

Establishing the Validity and Reliability of Professional Learning Community (PLC) Inventory in Educational Sector

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Abstract

The implementation of Profesional Learning Community (PLC) among secondary school teachers can enhance school capacity and excellence. To assess the execution of PLC, a reliable and valid instrument is necessary. This study aims to examine the validity, reliability and EFA of an instrument designed to evaluate the implementation of PLC. A well-designed instrument, which was distributed to 69 secondary school teachers in the form of a questionnaire for measuring the key components of PLC implementation and providing reliable data for research and assessment purposes. The Context, Input, Process and Product (CIPP) Evaluation Model, established by Daniel Stufflebeam, served as the foundation for the instrument. The content validity of the instrument was examined by experts, while the construct validity was assessed using internal consistency reliability or Cronbach Alpha. The pilot study findings suggest that the instrument is both reliable and valid, with 87 out of 91 items retained. This instrument provides a new perspective on measuring the implementation of Profesional Learning Community, especially in the school context.

Keywords: CIPP Model, Evaluation, Exploratory Factor Analysis (EFA), PLC

Introduction

The Malaysian Education Blueprint (PPPM) 2013-2025 Thrust 4 aims to elevate the teaching profession to be preferred profession (KPM, 2014). To ensure the continuity of teacher quality, the Teacher Education Division (BPG) implemented several initiatives, including the Profesional Learning Community (PLC).

The PLC is a school improvement process that involves collaborative efforts from school leadership and community members to generate knowledge and share information to enhance student performance (Zuraidah, 2021). Today's scholars recognize PLC as a critical element capable of transforming educational practices and enhancing the quality of teaching and student performance (Siti Nafsiah, 2019)

Implementing PLC in schools fosters the development of learning values through collaboration, promoting dynamic learning among teachers, students, principals, parents, and the community. Furthermore, PLC serves as agent to optimize the potential and skills of

teachers by enhancing the quality of the teaching and learning process and encouraging parental and community involvement in ensuring student success (KPM, 2014)

PLC is composed of five significant dimensions: i) shared and supportive leadership, ii) shared values, norms, missions and vision, iii) collective learning and application, iv) personel sharing practices and v) supportive conditions concerning relationships and structure. These five dimensions have a mutually reinforcing effect in ensuring that teacher learning takes place continuously, thereby enhancing student performance in school (Hipp & Huffman, 2003; Hord, 1997)

Literature Review

PLC, evaluation, instrumentation, validity, reliability and Exploratory Factor Analysis (EFA) from the literature are to be reviewed in this section.

Profesional Learning Community (PLC)

PLC, as defined by IPGM (2021), refers to a collective of teachers and administrators who engage in ongoing exploration, sharing of knowledge, and subsequent implementation of action based on their learning. This collaborative effort aims to enhance teaching practices and overall educational outcomes. On the other hand, the Teacher Professionalism Department (2019) defines KPP as a group of dedicated teachers who work together in a collaborative manner, striving to continuously improve the quality of teaching and contribute to the holistic development of students.

According to Zuraidah (2016), the PLC is considered a highly effective practice in school improvement, aimed at addressing challenges and enhancing student achievement. The primary objective of the PLC is to facilitate the sharing of teachers' skills and knowledge, foster meaningful relationships, plan focused programs, leverage available resources, and promote shared leadership in alignment with the National Education Policy. This collective effort aims to cultivate high-quality human capital for the future (KPM, 2019).

To gauge the impact of PLC implementation and identify areas for improvement, it is essential for the responsible party to assess its strengths, successes and weaknesses. Consequently, this study aims to evaluate the implementation of PLC, examining its positive aspects as well as areas that require enhancement. The findings from this evaluation will provide valuable insights for making necessary improvements.

Evaluation

According to Stufflebeam (2000), evaluation serves two primary purposes. Firstly, it aims to assess achievements and determine the extent to which desired goals and objectives have been accomplished. This helps in understanding the effectiveness and success of the subject under evaluation. Secondly, evaluation seeks to identify alternative options and potential improvements that can contribute to informed decision-making processes. By examining different possibilities and gathering insights through evaluation, decision-makers can make more informed choices and take appropriate actions.

Besides that, the CIPP (Context, Input, Process, Product) model is widely utilized to evaluate program implementation effectiveness due to its comprehensive nature. This model encompasses key dimensions necessary for assessment. It considers the contextual factors surrounding the program, the inputs or resources involved, the process of implementation, and the resulting products or outcomes.

Therefore, this CIPP Evaluation Model was chosen to conduct a study on the implementation of the PLC among secondary school teachers in the State of Selangor.

Instrument

The objective of this study was to assess the implementation of the PLC and to establish the validity, reliability and EFA of the instrument used in the evaluation process. A questionnaire was utilized as the survey instrument, featuring a seven-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. The questionnaire was distributed to 69 secondary school teachers in one of the Malaysian states.

The development of the instrument was executed in several stages. The researchers initially conducted an extensive literature search across various theories. Next, the researches utilized Stufflebeam's CIPP Model to design the instrument. Furthermore, they referred to past instruments and constructs developed by the ministry in its documents to aid in the design process. The researchers also sought the assistance of eight field specialists, including evaluation, subject matter, language, institutional and department experts to evaluate the instrument's content validity. Correction and improvements were made based on the experts' comments and suggestions. After completing the final draft, the researches submitted it to the academic advisor for finalization before conducting a pilot study to assess the instrument's validity and reliability criteria.

Validity

Validity refers to the degree of accuracy in representing information on a scale or within an assessment group (Hair et al., 2014). It ensures that the research is conducted as planned by the researcher with accurate and reasonable measurements (Uma Sekaran & Bougie, 2016). In this study, the validity of the questionnaire was established by consulting experts in the field under study. Typically, a review by a minimum of two experts is recommended (Äng & Garme, 2016). In this case, eight experts were involved, with six experts assessing content validity and two experts assessing face validity. All experts possessed extensive experience in the education field, with over fifteen years of expertise.

The experts were asked to rate each item on a four-point scale indicating construct relevance: 1 = irrelevant, 2 = somewhat relevant, 3 = relevant, 4 = very relevant. A total of 94 items were adapted for the study. The researcher compiled and summarized all responses and comments provided by the experts. The researchers then calculated the content validity index (CVI), which takes into account the average rating and the degree of suitability assigned by the experts. A CVI value of \geq 0.83 (Lynn, 1986) was considered acceptable.

Reliability

Reliability is defined as the stability or consistency of a measure when tested repeatedly (Idris, 2010). Furthermore, the reliability of a measure is achieved when it is consistent and unbiased and measures the concept that should be measured (Sekaran, 2016). In fact, internal consistency is an efficient and often used method to obtain trust in questionnaires (Santhanadass, 2015). In accordance with Creswell (2014) who stated that when the research instrument is in the form of a questionnaire, the best method to use is the reliability of the instrument using the Cronbach Alpha (α) coefficient. Therefore, the reliability of a study is seen based on the Cronbach Alpha value (Hair 2006). The table 1 below shows a guide to the correlation of Cronbach Alpha reliability values:

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Interpretation of Alpha Cronbach (Hair, 2006)	
Alpha Cronbach	Interpretation
< 0.60	Unacceptably low reliable
0.61 - 0.70	Reliable
> 0.80	Highly reliable

Table 1 Interpretation of Alpha Cronbach (Hair, 2006)

Exploratory Factor Analysis (EFA)

EFA is used to explore the data in search of information about the factor structure of the data. EFA is important for testing hypotheses and identifying any redundancy between items (Russell, 2002).The items in the questionnaire have been modified from the previous researcher's study to be more suitable to the context of the researcher's study, so the EFA application is followed and implemented with the aim of justifying the entire item (Zainudin Awang et al., 2018). All items under the four constructs (CIPP) in the questionnaire were checked using EFA as suggested by (Williams et al., 2010).

Principal component analysis (PCA) with Varimax rotation was performed on the questionnaire using IBM SPSS software with eigenvalues greater than one being extracted by factors. However, interpretation of results with double loading was done with caution, as recommended by (D. Muijs, 2011). The Varimax with Kaiser Normalization method was used for rotation and the analysis extracted factors from the context evaluation dimension components. The types of items contributing to the factors were found to be consistent with the earlier theory.

Methodology

The pilot study involved 69 secondary school teachers who were selected from the Klang district. It is important to ensure that the participants in the pilot study share similarities with the study population (Konting, 2005) but will not be included in the actual study to avoid contamination (Chua, 2014; Idris, 2013).

The sample size of 69 respondents was deemed sufficient for the researcher to proceed with exploratory factor analysis (EFA) and reliability analysis, as suggested by (Hair et al., 2014). The EFA helps to identify underlying factors or dimensions within the questionnaire, while the reliability analysis assesses the internal consistency and reliability of the instrument.

By conducting the pilot study, the researcher was able to refine the questionnaire further and assess its suitability for the field study. The feedback and responses from the pilot study participants informed any necessary adjustments or improvements to ensure the clarity and comprehensibility of the questionnaire. This process ensured that the final instrument used in the field study was reliable and suitable for capturing the desired data.

Results and Discussion

The results presented in this study are organized based on three fundamental characteristics: the validity, reliability and EFA of the instruments used. A survey administered in this study resulted in 87 original items being retained out of the initial 94 items, based on the assessments of validity, reliability and EFA.

a. Content Validity for Context, Input, Process and Product Evaluation

The CVI analysis was conducted using the formula by Polit and Beck (2006). The CVI for the constructs in this study ranged from 0.94 to 0.98 (Table 2), exceeding the threshold of

0.83. This indicated that the research instrument achieved acceptable content validity, as determined by the six experts. However, items with CVI values below 0.83 (Lynn, 1986) were removed. Specifically, two items were eliminated from the input evaluation dimension and one item from the product evaluation dimension.

Table 2							
VI constructs							
Constructs	Expert	Expert	Expert	Expert	Expert	Expert	CVI
	1	2	3	4	5	6	
Total Score	0.98	0.97	0.94	0.96	0.94	0.98	0.96

In conclusion, after the content validity process, the questionnaire, initially containing 94 items, was refined to retain 91 items. This revised questionnaire was then administered to secondary school teachers for pre-testing and pilot study.

b. Reliability and EFA for Context Evaluation

The dimension of context evaluation consists of three constructs: teachers' perspectives on the National Education Philosophy's goals, teachers' views on the Malaysia education Blueprint (2013–2025) and teachers' assessment of the objective PLC. Each construct is comprised of a total of twelve items with four items for the first construct, three items for the second construct and five items for the third construct. Table 3 displays the utilization of Cronbach's Alpha to assess the internal consistency reliability of each construct. According to the pilot study results that shows in Table 3, the Cronbach's Alpha reliability coefficient for the context evaluation dimension was found to be high. The results suggest that all items in the context evaluation dimension have a minimum value above 0.60, which indicates that the items are acceptable and possess good reliability. Thus, the items in this particular construct can be deemed suitable for use in field studies based on their high reliability coefficients,

Table 3

Context Evaluation	Item		Cronbach's Alpha	Overall Value
Constructs			Item Deleted	Alpha
Teachers' views on National		B1	0.941	
Education Philosophy		B2	0.940	
		B3	0.942	
		B4	0.939	
Teachers' views on MEB		B5	0.938	
(2013-2025)		B6	0.942	0.946
		B7	0.942	
Teachers' views on objective	!	B8	0.941	
PLC		B9	0.941	
	B10		0.944	
	B11		0.942	
	B12		0.942	

Cronbach's Alpha values if items are deleted and overall Cronbach's Alpha coefficient for constructs in context evaluation dimension

The findings of the factor analysis using Varimax rotation for context assessment dimension are presented in Table 4.

Component Matrix				
ltem	1	2	3	
B5	0.889			
B4	0.840			
B2	0.816			
B9	0.800			
B1	0.797			
B8	0.793			
B7	0.788			
B12	0.778			
B11	0.776			
B3	0.766			
B6	0.759			
B10	0.711			

Factor analysis findings with Varimax rotation for context evaluation dimension components Component Matrix

Based on Table 4, three factors extracted from context evaluation dimension component. The first factor comprises three items related to teachers' view on the National Education Philosophy (Items B1-B3), the second factor comprises three items on teachers' views on the Malaysian Education Blueprint (2013-2025) (Items B4-B6) and the third factor comprises five items on teachers' view on the objective of PLC (items B7-B12). All items in the three constructs of context evaluation were retained, indicating their significance in assessing the implementation of PLC among secondary school teachers.

c. Reliability and EFA for Input Evaluation

Table 4

The input evaluation dimension, includes three constructs: teachers' views on Design Action Share (DAS) Strategy, teachers' views on PLC Kit and teachers' view on PLC implementation facility. The pilot study found that the Cronbach's Alpha values for all items in each construct more than 0.90. which suggests acceptable to very good reliability. There is no need to repeat the pilot study before administering the instrument to the actual sample (Ghazali & Sufean, 2018). Therefore, the items in this construct can be used in field studies. Additionally. Table 5 displays the Cronbach's Alpha values if the items are eliminated, as well as the overall Cronbach's Alpha for input assessment dimension constructs.

Table 5

Cronbach's Alpha values if items are deleted and overall Cronbach's Alpha for input assessment dimension constructs

Input Evaluation	Item	Cronbach's Alpha if	Overall Value
Constructs		Item Deleted	Cronbach's Alpha
Teachers' views on	C1	0.966	
Design Action Share	C2	0.966	
(DAS) Strategy	C3	0.966	
	C4	0.966	
	C5	0.966	
	C6	0.966	
	C7	0.967	
	C8	0.967	
	C9	0.965	
	C10	0.966	
Teachers' views on	C11	0.966	
PLC Kit	C12	0.966	0.067
	C13	0.966	0.967
	C14	0.966	
	C15	0.965	
	C16	0.966	
	C17	0.966	
	C18	0.965	
	C19	0.965	
	C20	0.966	
	C21	0.967	
	C22	0.966	
	C23	0.966	
	C24	0.966	
	C25	0.967	
Teachers' views on	C26	0,966	
PLC implementation	C27	0.966	
facility	C28	0.966	
	C29	0,969	

Based on Table 6, the analysis revealed three factors that were extracted from components. The factors are: (a) teachers' views Design, Action and Share (DAS) Strategy (10 Items: Items C1-C10) including ten items, (b) teachers' views on PLC Kit (15 Items: Items C11-C25) involving fifteen items and (c) teachers' views on PLC implementation facility (4 Items: Items C26-C29) comprising four items. Nevertheless, values factor loading for item C29 was less than 0.60. The researcher deleted item C29 from the questionnaire.

Tabl	e 6
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Component Matrix					
Item		1	2	3	
	C18	0.865			
	C19	0.836			
	C15	0.833			
	C9	0.827			
	C2	0.804			
	C22	0.795			
	C13	0.782			
	C5	0.777			
	C20	0.767			
	C17	0.760			
	C3	0.756			
	C16	0.748			
	C1	0.738			
	C26	0.732			
	C4	0.732			
	C24	0.731			
	C27	0.728			
	C11	0.724			
	C10	0.722			
	C23	0.706			
	C6	0.705			
	C12	0.692			
	C25	0.676			
	C28	0,674			
	C14	0.667			
	C8	0.653			
	C7	0.643			
	C21	0.637			
	C29	0.534			

Results of Varimax rotation factor analysis for input evaluation dimension components

c. Reliability and EFA for Process Evaluation

The process evaluation dimension comprises four constructs; teachers' attitudes in implementing the PLC, teachers' knowledge of the PLC, the application frequency of collaborative tools and cooperation of administrators in the PLC implementation. The pilot study yielded a high Cronbach's Alpha value for the process evaluation dimension, exceeding 0.60, indicating reliable results. Consequently, there is no need to repeat the pilot study before administering the instrument to the actual sample. The items within this construct can be used in field studies. Table 7 presents both the overall Cronbach's Alpha for the process assessment dimension construct and the Cronbach's Alpha value if the items are removed, providing clear and concise information

Table 7

Cronbach's Alpha values if items are eliminated and overall Cronbach's Alpha for process evaluation dimension construct

Process Evaluation	Item	Cronbach's Alpha if	Overall Value
Constructs		Item Deleted	Cronbach's Alpha
Teachers' attitudes	D1	0.965	
towards	D2	0.965	
implementing the	D3	0.965	
PLC	D4	0.965	
	D5	0.965	
	D6	0.965	
Teachers' knowledge	D7	0.965	
improvement by	D8	0.965	
implementing PLC	D9	0.966	
	D10	0.966	
	D11	0.965	
Application	D12	0.965	0.967
frequency of	D13	0.966	
collaborative tools	D14	0.965	
	D15	0.966	
	D16	0.966	
	D17	0.966	
	D18	0.966	
	D19	0.966	
	D20	0.965	
	D21	0.965	
	D22	0.966	
	D23	0.966	
Cooperation of	D24	0.966	
administrators in the	D25	0.965	
PLC implementation	D26	0.966	
	D27	0.965	
	D28	0.965	
	D29	0.965	
	D30	0.965	
	D31	0.965	

Table 8 revealed three factors that were extracted from the components. The factors are: (a) teachers' attitudes in implementing the PLC (6 Items: Items D1-D6) (b) teachers' knowledge of the PLC (5 Items: D7-D11) (c) application frequency of collaborative tools (12 Items: D12-D23) (d) cooperation of administrators in the PLC implementation (8 Items: D24-D31) Nevertheless, values factor loading for items D18, D22 and D24 were less than 0.60. The researcher deleted items D18, D22 and D24 from questionnaire.

Table 8

Compor	Component Matrix						
Item		1	2	3	4		
D4		0.822					
D7		0.813					
D30		0.795					
D12		0.789					
D6		0.787					
D31		0.776					
D5		0.760					
D1		0.756					
D27		0.755					
D25		0.754					
D28		0.753					
D11		0.751					
D8		0.750					
D3		0.732					
D29		0.732					
D21		0.724					
_							
D9		0.722					
D20		0.722					
	D2	0.717					
D14		0.699					
D26		0.687					
D15		0.679					
D10		0.673					
D16		0.649					
D13		0.640					
D19		0.638					
D23		0.635					
DT/		0,610					
		0.5/3					
D18		0.570					
D24		0.564					

d. Reliability and EFA for Product Evaluation

The product evaluation dimension consists of three constructs, namely teachers' teaching skill improvement by implementing PLC, collaborative culture among teachers, and improving students' achievement by implementing PLC. The results of the internal consistency and reliability analysis for each construct are presented in Table 9. The pilot study revealed a high Cronbach's Alpha value for the product evaluation dimension, indicating excellent reliability. The findings indicate that all items within the construct have a minimum value exceeding 0.60, signifying acceptable to very good reliability. Hence, there is no requirement to replicate the pilot study before implementing the instrument in the actual sample. Consequently, the items within this construct can be utilized in the field study.

Table 9

Shows the Cronbach's Alpha values if the items are eliminated and the overall Cronbach's Alpha for the product evaluation dimension construct.

Product Evaluation	ltem	Cronbach's	Alpha	if I	tem	Overall Value
Constructs		Deleteu				Alpha
Teachers' view on teaching	E1	0.970				
skill improvement by	E2	0.971				
implementing PLC	E3	0.970				
	E4	0.970				
	E5	0.970				
Teachers' views on	E6	0.970				
collaborative culture	E7	0.969				
among teachers	E8	0.970				
	E9	0.970				0.972
	E10	0.970				
	E11	0.970				
	E12	0.972				
	E13	0.970				
Teachers' views on	E14	0.970				
improving students'	E15	0.970				
achievement by	E16	0.970				
implementing PLC	E17	0.970				
	E18	0.970				
	E19	0.970				

Table 10 presents the factor results for the product evaluation dimension component obtained through the Varimax (Rotated Component Matrix0 method with normality (Varimax with Kaiser Normalisation), which revealed four factors from the extracted product components.

Table 10

Component Matrix			
Item	1	2	3
E7	0,874		
E13	0.850		
E18	0.848		
E3	0.848		
E19	0.840		
E6	0.836		
E17	0.834		
E14	0.834		
E16	0.821		
E15	0.816		
E4	0.811		
E1	0.808		
E8	0,801		
E10	0.800		
E9	0,795		
E11	0.794		
E5	0,794		
E2	0.777		
E12	0,690		

Factor results with Varimax rotation for product evaluation dimension components

Based on Table 11, three factors from the product evaluation dimension components were extracted. The factors are (a)teachers' teaching skill improvement by implementing PLC (5 Items: Items E1-E5), (b) collaborative culture among teachers (8 Items: Items E6-E13), (c) improving students' achievement by implementing PLC (6 Items: Items E14- E19). The conclusion is all items in the three constructs of product evaluation were retained.

Table 11

Shows all items in CIPP evaluation dimensions and items after the validity, reliability and EFA process.

Teachers' views on a)NationalEducationB1, B2, B3, B4B1, B2, B3, B4a)NationalEducationB1, B2, B3, B4B1, B2, B3, B4b)MEB (2013-2025)B5, B6, B7B5, B6, B7B5, B6, B7c)objective PLCB8, B9, B10, B11, B12B8, B9, B10, B11, B12B8, B9, B10, B11, B12Input evaluation constructItems before the validity and reliabilityItem after the validity and reliabilityTeachers' views on a)Design Action ShareC1, C2, C3, C4, C5, C6, C7, C8, C1, C2, C3, C4, C5, C6, C7, C8, (DAS) StrategyC9, C10C9, C10b)PLC KitC11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25C23, C24, C25C23, C24, C25c)PLC implementation reliabilityC26, C27, C28C26, C27, C28C26, C27, C28Process evaluation constructItems before the validity and reliabilityItem after the validity and reliabilityTeachers' views on a)a)atitudes of teachers by implementing the PLCD1, D2. D3, D4, D5, D6D1, D2. D3, D4, D5, D6a)teachers' knowledge by implementing PLCD12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23D19, D20, D21, D23D19, D20, D21, D23b)application frequency of collaborative tools administrators in the play, D30, D31D31D31D31PLC implementation reliabilityItems before the validity and reliabilityItem after the validity and reliabilityTeachers' views on a)a)teaching skillE1, E2,	Context evaluation construct	Items before the validity and reliability	Item after the validity and reliability
a) NationalEducationB1, B2, B3, B4B1, B2, B3, B4PhilosophyMEB (2013-2025)B5, B6, B7B5, B6, B7B5, B6, B7c) objective PICB8, B9, B10, B11, B12B8, B9, B10, B11, B12B8, B9, B10, B11, B12Input evaluation constructItems before the validity and reliabilityItem after the validity and reliabilityTeachers' views ona)Design Action ShareC1, C2, C3, C4, C5, C6, C7, C8, C11, C12, C13, C14, C15, C16, C11, C12, C13, C14, C15, C16, C17, C13, C14, C15, C16, C17, C18, C19, C10, C11, C12, C16, C17, C18, C19, C11, C12, C13, C14, C15, C16, C17, C18, C19, C11, C12, C16, C17, C18, C19, C11, C12, C13, C14, C15, C16, C17, C18, C19, C11, C12, C16, C00peration of D124, D12, D13, D14, D15, D16, D17, D12, D13, D14,	Teachers' views on		
b) MEB (2013-2025) c) objective PLC B8, B9, B10, B11, B12 Input evaluation construct reliability Teachers' views on a) Design Action Share (DAS) Strategy DEC Kit PIC Kit Process evaluation construct terms before the validity and reliability Teachers' views on a) Design Action Share (DAS) Strategy C9, C10 C1, C2, C3, C4, C5, C6, C7, C8, (DAS) Strategy C9, C10 C1, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25 C23, C24, C25 C23, C24, C25 C23, C24, C25 C26, C27, C28, C29 C26, C27, C28 facility Process evaluation construct reliability Teachers' views on a) attitudes of teachers the PLC b) application frequency b) application frequency c12, C13, D14, D15, D16, D17, of collaborative tools c) cooperation a) teachers' site soft provement process evaluation construct terms before the validity and reliability Teachers' views on a) attitudes of teachers the PLC b) application frequency D12, D13, D14, D15, D16, D17, D12, D13, D14, D15, D16, D17, D12, D13, D14, D15, D16, D17, D12, D13, D14, D15, D16, D17, D13, D20, D21, D22, D23 D25, D26, D27, D28, D29, D30, administrators in the D30, D31 Product evaluation construct terms before the validity and reliability Teachers' views on a) teaching skill improvement by implementing PLC b) collaborative culture E6, E7, E8, E9, E10, E11, E12, E6, E7, E8, E9, E10, E11, E12, e14, E15, E16, E17, E18, E19 achievement by implementing PLC b) collaborative culture E6, E7, E8, E9, E10, E11, E12, E6, E7, E8, E9, E10, E11, E12, e13, E14, E15, E16, E17, E18, E19 achievement by implementing PLC D10TAL ITEMS 91 items 87 items	a) National Education Philosophy	B1, B2, B3, B4	B1, B2, B3, B4
c)objective PLCB8, B9, B10, B11, B12B8, B9, B10, B11, B12Input evaluation constructItems before the validity and reliabilityItem after the validity and reliabilityTeachers' views on a)Design Action Share (DAS) StrategyC1, C2, C3, C4, C5, C6, C7, C8, C9, C10C1, C12, C13, C14, C15, C16, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25C23, C24, C25c)PLC implementation facilityC26, C27, C28, C29C26, C27, C28Process evaluation constructItems before the validity and reliabilityItem after the validity and reliabilityTeachers' views on a)a) attitudes of teachers implementing the PLCD1, D2. D3, D4, D5, D6D1, D2. D3, D4, D5, D6a)teachers' knowledge implomenting PLCD7, D8, D9, D10, D11D7, D8, D9, D10, D11b)application frequency of collaborative tools administrators in the D30, D31D31Product evaluation construct implementing PLCItems before the validity and reliabilityProduct evaluation construct implementing PLCItems before the validity and reliabilityProduct evaluation construct a (tachers' views on a)Items before the validity and reliabilityProduct evaluation construct implementing PLCItems before the validity and reliabilityProduct evaluation construct implementing PLCItems before the validity and reliabilityProduct evaluation construct implementing PLCItems before the validity and reliabilitya)teaching skillE1, E2, E3, E4, E5<	b) MEB (2013-2025)	B5. B6. B7	B5. B6. B7
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Teachers' views on a) Design Action Share (1, C2, C3, C4, C5, C6, C7, C8, (DAS) Strategy (29, C10) b) PLC Kit (11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25) c) C1, C2, C3, C4, C5, C6, C7, C8, C17, C18, C19, C20, C21, C22, C23, C24, C25 c) PLC implementation C26, C27, C28, C29 C26, C27, C28 facility reliability Process evaluation construct Items before the validity and reliability a) attitudes of teachers inplementing the PLC a) tattitudes of teachers inplementing PLC b) application frequency of callshorative tools on paper and inistrators in the PLC bi application construct D12, D13, D14, D15, D16, D17, D12, D13, D14, D15, D16, D17, Of collaborative tools D10, D21, D22, D23, D24, D25, D26, D27, D28, D29, D20, D21, D22, D23 c) cooperation of D24, D25, D26, D27, D28, D29, D25, D26, D27, D28, D29, D30, D31 Product evaluation construct Items before the validity and reliability Teachers' views on a) a) teaching skill E1, E2, E3, E4, E5 E1, E2, E3, E4, E5 improvement by implementing PLC D30, D31 D31 E14, E15, E16, E17, E18, E19 a) teaching skill E1, E2, E3, E4, E5	Input evaluation construct	Items before the validity and reliability	Item after the validity and reliability
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(DAS) Strategy C9, C10 C9, C10 b) PLC Kit C11, C12, C13, C14, C15, C16, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25 C26, C27, C28 C26, C27, C28, C29, D20, D21, D22, D21, D22, D23 C1, D2, D3, D14,	a) Design Action Share	C1, C2, C3, C4, C5, C6, C7, C8,	C1, C2, C3, C4, C5, C6, C7, C8,
b) PLC Kit C11, C12, C13, C14, C15, C16, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25 C26, C27, C28 C26, C27, C28, C26, C27, C28, C26, C26, C27, C28, C26, C26, C26, C26,	(DAS) Strategy	C9, C10	C9, C10
C17, C18, C19, C20, C21, C22, C23, C24, C25C17, C18, C19, C20, C21, C22, C23, C24, C25c) PLC implementation facilityC26, C27, C28, C29C26, C27, C28Process evaluation constructItems before the validity and reliabilityItem after the validity and reliabilityTeachers' views on a) attitudes of teachers towards implementing the PLCD1, D2. D3, D4, D5, D6D1, D2. D3, D4, D5, D6a) teachers' knowledge implementing PLCD7, D8, D9, D10, D11D7, D8, D9, D10, D11b) application of collaborative tools administrators in the D30, D31D19, D20, D21, D22, D23D19, D20, D21, D23c) cooperation a) teaching atting pLCItems before the validity and reliabilityItem after the validity and reliabilityProduct evaluation construct implementing PLCItems before the validity and reliabilityD19, D20, D21, D23, D24, D25, D26, D27, D28, D29, D30, D31PLC implementation a) teaching implementing PLCItems before the validity and reliabilityItem after the validity and reliabilityTeachers' views on a) teaching implementing PLCE1, E2, E3, E4, E5E1, E2, E3, E4, E5b) collaborative implementing PLCE6, E7, E8, E9, E10, E11, E12, E13E14, E15, E16, E17, E18, E19c) improving achievement implementing PLCE14, E15, E16, E17, E18, E19E14, E15, E16, E17, E18, E19c) improving implementing PLCS1 itemsS7 items	b) PLC Kit	C11, C12, C13, C14, C15, C16,	C11, C12, C13, C14, C15, C16,
 c) PLC implementation C26, C27, C28, C29 c) PLC implementation construct Process evaluation construct a) attitudes of teachers towards implementing the PLC a) attitudes of teachers by implementing PLC b) application frequency of collaborative tools of back process in the plant process in		C17, C18, C19, C20, C21, C22,	C17, C18, C19, C20, C21, C22,
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 a) teachers' knowledge D7, D8, D9, D10, D11 improvement by implementing PLC b) application frequency D12, D13, D14, D15, D16, D17, Of collaborative tools D12, D13, D14, D15, D16, D17, D19, D20, D21, D23 c) cooperation of D24, D25, D26, D27, D28, D29, D25, D26, D27, D28, D29, D30, administrators in the D30, D31 PLC implementation Product evaluation construct Items before the validity and reliability Teachers' views on a) teaching skill E1, E2, E3, E4, E5 E13 C) improving students' E14, E15, E16, E17, E18, E19 achievement by implementing PLC TOTAL ITEMS 91 items 91 items 	towards implementing the PLC		
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reliabilityreliabilityreliabilityTeachers' views on	Product evaluation construct	Items before the validity and	Item after the validity and
Teachers' views ona) teachingskillE1, E2, E3, E4, E5E1, E2, E3, E4, E5improvementbyimplementing PLCimplementing PLCb) collaborativecultureE6, E7, E8, E9, E10, E11, E12, E6, E7, E8, E9, E10, E11, E12, among teachersE13c) improvingstudents'E14, E15, E16, E17, E18, E19E14, E15, E16, E17, E18, E19achievementbyimplementing PLCE14, E15, E16, E17, E18, E19TOTAL ITEMS91 items87 items		reliability	reliability
 a) teaching skill E1, E2, E3, E4, E5 E1, E2, E3, E4, E5 improvement by implementing PLC b) collaborative culture E6, E7, E8, E9, E10, E11, E12, E6, E7, E8, E9, E10, E11, E12, among teachers E13 E13 c) improving students' E14, E15, E16, E17, E18, E19 E14, E15, E16, E17, E18, E19 achievement by implementing PLC TOTAL ITEMS 91 items 87 items 	Teachers' views on		
improvementby implementing PLCb)collaborativecultureE6, E7, E8, E9, E10, E11, E12, E13E6, E7, E8, E9, E10, E11, E12, E13c)improvingstudents'E14, E15, E16, E17, E18, E19E14, E15, E16, E17, E18, E19achievementby implementing PLCb)b)b)TOTAL ITEMS91 items87 items	a) teaching skill	E1, E2, E3, E4, E5	E1, E2, E3, E4, E5
Implementing PLCb) collaborative culture culture E6, E7, E8, E9, E10, E11, E12, among teachersE13c) improving students' E14, E15, E16, E17, E18, E19achievement by implementing PLCTOTAL ITEMS91 items87 items	improvement by		
b) collaborative culture E6, E7, E8, E9, E10, E11, E12, E6, E7, E8, E9, E10, E11, E12, among teachers E13 c) improving students' E14, E15, E16, E17, E18, E19 E14, E15, E16, E17, E18, E19 achievement by implementing PLC 91 items 87 items	implementing PLC		
c) improving students' E13 E13 E13 E13 E13 E13 E13 E13 E13 E14, E15, E16, E17, E18, E19 achievement by implementing PLC E14, E15, E16, E17, E18, E19 E14, E15, E16, E17, E18, E14, E15, E16, E17, E18, E16, E16, E17, E18, E16, E16, E16, E16, E17, E18, E16, E16, E16, E16, E16, E16, E16, E16	b) collaborative culture	E6, E7, E8, E9, E10, E11, E12,	E6, E7, E8, E9, E10, E11, E12,
c) improving students c14, c15, c16, c17, c18, c19 c14, c15, c16, c17, c18, c19 achievement by implementing PLC TOTAL ITEMS 91 items	among teachers	E13 E14 E1E E16 E17 E10 E10	E13 E14 E1E E16 E17 E10 E10
implementing PLC TOTAL ITEMS 91 items 87 items	achievement	E14, E13, E10, E17, E18, E19	C14, C13, C10, C17, C18, C19
TOTAL ITEMS 91 items 87 items	implementing PLC		
	TOTAL ITEMS	91 items	87 items

Discussion

The aim of this research was to develop a framework for evaluating the implementation of PLC in Malaysia. The efficacy of the proposed framework is contingent upon the quality of

the study conducted. Currently, limited tools are available to assess the implementation of PLC. Therefore. an instrument to evaluate teachers' perceptions of PLC implementation was developed and tested. The study emphasized the importance of displaying the reliability and validity values of a questionnaire to inspire confidence in the quality of data collected by fellow researchers. The instrument was developed through literature reviews and previous instruments from PLC. The study found Cronbach Alpha to be between 0.946 and 0.972, which is considered acceptable for internal consistency, as the value must be above 0.7 (Hair et al., 2019) and a value higher than 0.80 is considered good (Koo et al., 2016). Items with a factor loading value of less than 0.6 are not significant to the construct measurement and can be removed (Zainuddin, 2015). Moreover, a factor loading value exceeding the minimum limit (0.6) is essential to identify the items used for one component, as suggested by (Hair et al., 2019; Hoque at al., 2017). Additionally, the relatively high factor loading value provides vital information on construct validity. The researchers' relevant interpretations were also evaluated.

Limitations of The Study

This study specifically focuses on evaluating the PLC among secondary school teachers in the State of Selangor. Hence, it is important to note that the results and conclusions derived from this study cannot be generalized to the entire country of Malaysia. The participants involved in this research were solely secondary school teachers within the State of Selangor. In future studies, it would be beneficial to incorporate data from schools in different states across Malaysia. The primary instrument employed in this study is a questionnaire, and therefore, the findings heavily rely on the respondents' honesty and sincerity when answering the questionnaire.

Conclusion

This study explores the teacher's thoughts on implementation of the PLC in secondary school. The findings present several key implications. Firstly, the study contributes to the improvement on detailed methods to test the level of questionnaire instrument in order to have high validity and reliability to be used in evaluating the implementation of PLC in schools. Secondly, the findings highlight that the implementation of PLC fosters a culture of collaboration and shared values among secondary school teachers. Thirdly, the results emphasize the role of PLC in promoting continuous professional development and increasing teacher accountability that leads to professional growth. Lastly, the findings underscore the importance of PLC in keeping teachers are collectively focused on students' success and continuously working to enhance their instructional practises. Overall, the implication of PLC among secondary school teachers has positive and transformative impact on instructional practises. student achievement and school environment. To obtain, more comprehensive formative and summative evaluations, it is essential to gather perspectives from diverse samples, especially from administration groups, headteachers, ministry officers and students. By incorporating these perspectives, a broader understanding of the impact of PLC can be achieved.

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