (Brookover, Schweitzer, Schneider, Beady, Flood, & Wisenbaker, 1978; Halpin & Croft, 1963 as cited in Thomas, 1976; Hoy & Hunnum, 1997; Simons-Morton & Crump, 2003; Welsh, 2000). Secondly, school climate is reflected from

attitudes, beliefs, feelings, and expectations of people expressed within the school (Brookover et al., 1978; Van Houtte, 2005; Welsh, 2000). Both types of definition have common attributes that can explain that the climate is a shared experience of people who are in the school; it can impact on thoughts, feelings, and behavior of school members as well. The most cited definition existing in the research articles defined the term of school climate as "the quality and character of school life. It is based on patterns of people's experiences of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures" (Cohen et al., 2009, p.182; Thapa et al., 2013, p.358). However, there is not a clear consensus regarding school climate definitions and its dimensions (Olsen et al., 2018; Thapa et al., 2013; Wang & Degol, 2016). Some scholars argued that the majority of school climate constructs was conceptualized by researcher perspectives (Hung et al., 2015) more than considering the people who were affected by the climate of school (Wang & Degol, 2016). Some study also pointed that most of school climate scales showed acceptable reliability results, but theory-grounded in the scale development is still missing (Ramelow, Currie, & Felder-Puig, 2015).

According to aforementioned arguments, this study has considered a school climate concept from various empirical studies. Underlying consideration, this study adapted the school climate measurement model, synthesized by Wang and Degol (2016), to develop a school climate scale because this concept was built up from significant dimensions of school climate; this concept was conceptualized from varied perspectives and also described by an adequacy grounded-theory. Thus, the measurement model of school climate used in this study can be represented as a conceptual framework that covered four dimensions (see Figure 1). Firstly, safety is measured by a perception of school members regarding physical and social-emotional safety. Secondly, academic climate is reflected by leadership, teaching and learning, and professional development. Thirdly, community is displayed from quality of relationships, connectedness, and respect for diversity among school members. Lastly, institutional environment is specified by indicators of intra-school environment, structure of organization, and accessibility of resources. Although the original version of measurement model comprises 13 indicators, this study excluded two indicators, order and discipline, and partnership, by reason of the fact that this study was changed to accommodate the Thailand context. Since order and discipline illustrate that school members must follow by the rules of school or other issues related to discipline practices (Wang & Degol, 2016), yet in the Thailand context, every school must follow the common rules that are determined by The Ministry of Education in Thailand. Thus, the climate that is reflected by the indicator of order and discipline may not provide heterogeneous results of school climate in Thailand context. Likewise, this study additionally excludes an indicator of partnership in the model because this indicator required some information from outer-school stakeholders (i.e., community, parents, organizations, and others); this may be inappropriate if conducting by UX research. Moreover, this study focuses on the UX that only relevant to intra-school members experience in order to gain informative evidence for school principals toward a decision-making regarding school climate enhancement.

In summary, the conceptual framework of the school climate measurement in this study includes essential constructs as explained before. Nevertheless, in practices, there are some challenges to develop the scale using the suggested concept. Therefore, the present study aims to develop a new scale according to the proposed measurement model and test its psychometric properties.

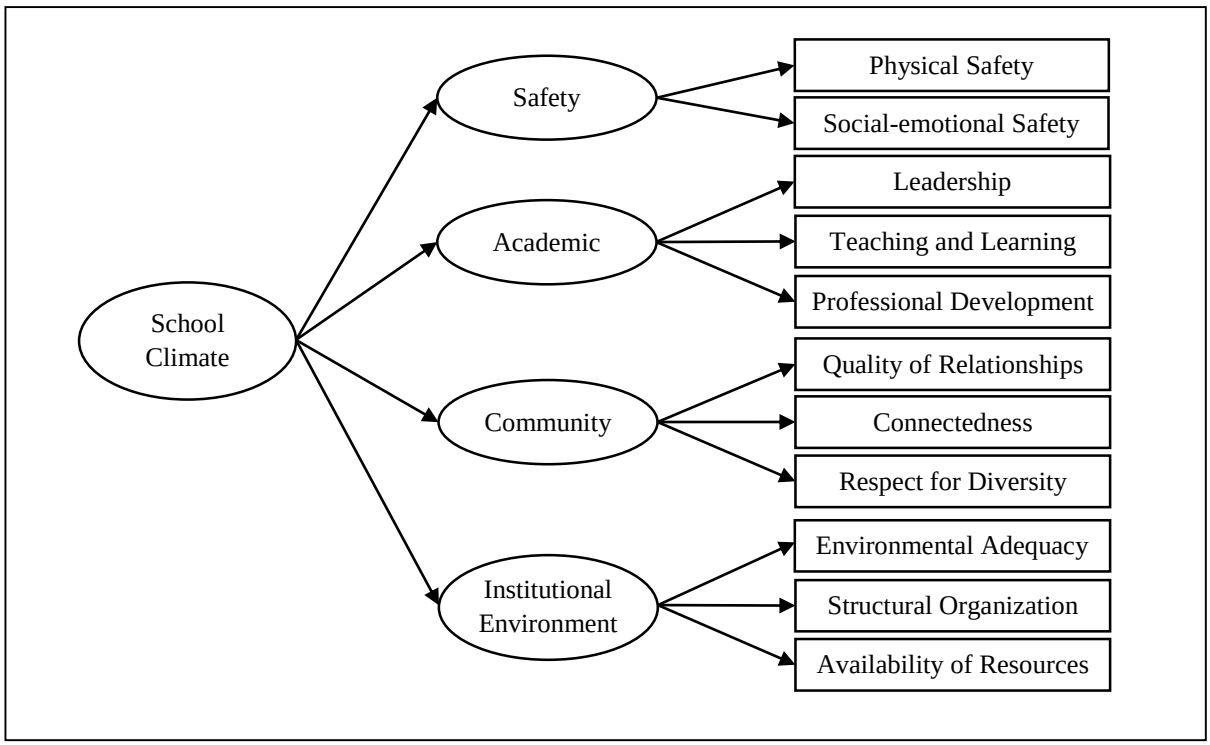


Figure 1. Conceptual Framework

User Experience Research

User experience (UX) research, also known as user experience approach, user research, user-centered approach, and is the part of user experience design process (UXD) (Kunniavsky, 2003; Stull, 2018). This approach is required when designers need to define the problems relevant to a design. The UX concept emphasizes the positive aspects in psychology of people that contribute outstanding quality experiences rather than prevent difficulty during experience with products and services (Hassenzahl & Tractinsky, 2006). Thus, most of designers have shifted from traditional methods to increasingly understanding customers or users; for instance, to gathering and utilizing UX data in order to create products and services (Kunniavsky, 2003; Rohrer, 2014). A significant benefit of UX is a tool for designers to construct artifacts, products, and services in order to meet customer needs (Vermeeren, Roto, and Väänänen, 2016). Since UX was pioneered in a human-computer interaction (HCI) context and widely spread and utilized in design methodology, the UX has been defined in various perspectives (Forlizzi & Battarbee 2004). However, user experience commonly occurs when a customer or user experienced with or expected usability of products and services as well as described how they feel about it; user experience have been described as a perception, attitude, emotion, and response of users after using products, systems, or services as well (Hassenzahl & Tractinsky, 2006; ISO 9241-210, 2009 cited in Zheng, Yu, Wang, Zhong, & Xu, 2017). In this study, school climate can be referred as a service experience that experienced by all school members.

In general, Law et al. (2014) indicated that there are no absolute dimensions of UX, but it depends upon designer perspectives. Based on literatures, this study synthesized and applied the common dimensions of UX that was proposed by Beauregard and Corriveau (2007), Law et al. (2014), Partala and Saari (2015), Rohrer, 2014, Stern (2016 as cited in Kovatcheva, 2018), because the selected dimensions are appropriate for study on experience of school members regarding the school climate. The reasons why the researchers selected the dimensions of UX

to study because UX researchers should consider UX dimensions based on the design goals, for instance; to understanding users, to discovering problems, to prototyping designs, or to testing products (d.school, n.d.; Stern, 2016 as cited in Kovatcheva, 2018; Stull, 2018). The main objective of this study was to develop a new school climate scale, the researchers then identify goal of UX to understand users how they feel and perceived about school. Thus, the UX dimensions in this study focus on only five essential dimensions included roles, emotions, perceptions, attitudes and behavior of the users (Law, Van Schaik, & Roto, 2014; Partal & Saari, 2015; Rohrer, 2014; Stern, 2016 as cited in Kovatcheva, 2018) as explained in the next section. These UX dimensions enabled the researchers to understand and design the items of the scale effectively.

Based on the synthesis of UX dimensions, it revealed five dimensions of UX, including role, emotion, perception, attitude, and behavior of the users (see Figure 2). Role refers to responsibility, duty, personal skills, or background of the users related to products and services. Emotion is captured when the designer needs to design a product to meet the emotions of the users because positive emotions and feelings has high relationship with the quality experiences. Perception focuses on the perception of users perceive after their experience with products or services; diverse perception can also create different experiences between users. Attitude helps designer to understand a thought of the users because the users who had a positive attitude can influence their positive behavior. Behavior focuses on the results of psychological needs, emotions, or values of the users; behavior is how user reacts, respond, or behave after using products or services.

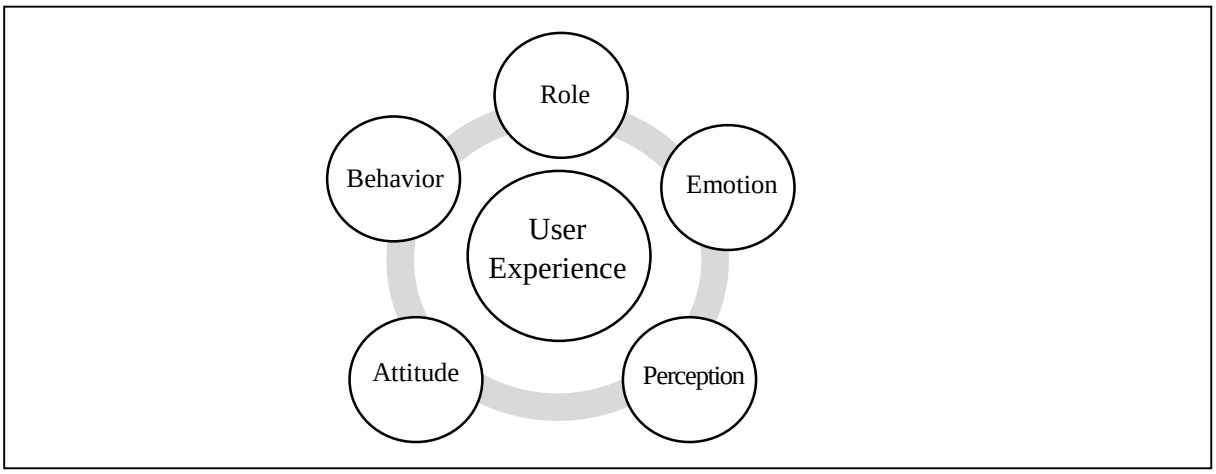


Figure 2. The dimensions of user experience

User experience researchers, or UX researchers, have proposed several data collection techniques in UX research, including experimental or non-experimental procedures, such as true-intent interview, observation, diary studies, eye tracking, A/B testing, usability testing, clickstream analysis, customer feedback, card sorting (Albert & Tullis, 2013; Rohrer, 2014; Stull, 2018). This study applied interview method to collect UX data from school members relevant to their school climate experiences, because this method allows researcher to meet with users face-to-face to discuss in-depth what the they think about the topic in questions (Rohrer, 2014) as well as perhaps comfortably gather insight from users how they feel in school. Another reason why interview method was chosen because most of UX researchers frequently focus on "the extreme users" that include high positive and negative aspects (Liikkanen, 2009; Strachan, 2017). The extreme users are different from other users, because they can provide more essential or deeper information relevant to a services or products (Strachan, 2017). Additionally, the needs from the extreme users also found in wider users in the population

(d.school, n.d.). Thus, researcher can conduct research with small sample size of informants that can provide insightful information. A small size of informants in UX did not raise difficult problems, however for the validation process a wide range or general users is required larger sample size (d.school, n.d.; Strachan, 2017).

Methods

This study was divided into two phases; the study 1 was UX research, that included collecting qualitative data from the users, comprised teachers, students, and principals; the information was related to their perceptions about school climate, which was synthesized to develop the scale. The study 2 was quantitative research to examine the psychometric properties of the school climate scale that only measured from the perspective of teachers.

Study 1

Cases and informants

This study was built on case studies to collect UX data from schools in various settings, covering both higher and lower extreme cases. Selection criteria of the cases was based on three aspects of the school, firstly, the schools had the high and low scores in the official school quality assessment of Thailand in 2015. Second, the school that some users offered themselves as volunteers to provide initial information about their school. Finally, the schools that considered some personal characteristics of the users, for instance particular work experience of teachers, prominent school management style of principals, and/or specific experience of students. All informants or users were purposely selected from the schools that met the given criteria with different contexts, types, locations, and sizes in Bangkok and the metropolitan area of Thailand. However, the cases and the users in this step were adequate in strategic character for study the experience and develop the scales, but were not representative of the population (Patton, 2002). In summary, six secondary schools were included in this study, four of cases are public schools covered in both higher and lower socioeconomic areas, and two of cases are private school located in high socioeconomic areas; all selected schools covered of small, medium, and large size. The users in the UX study included representative teachers (n=6), students (n=8), and principals (n=4) within the selected schools which called as “the extreme users”. This study also considered some characteristics of the users such as appropriate school experiences, diverse lifestyle in school, as well as willingness to cooperate interview process.

Procedures and data analysis

Interview method was conducted in this study. Structured interview was used for qualitative data collection. The instrument consisted of the items based on the conceptual framework of the school climate which proposed by Wang and Degol (2016). For each construct of climate, the interview questions were produced based on dimensions of UX included emotions, along with roles, perceptions, attitudes, and behavior of the users (Law, Van Schaik, & Roto, 2014; Partal & Saari, 2015; Rohrer, 2014; Stern, 2016 as cited in Kovatcheva, 2018). The final interview instrument consisted of main 16 questions (see partial of interview items in Table 1). The interview process was conducted from December 15, 2017 to February 15, 2018. All participants were informed through consent form prior to answering the interview questions. This study did not reveal the identities of all participants and did not report their personal information in the study findings.

Transcription, coding, and thematic analysis was used in this phase in order to develop the main categories regarding the school climate. The researchers had identified subcategories, patterns, and relationships among codes and summarized it into categories within the data (Saldaña, 2013). This study also reviewed the categories from cross-cases again to ensure appropriateness of data and chose the final categories to design items for the school climate scale.

Study 2

Participants

To examine the psychometric properties of the school climate scale, sample size determination was done using the method of Soper (2017) that considers the complexity of measurement model structures (Westland, 2010). The required minimum sample size calculated was 107 cases. The participants in this study consisted of 353 teachers within 70 secondary schools in Bangkok metropolitan region of Thailand. The investigation was conducted in two phase, because the researchers found the initial validation of the scale from 133 respondents was an inappropriate level of its properties. The scale then was re-examined from 220 respondents. The total second-round respondents who completed the scale, there were female, 68.60%, with a majority 47.30% of age 23 - 31 years old. Around 90.60% were teachers working in the public school, as well as 73.60% were teachers working in the large school. The average of workload hours for teaching were 18.55 hours per week (ranged from 6 to 33 hours per week).

Table 1

Samples of the interview items classified by constructs of school climate, UX dimensions, and type of users.

School climate construct	Sample of the interview items	Users
Introductory questions	▪ Tell us about your work/school life experience, and other responsible roles in your school. *(Role)*	Students, Teachers, Principals
	▪ School characteristics in the *opinion (perception)* of the interviewees.	
Safety	▪ Since starting to work/study here, are you *satisfy (emotions)*, or *feel (attitude)* that your school is a safe place to work/study or not? Please tell us how or why (*perception*).	Students, Teachers
	▪ Have your school ever *promoted (behavior)*, *provided (behavior)*, or *have preventive tools (perception)* regarding security or not? Tell us how procedures of school members *do (behavior)*.	Students, Teachers, Principals
Academic	▪ Do you or your colleagues *have the opportunity (perception)* to *develop (behavior)* your work performance or not? Please describe.	Teachers, Principals
	▪ When you/your principal framing policy in your school, do you/your school members satisfy (*emotion*) with the policy? Please tell *how* and *why*? *(attitude)*	Students, Teachers, Principals
Community	▪ What type of relationship in the school that makes you *feel comfortable or uneasy (emotion/attitude)*, and how does it *affect your (perception)* work at the school, or how does it *prevent you (perception)* from working efficiently?	Students, Teachers
Institutional environment	▪ Please *explain (perception)* how the facilities at your school *enough (emotion/attitude)* to support the learning process of the students.	Students, Teachers
	▪ Have you ever *promoted (behavior)* the school environment, or *organized (behavior)* for facilities for members of the school? Please describe.	Teachers, Principals

Note. Interview questions could be flexible across type of users and school contexts.

Measures and data collection

Based on UX information from study 1, this procedure determined the indicators and generated items of the scale from UX data. Sample items are described briefly in the result section (see Table 2). In summary, the proposed school climate scale consists of four subscales totalling 34 items: 6 items for safety, 10 items for academic, 9 items for community, and 9 items for institutional environment. The scale format was designed using a five-point rating scale of *strongly disagree=1*, *disagree=2*, *neither agree nor disagree=3*, *agree=4*, and *strongly agree=5*. A survey by questionnaire was conducted of both paper-based and internet-based methods. The period of survey process was approached from March 1 to April 30, 2018. This study is independent and impartial; the responses from participants were protected by not revealing their individual answers in the research findings.

Validation and statistical analysis

A reliability of the scale was examined based on the internal consistency reliability of each dimension of school climate using Cronbach's alpha coefficient. Since a school climate is a hierarchical factor, several research on multidimensional approach indicated that Cronbach's alpha has few weaknesses in analysis regarding the multidimensional factor (Cho & Kim, 2015; Dunn, Baguley, & Brunsden, 2014). Hence, the scale also assessed the internal consistency of the multi-factor scale using McDonald's omega coefficient conducted by using the lavaan and semTools packages in R. This study assessed a construct validity of the scale in two approaches. First, factorial validity of the scale was basically examined using confirmatory factor analysis (CFA). Analyses were conducted using Mplus version 7.2 by robust maximum likelihood (MLR) estimator to estimate parameters with completed data. The measurement model was also assessed model fit by Chi-square test (χ^2) and four others model fit indices: the Comparative Fit Index (CFI), the the Tucker Lewis index (TLI), the Root Mean-Square Error of Approximation (RMSEA), and the Standardized Root Mean-Square Residual (SRMR). The thresholds of mentioned indices for satisfactory fit suggested by Kline (2016): p-value of Chi-square's test > .05, CFI > .95, TLI > .95, RMSEA < .08, SRMR < .08. Second, convergent and discriminant validity was conducted. Kline (2016) suggested that convergent and discriminant validity can be considered by the magnitude of intercorrelations among variables such as Pearson's correlation (Lee, 2019). If two constructs have a high correlation, it indicates that the measures reflect the same construct. Convergent validity can be considered by magnitude of factor loadings whether factor loadings are stronger than .60 this indicate good convergent validity (Garson, 2010 as cited in Cabrera-Nguyen, 2010). For discriminant is opposite, in term of discriminant validity, some scholars recommended analyzing correlation among latent factor from unconstrained model (Shaffer, DeGeest, & Li, 2016). If the values of latent construct correlation are greater than .80 (Brown, 2014) or .85 (Kenny, 2016; van Mierlo, Vermunt, & Rutte, 2009) indicates poor discriminant validity. Thus, this study was examined both convergent and discriminant validity using the concept of correlation.

Results

The findings are presented in main three parts; the first part explains the result from UX approach and conceptualized UX data in order to generate the items of the scale. Second part shows the result of scale reliability using internal consistency. The final part addresses the result of confirmatory factor analysis to assess factorial construct of school climate and respectively reported evidences of convergent and discriminant validity.

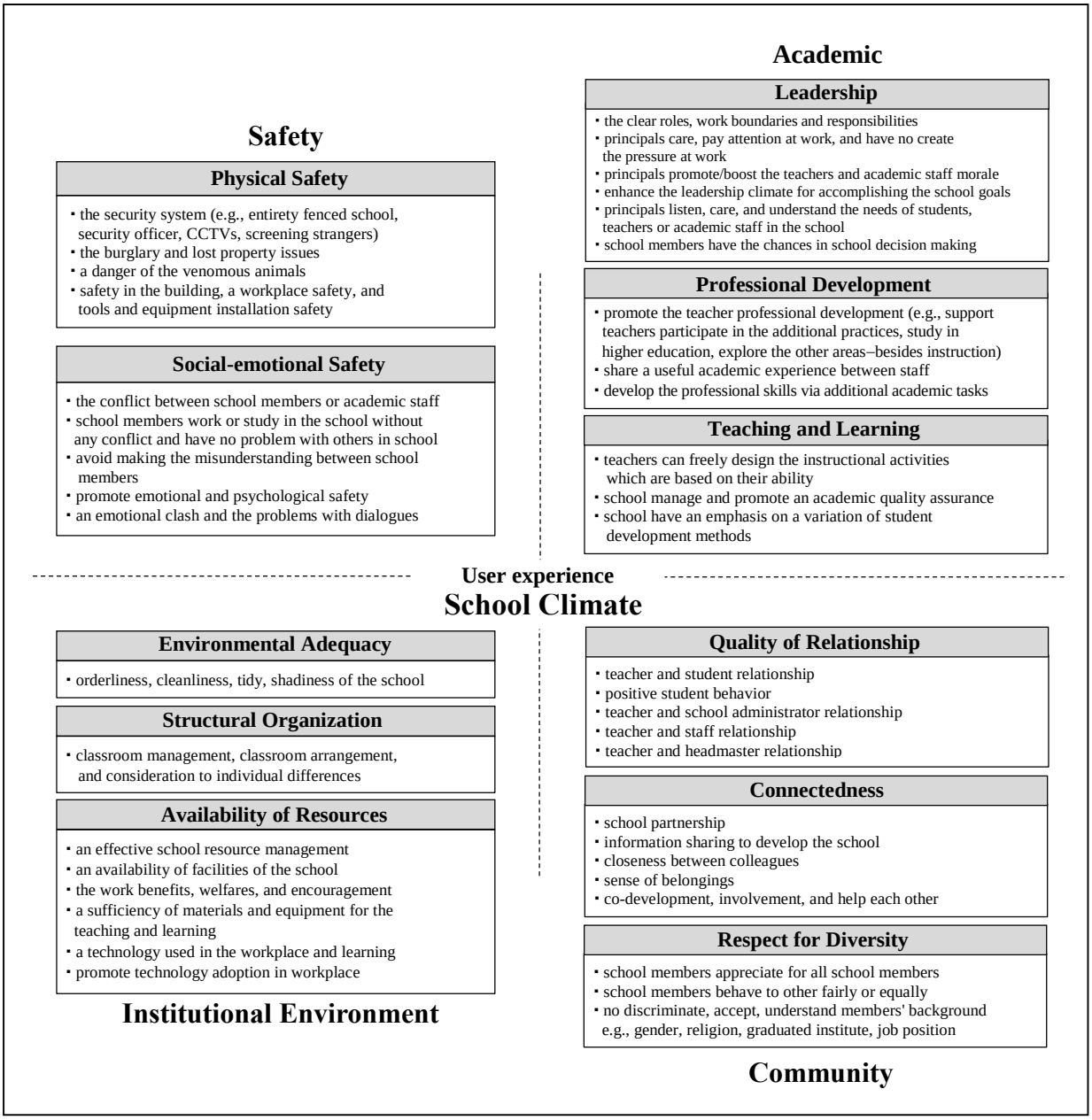


Figure 3. Themes of user experience for the school climate

User Experience Information and Generation of Items in the School Climate Scale

All users from various settings that covered both public and private schools in Bangkok and the metropolitan region differently expressed their experiences on roles, emotions,

perceptions, attitudes, and behavior regarding to school climate. Based on qualitative data analysis, there was a little different information across the setting, but this study summarized the final UX categories from various school contexts into 42 categories based on 11 indicators from the school climate measurement model. The summarized of the themes of school climate experienced by the users as shown in Figure 3. The results also showed that the collected UX information that provide insights from the users that might be generated into the items to measure school climate next. Sample of the items in Table 2 demonstrates how we linked or constructed the UX information into items of school climate scale. In summary, the developed school climate scale therefore consisted of 34 items with a five-point rating scale questionnaire. However, the results point to interesting issues that the Institutional environment dimension shows fewer categories information about UX when compared to other dimensions.

Reliability: Internal consistency

The internal consistency was assessed using Cronbach's alpha and McDonald's omega coefficient. The result showed acceptable level of reliability of measures with safety $\alpha = .68$, academic $\alpha = .91$, community $\alpha = .87$, and institutional environment $\alpha = .90$. As for McDonald's omega this was also adequate with safety $\omega = .66$, academic $\omega = .91$, community $\omega = .87$, institutional environment $\omega = .91$, and the general factor saturation with both $\omega_t = .94$ and $\omega_h = .93$. Therefore, the developed school climate scale, are deemed to be suitable for assessing school climate with satisfactory levels of reliability.

Construct Validity: Confirmatory Factor Analysis

Intercorrelations among observed variables are presented in Table 3; the result revealed the Pearson's correlation coefficients were positive and ranged from .26 to .73 with statistically significance. Within-construct observed variables shows moderate to high relationship, and between-construct observed variables indicate low to moderate level relationship. The result point that the relationship of the observed variables in the scale are sufficiently correlated across all variables.

The factorial validity, which is a part of construct validity, was examined using second-order confirmatory factor analysis (CFA), the result revealed the measurement model provided a reasonable fit to the empirical data, $\chi^2(34, N = 220) = 43.80$, $p = .12$, CFI = .99, TLI = .99, RMSEA = .04, SRMR = .05. As seen in Figure 4, all standardized factor loading of both first and second-ordered construct were all statistically significant and reasonably robust with factor loadings ranging from .68 to .90 for observed variables, as well as ranging from .72 to .97 for latent variables. Moreover, the variance of all subscale scores was explained by school climate construct with R^2 ranging from .52 to .95, as well as the variance of all observed variables was explained by each of school climate dimensions with R^2 ranging from .46 to .84. There particularly has some variation in Safety indicators that can explain by its latent construct lower than 50%, this evidence contributes some information to explain next in discussion section. However, the proposed four-dimension of school climate model yield adequate to confirm school climate construct.

Table 2

Samples of items measuring school climate generated from UX

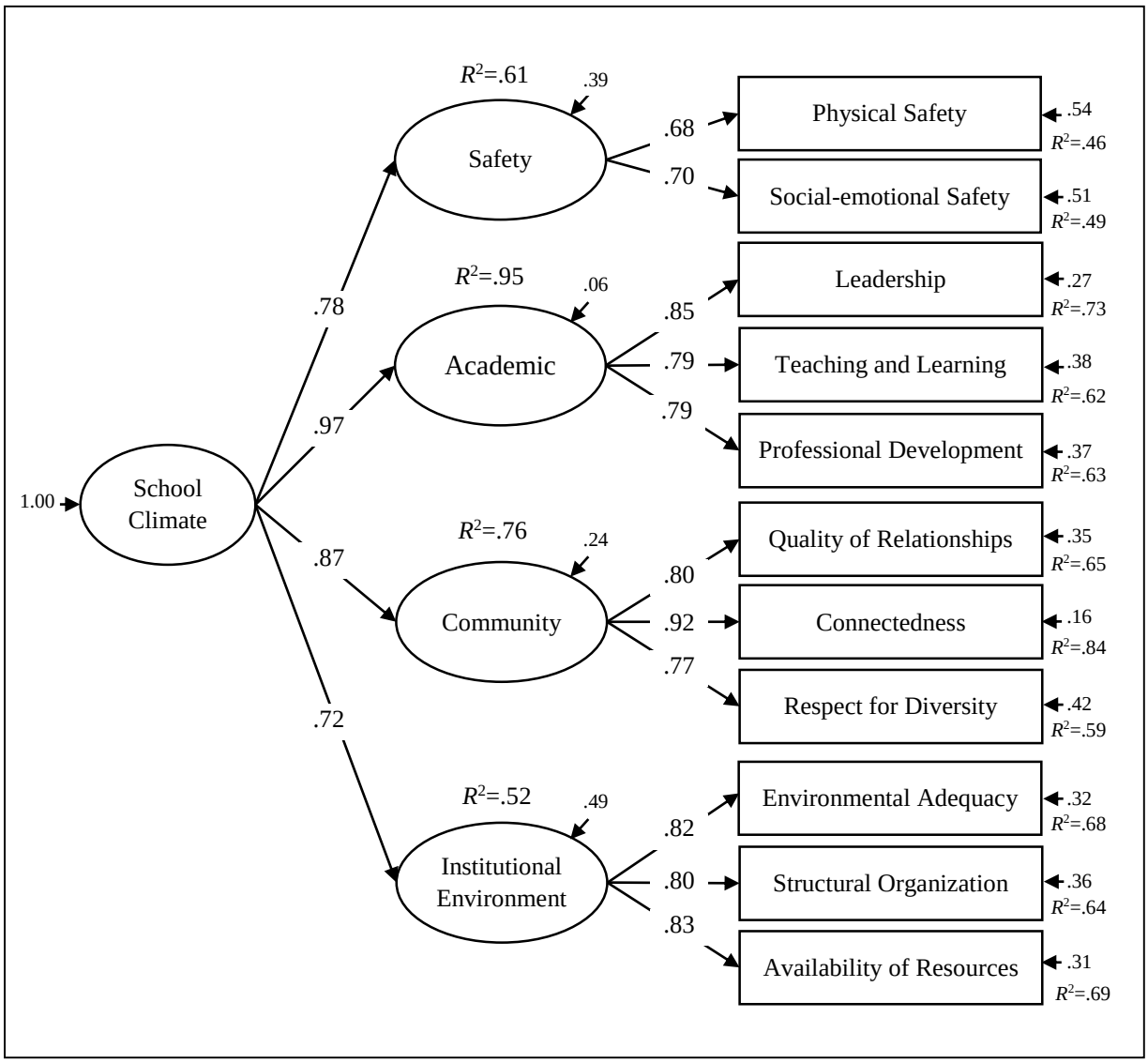
School climate construct	Indicator of Construct	UX Categories	Item samples based on UX
Safety	Physical safety	▪ Working or studying in school without conflict and have no problem with others in school	▪ I have **NO** problem working with my school friends, can discuss matters in a straightforward way, or disagree reasonably without discussing it behind their backs.
	Social-emotional safety	▪ Conflict between school members or academic staff	▪ In school, there are some colleagues who often create misunderstandings, which create work conflicts among my fellow teachers.
Academic	Professional development	▪ Promote teacher professional development e.g., study in higher levels, assign beneficial academic task to practice	▪ I was given the opportunity to develop my own professional skills (e.g. academic training, studying in higher education, self-development seminars).
Community	Respect of diversity	▪ No discriminate, accept, understand members' background, e.g., gender, religion, graduated institute, job position	▪ My colleagues and I work without any cultural or background discrimination of any kind (e.g. education background, religion, race, job position).
Institutional environment	Environmental adequacy	▪ Orderliness, cleanliness, shadiness of school	▪ I work in a school that promotes and raise concerns with a clean and tidy environment.

Table 3

Intercorrelations between observed variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Physical safety	—										
2. Social-emotional safety	.37*	—									
3. Leadership	.41*	.47*	—								
4. Teaching and Learning	.37*	.44*	.67*	—							
5. Professional development	.42*	.40*	.68*	.72*	—						
6. Quality of relationships	.35*	.51*	.61*	.55*	.69*	—					
7. Connectedness	.41*	.56*	.66*	.62*	.69*	.73*	—				
8. Respect for diversity	.34*	.55*	.53*	.46*	.48*	.60*	.72*	—			
9. Environmental adequacy	.46*	.28*	.50*	.44*	.42*	.38*	.37*	.38*	—		
10.Structural organization	.42*	.26*	.52*	.47*	.48*	.44*	.41*	.40*	.67*	—	
11.Availibility of resources	.42*	.30*	.50*	.47*	.51*	.45*	.45*	.43*	.70*	.66*	—
M	3.69	3.62	3.96	3.97	3.95	3.93	3.90	4.01	3.84	3.83	3.98
SD	0.71	0.76	0.72	0.74	0.72	0.62	0.66	0.69	0.83	0.72	0.77

Note. * $p < .05$



$X^2(34, N = 220) = 43.80$, $p = .12$, CFI = .99, TLI = .99, RMSEA = .04, SRMR = .05

Figure 4. Second-order confirmatory factor analysis for teachers' perception of school climate. All coefficients are significant ($p < .05$). Standardized coefficients are reported.

Construct Validity: Convergent and Discriminant Validity

Table 4 shows the assessment of convergent and discriminant validity. The results demonstrated all correlation coefficients between the scores of school climate subscales were statistically significant ($r = .58$ - $.76$), these results point out that the relationship between scores of the constructs were highly correlated with the other one. As for consideration of factor loadings both latent and observed variables, the results indicate factor loadings were higher than .60, thus convergent validity is supported. Further, analysis results of latent factor correlation among mostly constructs showed greater than .80 value of coefficients which verified a satisfactory level discriminant validity. From these findings it can be concluded that the developed school climate scale has an acceptable level of both convergent and discriminant validity.

Table *4*

Summary of Intercorrelations, Means, Standard deviations among sub-dimensions

Constructs	1	2	3	4
1.Safety	—	.69*	.68*	.58*
2.Academic	.83	—	.76*	.60*
3.Community	.83	.84	—	.60*
4.Institutional Environment	.58	.71	.59	—
M	3.77	3.96	3.97	3.89
SD	0.57	0.65	0.55	0.68

Note. Latent variables correlations are presented below the diagonal, and Pearson's correlation between subscales' score are presented above the diagonal. (* $p < .05$)

Discussion

The result from conducting the study 1 provided the answers for the first research question as this study provided a school climate scale developed from synthesis of previous research. Even though the UX was firstly initiated in human-computer interaction (HCI) research (Hassenzahl & Tractinsky, 2006), the concept could be similar to previous concepts in educational context such as needs assessment (Wongwanich, 2015). The majority of goals in needs assessment in education aim to describe a gap or difference between target state (i.e., desirable, ideal, expected, what should be) and actual state (i.e., what is) based on the perception of people, environment conditions, and others (Kaufman & English, 1979; Witkin, 1984; Wongwanich, 2015; Wongwanich, Sakolrak, & Piromsombat, 2014). Level of needs could let the information for stakeholders to handle the gap, nevertheless, in terms of UX provides additional information related to aspects or psychological state of human beings (Law et al., 2009). It could be assumed UX approach is not only focus on people needs but also extended to understand the emotions and feelings of people, as well as provides informative insightful data to handle a deep understanding of people. Due to the fact that prior school climate scales were frequently developed based on literatures, the UX may help to construct the items that can measure "the climate that works" for the school members indeed that are close to their preferences or specific experiences. This may help and reduces the failures of the school principal for promoting the climate that sometimes are not related to the preferences of school members. The UX in this study also focuses on multi-informants which could provide diverse experiences in school including students, teachers, and principal. Thus, UX can handle the school climate scale with more person-centered approach.

Previously school climate scale items were developed from a broader term (e.g., *I feel safe in my school*, *Teachers care about their students, It is important to finish high school*) and provided some unclear meaning of items to respondents. Moreover, some of the items in previous scales might lead to differential reference point during responding (i.e., require to measure safety of students but collected teachers responded that students felt safe when they were at school), which could not provide the authentic information from the measurement (Wang & Degol, 2016) by cause of the respondents may interpret the questions differently. By applying the user experience (UX) approach to address the prior limitations, the newly developed scale can reflect more insight from respondents because user experience approach could allow school members to express their emotions related to school climate experiences. Since all of the items in the scale were derived from the study of emotions, perceptions, attitudes, and behavior of school members, the findings could support the feelings of users

indeed the new scale is more appropriate to be responded to. It can be explained that the developed scale makes the respondents feel that the newly developed items are matters that are close to themselves, which are not difficult to comprehend, and minimizes the risk of misunderstanding of the items concerned.

The findings that answer the second research question revealed that the developed school climate scale showed adequate psychometric properties both in reliability and validity which achieved the second aim. Especially, this research assessed the internal consistency both Cronbach's alpha and McDonald's omega coefficient, since the proposed school measurement model is a multidimensional construct. Thus, McDonald's omega for internal consistency might be an appropriate approach to handle multidimensional scales (Cho & Kim, 2015; Viladrich, Angulo-Brunet, & Doval, 2017). As for the validity of the scale, the CFA results provided evidence deemed to confirm that four constructs of school climate capitalized by Wang and Degol (2016) are suitable for Thailand. This evidence also indicates the scale is appropriate for assessing the climate of school. Some results pointed that some construct of school climate have a lower value of both Cronbach's alpha and R^2 when compared with other constructs. It can be explained that in the scale include a few double negative questions in safety construct, which implied that items might increase error variance within the measurement results (Fornell & Larcker, 1981). Data collection in further research or implementation should be conducted with caution such as informing the respondents to be careful when answering the questionnaire. Nevertheless, the convergent validity result was in reasonable level with high correlation both latent factor and observed score dimensions. The findings can explain to why discriminant validity is not rigorous because this study found high correlation between constructs. It could be assumed that all constructs were measured the same high-level factor. However, the explanation of this study with this issue is based on the viewpoint of researchers regarding to the nature of school climate variable that was developed from literatures. Further research should clearly investigate using statistical approach.

The results from this study provides practical implications for stakeholders (i.e., school principal, particular educational organization such as Educational Service Area Office) to utilize a well-developed scale for measuring and determining policy from the school climate. Even though previous research also conducted similarly this way, the findings of this study additionally provides evidence that might assist school principals or school administrators to enhance a positive school climate for students, teachers or academic staff.

Conclusion and Recommendation

The result indicated that a school climate scale developed in this research is a five-point rating scale, the scale can be measured by four dimensions including safety, academic, community, and institutional environment. This scale also showed satisfactory level, both validity and reliability. Whoever maybe involved can conduct this scale to measure school climate in order to show informed evidence of their school to enhance a positive and to prevent a negative school climate for school members. Since the newly school climate scale is developed based on a shared experiences of school members, such as students, teachers, and principals; the results from the measurement process can therefore provide information regarding emotion and feelings in theirs experiences. Although previous research examined the properties of scales from all school members (i.e., Ramsey, Spira, Parisi, & Rebok, 2016) but this study examines the psychometric properties focusing on teachers' perspective. To assess school climate based on the proposed measurement model for student or academic staff

perspectives need to be conducted in further research. Even though the scale which developed in this study was only examined psychometric properties from the perspective of teachers, but the construct and measurement items of this scale can be applying to study in similar school contexts because the items of the scale are not developed in a particular context. However, the scale validation process in another context before using should be required; for instance, if researcher has prior knowledge that school climate maybe different between data structures, they should examine the other properties of the scale such as measurement invariance, multilevel analysis (i.e., multilevel CFA), and others. The scale additionally required some further research on perceptions of students, or principals. Further research can use this instrument to study with stakeholder outcomes (e.g., causal relationship research) and utilize the information to prevent negative aspects which could be impact on school members outcomes.

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Appendix

School Climate Scale Based On School Members' Shared Experiences

Safety (6 items)

Physical safety

1. Equipment and tools, classrooms, teacher rooms, and buildings in my school are well maintained.
2. My school has security systems (e.g., entirely fenced school, CCTV, security officer, the security duty arrangement and others).
3. My school DOES NOT have problems with burglary and other safety problems (e.g., broken twigs, roof leak, untidy electrical wiring, electric leakage, hazardous waste, and poisonous animals).

Social-emotional safety

4. I have NO problem working with my school friends, can discuss matters in a straightforward way, or disagree reasonably without discussing it behind their backs.
5. My school colleagues work collaboratively, generously, and sincerely with each other.
6. In school, there are some colleagues who often create misunderstandings, which create work conflicts among my fellow teachers.

Academic (10 items)

Leadership

7. I understand the academic visions and goals of my school determined by school principal or my supervisors.
8. I have a role and a clear scope of academic work (e.g., instruction workload, student development responsibility).
9. I have been advised on opportunities for improvement I can apply to my work, as well as received encouragement and direction from school principals and supervisors.
10. I work in a school where school principals or supervisors can accomplish all school duties.

Teaching and Learning

11. I have full autonomy to organize my classroom instructions in order to help students achieve their academic goals.
12. I can organize my classroom instructions by following school guidelines, with support from school principals and colleagues.
13. I have received support from school principals to use a variety of student development methods.

Professional Development

14. I was given the opportunity to develop my own professional skills (i.e. academic training, studying in higher education, self-development seminars).
15. I have opportunity to share useful experiences in teaching and learning with my colleagues.
16. I have the opportunity to explore other areas, besides teaching, to develop my professional skills (e.g., academic camp, academic projects).

Community (9 items)

Quality of Relationships

17. Students respect, appreciate, and behave in a proper manner to me.
18. My colleagues and I can make conversations and have discussions relevant to work.

19. I can have conversations and discussions about all issues with school principals.

Connectedness

20. I feel accepted and a sense of belonging in the school community.
21. I have the opportunity to share my ideas and suggestions in order to improve the school development.
22. I can work with my school friends and help the development of the school.

Respect for Diversity

23. I work in a school that teachers treat students equally.
24. My colleagues and I respect and agree with each other on individual differences.
25. My colleagues and I work without any cultural or background discrimination of any kind (i.e. education background, religion, race, job position).

Institutional Environment (9 items)

Environmental Adequacy

26. I work in a school that promotes and raise concerns with a clean and tidy environment.
27. I work in a school that provides various learning resources that is enough for student learning (e.g., availability of library, or laboratory room).
28. I work in a school that is encouraged to use learning resources, as well as, keep the resources readily available for future educators.

Structural Organization

29. My school has an appropriate classroom management system (e.g., class size, teacher & student ratio, number of students per classroom, and classroom utilization).
30. My school has accommodation for learners who have different readiness or potentiality (e.g., disability students, gifted or talented students).
31. My school gives appropriate time for learning and/or extra-curricular activities (e.g., homeroom, student development activity) to help students learn to the fullest.

Availability of Resources

32. I can make full use of tools, equipment, and school resources for teaching or working efficiently (e.g., favorable computers, internet network, digital tools for work).
33. I have received proper work benefits (e.g., health insurance, other necessary benefits for work).
34. My school provides or supports technology use for learning, teaching, and classroom research.