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EXAMINING COMPETENCE IN ACTION RESEARCH OF BASIC EDUCATION TEACHERS IN CEBU CITY, PHILIPPINES

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ABSTRACT

Background and Purpose: This study examined the self-perceived competence in action research components of basic education teachers in Cebu City as one form of identifying their challenges in doing AR. The results aimed to provide baseline information for the planned professional development program.

Methodology: It employed a sequential explanatory design (QUAN→qual). It is characterized by collecting and analyzing quantitative data in the primary phase and then by collecting and analyzing qualitative data. There were 166 teachers who participated in the online survey. These teachers previously underwent professional development programs in designing AR projects, and two-thirds did an AR. Using their responses, they were grouped through a hierarchical clustering technique to create distinct groups of teachers sharing the similarity of competence or needs in the AR components. The cluster analysis yields four groups. Eventually, eight teachers were interviewed regarding their responses, which means two teachers represented each cluster.

Findings: For very few teachers in cluster one (n=4), they regard selecting AR topic, planning the project, analyzing and presenting data, and integrating ethics as areas of non-difficulty while integrating technology, reflecting on AR, and communicating results as areas of difficulty. For the majority of the teachers belonging in cluster 2 (n=76), cluster 3 (n=37), and cluster 4 (n=49), all AR components are regarded as difficult, indicating all are critical areas for professional development.

Contributions: A conventional way of conducting needs assessment of teachers' competence in AR as a basis for professional development program is done through calculating the mean and standard deviation per AR competence or skills of all teachers participating in a survey. However, this method disregards the individual professional needs of teachers as it presents the general level of competence in each skill set. The professional needs may vary from one teacher to another. Thus, this study presents a novel way of examining teachers' needs in AR by using cluster analysis to homogenously group participants according to the similarity of their responses or professional needs. This gives key reference points on which AR skills need to be improved for teachers belonging to the same group when planning a teacher development program in AR.

Keywords: Action research, competence, in-service teacher, professional development, teacher research.

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1.0 INTRODUCTION

Action research (AR) shifts the paradigm of doing research in education by emphasizing reflective inquiry and placing the teachers at the epicenter of research-into-practice (Manfra, 2019). By doing so, AR engages these teachers to investigate their practices and resolve their existing problems rather than relying on the suggested interventions from empirical studies conducted by those research specialists. Broekkamp and Wolters (2007) argued that it only creates a gap between educational research and practice because the suggested interventions may not resolve the teachers' problems in the field. For instance, social media platforms are recently recommended and used as learning management systems at the height of the COVID-19 Pandemic (*e.g.,* Cortes, 2020), but this will not likely be applicable for students and teachers in remote settings. However, by situating teachers as researchers into their practices, they can resolve these issues and problems in their professional lives (Álvarez, 2015). AR allows them to systematically assess these problems and provide idiosyncratic interventions responsive to the problems in the context (Manfra, 2019).

1.1 International and Philippine Efforts and Initiatives in Promoting Action Research

AR's significance cannot be discounted and is widely acknowledged in the literature. Hence, several efforts have been focused on AR, and these are increasingly visible aspects of

educational reforms (Cortes, 2019; Cortes et al., 2021). For one, a university in Australia reported the offering of a course called *Action Research in Education* in a master's degree program. The course introduces the students to the research method's theoretical concepts and requires them to design and implement an AR project responsive to their contexts' needs. There are diverse educational enterprise areas that they may work on, ranging from early childhood to tertiary education (Hine, 2013). Two, a university in Malaysia motivates its lecturers and teachers to do AR by providing them research grants, recognizing their AR publications, and organizing yearly congress intended for sharing the results of their AR projects (Meerah & Osman, 2013). Three, the Abu Dhabi Education Council of the United Arab Emirates organized mandated programs on AR, which are done through *off*-campus or whole school approach *on* campus for the teachers to conduct an individual AR inquiry or do collaborative school-based AR, respectively (Hathorn & Dillon, 2018).

In the Philippines, the efforts in promoting AR have been varied. The country's Commission on Higher Education (CHED) embeds AR as a content course across all specializations as indicated in various teacher education curricular programs as one of the efforts to promote the culture of doing AR in the country. For pre-service elementary teachers who are in their practicum, AR course is designed to provide them an avenue to conduct AR to improve student learning and teaching practices (Commission on Higher Education, 2017a). For pre-service secondary science teachers, AR course requires them to do AR in the content or pedagogy in Biology, Chemistry, Physics, or Earth Science (Commission on Higher Education, 2017b). Indeed, the goals of AR course vary according to the curricular program the pre-service teachers are enrolled in.

Meanwhile, the country's Department of Education (DepEd), which is in charge of its basic education program, funds eligible proponents to do research in the Department's key priority areas. The goals are to renew the vigor to conduct research and create policies and programs informed by evidence (Department of Education, 2017). Professional organizations in the country also introduce AR methodology through Continuing Professional Development (CPD) programs. However, the number of trainings are relatively few and poorly documented, which may be caused by the attention being directed on training teachers in pedagogical and content knowledge specific to disciplines brought by the current reform from a 10-year to 12-year basic education program (Morales et al., 2016).

1.2 Challenges of Philippine Basic Education Teachers in Conducting Action Research

Despite the efforts toward developing AR culture in the Philippines, few studies in its southern and northern regions surfaced and reported several challenges of teachers in doing AR. First, a study of experiences among public school teachers in Mindanao revealed that they still lack financial assistance from the school, lack trainings, and have heavy teaching and service loads. These teachers also reported no access to internet services and reference materials (Ulla, 2018). Second, a survey in Agusan del Norte in Mindanao reported that teachers were constrained to conduct AR because of teaching more than the prescribed teaching loads, demands for time, and a limited number of AR training. The teachers further explained that they are busy with their personal and professional lives and do not account AR as a job function. Hence, their motivation to do research is low. They also clarified that their lack of training on this research method translates to their poor conceptual knowledge. Finally, these teachers disclosed that they do not gain school support in terms of budget, motivation, and recognition (Ulla, Barrera, & Acompanado, 2017). Third, an assessment of teachers' needs on AR competences in Surigao del Sur in Mindanao found out that the majority of the teachers teaching in basic education program in the province did not perceive themselves as *expert* or at least *advanced* in the following research components, namely: problem identification, data gathering, analysis, and presentation, technology integration, and ethics integration in AR (Cortes, 2019).

Meanwhile, in the Northern part of the Philippines, this study documents three empirical studies on the challenges and needs of teachers in AR. First, an assessment of teachers' perception of their knowledge and understanding about basic concepts of AR in public elementary schools in Batangas may be desirable. However, a recommendation for extensive capacity-building programs through seminar workshops was still emphasized (Anzaldo & Cudiamat, 2019). Second, similar findings were documented regarding teachers' challenges in a Catholic Higher Educational Institution (HEI) in the northern Philippines with Agusan del Norte. The teachers perceived doing AR as an additional workload and burden in their professional practice. They also reported that they lack time and knowledge on the research method coupled with their writing anxiety. In particular, their lack of knowledge pertains to difficulty in searching the literature, collecting data, and communicating research results (Tindowen, Guzman, & Macanang, 2019). Finally, a survey among science and mathematics basic education teachers in Manila schools revealed that they have a moderate level of difficulty in some AR components, indicating areas for professional development. These were statistics, organizing data, searching the literature, and writing the research report.

The teachers also reported that their teaching loads are beyond the prescribed. In effect, it exhausts them, thus, leaving a little time and energy to do research (Morales et al., 2016).

These Philippine studies reveal that Filipino teachers still face a plethora of challenges in doing AR. Consequently, research productivity in the country, especially in the basic education sector is scarce because many teachers do not engage despite AR being a part of their standard outcome and as basis of promotion to a higher level in their career paths (Department of Education, 2007). Furthermore, studies on this aspect indicate that majority are conducted in Luzon and Mindanao while teachers challenges and clamor in AR is not well explored in the Visayan regions, specifically in Cebu City. Thus, this study examined the self-perceived level of competence in AR components of basic education teachers in the city. The results of which will determine which components of AR are challenging and in need to be developed among teachers, thus, informing on how to appropriately design the planned research-extension program on AR PD program for basic education teachers. It is the core function of HEI to offer appropriate and responsive extension services of which one is on the capacity building programs to its counterpart in nation building, the basic education sector. The planned professional development programs may increase AR use to improve practice and resolve educational problems, thus improving educational outcomes. Moreover, this needs assessment survey filled the literature gaps regarding teachers' challenges in the Visayan region. These challenges are described in the context of AR's essential competencies or components, which teachers are expected to demonstrate in conducting AR.

2.0 METHODOLOGY

2.1 Research Design

This study is mixed-methods research that employed a sequential explanatory design (QUAN→qual) characterized by collecting and analyzing quantitative data in the primary phase, then subsequently followed by qualitative data. The rationale behind using a mixed-method research design is to build the quantitative results by supporting with narrative accounts. A cross-sectional descriptive research under quantitative non-experimental research classifications of Johnson (2001) was employed for the quantitative method. However, it does not follow the methods employed by Morales et al. (2016), Anzaldo and Cudiamat (2019), and Tindowen et al. (2019), where the mean score and standard deviation per component of action research were calculated as one, therefore, the score represents the difficulty or non-difficulty of the whole research participants. It will likely create bias because the obtained score may not necessarily represent the individual needs, level of difficulty, or competence of each

participant. Instead, this study adopted Cortes' (2019) method, which data were treated using cluster analysis, a multivariate data analysis technique that grouped teachers according to the similarity of their responses. In other words, this test will yield clusters or groups of teachers. The teachers in a certain cluster may have greater chances of the same needs, level of difficuly, or level of competence in AR components. The presence of these clusters makes cross-sectional descriptive research appropriate while the planned professional development programs will be customized according to each group's degree of needs. On the other hand, the qualitative method used unstructured interviews of which the narrative accounts obtained were used to support teachers' responses in the quantitative scale.

2.2 Research Participants

Participants in this study were 166 basic education teachers from randomly selected private and public schools in Cebu City. The teacher-participants were purposively sampled from these schools provided they met one of the following criteria: (a) able to attend a professional development program in AR, (b) able to propose an AR project, and (c) able to complete an AR project but not necessarily published. Figure 1 shows teachers' distribution according to the following professional profiles: degree program obtained, specialization, years of teaching experience, number of professional development programs attended specific to action research, number of completed AR, and number of published AR in a research journal or a book chapter.

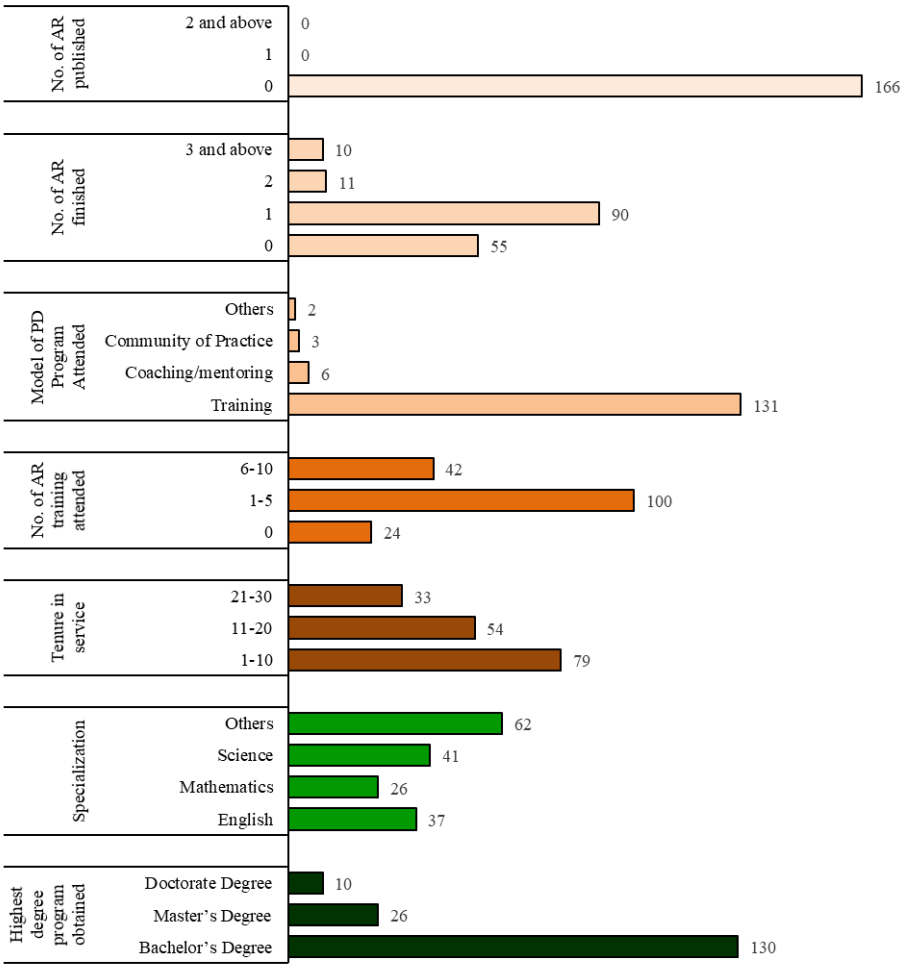

Figure 1: Distribution of teachers according to professional profiles

2.3 Research Instrument

The researchers developed a scale called Teacher's Competence in Action Research (TCAR) to examine the competence held by basic education teachers in AR (Cortes, Pineda, & Geverola, 2020). This scale's validity was established through content validation using Aiken's Validity Index (AVI) and construct validation using Factor Analysis (FA). The AVI of initial items range from 0.78 to 1.00, indicating that all items were valid based on experts' opinion, and the percentage of variance explained by the scale after FA is 78.16. Meanwhile, the reliability was established by calculating Cronbach's alpha as a measure of internal consistency, which resulted in 0.988 for the entire scale. Originally, the scale based on the FA results had seven factors representing the competences of AR and retained 54 items that were unevenly distributed. However, the researchers decided to merge two factors that load items on technology integration in AR. This led to six-factor scale representing six competences or components of AR, namely: selecting topic for professional growth (4 items), planning an AR

project (11 items), analyzing and presenting AR data (13 items), integrating ethics (8 items), integrating technology in writing literature and analyzing data (5 items), and reflecting on and communicating results (13 items). Each item per competence was rated on a five-point Likert scale with the following interpretation: 5–*expert*, 4–*advanced*, 3–*proficient*, 2–*basic*, and 1–*limited*. A rating above midpoint score or adjectival rating which falls within *advanced* and *expert* by the teacher indicated that a particular AR component is considered non-difficulty. On the contrary, rating below the midpoint score or adjectival rating, which falls within *limited* to *proficient* by the teacher, indicates that a certain AR component is considered difficulty.

2.4 Gathering of Data

The researchers secured permission from the school's division superintendent of Cebu City to invite teachers to participate in a needs-based assessment survey about their competence held in AR. Upon approval, the link of a Google Form containing the approved letter from the division superintendent, informed consent, and survey questionnaire was sent online to the target teacher-participants' email. The informed consent stated the purpose and background of the survey, procedures, risks and discomfort, confidentiality, and benefits. The teachers were informed that they could only proceed answering the survey questionnaire if they agree to the terms stipulated in the consent. It was also reiterated to the teachers before answering that their participation was entirely voluntary, and they may withdraw their participation anytime without incurring penalty or loss on their end. 166 teachers agreed to these terms and responded to the survey out from 184 teachers, thus, recording a response rate of 90.2 percent. Eight teachers were interviewed. Therefore, two teachers represented each cluster. Their profiles are presented in Table 1.

Table 1: Profile of teacher's interviewed

Participants	Tenure of Service (years)	Educational Degree Earned	Professional Rank	Field of Specialization	No. of Trainings Attended related to AR	No. of AR proposed	No. of AR completed	No. of AR published
Teacher A – Cluster 1	5	Master's Degree	Teacher 2	Science	2	2	1	0
Teacher B – Cluster 1	28	Bachelor's Degree	Teacher 3	English	1	1	1	0
Teacher C – Cluster 2	17	Doctorate Degree	Master Teacher 2	Science	3	3	2	0
Teacher D – Cluster 2	23	Bachelor's Degree	Teacher 3	Social Studies	1	1	1	0
Teacher E – Cluster 3	5	Master's Degree	Teacher 3	Mathematics	3	2	1	0
Teacher F – Cluster 3	13	Master's Degree	Master Teacher 1	Filipino	2	1	1	0
Teacher G – Cluster 4	20	Bachelor's Degree	Teacher 3	Mathematics	1	1	1	0
Teacher H – Cluster 4	3	Bachelor's Degree	Teacher 1	English	1	1	1	0

2.5 Data Analysis

Data from the survey questionnaire were used to perform cluster analysis to group teachers according to the similarity of their responses concerning competence held in the AR components. Although a Mahalanobis Distance technique is usually done as a preliminary test to detect multivariate outliers (Leys, Klein, Dominicy, & Ley, 2018), the present study did not perform the test as outliers may also represent an important group with unique needs or levels of competence in AR. The multivariate test eventually proceeded to hierarchical cluster analysis using Ward's method with Euclidean Distance as the test criterion. Ward's method is known for searching proximity matrix, dividing responses into homogeneous subgroups, and forming groups in which variance within is reduced (Esztergár-Kiss & Caesar, 2017). In this case, the application of this method is to cluster teachers according to the similarity of their responses in the items. Then, a K-means clustering technique was also performed to confirm

the number of clusters. Then, the mean and standard deviation per item was calculated in every AR component of each cluster to identify which is low as it indicates an area of focus for the professional development of a certain cluster of teachers. Finally, narrative accounts were transcribed, coded, and thematized. These were critically reviewed and analyzed then used as support for the descriptive results of all items contained within a particular AR competence or skills set. In other words, the theme or foci of the interviews are teachers' accounts as to the reasons for their perceived level of competence in all six AR components measured by TCAR.

3.0 ANALYSIS AND DISCUSSION

3.1 Cluster Analysis

The hierarchical cluster analysis created four distinct groups or clusters with the following percentage distribution: 2.41% for cluster 1, 45.78% for cluster 2, 22.29% for cluster 3, and 29.52% for cluster 4. The K-means clustering technique confirmed these numbers of clusters of which four clusters converged in the sixth iteration; thus, the four-cluster solution is established. Each cluster contains teachers with almost similar responses across the survey items indicating that they may be of the same level of competence or needs in AR components. The professional profile of teachers per cluster are shown in Table 2. Each cluster is no longer labeled as the purpose of this clustering is to basically identify which group will a particular teacher belong in the planned professional development programs. In this regard, the descriptive results and their corresponding level of competence per item and per competence of each cluster are reported to delineate which competence needs to be developed or improved in AR per cluster of teachers.

Table 2: Distribution of teachers per cluster according to professional profile

Professional Profile		Cluster 1 (n=4)	Cluster 2 (n=76)	Cluster 3 (n=37)	Cluster 4 (n=49)
Highest degree program obtained	Doctor's degree	2	7	0	1
	Master's degree	2	11	6	7
	Bachelor's degree	0	58	31	41
Field of Specialization	Others	0	13	22	27
	Science	2	19	12	8
	Mathematics	2	17	1	6
	English	0	27	2	8
Tenure in service (years)	21 – 30	0	10	4	19
	11 – 20	1	23	11	19
	1 – 10	3	43	22	11
No. of professional development program attended	6 – 10	1	14	5	22
	1 – 5	3	50	22	25
	0	0	12	10	2
Model of PD Program Attended	Others	1	8	3	5
	Community of Practice	2	15	20	19
	Coaching/mentoring	0	10	17	21
	Training	1	37	38	26
No. of AR finished	3 and above	2	0	0	8
	2	1	3	5	2
	1	1	53	25	11
	0	0	20	7	28
No. of AR published	1	0	0	0	0
	0	4	76	37	49

3.2 Teachers' Perceived Competence in Selecting Action Research Topic

This competence evaluated teacher's capacity to select an action research topic, which results are shown in Table 3. The mean ratings in this competence for three clusters that most teachers belong, are below the midpoint, particularly in *basic* level. It indicates that majority of the teachers have difficulty in selecting an AR topic. In particular, teachers in cluster 3 and 4 have reported difficulty in terms of choosing research topic and questions which are of general interest by the colleagues in the profession, searching and reviewing related literature, and developing the AR plan of the chosen topic. These difficulties are also shared by teachers in cluster 2 except in choosing an AR topic and reviewing its related studies and literature because

the mean scores for these competences are above midpoint indicating non-difficulty. In general, this *basic* rating as perceived by the majority of the teachers in selecting an AR topic can be attributed to the following narratives, *e.g.*

> I have not enrolled a master's degree since 2016 when I finished my undergraduate program. (Teacher H – Cluster 4)

> I am not mastered in the research craft and that includes identifying the research problem and writing the review of literature. (Teacher F – Cluster 3)

The lack of master's degree in education and lack of mastery of the research method basically explain the difficulty of teachers to select and write about an AR topic However, this difficulty is also shared among other Filipino teachers based on previous findings of Morales et al. (2016) and Tindowen et al. (2019). It is even coherent with an international finding that teachers have difficulty in identifying an initial idea for AR, thus, considered an area of teacher training and awareness (Burns, 2010). Developing this competence is critical because this may eventually resonate in difficulty towards other components in AR.

Table 3: Level of competence in selecting AR topic for professional growth of four clusters

Item Statements	Cluster 1 M ± SD	Cluster 2 M ± SD	Cluster 3 M ± SD	Cluster 4 M ± SD
1. I can develop a research proposal which support my professional development.	1.00±0.00	2.05±0.88	1.92±0.55	1.87±0.73
2. I can choose questions which interest my teaching colleagues, counselors, and administrators.	2.75±0.50	2.34±0.78	2.11±0.61	2.02±0.75
3. I know how to choose list of topics which are of interest to me before selecting the one.	4.25±1.50	2.54±0.10	2.00±0.62	2.02±0.75
4. I can take literature search and review on my proposed topic.	3.75±0.50	2.51±0.86	1.97±0.60	1.91±0.64
Mean ± SD	2.94±0.63	2.36±0.68	2.00±0.48	1.96±0.66
Level of Competence	Proficient	Basic	Basic	Basic
Interpretation	Non-difficulty	Difficulty	Difficulty	Difficulty

Note. 1.00-1.80=Limited; 1.81-2.60=Basic; 2.61-3.40=Proficient; 3.41-4.20=Advanced; 4.21-5.00=Expert

Meanwhile, there were only four who identified themselves *proficient* in this competence and their self-perceived ratings were grounded on the following reasons:

> I made readings on action research before. (Teacher B – Cluster 1)

> I find it easy to select an AR topic because there are many problems and issues in the field that I may be used as a subject to my study. (Teacher A – Cluster 1)

> I have previous trainings and engagement in AR. (Teacher C – Cluster 2)

When examining their responses, there are three factors that explain their *proficient* rating in this AR competence, namely: readings, training, and engaging in AR projects. In this cluster, the teachers have one of the following qualifications, a master's degree in education and have worked on an AR project before. Also, teachers in this cluster have previously attended professional development programs in AR. Anh (2017) explained that the implementation of teacher training programs on AR helps teachers particularly in this research component. Thus, they developed proficiency in selecting a topic for an AR and eventually writing about it.

3.3 Teachers' Perceived Competence in Planning an Action Research Project

This competence collectively evaluates teacher's competence to write an AR proposal. Specifically, this evaluates competence in stating research questions, performing literature search, and planning for data gathering procedure and analysis. As shown in Table 4, teachers in cluster 2, cluster 3, and cluster 4 still perceived themselves *basic* in this competence. The mean scores in most of the items are still below midpoint, indicating difficulty in the above cited components. Samples of verbatim narratives with strong reference to their difficulty include the following:

> I learned these before from our research professor during my undergraduate studies but I cannot apply those learnings into practice anymore. Those were years ago. (Teacher D – Cluster 2)

> I had conducted research before during college, but it was done by group. I have not mastered all these research competences before because I was only assigned particular tasks. (Teacher F – Cluster 3)

I still need to learn about these data gathering and analysis tools. (Teacher G – Cluster 4)

Table 4: Level of competence in planning an AR project of four clusters

Item Statements	Cluster 1 M ± SD	Cluster 2 M ± SD	Cluster 3 M ± SD	Cluster 4 M ± SD
1. I can narrow the research topic to put it in a researchable concept.	2.75±0.50	2.29±0.92	1.86±0.59	1.91±0.67
2. I can state research questions in common language.	4.50±1.00	2.53±0.92	2.05±0.57	1.94±0.66
3. I can ensure that the topic I will be working on is grounded in the realities of the school.	3.75±0.50	2.72±0.93	2.05±0.57	1.96±0.74
4. I can identify what has been done in previous studies and the gaps when choosing a topic.	2.50±1.00	2.46±0.87	1.86±0.67	1.92±0.64
5. I can identify underlying assumptions of previous authors on their research questions.	1.75±1.50	2.24±0.80	1.84±0.69	1.94±0.66
6. I can evaluate my sources when conducting literature search and review.	4.75±0.50	2.34±0.89	1.94±0.62	1.92±0.67
7. I can track and write references of the literature used in the review.	4.00±0.00	2.50±0.92	2.03±0.65	1.92±0.67
8. I am aware on the usefulness and limitations of various qualitative data collection tools.	3.00±0.00	2.29±1.00	1.92±0.72	1.92±0.67
9. I can conduct research in a systematic and disciplined manner.	3.50±1.00	2.43±0.90	1.97±0.65	1.98±0.72
10. I can determine appropriate data sources to establish data triangulation.	2.25±0.50	2.21±0.92	2.00±0.67	1.94±0.72
11. I am aware on the usefulness and limitations of various quantitative data collection tools.	2.25±0.50	2.45±0.93	1.95±0.71	2.02±0.66
Mean ± SD	3.18±0.00	2.41±0.70	1.95±0.53	1.94±0.65
Level of Competence	Proficient	Basic	Basic	Basic
Interpretation	Non-difficulty	Difficulty	Difficulty	Difficulty

Note. 1.00-1.80=Limited; 1.81-2.60=Basic; 2.61-3.40=Proficient; 3.41-4.20=Advanced; 4.21-5.00=Expert

These teachers basically point out that they have not applied their theoretical knowledge on research which they learned from their undergraduate studies into their teaching and research practices over the years. One teacher reported that she learned the competences or skills years ago but has not conducted nor proposed a research since then. Following her entry to the

workforce, she explained that reflecting into her teaching practices through AR was her least concern. She was on the adjustment period of learning the subjects she was assigned to teach her students. Further, she explained "*It is difficult to write an AR amid heavy teaching loads, lack of retooling, and limited time*." These results are congruent with previous findings on challenges faced by the teachers in the Philippines in doing research (e.g. Morales et al., 2016; Ulla et al., 2017; Ulla, 2018; Tindowen et al., 2019) and even teacher abroad (e.g., Kutlay, 2013; Othman & Chia, 2016; Ellis & Loughland, 2016).

Another teacher also claimed that her research knowledge is *basic* on certain competences (*e.g.* data gathering analysis) because of tasks partitioning they did in their undergraduate thesis. It is a usual scenario in the Philippine universities and colleges where professors grouped their students with common interest when requiring for a research project as a course requirement to save time, effort, and resources. In this regard, students within the group only master or learn skills they were assigned to produce an output in a project. Students do not usually take extra effort to learn other research skills or competences when doing their undergraduate thesis.

For those teachers who are at the *proficient* level in planning an AR project, the following are their responses explaining why this competence is not considered a difficulty on their part:

> I have taught research subject since 2017. As a research teacher, I should have these necessary skills to teach my students to plan their research correctly. (Teacher C – Cluster 2)

> Having helped some of my students before planning their research (*e.g.*, thesis and science investigatory projects), I could say that these experiences have improved my proficiency in planning an AR project. (Teacher A – Cluster 1)

These teachers have attributed their proficiency in this competence with their experiences in teaching research subject. These are also the competences they are teaching to their students and are essential when developing an AR proposal. However, not all basic education teachers are given the chance to teach research because it is usually offered senior high school curriculum and special science classes.

3.4 Teachers' Perceived Competence in Analyzing and Presenting AR Data

This competence evaluates teachers' capacity to evaluate appropriate data analysis techniques, interpret and present results. Results, as reflected in Table 5, reveal that mean ratings in this competence for clusters 1, 2, and 3 are again below midpoint or in *basic* level indicating difficulty for most teachers. These results are again consistent with the findings of Morales et al. (2016) and Tindowen et al. (2019) which studies were conducted in Manila and Tuguegarao, respectively, but are inconsistent with findings of Cortes (2019), which study was conducted in the province of Surigao del Sur. Teachers participating in this study have the following opinions explaining their *basic* competence in data analysis and presentation:

> I still have a lot of questions regarding the appropriate use of both qualitative and quantitative tools. (Teacher A – Cluster 1)

> I have not tried to conduct quantitative type of research. In Social Science, we usually deal with qualitative research. (Teacher D – Cluster 2)

> I don't have enough knowledge about these. (Teacher H – Cluster 4)

> I may be able to do the analysis and presentation of quantitative AR data, but I am not that confident. I am also unfamiliar with methods to quantitative data analysis. Linguistic intelligence is very much necessary in dealing with qualitative data to interpret the underlying meaning, which I could say I lack in that aspect. (Teacher E – Cluster 3)

Their opinions concerning their perceived level of competence in analyzing and presenting AR are associated with stereotyping. This means that those science and mathematics teachers should be inclined more in quantitative research as they work more with numbers, while those linguistics and social science teachers should be inclined in qualitative research as they deal more with words or narrative accounts.

Table 5: Level of competence in analyzing and presenting AR data of four clusters

Item Statements	Cluster 1 M ± SD	Cluster 2 M ± SD	Cluster 3 M ± SD	Cluster 4 M ± SD
1. I can align appropriate statistical test with parametric and nonparametric data to address issues of validity in quantitative action research studies.	2.25±0.50	2.13±0.91	1.78±0.63	1.92±0.67
2. I can determine which analysis suits to qualitative data.	4.00±0.00	2.25±0.95	1.81±0.62	1.92±0.67
3. I can develop a data collection plan.	2.50±1.00	2.21±0.79	1.95±0.78	1.94±0.66
4. I can summarize collected data in a dependable and accurate manner.	4.00±0.00	2.25±0.93	1.68±0.63	1.92±0.67
5. I can interpret the underlying meaning or the implication of the data.	3.50±1.00	2.20±0.80	1.76±0.60	1.92±0.67
6. I can perform preliminary and iterative steps involving reading, describing, and classifying research data before proceeding to data analysis.	3.00±0.00	2.20±0.82	1.87±0.63	1.92±0.67
7. I can identify techniques involved in qualitative data analysis.	3.00±0.00	2.12±0.73	1.78±0.63	1.92±0.67
8. I can analyze quantitative data regardless if the test involves descriptive or inferential.	3.25±0.50	2.03±0.86	1.81±0.70	1.92±0.67
9. I can identify emerging themes in an inductive analysis of qualitative data.	2.50±1.00	2.04±0.84	1.68±0.63	1.94±0.69
10. I can analyze both quantitative and qualitative data in mixed-method research deigns.	3.75±0.50	2.13±0.84	1.81±0.66	1.90±0.69
11. I can create a coherent story from all the data collected.	2.25±0.50	2.12±0.69	1.84±0.65	1.90±0.69
12. I can make visual display for the reader to easily understand information.	3.75±0.50	2.38±0.82	1.87±0.67	1.92±0.73
13. I can present qualitative data in graphs, charts and networks when necessary.	4.25±1.50	2.40±0.92	1.92±0.60	1.88±0.70
Mean ± SD	3.23±0.15	2.19±0.69	1.81±0.56	1.92±0.67
Level of Competence	Proficient	Basic	Basic	Basic
Interpretation	Non-difficulty	Difficulty	Difficulty	Difficulty

Note. 1.00-1.80=Limited; 1.81-2.60=Basic; 2.61-3.40=Proficient; 3.41-4.20=Advanced; 4.21-5.00=Expert

On the other hand, teachers in *proficient* level who do not classify this competence as a difficulty are good at quantitative research. A teacher explained:

> I have finished a statistics course, so I am familiar with descriptive and inferential statistics, including their associated parametric and non-parametric tests. (Teacher C – Cluster 2)

However, they considered themselves less *proficient* in qualitative research, particularly in developing its data collection plan, identifying emerging themes during inductive analysis, and creating a coherent story from qualitative data collected. One possible explanation for this relates to their specialization. Teachers in this cluster are composed only of those teaching mathematics and science. The epistemological belief of these teachers is usually positivist. With this epistemological position, one regards truth as a matter of validity and views validity as correspondence between the data and the independently existing reality (Guba & Lincoln, 1994). In this regard, they follow rigorous procedures in which the use of statistical data analysis is one in search for the truth (Slevitch, 2011).

3.5 Teachers' Perceived Competence in Integrating Ethics in AR

This competence evaluates teachers' capacity to identify and practice the ethics involved when conducting AR. In the previous studies conducted pertaining to the perceived needs or challenges in AR of teachers in the Philippines, this was not usually evaluated (e.g. Morales et al., 2016; Ulla et al., 2017; Ulla, 2018; Tindowen et al., 2019) except for one study in Surigao del Sur where teachers perceived *proficient* and *advanced* levels of competence indicating non-difficulty. On the contrary, the present study results, as reflected in Table 6, show that teachers in cluster 2, cluster 3, and cluster 4 have remained *basic*. It still indicates difficulty on the part of most of the teachers. Zeni (2006) explained that such incompetence may be grounded on the fact that some research practitioners often do not acknowledge that ethics is equally important with other research components and that it should be practiced at all times, even when studying their context. Indeed, a response by the teachers' in the interview reflects this position that,

> Research ethics is the most underrated research component for me. Maybe because the trend of teaching research is confined to the accuracy of the methods, and ethics is not as demanding as other research components. (Teacher F – Cluster 3)

Table 6: Level of competence in integrating ethics in AR of four clusters

Item Statements	Cluster 1 M ± SD	Cluster 2 M ± SD	Cluster 3 M ± SD	Cluster 4 M ± SD
1. I can write an assent form.	3.00±0.00	2.20±0.73	1.95±0.71	1.90±0.65
2. I can write letter of consent to parents or legal guardians.	4.50±1.00	2.63±0.94	2.11±0.66	1.90±0.69
3. I know the guidelines in securing consent from my immediate head and teacher researchers.	2.25±0.50	2.45±0.89	1.87±0.71	1.90±0.69
4. I can examine ethical slippages such as concealment and exaggeration when analyzing data.	2.50±1.00	2.16±0.78	1.76±0.68	1.90±0.69
5. I can provide information in the right way to participants.	4.00±0.00	2.46±0.82	1.87±0.71	1.90±0.69
6. I can present and disseminate findings in line with ethical guidelines.	4.00±0.00	2.37±0.88	1.84±0.69	1.90±0.69
7. I can identify ethical issues which may arise ahead in an action research project (*e.g.*, research topic, method, design of instruments, archiving, etc.).	4.75±0.50	2.47±0.93	1.97±0.65	1.90±0.69
8. I can apply the basic principles of ethical research which are stipulated in various codes and guidelines (*e.g.*, The Belmont Report, 1979).	1.75±1.50	2.41±1.02	1.95±0.66	1.90±0.69
Mean ± SD	3.34±0.19	2.40±0.67	1.91±0.59	1.90±0.68
Level of Competence	Proficient	Basic	Basic	Basic
Interpretation	Non-difficulty	Difficulty	Difficulty	Difficulty

Note. 1.00-1.80=Limited; 1.81-2.60=Basic; 2.61-3.40=Proficient; 3.41-4.20=Advanced; 4.21-5.00=Expert

Meanwhile, for other individuals, both in the *basic* and *proficient* group, who identified ethics as an area of difficulty, they attributed this to their lack of knowledge on this research component and the influence of personal prejudices. These are proven by the following narrative accounts:

> Personally, I do not know yet whether there is a fixed ethical protocol on qualitative and quantitative research methods. (Teacher D – Cluster 2)

> I may have known these ethical guidelines, yet there are instances in which we get to overwhelmed with our AR findings and tend to disseminate information which do not conform to the ethical guidelines anymore. There are also

> tendencies that personal prejudices regarding the topic override our will to do the research, and we forget to foresee ethical issues that may come along with it. (Teacher C – Cluster 2)

These factors affecting their *basic* competence in AR ethics regardless of their reason from above should be given serious attention as ethical dilemmas transcend to more significant problems. AR should be based on respect, honesty, teachers' and learners' interests, and constant awareness of ethical dilemmas around researchers' actions and decisions to become memorable, engaging, and meaningful (Banegas & Villacañas de Castro, 2015). These may only be realized if research practitioners have greater knowledge and competence on ethics and will be practicing ethics in the research process.

3.6 Teachers' Perceived Competence in Integrating Technology in AR

This competence evaluates teachers' capacity to use technology in searching and referencing literature and analyzing data. As shown in Table 7, all clusters have considered this competence a difficulty as expressed by mean scores all below midpoint. These results confirm again with the results from teachers previously studied by Morales et al. (2016) in Manila but deviate with the findings of Tindowen et al. (2019) and Cortes (2019). The teachers have the following responses as to why they considered this competence a difficulty on this research aspect:

> I still need to have at least a month of rigorous training on these research apps or software to earn credentials. (Teacher B – Cluster 1)

> I am the kind of person who loves to explore technology, but I am not that familiar with all software programs used in analyzing data. (Teacher H – Cluster 4)

> I am familiar with the different data analysis software but I am not confident using them by myself. I need to be trained otherwise, I should seek help from the experts. (Teacher E – Cluster 3)

Table 7: Level of competence in integrating technology in AR of four clusters

Item Statements	Cluster 1 M ± SD	Cluster 2 M ± SD	Cluster 3 M ± SD	Cluster 4 M ± SD
1. I can use search engines to explore internet sites which will build my review of related literatures.	4.25±1.50	2.60±0.90	1.73±0.61	1.90±0.69
2. I can use technology when doing bibliographical entries in Microsoft Word.	4.25±1.50	2.67±0.99	1.78±0.63	1.90±0.69
3. I can operate computer software in analyzing qualitative data (*e.g.,* NVivo 10.0).	1.25±0.50	2.03±0.98	1.65±0.63	1.90±0.69
4. I can operate computer software in analyzing quantitative data (*e.g.*, SPSS).	1.25±0.50	1.96±0.97	2.11±0.57	1.96±0.68
5. I can operate software programs for analyzing mixed-method data (*e.g.*, Dedoose).	1.25±0.50	1.82±0.81	1.95±0.58	1.96±0.68
Mean ± SD	2.45±0.30	2.21±0.72	1.84±0.50	1.92±0.67
Level of Competence	Basic	Basic	Basic	Basic
Interpretation	Difficulty	Difficulty	Difficulty	Difficulty

Note. 1.00-1.80=Limited; 1.81-2.60=Basic; 2.61-3.40=Proficient; 3.41-4.20=Advanced; 4.21-5.00=Expert

These teachers are asking for training on technology integration in research. The Philippine Department of Education has been incorporating these topics in AR training but are episodic and the duration is limited or not given equal emphasis compared to other research components. In effect, the training did not create a significant impact on them.

3.7 Teachers' Perceived Competence in Reflecting on and Communicating Results of AR

This competence evaluates teachers' capacity to reflect on AR results by developing action plans, writing results and communicating results in journals or conferences. The mean ratings for all clusters are below the midpoint indicating difficulty in this competence, as shown in Table 8. However, such results may be expected because these teachers were already struggling in the previous AR competences. This competence collectively measures teachers' capacity to put their research skills or competence and knowledge into writing. There are several factors which explains further why they consider this competence a difficulty on their part based on the following narratives:

> I have not attended any talk on proper procedures in communicating research results in journals. (Teacher H – Cluster 4)

I only learned few things about this through my friends who are into research too. (Teacher G – Cluster 4)

I do not have enough knowledge of the publication process, but I would love to publish one soon. (Teacher C – Cluster 2)

I have never attempted yet to publish my research work. (Teacher E – Cluster 3)

Publishing research results is difficult since there are many processes to do, including the formatting and testing of the originality of work. (Teacher A – Cluster 1)

Table 8: Level of competence in reflecting on and communicating results of four clusters

Item Statements	Cluster 1 M ± SD	Cluster 2 M ± SD	Cluster 3 M ± SD	Cluster 4 M ± SD
1. I can identify the distinction between an action plan and the action research process itself.	1.50±1.00	2.16±0.88	1.76±0.72	1.90±0.69
2. I can discuss the purpose of an action plan.	1.50±1.00	2.25±0.90	1.84±0.65	1.90±0.69
3. I can identify the basic components of an action plan.	1.50±1.00	2.16±0.88	1.81±0.70	1.90±0.69
4. I can design an action plan following the "Steps to Action Chart" format.	1.50±1.00	2.00±0.86	1.73±0.69	1.88±0.70
5. I can work with an array of people to develop action plan depending on the scope of action research effort.	3.25±0.50	2.28±0.79	1.78±0.63	1.88±0.67
6. I can write the action research report in a scholarly manner.	2.50±1.00	2.08±0.76	1.76±0.64	1.88±0.67
7. I can formally write an action plan as a complete report for the action research project when considered for publication in a professional journal.	3.25±0.50	2.05±0.76	1.70±0.66	1.88±0.67
8. I am aware on the guidelines in academic writing agreed-upon conventions of style (*e.g.*, Publication Manual of the American Psychological Association).	1.75±1.50	2.03±0.85	1.73±0.70	1.84±0.69
9. I am aware on the basic organizational structure for formatting an action research report.	1.75±1.50	2.04±0.79	1.78±0.63	1.88±0.67
10. I am aware on the fundamental submission guidelines to a research journal when considering an action research project for publication.	2.00±0.00	2.00±0.77	1.68±0.63	1.88±0.67
11. I can identify which journals are tagged as credible and predatory.	2.00±0.00	2.01±0.81	1.60±1.64	1.88±0.67
12. I can disseminate results of action research in journals and conferences.	1.50±1.00	1.99±0.84	1.65±0.68	1.90±0.65
13. I can present information without revealing confidential details regarding participants or location.	3.75±0.50	2.05±0.76	1.70±0.62	1.88±0.67
Mean ± SD	2.13±0.73	2.08±0.64	1.73±0.58	1.88±0.67
Level of Competence	Basic	Basic	Limited	Basic
Interpretation	Difficulty	Difficulty	Difficulty	Difficulty

Note. 1.00-1.80=Limited; 1.81-2.60=Basic; 2.61-3.40=Proficient; 3.41-4.20=Advanced; 4.21-5.00=Expert

Some of these teachers have the intrinsic motivation to publish their research works but were not trained to do so. Hence, they have not the confidence to undergo the research publication process. Some teachers also prematurely identify the publication process as difficult.

However, most of the teachers failed to recognize the competence in action planning here, which also explains why they have *limited* to *basic* rating in the first four items in Table 6. The teachers associated action plan as a research plan, although it may be the latter sometimes but not necessarily the same. An action plan may be a description on the implementation of new educational practice, a plan to reflect on alternative strategies to resolving the problem, a plan containing what the researcher has learned, or a plan the researcher intends to take in the next cycle of AR (Creswell, 2005; Johnson, 2008 cited in Cortes, 2020). This part of the action research process is very significant as it sets the research method with the other. It is characterized by reflection on the AR process leading to suggestions for improving the following AR cycle. This competence, however, is of difficulty among all teachers. Thus, it is considered an area also of professional development.

3.8 Summary of Results on Levels of Competence in Six Action Research Components

The results of teachers' levels of competence in six research components across four groups or clusters are shown in Figure 2. For cluster 1, these teachers perceived themselves *proficient* in the following research components: selecting an AR topic, planning an AR project, analyzing and presenting AR data, and integrating ethics in AR. These areas are considered non-difficulty for four teachers, but they still need further tooling and retooling through professional development programs aligned to these components. Proficiency is only a midpoint level of competence before *advanced* and *expert* levels, which means that non-difficulty means competence. On the other hand, integrating technology in AR, reflecting on, and communicating results are considered critical areas for professional development for this group of teachers whereby they perceived themselves as only *basic* in the two competences.

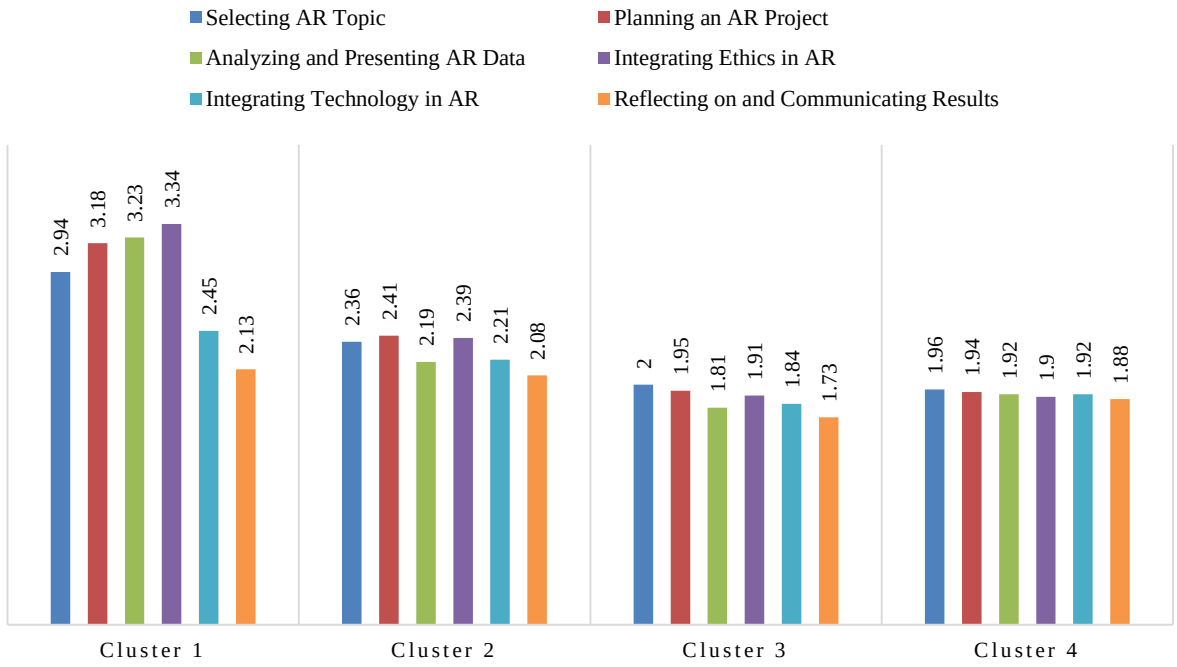

Figure 2: Summary of results of teachers' levels of competence in six research components across four groups or clusters

For the majority of the teachers who belong in cluster 2 (n=76), cluster 3 (n=37), and cluster 4 (n=49), all components of AR are considered critical needs for their improvement. Levels of competence among these areas only span from *limited* to *basic*. These results are alarming as it indicates that majority of the teachers are challenged to conduct an AR. Cluster 3 even reported a *limited* competence in reflecting on and communicating results. In other words, this AR component is considered an extreme difficulty for teachers.

4.0 CONCLUSION

To deliver quality education, teachers should reflect on their teaching practices by conducting AR. In this regard, this study found out that many teachers have conducted and finished action research but are not published. There are several reasons for these, such as: (a) their lack of confidence to engage in the process of publication; (b) lack of assistance from an experienced mentor; and (c) their doubt on the quality of their work. It can be noted that a great percentage of them reported difficulty across all AR components, thus, giving them doubts on the quality of their completed AR. In this regard, these findings suggest that their exposures previously to transmissive (*e.g.*, training) and transitional (*e.g.*, mentoring and community of practice) models of professional development programs are not effective toward developing their competence in six AR components examined in the present study. However, this study does

not also suggest a wholesale move towards the professional development program's transformative models, which are thought to be context-specific and teacher-centered because the models provide increased capacity for professional autonomy; instead, there should be a balance between models, and these models should have a transformative purpose.

AR is a transformative professional development model itself, but teachers' experiences from previous engagements in AR projects, community of practice, training, and mentoring programs did not develop them to become competent in AR components. Usually when training and mentoring are applied in the Philippine context, it would entail a large number of trainees or mentees. It results to a ratio of one trainer or mentor to thirty to fifty trainees or mentees. Thus, the amount of reinforcement, scaffolding, or monitoring received by the trainees or mentees during and after engaging in the AR process is limited. Also, there are no rigid evaluation and peer review of teachers completed AR projects resulting to teachers lack of confidence to publish their researches. In this regard, the present study suggests multiple use of professional development models in any of the following: training, award-bearing, deficit, cascade, standards-based, coaching or mentoring, community of practice, action research, and transformative as deemed appropriate. The use of these models will depend on the components or areas of AR needing development or improvement for the teachers. It should be noted that not all components of AR are learned through transitional and transformative models. Some are still best learned through transmissive and transitional approaches to learning. For instance, skills or competence in technology integration in AR may still be done via teacher training and coaching, but other models may also be considered. Also, there is a need to reconsider the number of participants in any professional development opportunity for the trainer or mentor to have enough time for mentoring. A large number of participants in professional development program sacrifices the quality of mentoring process. Finally, there is a need to consider clustering participants according to the similarity of their needs and refrain from mass training because it treats all the teachers to have the same or equal needs. The present study provides key reference points on which AR components need to be focused or improved per cluster of teachers when they will undergo the planned professional development program.

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