

## THE EXPLORATION OF PROFESSIONAL LEARNING COMMUNITY (PLC) IN ELEMENTARY SCHOOL USING RASCH MODEL

<sup>1</sup>MUH. WASKITO ARDHI, <sup>2</sup>SUNARDI, <sup>3</sup>ASROWI and <sup>4</sup>BAEDOWI

<sup>1,2,3,4</sup> Department of Education Science, Faculty of Teacher Training, Universitas Sebelas Maret, Surakarta, Indonesia.

Email: <sup>1</sup>waskitoardhi@student.uns.ac.id, <sup>2</sup>sunardi.ipuns@gmail.com, <sup>3</sup>asrowi@yahoo.com,

<sup>4</sup>bdhwi@yahoo.co.id,

### Abstract

This research is a case study research to explore Professional Learning Community (PLC) in several elementary schools in Indonesia. PLC is a group of people in a profession who exchange common values or beliefs and actively agree to learn together with others. The purpose of this study was to analyze the dimensions and involvement of teachers in PLC in general elementary schools and special elementary schools. The study uses a quantitative approach involving the teachers as the respondents with a polychotomy assessment which is analyzed with the Rasch Model through the assistant of Winstep software. The data collection technique used a questionnaire about PLC consisting of five dimensions, those are leadership, shared values and vision, collaborative culture, supportive conditions, and sharing experiences. The results of the analysis carried out with the Rasch Model indicate that the criteria of the person reliability is "very good" and the criteria of item reliability is "good". The findings point that aspects of PLC appear in teachers who are in the elementary schools with the characteristics of a special program having the ability to express experiences in their community. Therefore it shows that the dimensions of PLC exists in these elementary schools.

**Keywords:** Professional learning community, elementary school, rasch model, rating scale

### 1. INTRODUCTION

Teachers need mediums to share experiences in teaching practice, leadership roles and a supportive atmosphere for competency development. Those who feel getting support in continuous learning in their own classroom practice will be more committed and effective than teachers who are lack of support in school [10]. The existence of stable teamwork, space for exchanging experiences for teachers, and time to share concepts and knowledge for teachers in PLC (Professional Learning Community) can increase teacher participation in CRT (Culturally responsive teaching).

PLC can be found in various forms including "learning community", "community of practice", "critical peer group", professional development community," "learning team," "teacher team," "teacher community," professional community," and "teacher study group [6]. Various types of learning communities formed can contribute to the development of teacher competence in schools especially in elementary school where the cognitive foundation placed.

The quality of teacher competence in elementary schools is not the responsibility of the individual teacher but is a collegial responsibility, namely the leadership, education personnel and education staff. Teacher competence in primary schools has an impact on teaching quality and student outcomes. In addition, the teacher community plays an important role in

teacher decision making [8], [20]. In this case, teacher feels confident in making decisions about the learning strategy to be used, thus affecting his pedagogic competence [23].

## 2. LITERATURE REVIEW

Some other PLC studies are school-based PLC [32], cross-school PLC [15], and PLC in subjects [30]; [3]; [2]; [22], PLC for principal development [36], learning community through lesson study [21], PLC in vocational schools [31] and PLC in twitter [34]. The teacher community is claimed to contribute to the improvement of teaching practices at school [15];[12], as well as the development of individual teacher and school collective capacities [9]. Providing a relentless focus on student learning needs is a key function of PLC [4]. Teachers can learn from each other and reinforce the impact of individual knowledge and skills in PLC [17]. Positive attitudes that actively participate in each other can create teacher and student learning activities [13].

Although there is no absolute definition of PLC, there are representative points of the types of PLC and their derivatives that embrace the importance of teacher autonomy, as found in the previous literature review. PLC is a group of professionals who share a common goal of continuously acquiring new knowledge through interaction with each other, and aiming to improve practice. It is a cycle of how learning is usually embedded into everyday work. The teacher gains new knowledge, tries it in practice, and from those experiences they will gain more knowledge [25];[16]; [6]. This quantitative study is an exploration of the components and the involvement of teachers in the learning community in elementary schools in Klaten and Boyolali districts. PLC's focus on five dimensions refers to research from [10];[11];[25];[19];[7], the PLC dimensions include supportive leadership, 2) shared vision values, 3) collaborative / collective culture , 4) supportive conditions, 5) practice together / share experiences.

The research is important to conduct so that it can describe which elementary schools are able to build a good relationship between teachers and leaders, teachers with education personnels and education staffs. The coception of this research can be used as a basis for in-depth research on PLC in elementary schools. In the end, the findings can be conveyed to the public, especially in elementary schools on how to build and create PLC-based programs.

## 3. METHODS

### 3.1. Data

The study uses polytomy data. The data collected were analyzed using the Rasch Model with the help of Winstep software using the Rating Scale Model [28]. First, the raw score is set into Microsoft excel, then it is coded and the data is prepared to be calculated by the Winstep software. The analysis of the Rating Scale model includes aspects of the teacher's PLC and ten question items.

### 3.2. Data Collection

This research is a quantitative research on Professional Learning Community (PLC) in elementary schools in Indonesia that occurs in a natural environment. The researchers do not give treatment to the school environment. The study explores the dimensions of the Professional Learning Community that occurs in the elementary school environment. Respondents in this study are fourteen teachers spread over two cities in four elementary schools in Indonesia.

### 3.3. Instrument

Researchers developed a PLC rubric instrument designed to measure the five main components related to learning strategies and teacher activities in study groups. The instrument consisting of twelve items to assess PLC was identified referring to studies from [10];[11];[25];[19]; [7] into the questions on the questionnaire. The descriptions of the PLC components arranged in the rubric items are prepared as data polytomies and are presented in Table 1.1. In this polytomy data, each item in the rubric is ranked with a maximum score of 5 and a minimum score of 1 with the following information (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Always).

**Table 1.1. Description of PLC Items Rubric**

PLC Dimensions	Descriptions	Question Codes
Supportive leadership	1. Leaders support	UKP
	2. Teacher collaboration with other teachers and education personnel	KGG
Shared values and vision	1. The togetherness of the whole school community	KSK
	2. Having a vision as a guide in learning	MVP
Collaborative/collective culture	1. Collegiality in preparing lesson plans (media, strategies, models, evaluations, learning resources)	KDR
	2. Ideas or thought in groups for student learning	IGK
Social climate/supportive conditions	1. Regular meetings of the entire school community (meetings, education and training)	PRK
	2. Infrastructure	SP
Practice together / share experiences	1. Teachers have the opportunity to share experiences	GMP
	2. Collegial conversation	PK

From the compiled PLC rubric, the researcher arranged a questionnaire with ten questions. This was carried out to sharpen the questions so as to avoid ambiguity to the respondents in answering questions. The list of questions is set out in Table 1.2.

**Table 1.2. List of Questions**

No	Questions	Question Codes
1.	Does the school provide learning programs, activities, and workshops in which there is an element of leadership for the teacher?	UKP
2.	Do you get support from school leaders in collaboration between teachers in student learning	KGG
3.	Are you actively involved in programs at school in which there is an element of togetherness between teachers in the community?	KSK
4.	Do you use the guidelines and based on a shared vision in preparing the Lesson Plans?	MVP
5.	Do you collaborate with other teachers in planning the learning process?	KDR
6.	Do you share your ideas/ideas with other teachers in groups for student learning? For example, choosing a method/model/media/evaluation.	IGK
7.	Does the school schedule regular meetings to discuss teaching practices between teachers?	PRK
8.	Do you take the time and place to discuss and collaborate on various ideas or thoughts in preparing the Lesson Plans?	SP
9.	Do you share experiences with other teachers on the use of learning methods/models/media?	GMP
10.	Do you take advantage of collegial conversations with other teachers at school when you are preparing the Lesson Plans?	PK

## 4. RESULTS AND DISCUSSION

### 4.1. Result

**Table. 1.3. PLC Rating Item Quality**

SUMMARY OF 16 MEASURED PERSON

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	34.8	10.0	-.21	.78	.98	-.13	.98	-.10
SEM	1.5	.0	.91	.01	.16	.28	.21	.27
P.SD	6.0	.0	3.52	.05	.63	1.07	.81	1.05
S.SD	6.1	.0	3.63	.06	.65	1.11	.84	1.09
MAX.	46.0	10.0	6.58	.89	2.91	2.20	3.56	2.22
MIN.	28.0	10.0	-4.08	.73	.31	-1.82	.22	-1.73
REAL RMSE .87		TRUE SD 3.41		SEPARATION 3.92		PERSON RELIABILITY .94		
MODEL RMSE .78		TRUE SD 3.41		SEPARATION 4.41		PERSON RELIABILITY .95		
S.E. OF PERSON MEAN = .91								
PERSON RAW SCORE -TO-MEASURE CORRELATION = 1.00								
CRONBACH ALPHA (KR-20) PERSON RAW SCORE “TEST” RELIABILITY = .95 SEM = 1.36								

## SUMMARY OF 16 MEASURED ITEM

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	55.6	16.0	00	.61	.97	-.22	.98	-.22
SEM	1.2	.0	.47	.01	.17	.42	.22	.43
P.SD	3.7	.0	1.40	.04	.52	1.27	.65	1.30
S.SD	3.9	.0	1.47	.04	.55	1.34	.68	1.37
MAX.	62.0	16.0	2.40	.66	1.98	1.67	2.33	1.89
MIN.	49.0	16.0	-2.36	.56	.12	-2.67	.10	-2.56
REAL RMSE .68		TRUE SD 1.22		SEPARATION 1.80		PERSON RELIABILITY .76		
MODEL RMSE .61		TRUE SD 1.26		SEPARATION 2.05		PERSON RELIABILITY .81		
S.E. OF PERSON MEAN = .47								
PERSON RAW SCORE -TO-MEASURE CORRELATION = 1.00								
CRONBACH ALPHA (KR-20) PERSON RAW SCORE “TEST” RELIABILITY = .95 SEM = 1.36.								

Table 1.3 indicates that the person reliability score is 0.94. Based on the Instrument Quality Rating Scale Criteria, the person reliability score includes in the "very good" criteria, which means that the respondents from the questionnaire are quite consistent. In the meantime the reliability item with a score of 0.76 is included in the "fair" criteria. Other criteria shown in the table that person separation obtained a score of 3.92, so that it is included in the "good" category. This reflects that the items have a broad continuum. While the item separation is 1.80 score so that it enters the "poor" criteria or less one. Therefore, it can be interpreted that respondents seem less varied here.

### 4.2. PLC Overview on Elementary School Teachers

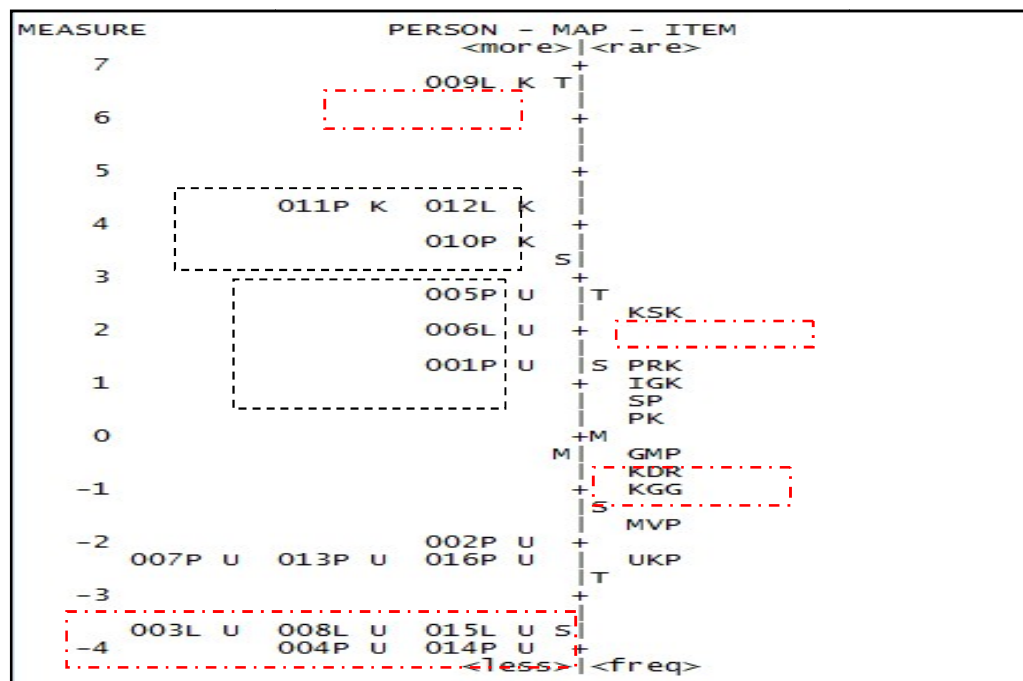
The description of the distribution of respondents' abilities can be indicated through Wright's Map Analysis (person item map) by using the Rasch model. Figure 1, on the left Wright map, describes the ability of teachers (respondents) with a high level of ability and are outliers compared to other respondents, that is respondent number 009L. The logit value of this teacher is more than +6 logit. In the next rank is by teacher abilities number 011P, 012L, 010P with logit values more than +3 and 005P. The four respondents scores were higher than all levels or acceptance in answering the questions given even on the questions with the highest difficulty level, namely the KSK item questions with a logit of +2.40. It implies that the four respondents will get the maximum score. On the lower left map, it shows that there are five respondents with low abilities (014P, 004P, 015L, 003L, 008L) who are unable to answer the questions that have the lowest difficulty, that is the UKP item with a logit value of -2.36.

On the right side of the map, it shows ten question items that have varying degrees of difficulty, from the most difficult KSK to the easiest UKP. The variability of the questions indicates and provides information about the respondents' abilities, namely elementary school teachers about PLC. This provides an explanation of the ability of elementary school teachers

in responding to questions with their experiences. Teachers who have experience and are members of the learning community at school will be able to answer the item questions.

**Gambar 1.Peta Wright**

**Figure 1. Wright Map**



In this case, the school plays a role in holding programs that have PLC aspects. Elementary school teachers who do not get the opportunity to learn together and get the experiences in the teacher community at schools will find it difficult to express their experiences. Overall views from the right and left sides in Figure 1, it can be illustrated that the **M S T** on the Wright map points that the distribution of respondents' abilities is greater than the distribution of item difficulty levels. In the context of the item difficulty level, it shows that the questions on the items about the diversity are not far apart.

However, when viewed from the ability of the sixteen respondents, it can be seen that the gap in ability is quite wide between respondents who are able to answer questions and those who are difficult to answer questions. This indicates that the abilities of the sixteen respondents are different each other and the questions given can provide the necessary information in the context of measuring aspects of PLC in elementary schools. The low ability of teachers can be a mean of evaluation and input for schools to develop teacher community-based programs or activities. Figure 1 shows that the four respondents/teachers who have high abilities come from special program elementary schools located in sub-urban areas. Complete data on the description of the difficulty level of the item is shown in Table 1.4.



**Table 1.4. Data on the level of difficulty of the items can be seen in the table below**

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEA SURE	MODEL S.E.	INFIT		OUFIT		PTMEASURE- AL		EXACT	MATCH	ITEM
					MNSQ	ZSTD	MNSQ	ZSTD	CO	EXP.			
3	49	16	2.40	.56	.88	-.38	.80	-.47	.85	.82	75.0	70.4	KSK
7	52	16	1.44	.59	.88	-.24	.84	-.19	.80	.82	81.3	74.4	PRK
6	53	16	1.08	.61	.67	-.84	.51	-.96	.86	.82	87.5	78.2	IGK
8	54	16	.69	.64	1.53	1.16	1.76	1.29	.87	.83	68.8	80.9	SP
10	55	16	.27	.66	1.98	1.67	2.33	1.89	.80	.84	68.8	83.2	PK
9	56	16	-.17	.66	.12	-2.67	.10	-2.56	.96	.84	100.0	84.1	GMP
5	57	16	-.60	.65	.34	-1.66	.25	-1.77	.91	.83	93.8	83.0	KDR
2	58	16	-1.01	.63	1.29	.76	1.27	.64	.66	.82	75.0	80.2	KGG
4	60	16	-1.73	.58	1.22	.75	1.24	.64	.82	.80	68.8	72.2	MVP
1	62	16	-2.36	.56	.79	-.78	.70	-.71	.86	.78	75.0	70.0	UKP
MEAN	55.6	16.0	.00	.61	.97	-.2	.98	-.2			79.4	77.7	
P.SD	3.7	.0	1.40	.04	.52	1.3	.65	1.3			10.5	5.2	

Table 1.4 illustrates that the item items that have the highest level of difficulty are KSK questions with a total score of 49 and a score of measure = +2.40 logit. The item code for the KSK questions relates to the dimensions of shared values and vision. As for the questions with the lowest difficulty level, namely questions with UKP codes with a total score of 62 with a score of measure = -2.36 logit. The UKP question code relates to the dimensions of supportive leadership. It means that all respondents have the support from the leadership of the school they occupy.

**Table. 1.5. Respondents Abilities Table**

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEA SURE	MODEL S.E.	INFIT		OUFIT		PTMEASURE- AL		EXACT	MATCH	PERSON
					MNSQ	ZSTD	MNSQ	ZSTD	CORR	EXP.			
9	46	10	6.58	.76	.89	-.19	.88	-0.1	.57	.52	80.0	74.1	009L K
11	42	10	4.26	.81	.39	-1.46	.27	-1.24	.73	.48	90.0	79.2	011P K
12	42	10	4.26	.81	.91	-.03	.94	.16	.37	.48	90.0	79.2	012L K
10	41	10	3.56	.86	.35	-1.32	.22	-1.24	.56	.43	90.0	82.4	010P K
5	40	10	2.78	.89	2.91	2.20	3.56	2.22	.31	.41	60.0	84.4	005P U
6	39	10	2.02	.86	.65	-.48	.43	-.69	.34	.42	90.0	82.3	006L U
1	38	10	1.33	.80	.44	-1.29	.31	-1.16	.69	.46	90.0	79.3	001P U
2	32	10	-1.92	.73	1.51	1.10	1.47	.92	.53	.52	60.0	75.5	002P U
7	31	10	-2.46	.74	1.47	1.00	1.53	.98	.79	.50	60.0	76.0	007P U
13	31	10	-2.46	.74	1.29	.71	1.36	.75	.46	.50	60.0	76.0	013P U
16	31	10	-2.46	.74	.31	-1.82	.25	-1.73	.56	.50	100.0	76.0	016P U
3	29	10	-3.55	.74	.64	-.70	.53	-.82	.26	.49	80.0	76.2	003L U
8	29	10	-3.55	.74	.84	-.19	.75	-.29	.73	.49	80.0	76.2	008L U
15	29	10	-3.55	.74	.64	-.70	.53	-.82	.26	.49	80.0	76.2	015L U
4	28	10	-4.08	.73	1.41	.96	1.56	1.07	.52	.51	70.0	74.6	004P U
14	28	10	-4.08	.73	.97	.08	1.09	.35	.12	.51	90.0	74.6	014P U
MEAN	34.8	10.0	-.21	.78	.98	-.1	.98	-.1			79.4	77.7	
P.SD	6.0	.0	3.52	.05	.63	1.1	.81	1.1			13.0	3.1	

The data in Table 1.5 shows the teacher's ability from the highest to the lowest ones. The teacher who has the highest ability is indicated by the teacher with the code 009L K with a total score of 46 and measure = +6.58 logit. Whereas the teacher with low abilities is shown in respondents with code 014P U with a total score of 28 and measure = -4.08 logit.

### 4.3. Discussion

Teaching privately in a separate classroom from other classes and get the door closed has become a teaching culture for elementary school teachers in general. There are still many teachers who have the perspective that teaching is their own responsibility. This is a fact and needs to get a new paradigm about the importance of cooperation in the teacher community in schools. The condition of the teacher's environment in schools affects the collaboration process between teachers in their community. Teacher participation in teaching and research activities in PLC is beneficial for the development of teacher PCK [18]. Collaboration can be established if there is an atmosphere of mutual support between the teacher community. Within the community, teachers can learn together and share experiences in order to improve the quality of learning and the quality of their competencies.

Based on Table 1.5, the data expresses that there are respondents who have high abilities, those are 009L, 011P, 012L, and 010P. The four respondents have the ability to describe their involvement in PLC. Viewed from the background of the top four teachers teaching place, it can be seen that these teachers are in an elementary school environment that implementing special program management (teacher code "K"). They are in a religion-based elementary school community with special program characteristics. The analysis of the Wright map said that they get the maximum value. This means that the teachers in these elementary schools are able to express their experiences in a professional learning environment. Otherwise, from table 1.5, the teacher with the lowest ability is shown in teacher number 006L with a logit value less than -7. It points his low ability because it is outside the T limit. Teachers with the lowest logit scores are dominated by teachers from general elementary schools and religion-based elementary schools.

The striking result of the study is that most elementary school teachers are not able to express their experiences in detail about their roles and activities with other teacher communities. Teachers do not intensively collaborate with other teachers. Schools through leaders have a role in conditioning teachers in their environment. School leaders' perspectives on learning communities influence policy and their role in mobilizing teachers in their communities to collaborate and create a supportive atmosphere. When respondents were asked questions related to leadership and school leadership support in collaboration on student learning (UKP question code), it can be seen that there are five respondents out of a total of sixteen, those are (014P, 004P, 015L, 003L, 008L) who have not been able to answer well. From the answer given, it reflects that more than half of the respondents received support from school leaders though there are still some respondents who do not receive school leaders' support. Principal leadership is very important for teachers in forming learning communities and providing opportunities to explore aspects of leadership in community members. The principal



leadership and social relations among teachers are important contributors to PLC effectiveness [25].

The relationship between transformational leadership, community professional learning and teacher learning with learner-centered teaching practices is quite strong [17]. No doubt found in the literature regarding that the role of school leaders plays an important portion in education. School leaders have a strong influence to their teachers and the working conditions in their schools where they can also contribute to student learning. They should engage deeply with teachers' classroom practices and provide them with advice or guidance as instructional leaders. Wise principals should manage to create a safe platform for teachers to express their voices freely, make hidden conflicts visible, and act as models in fostering deep critical dialogue among teachers [29];[35].

The involvement of teachers in the efforts to improve learning competencies requires a good atmosphere at school so that it supports teacher activity. Teachers' skills alteration appear especially when they explain what they can do now and when they prepare or think about the lessons. Five out of twelve teachers stated that they felt able to adapt their lessons and that PLC had stimulated them to develop their teaching skills[1].

The collaboration dimension at schools is very important in building PLC. Teachers' perceptions of self-efficacy through a collaborative structure that are part of every PLC [37]. Teachers who are in special program elementary schools are able to work on questions of the collaborative / collective cultural dimension, in this case related to the collaborative aspect (KDR question code). Collaborative relationships in learning communities can support the development of strong resources [26]; [17]. Figure 1 shows that all teachers in the special program primary school community were able to answer well the questions related to the collaboration dimension. This indicates that the teacher's experience in collaboration at school can be expressed by being able to answer questions. Professional learning communities are concerned with mutual consultation, collective decision making and information exchange among teachers in schools[17]. Thus teachers can learn from each other and strengthen the impact of individual knowledge and skills. It is also important to note that professional learning communities are likely to be ineffective if all teachers in a school do not have basic teaching skills.

The dimensions of values and shared vision are an important part of building a learning community [27];[13]. Shared vision provides a framework for teacher decision-making in learning. The results of the data show that all teachers in special program schools are able to answer well about questions on the dimensions of shared values and vision (KSK code) and only one respondent from a general elementary school is able to express his experience on this dimension. This illustrates that teachers in special program elementary schools are able to tell their active involvement in programs in schools in which there is an element of togetherness between teachers in the community and other teachers. It is difficult to express how the atmosphere of togetherness in the whole school community is.

In a supportive atmosphere dimension, shown in Figure 1, there are three respondents from public elementary schools who are able to answer well, namely in the PRK test code. This illustrates that some public elementary schools have conditions that support learning. Whereas in special program elementary schools, all teachers in special program elementary schools are able to answer well, so it can be interpreted that the learning atmosphere in the school is supportive for learning.

In PLC on the dimensions of sharing experiences and practices together with the code of GMP questions, practices that are not evaluative but are part of the "friends help others" process. These reviews are carried out regularly by teachers who visit each other's classrooms to observe, take notes on manuscripts, and discuss each other's observations [10]. Figure 1 of the Wright Map Analysis data shows that of the sixteen respondents there are seven respondents who are able to answer well, while nine respondents have not been able to answer well on the item questions with the GMP code. To answer this question, the respondent must have experience of sharing activities or practice together with other teachers, so it is indicated that most of the teachers are lacking in sharing experiences in learning. Sharing experiences in learning practices provides an opportunity for teachers to share about the use of learning strategies. Other teachers can take advantage of the teacher's experience in their learning. The ability to engage in best practice studies with colleagues is an important component of the PLC framework [33].

Although this research is found the complete PLC dimension in the special program elementary schools, but how PLC is built, developed and applied to school life is still unanswered. What forms of collaboration, forms of support from school leaders to teachers, and how the atmosphere supports teachers need to be further researched. In connection with these conditions, there is a need for an in-depth research effort to find out the actual condition of PLC and see the impact of PLC on improving teacher competence.

## 5. CONCLUSION

PLC aspects appear in teachers who teach in elementary schools with special program characteristics. The teachers at these schools have the ability to express experiences in their communities. This indicates that the involvement of these teachers is very high. In order to be able to show more deeply about the dimensions of PLC that are seen in teacher activities in elementary schools, it is necessary to conduct profound research to see deeper conditions in elementary schools with special program characteristics.

## References

- 1) Alhanachi, Sabrina, Lonneke AL de Meijer, and Sabine E. Severiens. "Improving culturally responsive teaching through professional learning communities: A qualitative study in Dutch pre-vocational schools." *International Journal of Educational Research* 105 (2021): 101698
- 2) Beddoes, Zack Edward, Keven A. Prusak, and David Barney. "Taking the helm: Physical educators managing change through professional learning communities." *Quest* 71.4 (2019): 479-496
- 3) Beddoes, Zack, Keven A. Prusak, and Amber Hall. "Overcoming marginalization of physical education in

- America's schools with professional learning communities." *Journal of Physical Education, Recreation and Dance* 85.4 (2014): 21-27
- 4) Bennis, W. "Future Leaders: Great leaders anticipate or create the situation, and thus avoid becoming victims of conditions." *EXECUTIVE EXCELLENCE* 14 (1997): 8-9.
  - 5) Brodie, Karin, and Tinoda Chimhande. "Teacher Talk in Professional Learning Communities." *International Journal of Education in Mathematics, Science and Technology* 8.2 (2020): 118-130.
  - 6) Doğan, Selcuk, and Alyson Adams. "Effect of professional learning communities on teachers and students: reporting updated results and raising questions about research design." *School effectiveness and school improvement* 29.4 (2018): 634-659.
  - 7) Ell, Fiona, and Karen Major. "Using activity theory to understand professional learning in a networked professional learning community." *Teaching and Teacher Education* 84 (2019): 106-117.
  - 8) Fauth, Benjamin, et al. "The effects of teacher competence on student outcomes in elementary science education: The mediating role of teaching quality." *Teaching and Teacher Education* 86 (2019): 102882.
  - 9) Grossman, Pamela, Sam Wineburg, and Stephen Woolworth. "Toward a theory of teacher community." *Teachers college record* 103.6 (2001): 942-1012.
  - 10) Hord, Shirley M. "Professional learning communities: Communities of continuous inquiry and improvement." (1997).
  - 11) Hord, Shirley M. "Creating a Professional Learning Community: Cottonwood Creek School." *Issues about change* 6.2 (1998): n2.
  - 12) Imants, Jeroen, Peter Slegers, and Bob Witziers. "The tension between organisational sub-structures in secondary schools and educational reform." *School leadership & management* 21.3 (2001): 289-307.
  - 13) Intanam, Narongrith, and Suwimon Wongwanich. "An application of the professional learning community approach to developing the learning process and enhancing academic achievement in the mathematics and science teaching of the primary school student." *Procedia-Social and Behavioral Sciences* 131 (2014): 476-483.
  - 14) Leithwood, Kenneth, et al. "How successful leadership influences student learning: The second installment of a longer story." *Second international handbook of educational change*. Springer, Dordrecht, 2010. 611-629.
  - 15) Little, Judith Warren. "Inside teacher community: Representations of classroom practice." *Connecting Policy and Practice: Challenges for Teaching and Learning in Schools and Universities* (2003).
  - 16) Louis, Karen Seashore, Helen M. Marks, and Sharon Kruse. "Teachers' professional community in restructuring schools." *American educational research journal* 33.4 (1996): 757-798.
  - 17) LuLuyten, Hans, and Manuel Bazo. "Transformational leadership, professional learning communities, teacher learning and learner centred teaching practices; Evidence on their interrelations in Mozambican primary education." *Studies in educational evaluation* 60 (2019): 14-31.
  - 18) Mu, Guanglun Michael, et al. "Building pedagogical content knowledge within professional learning communities: An approach to counteracting regional education inequality." *Teaching and Teacher Education* 73 (2018): 24-34.
  - 19) Harris, Alma, and Daniel Muijs. "Improving schools through teacher leadership." (2004).
  - 20) Romijn, Bodine R., Pauline L. Slot, and Paul PM Leseman. "Increasing teachers' intercultural competences in teacher preparation programs and through professional development: A review." *Teaching and Teacher*

Education 98 (2021): 103236.

- 21) Saito, Eisuke, and Matthew Atencio. "Lesson study for learning community (LSLC): Conceptualising teachers' practices within a social justice perspective." *Discourse: studies in the cultural politics of education* 36.6 (2015): 795-807.
- 22) Samsudin, Achmad. "Supervisi Akademik Pembelajaran IPA Melalui ICT Based Lesson Study Untuk Membangun Learning Community Guru SD." *Mimbar Sekolah Dasar* 1.1 (2014): 77-82.
- 23) Santagata, Rossella, and Cathery Yeh. "The role of perception, interpretation, and decision making in the development of beginning teachers' competence." *ZDM* 48.1-2 (2016): 153-165.
- 24) Song, Kyoung-Oh, and Jinyoung Choi. "Structural analysis of factors that influence professional learning communities in Korean elementary schools." *International electronic journal of elementary education* 10.1 (2017): 1-9.
- 25) Sigurðardóttir, Anna Kristín. "Professional learning community in relation to school effectiveness." *Scandinavian Journal of Educational Research* 54.5 (2010): 395-412.
- 26) Sinnema, Claire, et al. "Exploring the communities of learning policy in New Zealand using social network analysis: A case study of leadership, expertise, and networks." *International Journal of Educational Research* 99 (2020): 101492.
- 27) Stoll, Louis. Professional learning community. *International Encyclopedia of Education*, (2010). 151–157.
- 28) Sumintono, Bambang, and Wahyu Widhiarso. *Aplikasi pemodelan rasch pada assessment pendidikan*. Trim komunikata, 2015.
- 29) Vanblaere, Bénédicte, and Geert Devos. "Relating school leadership to perceived professional learning community characteristics: A multilevel analysis." *Teaching and teacher education* 57 (2016): 26-38.
- 30) Visscher, Adrie, and Bob Witziers. "Subject departments as professional communities?." *British educational research journal* 30.6 (2004): 785-800.
- 31) Warwas, Julia, and Christoph Helm. "Professional learning communities among vocational school teachers: Profiles and relations with instructional quality." *Teaching and teacher education* 73 (2018): 43-55.
- 32) Wasley, Patricia a et al. *The Teaching Career: The Series on School Reform*. N.p., 2004. Print
- 33) Wiedmer, Terry. "Generations do differ: Best practices in leading traditionalists, boomers, and generations X, Y, and Z." *Delta Kappa Gamma Bulletin* 82.1 (2015): 51.
- 34) Xing, Wanli, and Fei Gao. "Exploring the relationship between online discourse and commitment in Twitter professional learning communities." *Computers & Education* 126 (2018): 388-398.
- 35) Yin, Hongbiao, and Xin Zheng. "Facilitating professional learning communities in China: Do leadership practices and faculty trust matter?." *Teaching and Teacher Education* 76 (2018): 140-150.
- 36) Zepeda, Sally J., Oksana Parylo, and Ed Bengtson. "Analyzing principal professional development practices through the lens of adult learning theory." *Professional development in Education* 40.2 (2014): 295-315.
- 37) Zonoubi, Rezvan, Abbas Eslami Rasekh, and Mansoor Tavakoli. "EFL teacher self-efficacy development in professional learning communities." *System* 66 (2017): 1-12.