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PROFESSIONAL LEARNING COMMUNITIES AND SCHOOL PSYCHOSOCIAL ENVIRONMENT AS PREDICTORS OF 21ST-CENTURY TEACHING PRACTICES AMONG SECONDARY SCHOOL TEACHERS IN SABAH, MALAYSIA

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Abstract

This article examines the extent to which Professional Learning Communities (PLC) and the school psychosocial environment predict the implementation of 21st-century teaching practices (PAK-21) among teachers in government-aided daily secondary schools in Sabah, Malaysia. The article is derived from a doctoral study that employed a quantitative, non-experimental cross-sectional survey design. The study population comprised 16,538 teachers, from which 400 teachers were selected from 12 secondary schools representing six geographical divisions in Sabah. Data were collected using a five-point Likert-scale questionnaire adapted from established instruments, including the Revised School Level Environment Questionnaire, measures of Professional Learning Communities, and an instrument measuring 21st-century teaching practice. The instruments underwent expert content validation, exploratory factor analysis, and reliability analysis before the main study. Descriptive statistics, Pearson correlation, and stepwise multiple linear regression were used for the analyses reported in this article. The findings showed high levels of the school psychosocial environment ($M = 3.81$, $SD = 0.375$), PLC ($M = 4.07$, $SD = 0.439$), and 21st-century teaching practices ($M = 3.97$, $SD = 0.324$). Both the school psychosocial environment ($r = 0.632$, $p < 0.01$) and PLC ($r = 0.822$, $p < 0.01$) were positively and significantly associated with 21st-century teaching practices. Stepwise regression identified PLC ($B = 0.557$, $\beta = 0.754$, $t = 18.660$, $p < 0.001$) and the school psychosocial environment ($B = 0.083$, $\beta = 0.096$, $t = 2.369$, $p = 0.018$) as significant predictors. Together, the two predictors explained 68.0% of the variance in PAK-21 practices ($R^2 = 0.680$). The findings underscore the importance of collaborative professional learning and a supportive psychosocial school climate in strengthening 21st-century pedagogy in secondary schools in Sabah.

Kata kunci:
Komuniti pembelajaran profesional, persekitaran psikososial sekolah, pengajaran abad ke-21

Artikel ini meneliti sejauh mana Komuniti Pembelajaran Profesional (PLC) dan persekitaran psikososial sekolah dapat meramalkan pelaksanaan amalan pengajaran abad ke-21 (PAK-21) dalam kalangan guru di sekolah menengah harian bantuan kerajaan di Sabah, Malaysia. Artikel ini dihasilkan berdasarkan kajian kedoktoran yang menggunakan pendekatan kuantitatif dengan reka bentuk tinjauan keratan rentas bukan eksperimen. Populasi kajian terdiri daripada 16,538 orang guru, manakala seramai 400 orang guru daripada 12 buah sekolah menengah yang mewakili enam bahagian geografi di Sabah telah dipilih sebagai sampel kajian. Data dikumpulkan menggunakan soal selidik berskala Likert lima mata yang diadaptasi daripada instrumen sedia ada, termasuk Revised School Level Environment Questionnaire, instrumen pengukuran Komuniti Pembelajaran Profesional dan instrumen pengukuran amalan pengajaran abad ke-21. Instrumen kajian telah melalui proses pengesahan kandungan oleh pakar, analisis faktor penerokaan dan analisis kebolehpercayaan sebelum kajian sebenar dijalankan. Statistik deskriptif, analisis korelasi Pearson dan analisis regresi linear berganda secara berperingkat digunakan untuk menganalisis data yang dilaporkan dalam artikel ini. Dapatan kajian menunjukkan bahawa tahap persekitaran psikososial sekolah (M = 3.81, SP = 0.375), PLC (M = 4.07, SP = 0.439) dan amalan pengajaran abad ke-21 (M = 3.97, SP = 0.324) adalah tinggi. Persekitaran psikososial sekolah ($r = 0.632$, $p < 0.01$) dan PLC ($r = 0.822$, $p < 0.01$) masing-masing mempunyai hubungan positif yang signifikan dengan amalan pengajaran abad ke-21. Analisis regresi secara berperingkat mengenal pasti PLC ($B = 0.557$, $\beta = 0.754$, $t = 18.660$, $p < 0.001$) dan persekitaran psikososial sekolah ($B = 0.083$, $\beta = 0.096$, $t = 2.369$, $p = 0.018$) sebagai peramal yang signifikan. Kedua-dua peramal tersebut secara bersama menjelaskan sebanyak 68.0% varians dalam amalan PAK-21 ($R^2 = 0.680$). Dapatan kajian ini menegaskan kepentingan pembelajaran profesional secara kolaboratif dan persekitaran psikososial sekolah yang menyokong dalam memperkukuh amalan pedagogi abad ke-21 di sekolah menengah di Sabah.

1.0 Introduction

Educational transformation in Malaysia requires more than changes in curriculum and the provision of resources. It also depends on the quality of teachers' classroom practices and on the capacity of schools to provide organizational conditions that support pedagogical change. Within the Malaysian education system, 21st-century teaching and learning (PAK-21) emphasizes active learning, communication, collaboration, creativity, critical thinking and student-centred pedagogy. Teachers are therefore central to translating educational aspirations into classroom practice.

However, the implementation of PAK-21 cannot be explained solely through teachers' individual competence. Teaching practice is also embedded in a social and organizational environment. The school psychosocial environment shapes professional relationships, support, communication, innovation and teachers' experiences of their workplace. A conducive environment can provide the psychological and social conditions that allow teachers to experiment with new strategies, receive feedback and address instructional challenges collectively.

Professional Learning Communities (PLC) provide a more structured form of collective professional learning. The PLC literature emphasizes collaborative inquiry, reflective dialogue, shared practice and collective responsibility for improvement. Borko (2004) conceptualized professional development as a situated process of teacher learning, while later work has continued to emphasize collaboration as a

mechanism for sustained professional learning (De Jong et al., 2022; Nguyen et al., 2024; Grimm, 2024). In the Malaysian context, professional collaboration is particularly relevant to the implementation of pedagogical innovations that require teachers to move beyond conventional teacher-centred approaches.

The source doctoral study examined four predictors of PAK-21: school psychosocial environment, teacher self-efficacy, PLC and teacher readiness. All four variables were positively correlated with PAK-21, but the final stepwise regression retained only PLC and the school psychosocial environment as significant unique predictors. This article therefore focuses specifically on these two organizational and collective variables, without altering the original data, analyses or findings of the thesis.

The purpose of this article is to examine the relationship of PLC and the school psychosocial environment with 21st-century teaching practices and to determine their combined predictive contribution among daily secondary school teachers in Sabah, Malaysia.

2.0 Literature review

This section reviews the conceptual and empirical foundations of professional learning communities (PLC) and the school psychosocial environment as contextual correlates of 21st-century teaching practices. It first considers how collective professional inquiry may support instructional improvement, then examines how relationships, trust and organizational support shape teachers' opportunities to implement student-centred pedagogies. Together, these perspectives provide the rationale for examining the two variables in the Sabah secondary-school context.

This section reviews the conceptual and empirical foundations of Professional Learning Communities (PLC) and the school psychosocial environment in relation to 21st-century teaching practices. It first considers collaborative professional learning as a mechanism for improving classroom pedagogy, then examines how school-level psychosocial conditions may support teachers' instructional practices. Together, these perspectives provide the rationale for examining the two constructs as predictors of PAK-21 in Sabah secondary schools.

2.1 Professional Learning Communities and 21st-century teaching

Professional Learning Communities position teacher learning as a collective, continuous and practice-oriented process rather than an isolated activity. Collaborative professional learning enables teachers to share expertise, examine instructional problems, reflect on practice and develop common approaches to teaching. Tam et al. (2016) highlighted the roles of leadership and culture in building PLC, while Wang and Guo An (2023) reported that teachers' professional development can be strengthened through sustained professional learning communities.

The conceptualization used in the thesis is closely aligned with the Hord tradition of PLC, which emphasizes shared and supportive leadership, shared values and vision, collective learning and application, shared personal practice, and supportive conditions. These dimensions are relevant to PAK-21 because pedagogical change requires teachers to develop new instructional knowledge collectively and to

translate professional dialogue into classroom action.

Research synthesized by Liu et al. (2024) indicates that PLC can function as a mechanism for teacher professional development. In addition, Nguyen et al. (2024) emphasized the connection between professional learning communities and student learning, while Singh and Loh (2024) framed PLC as a driver of teacher empowerment and 21st-century instructional practice. These findings support the premise that PLC may be associated with stronger implementation of PAK-21.

2.2 School Psychosocial Environment and Pedagogical Practice

The school psychosocial environment refers to the social and organizational conditions experienced by teachers in their workplace. It includes the quality of professional relationships, perceived support, openness to innovation and the wider climate within which teachers carry out their professional roles. A supportive school climate can reduce isolation and create conditions in which teachers feel safer to experiment, collaborate and seek feedback.

The thesis treats the school psychosocial environment as an organizational factor that interacts with individual and professional variables in shaping PAK-21. This perspective is consistent with social cognitive reasoning that behavior is influenced by the interaction between individuals and their environments (Bandura, 1986). It also aligns with contemporary attention to learning environments and well-being in schools (Singh & Loh, 2024).

Within the context of Sabah, the psychosocial environment is especially relevant because schools operate across diverse geographical and organizational settings. The ability of teachers to sustain innovative classroom practices may therefore depend not only on their personal beliefs or readiness but also on whether the school provides supportive interpersonal and professional conditions.

Based on the integrated framework of the doctoral study, this article addresses two research questions: (a) What are the levels of PLC, school psychosocial environment and 21st-century teaching practices among the sampled teachers? and (b) To what extent do PLC and the school psychosocial environment predict 21st-century teaching practices when considered within the original stepwise regression model?

The two variables are conceptually related but not interchangeable. PLC represents deliberate structures and routines for collective teacher learning, whereas the psychosocial environment concerns the perceived quality of everyday social and organizational interactions. A school may provide scheduled collaborative activities without the trust needed for open professional dialogue; conversely, positive collegial relationships may not automatically generate systematic instructional inquiry. Their joint consideration therefore offers a more differentiated account of the organizational conditions associated with PAK-21.

3.0 Method

This section describes the survey design, sampling frame, measurement instruments, data collection procedures and statistical analyses underlying the findings reported in this article. The analysis draws on the original doctoral dataset and focuses

on the two predictors retained in the final regression model; no additional data collection or re-estimation is claimed.

This section outlines the quantitative research design, study population and sample, measurement instruments, data collection procedures, and statistical analyses. The methodological description is confined to the variables and analyses reported in this article while retaining the context of the broader doctoral investigation.

3.1 Research Design

The study used a quantitative, non-experimental cross-sectional survey design. The design was used to describe the levels of the study constructs and to examine relationships and predictive effects among the variables. As the observations were collected at one point in time, the design is appropriate for estimating concurrent associations and statistical prediction, but it cannot establish temporal order or rule out alternative explanations. Consequently, the term "predictor" is used in its regression-model sense throughout the article.

3.2 Population and Sample

The study population consisted of 16,538 teachers serving in government-aided daily secondary schools in Sabah. A total of 400 teachers were selected from 12 secondary schools. The participating schools represented six broad divisions: North, West, South, Southeast, Sandakan and Interior. The final sample comprised 93 teachers from the North, 77 from the West, 41 from the South, 87 from the Southeast, 39 from Sandakan and 63 from the Interior.

Table 1: Distribution of Respondents by Division

Division	Respondents (n)	Percentage (%)
North	93	23.3
West	77	19.3
South	41	10.3
Southeast	87	21.8
Sandakan	39	9.8
Interior	63	15.8
Total	**400**	**100.0**

3.3 Instrumentation

Recent reviews show that sustained collaboration depends on organizational support and meaningful professional dialogue (Olmo-Extremera et al., 2023; Yu & Chao, 2023).

The study questionnaire used a five-point Likert scale and contained 95 construct items across the full doctoral model. For the variables emphasized in this article, the school psychosocial environment was measured using 15 items adapted from the Revised School Level Environment Questionnaire, PLC was measured using 15 items based on established PLC instruments, and PAK-21 was measured using 34 items covering critical thinking, collaboration, communication, creativity and

innovation. The pilot-study Cronbach's alpha coefficients were 0.893 for the school psychosocial environment, 0.856 for PLC and 0.914 for PAK-21, indicating good internal consistency.

A pilot study involving 100 secondary school teachers was conducted before the main study. The questionnaire was reviewed by four expert panels. Exploratory factor analysis used Principal Component Analysis with Oblimin rotation. Across the study variables, Kaiser-Meyer-Olkin values ranged from 0.730 to 0.857, and the percentage of explained variance ranged from 34.05% to 47.66%, supporting the suitability of the instruments for further analysis.

3.4 Data Collection and Analysis

Formal permission to conduct the research was sought from the Educational Planning and Research Division of the Ministry of Education Malaysia, followed by the Sabah State Education Department and the relevant District Education Offices. Participating schools were contacted before questionnaire administration. Respondents were informed that the information provided would be confidential and used for research purposes.

The reported results were obtained from the existing dataset. Means and standard deviations were used to summarize construct scores, Pearson's r to quantify bivariate linear relationships, and stepwise multiple linear regression to identify retained variables in the candidate model. The stepwise selection procedure is data-dependent; therefore, the reported explanatory power should be interpreted within this sample and verified through replication in independent samples.

The doctoral study used IBM SPSS and IBM AMOS for data analysis. The analyses relevant to this article comprise descriptive statistics, Pearson correlation and stepwise multiple linear regression. The original regression model considered school psychosocial environment, teacher self-efficacy, PLC and teacher readiness as candidate predictors of PAK-21. The stepwise procedure retained PLC and school psychosocial environment as the significant predictors.

4.0 Findings

The results are presented in three stages. First, descriptive statistics summarize the levels of the focal constructs. Second, Pearson correlations describe their bivariate associations with PAK-21 practices. Third, the stepwise multiple regression results identify the predictors retained from the original four-variable candidate model. These associations and predictive coefficients should not be interpreted as evidence of causation.

This section presents the empirical findings in three stages. First, descriptive statistics summarize the levels of the school psychosocial environment, PLC, and PAK-21 practices. Second, Pearson correlations examine the bivariate relationships between each focal predictor and PAK-21. Finally, the stepwise multiple regression results identify the predictors retained in the original doctoral model and their respective contributions to explained variance.

4.1 Descriptive Levels of the Focal Variables

The descriptive results showed that PLC, the school psychosocial environment and 21st-century teaching practices were all at a high level. PLC recorded a mean of 4.07 (SD = 0.439), the school psychosocial environment recorded a mean of 3.81 (SD = 0.375), and PAK-21 recorded a mean of 3.97 (SD = 0.324).

Table 2: Descriptive Statistics for the Focal Variables

Variable	N	Minimum	Maximum	Mean (SD)
School psychosocial environment	400	2.62	4.95	3.81 (0.375)
Professional Learning Communities	400	3.00	5.00	4.07 (0.439)
21st-century teaching practices	400	3.26	4.91	3.97 (0.324)

4.2 Correlation with 21st-Century Teaching Practices

Pearson correlation analysis showed statistically significant positive relationships between both focal predictors and PAK-21. The relationship between PLC and PAK-21 was very strong ($r = 0.822$, $p < 0.01$), whereas the school psychosocial environment also showed a substantial positive relationship with PAK-21 ($r = 0.632$, $p < 0.01$).

Table 3: Pearson Correlations with 21st-Century Teaching Practices

Predictor	Pearson r	p
School psychosocial environment	0.632	< 0.01
Professional Learning Communities	0.822	< 0.01

4.3 Stepwise Multiple Regression

In the original doctoral regression analysis, all four candidate predictors were entered at the specified significance level. Teacher self-efficacy and teacher readiness were not retained because they did not make statistically significant unique contributions after the stepwise selection. PLC and the school psychosocial environment were retained as predictors of PAK-21.

PLC entered the model first and accounted for 67.5% of the variance in PAK-21 ($R2 = 0.675$; $F = 828.384$). The addition of the school psychosocial environment increased the explained variance to 68.0% ($R2 = 0.680$; delta $R2 = 0.005$; $F = 421.798$). PLC had the larger standardized coefficient (beta = 0.754, $t = 18.660$, $p < 0.001$), while the school psychosocial environment contributed a smaller but statistically significant coefficient (beta = 0.096, $t = 2.369$, $p = 0.018$).

Table 4: Final Stepwise Regression Model Predicting PAK-21

Predictor	B	beta	t	p	Model contribution
Professional Learning Communities	0.557	0.754	18.660	< 0.001	R2 = 0.675
School psychosocial environment	0.083	0.096	2.369	0.018	delta R2 = 0.005

Final model: R2 = 0.680. The two retained predictors jointly explained 68.0% of the variance in 21st-century teaching practices.

5.0 Discussion

The results demonstrate that PLC is the strongest organizational predictor of PAK-21 in the doctoral dataset. Its bivariate correlation with PAK-21 was high, and it remained the dominant predictor in the stepwise regression model. This pattern supports the view that 21st-century pedagogy is strengthened when teachers have structured opportunities to learn with colleagues, share instructional knowledge and reflect collectively on classroom practice.

The magnitude of the PLC contribution is consistent with literature that conceptualizes professional communities as mechanisms for sustained teacher learning. Borko (2004) emphasized the situated nature of professional development, while De Jong et al. (2022) highlighted the importance of collaboration and data use in teacher professional learning communities. More recent work in Malaysia and comparable settings has likewise linked PLC participation with professional development, teacher empowerment and instructional improvement (Dzul et al., 2023; Singh & Loh, 2024; Wang & Guo An, 2023). Evidence also connects PLC participation with efficacy beliefs and collective trust, although these associations do not establish causation (Liu et al., 2024; Singh & Loh, 2024).

The school psychosocial environment also made a statistically significant unique contribution after PLC entered the model. Although its additional contribution to explained variance was comparatively small, the result is substantively important because it indicates that professional learning structures operate within a wider organizational climate. Collaborative learning is more likely to be sustained when teachers experience supportive relationships, trust, constructive interaction and a work environment that permits professional experimentation.

The combined model highlights the complementary roles of professional structure and psychosocial climate. PLC provides the organized mechanism for collective learning, whereas the psychosocial environment provides conditions that can enable or constrain such learning. This supports a systems-oriented interpretation of pedagogical change: improvement in PAK-21 is not simply a function of individual teacher attributes but is embedded in the professional and social organization of the school.

An important aspect of the original thesis findings is that teacher self-efficacy and teacher readiness were significantly correlated with PAK-21 but were not retained as unique predictors in the final stepwise model. This does not mean that those

individual variables are unimportant. Instead, within the model tested, their unique predictive contribution was reduced when PLC and school psychosocial environment were considered. The finding therefore directs attention to the possibility that organizational and collective conditions may be especially salient for explaining variation in PAK-21 among the sampled teachers.

The findings have practical implications for school leadership and teacher professional development. First, school-based professional learning should be designed as an ongoing collaborative process rather than as isolated training events. Structured approaches such as professional dialogue, peer coaching, lesson study and collaborative inquiry can provide repeated opportunities for teachers to examine PAK-21 practice and learn from one another.

Second, strengthening PLC should be accompanied by attention to the psychosocial conditions of the school. Collaboration is difficult to sustain in environments characterized by weak trust, limited professional support or restricted opportunities for open discussion. School leaders therefore need to cultivate supportive relationships, psychological safety and shared responsibility for instructional improvement. Leadership and relational trust may further shape collaborative practices (Zhang & Liu, 2024).

Third, policy and professional-development initiatives may benefit from recognizing differences across school contexts in Sabah. The organizational capacity to sustain PLC and supportive psychosocial conditions can vary according to geography, resources and local circumstances. A context-sensitive approach may therefore be more appropriate than a uniform implementation strategy.

The distinctive contribution of the doctoral study, as reflected in this article, is the identification of a pattern in which collective and organizational factors make the dominant unique contribution to PAK-21 when the study variables are examined simultaneously. Specifically, PLC explains the largest proportion of variance, while the school psychosocial environment adds a smaller but significant increment. The result extends the interpretation of PAK-21 beyond individual teacher attributes and provides empirical evidence from government-aided daily secondary schools in Sabah, a context characterized by substantial geographical, demographic and organizational diversity.

The findings should be interpreted within the delimitations of the original study. The sample was drawn from daily secondary schools in Sabah, and the measures relied on teacher self-report. The cross-sectional design also limits causal interpretation. Future studies may use Structural Equation Modeling or path analysis to test direct, indirect, mediating and moderating relationships more rigorously. Mixed-method and longitudinal studies could also examine how PLC and psychosocial conditions develop over time and how they are translated into observable classroom practices. Replication across different school types and regions would further test the external validity of the model.

6.0 Conclusion

This article demonstrates that Professional Learning Communities and the school psychosocial environment are significant predictors of 21st-century teaching practices among the sampled secondary school teachers in Sabah. PLC was the dominant predictor, accounting for 67.5% of the variance in the first regression step,

while the psychosocial environment added a further 0.5 percentage points. Together, the two variables explained 68.0% of the variance in PAK-21. The findings suggest that strengthening 21st-century pedagogy requires not only competent individual teachers but also collective professional learning structures and a supportive school environment that enables teachers to learn, collaborate and innovate.

Taken together, these findings offer a practical direction for school improvement by emphasizing the alignment of collaborative professional learning with a supportive organizational climate. School leaders can use this evidence to prioritize sustained opportunities for teachers to share instructional strategies, reflect on classroom experiences, and develop collective approaches to PAK-21. Nevertheless, because the evidence is cross-sectional and based on self-reported responses, the predictive relationships should not be interpreted as causal effects. Further research across different school settings would help establish the transferability and robustness of these findings.

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8.0 Conflict of Interest Statement:

The author declares that there is no conflict of interest regarding the publication of this article.

9.0 Research and Publication Ethics Statement:

Permission to conduct the study was sought from the relevant education authorities. Respondents were informed that their questionnaire responses would be treated confidentially and used for research purposes. Confirmation of informed consent, the applicable ethics-approval record and the publication originality declaration is required from the author prior to submission.

10.0 Author Contributions:

Nurulhuda Mohd Derus is the sole named author of this manuscript and is responsible for reviewing and approving its final submitted version. Specific contributions to study design, data collection and analysis should be confirmed by the author.

11.0 Data Availability Statement:

The conditions under which de-identified study data may be made available are subject to confirmation by the author and any applicable institutional or participant-confidentiality restrictions.

12.0 AI Disclosure Statement:

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