Anatolian Journal of Education
e-ISSN: 2547-9652

October 2025 ● Vol.10, No.2
www.e-aje.net
pp. 143-152

Science Teachers' Perceived Impact on the Implementation of Learning Action Cell (LAC) in Remote Philippine Region

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The Learning Action Cell (LAC) is a structured, cost-effective professional development initiative to continuously enhance school pedagogical competencies, teaching methodologies, and assessment practices. This study explored the science teachers' perceived views, attitudes, and knowledge on the impact of the LAC program as an in-house professional development training in remote areas of the Philippines. The study employed a quantitative approach using a researcher-made survey questionnaire involving science teachers (n = 430) from six division offices in Region VIII. The findings revealed that teacher participants preferred the conduct of face-to-face school LAC over online LAC settings, which was found to have a significant impact on where they could physically participate and engage in the training. Also, findings show that science teachers believed that the Learning Action Cell helps them develop new teaching techniques, and they see the importance of the development program and how it enriched their knowledge, skills, and capabilities as teachers. Results show that science teachers receive and learn more ideas about content, assessment, ICT, and curriculum. Hence, LAC is believed to increase teachers' knowledge and attitudes toward professional development and acknowledges flexibility in professional development's efficiency. By determining science teachers' perceived impacts, this study provides insights into how the LAC program is experienced in remote areas in the Philippines, where access to professional development resources is limited. It gives information on how LAC can be designed to meet the needs of science teachers. Also, the findings of this study suggest that improving the design and implementation of teacher professional development programs reveals specific strategies that help or hinder the effectiveness of LACs and can inform future training programs and policy decisions.

Keywords: learning action cell, faculty development training, secondary education, perceived impact

INTRODUCTION

Professional development for teacher educators is becoming increasingly important in promoting and strengthening educational practice. It is regarded as an essential component of curriculum transformation particularly in the Philippines (Barrot, 2023) Teaching quality is crucial in determining student learning outcomes (Olvido et al, 2024). As a result, the qualities of highly effective teaching must yield a shared reference point for effective teaching and learning practice (Rasool et al., 2022; Olvido et al, 2024).

The Philippine Professional Standards for Teachers (PPST), originally known as the National Competency-Based Teacher Standards (NCBTS), served as a foundation for teacher quality. The Department of Education (DepEd) emphasizes the importance of professional standards in teachers continued professional growth and advancement based on lifelong learning. However, since its adoption, classroom teachers have expressed concerns about the amount of objectivity in evaluating

Citation: Vega, M. G. A., & Orleans, A. V. (2025). Science teachers' perceived impact on the implementation of Learning Action Cell (LAC) in remote Philippine region. *Anatolian Journal of Education*, *10*(2), 143-152. https://doi.org/10.29333/aje.2025.10211a

students' performance. Public school teachers faced challenges in implementing the Results-Based Performance Management System (RPMS) aligned with the Philippine Professional Standards for Teachers, including frustration due to a lack of administrative support, dealing with conflicting personal issues, and losing trust in school administrators.

In the Philippines, DepEd Order 35, s. In 2016, the "Learner Action Cell," or LAC, was mandated as a K-12 Basic Education Program School-Based Continuing Development Strategy to improve teachers' knowledge, skills, and attitudes based on established K-12 skills (DepEd, 2016). According to DepEd, the LACs are the primary method for teacher development. In essence, LACs are systematic professional development and cost-effective activities based on schools that aim to continuously improve pedagogical skills, teaching methodologies, and evaluation processes to produce better academic performance among students. However, despite DepEd's advocacy and increased interest in LAC as a professional development tool in schools, empirical evidence is needed to suggest that the strategy is being applied to improve teacher performance. Several research studies (de Vera et al., 2020; Generalao et al, 2022; Vega, 2020) have confirmed this observation among teachers.

Teachers were concerned about the quality of the LAC sessions at their schools. Teachers stated that the LAC had no direct influence on science teachers' content and that specific demands were not met because the generalist approach in LAC sessions ignored teachers' specialty in science (de Vera et al., 2020). The customary discussion focuses on K-12 Basic Education Program material and pedagogy, 21st-century skills, ICT integration in instruction and evaluation, and curriculum contextualization. Furthermore, schools conducting LAC sessions must address learner diversity, student inclusion, K-12 Basic Education Program evaluation and reporting, or indigenization (Vega, 2020). In other words, the concept of LAC needs to be sufficiently contextualized, undermining the professional growth goal. Correos and Paler (2020) also discovered that teachers need to have more substantial knowledge of how to use what they learned during the LAC session. It is proposed that school principals and teachers receive comprehensive training programs on the conduct and monitoring of LAC to provide them with the knowledge and skills necessary to adopt said activity to improve teaching and learning delivery.

No reliable information is available to explain the progress of LAC sessions, indicating that specific gaps are being addressed (de Vera et al., 2020; Vega, 2020). There needs to be a clear assessment of the program to determine its strengths and weaknesses, emphasizing its perceived impacts on teachers who underwent such a development program. According to Gepila (2020), more research is needed to study this program and determine its effectiveness and sustainability in meeting teachers' diverse professional expectations. The efficiency of LAC as a professional activity needs to be examined. In science, Sotto and Marzocchi (2021) proposed that teachers should be able to create their learning in an active context in an effective professional development activity. A successful professional development program also emphasizes specific classroom techniques and approaches to teaching that teachers can implement. There is a substantial correlation between using LAC sessions and academic success (Bernabe, 2019). Antiola and Ferenal (2024) cited that one of the primary objectives of the learning process was to institutionalize the school LAC to improve teacher competence. As a result, this study presents the basic principles of effective professional development to address the issues faced during the LAC session.

Furthermore, Correos and Paler (2020) found that educators need to improve their comprehension of how to use the knowledge acquired during the LAC session. It is recommended that educators and school administrators undergo extensive training programs on the implementation and oversight of LAC to provide them with the requisite knowledge, attitudes, and abilities to incorporate this activity as a means of enhancing teaching and learning outcomes. Moreover, there is a need to determine how geographical remoteness impacts science teachers' perceptions and experiences. Factors like limited internet connectivity, resource scarcity, and unique cultural contexts in remote Philippine regions

require more focused research (Vega, 2019; Valdehueza et al., 2023). Thus, this study seeks to investigate and examine the Learning Action Cell, an instrument in professional development training, as perceived by science teachers based on the implementation in the different schools in the remote region of the Philippines. Moreover, this study aims to investigate the perceived views, attitudes, and knowledge towards LAC sessions in schools for enhanced effectiveness and efficiency while advancing the school community of practice.

The following were the research questions: (1) What are the perceived views of science teachers in the LAC session? (2) What are the perceived attitudes of science teachers in the LAC session? (3) What knowledge do science teachers gain in the LAC session?

METHOD

This study employed a quantitative research approach to investigate science teachers' perceived views, attitudes, and knowledge during LAC sessions. Before its implementation, the structured survey instrument underwent content validation and pilot testing to fine-tune the context. Content validation was carried out using the specified validation checklist, with experts and science teachers invited to examine the instrument's content. It includes the instrument's content characteristics and face validity in written and digital formats.

The study's sample size included 403 science teachers from six division offices in Region VIII, and respondents were chosen using purposive sampling for the survey questionnaires and interviews. Purpose sampling was used in this study to determine the perceived impact on the population mainly. To reduce possible bias in this study. Inclusion criteria were created when selecting the participants. It reduces ambiguity, and the researcher ensures that everyone involved in the selection process clearly understands it. A structured research instrument was also used to keep the data collection uniform.

The following inclusion criteria were utilized in the selection process:

1. Science teachers in Biology, Chemistry, Physics, and Earth Science
2. Science teachers working in DepEd Secondary Schools.
3. Science teachers in Region VIII
4. Participants must have taken part in any LAC sessions.

After five months, the researcher concluded the data-gathering phase, providing the necessary returns to meet the target demographics. The structured survey questionnaire was cross-sectional, with data collected simultaneously. Interviews with identified teachers were also conducted after the survey was conducted. Due to unreliable internet connectivity in certain schools, some data were gathered by printed surveys, while others were obtained via Google Forms links. The closed-ended responses were collected and encoded, and results from several subgroups were identified. The data were then examined using SPSS version 10. Descriptive statistics were utilized to calculate the percentages, means, and standard deviations of the specific responses to the survey questions based on the indicated Likert scale. Moreover, the quantitative assessment of the construct validity of the empirical data was performed using Excel.

FINDINGS AND DISCUSSION

The perceived views, attitudes, and knowledge of science teachers in the LAC session are presented in the following sections.

Science Teachers' Perceived Views on the Impact of LAC Sessions

The teachers' perceived views on the impact of LAC sessions were investigated. The LAC sessions were classified according to levels (school, division, and regional) and modality (face-to-face and online). The mean and standard deviation of the views are presented in Table 1.

Table 1 presents that science teachers believed that school LAC sessions conducted in a face-to-face (F2F) set-up tend to significantly impact them, showing the highest median score (Mdn-4). The result implies that teachers preferred face-to-face school LAC over other LAC settings, such as online school LAC, which has been said to have a "moderate impact" on teachers (Mdn-3). On the other hand, the conduct of Division and Regional LAC in a face-to-face mode were perceived to have moderate (Mdn – 3) and small (Mdn – 2) impacts, respectively. The conduct of the online mode in both the division and regional has little influence (Mdn – 2) on the teachers. The most negligible impact of the conduct of LAC in divisions and regions is associated with the reason that science teachers had no experience in the conduct of such settings. It is emphasized that insufficient travel funding can hinder teachers from attending division and regional LAC sessions. It is also found that teachers often have heavy workloads, and finding time for regional LAC sessions can be challenging (Grape, 2024); Gul et al., 2021). Also, teachers may not view the sessions as essential or relevant, leading to low attendance or passive engagement during the sessions (Grape, 2024). Thus, these led to rush, poorly, and ineffective attended sessions.

Table 1

Science teachers' views on the impacts of LAC sessions on different modalities

Level/ Modality	Mdn	R	Q
School LAC / Face to Face	4	4	LI
Division LAC / Face to Face	3	4	MI
Regional LAC / Face to Face	2	4	S.I.
School LAC / Online mode	3	4	MI
Division LAC / Online mode	2	4	S.I.
Regional LAC / Online mode	2	4	S.I.

Note: Mdn- median; R - Range; Q - Qualitative Description.
LI - Large Impact (Mdn - 4), MI – Moderate Impact (Mdn -3), S.I. – Small Impact (Mdn-2), N.I. – No Impact (Mdn -1), N.A. – Not Applicable (Mdn < 1)

Science Teachers' Perceived Attitudes on the Impact of LAC Sessions

Table 2 shows the attitudes of science teachers who attended the LAC sessions. Research findings indicate that science teachers predominantly agree with the idea of not participating in LAC when there is an option not to attend (Mdn-1). It was also revealed that they moderately agree (Mdn-2) that LAC is not a valuable use of their time in school because the training they got at the LAC session was unrelated to their field of specialization. Teachers needed help figuring out how to use the training in their science classes, which is evident in the teachers' response, where most disagreed (Mdn – 4) that LAC sessions often help them develop new teaching teachings.

However, data also shows that science teachers mostly agree that LAC sessions have influenced and enriched them better (Mdn-2). In the same way, science teachers moderately disagreed (Mdn – 5) with the idea that LAC had little impact on their teaching. These results show how science teachers feel about LAC lessons. Most of them do not agree with how LAC has changed their profession. However, they agree on the importance of LAC as training and how it is enriching.

Table 2
Science teachers' attitudes in participating in the LAC sessions

Statement	Mdn	R	Q
LAC sessions/workshops often help me to develop new teaching techniques	4	5	DSA
If I have an option not to attend the LAC session, I will not attend	1	5	SA
LAC sessions are not worth the time they take	2	5	MA
I have been enriched by the teacher training like LAC session events I have attended	2	5	MA
LAC session initiatives had little impact on my teaching	5	5	MD

***Note**:* Mdn = median, R - Range, Q = Qualitative Description
SA - Strongly Agree (Mdn - 1), M.A. - Moderately Agree (Mdn – 2), ASD - Agree Slightly more than Disagree (Mdn - 3), DSA - Disagree Slightly more than Agree (Mdn - 4), M.D. - Moderately Disagree (Mdn - 5), S.D. - Strongly Disagree (Mdn - 6)

Moreover, the findings support that LAC sessions are helpful for personal and professional growth (Grape, 2024). The initiative serves as a cost-efficient platform that hones and manages the pedagogical effectiveness of teachers and addresses the gaps in instructional delivery. Since the LAC sessions offer opportunities for needs assessment, it is critical for teachers' professional development (Culajara, 2023).

On the other hand, some science teachers' perceptions of LAC contradict their perception of its significance. Science educators generally agree that LAC sessions are valuable relative to the time invested and that teacher training has enhanced their experience. The contradictory findings imply that teachers are aware of the importance of improvement brought about by LAC but may have experienced poorly or ineffective executed sessions that failed to meet their needs, causing doubt about the future effectiveness of LACs. Also, Grape (2024) revealed that current professional development requirements often emphasize quantity over the quality of teachers' learning. The lack of resources and time constraints also demotivated teachers about seeking PD opportunities. Hence, Wess et al (2023) support the idea that professional development depends primarily on the attitudes and concerns of the individuals involved and how it is affected by their personal experiences.

Additionally, it is believed that educators who have the choice not to participate in the LAC will likely choose to do so. Similarly, certain teachers indicated a minor disagreement rather than agreement on the claim that LAC promoted the development of new teaching skills. Attitudes affect behavior intentions, which generally influence actual behavior. Thus, the positive attitudes of science teachers towards the LAC session suggest that it was influenced by the teachers' disposition and the effectiveness of how the LAC was conducted.

Science Teachers' Perceived Knowledge on the Impact of LAC Sessions

Table 3 presents the perceived knowledge of the impact of LAC sessions. It can be observed that science teachers gained primarily the content knowledge in the LAC session, which includes (a) learner's diversity and inclusion, (b) content and pedagogy, (c) assessment and reporting of 21st-century skills and ICT integration, (d) curriculum, contextualization, localization, and indigenization, and (e) DepEd Thrust and Policies. Furthermore, the teachers generally consider the content and pedagogy, assessment and reporting, 21st-century skills and ICT integration and curriculum, contextualization, localization, and indigenization of knowledge to be acquired mainly by their engagement in the LAC sessions. Findings imply that science teachers tend to receive and learn more ideas about content, assessment, ICT, and curriculum (Mdn-4).

Table 3
Science teachers' content knowledge in the LAC

Knowledge Category	Mdn	R	Q
A. Learners' Diversity and inclusion			
Diversity of Learners	4	5	TALE
Inclusive Education	3	5	TSE
Special Education	3	5	TSE
Multiple Intelligences	4	5	TALE
Gender and Development	4	5	TALE
B. Content and Pedagogy			
Application of Content Knowledge within and across curriculum teaching areas	4	5	TALE
Using a range of Teaching Strategies that Enhance Learner Achievement in Literacy	4	5	TALE
Teaching Strategies that Enhance Learner Achievement in Numeracy	4	5	TALE
Strategies Applied to Developing Critical and Creative Thinking Skills as well as Higher Order Thinking Skills	4	5	TALE
Different Approaches to Teaching	4	5	TALE
C. Assessment and reporting			
K to 12 Assessment Process	4	5	TALE
Blooms Taxonomy	4	5	TALE
Utilization of Rubrics	4	5	TALE
Using Group Consultation in Communicating Learners Needs and Progress	4	5	TALE
Home Visitation as a Tool for Communication with Stakeholders	4	5	TALE
D. 21st-century skills and ICT integration			
Utilization of ICT in Teaching	4	5	TALE
Integration of ICT in Teaching	4	5	TALE
Understanding 21st Century Learner	4	5	TALE
21st Century Teaching Skills	4	5	TALE
E. Curriculum, contextualization, localization, and indigenization			
Localization	4	5	TALE
Contextualization	4	5	TALE
Developing Localized Plan	4	5	TALE
Developing Contextualized Plan	4	5	TALE
F. DepEd Thrusts and Policies			
School-Based Management	4	5	TALE
Reading Program	3	5	TSE
Disaster Risk and Management	4	5	TALE
Research	3	5	TSE
Journalism	3	5	TSE

***Note**:* Mdn = median, R - Range, Q = Qualitative Description
TGE – To a Great Extent (Mdn - 5), TALE – To a Large Extent (Mdn - 4), TSE – To Some Extent (Mdn- 3), TLE – To a Little Extent (Mdn - 2), NAA – Not at All (Mdn - 1), N.A. – Not applicable (Mdn < 1)

Moreover, findings show that science teachers' knowledge of the application of content knowledge within and across curriculum teaching areas, using a variety of teaching strategies to improve learner achievement in literacy, teaching strategies to improve learner achievement in numeracy, strategies for developing critical and creative thinking skills, as well as higher order thinking skills, and different approaches to teaching, are to a large extent acquired by science teachers in the LAC session. According to Gutierez (2016), teachers can still learn from the subject matter and pedagogical content knowledge from each other and knowledgeable others through constant collaborative reflection, like what is happening in the LAC session and a community of practice. Daniel et al. (2013) claimed that the reflective process enables teachers to refine their practices in response to the dynamic nature of their professional work and the content of the subject area.

Eborde and Escote (2024) presented that regarding the implementation of SLAC sessions and teachers' competencies, there may not always be a direct correlation between the degree of SLAC implementation and teachers' professional development in behavioral and functional competencies. It was also stated that although SLAC sessions improve the pedagogy and well-being of teachers, it is possible that they do not adequately address the difficulties associated with teaching outside of one's field, which could restrict their ability to improve teachers' overall performance. The non-significant correlation between SLAC and teachers' performance can be attributed to all these factors combined.

The findings support that LAC should cater to the participants' acquisition of content relevant to their specifications, which they may implement in their classrooms. School-based LAC sessions provided learning opportunities where resource speakers imparted new knowledge, skills, and perspectives pertinent to teaching (Dilay & Ramos, 2024). LAC contents are essential to the professional growth of teachers. The delivery of each topic or content in the LAC session should actively engage science teachers in a wide range of inquiry-based activities they would eventually experience when conducting similar activities in their classrooms (Gutierez, 2016). Moreover, Bandura (2000) emphasized that teachers are more likely to apply newly acquired skills and knowledge in the classroom when they are dynamically engaged during professional learning sessions. During this professional development for teachers, the teachers' enriched content knowledge provided ideas on how to make their subject matter understandable and relatable to the students (Chu et al., 2016; Desimone, 2019).

In the same way, findings show the subtopics under the assessment and reporting, including the K to 12 assessment process, Bloom's taxonomy, rubrics, using group discussion in communicating learners' needs and progress, and home visitation as a tool for communication with stakeholders. Data revealed that most science teachers acquired an understanding of the assessment and reporting in the LAC session. The empirical data on assessment and reporting must be given equal priority as the rest of the LAC contents because every science teacher should understand how to implement learner-centered assessment in science instruction and the K to 12 Curriculum (Cortez et al., 2019). In addition, assessment and reporting provide teachers and students with critical feedback on learning outcomes. This feedback informs the reporting cycle and enables teachers to continuously choose, organize, and use rational assessment processes (Correos & Carlos, 2020; Bautista et al., 2015).

According to DepEd (2016), bringing 21st-century skills into teaching and learning is central to the K to 12 Basic Education Program. It must be taken into consideration in the LAC contents. Teachers must enrich lessons with simple integration strategies that use developmentally appropriate information and communication technology (ICT) (Sugano & Nabua, 2020; Sugano & Mamolo, 2021). Utilization and Integration of ICT in Teaching can be used to make instruction and assessment processes more collaborative, which teachers can implement using the tools and equipment available in their schools (Mamolo & Sugano, 2023).

Teachers recognize and take opportunities to connect classroom learning to school community and stakeholder experiences, interests, and aspirations. Most science teachers had some contextualization, localization, and contextualized plan experience. According to DepEd, science teachers must grasp curriculum contextualization, which matches curriculum content and instructional practices to student needs. K-12 curriculum localization is essential. New content related to local experiences will improve students' learning efficiency and relevance. Communities with distinct cultural practices must deepen curriculum contextualization through indigenization. Teachers and educational systems must involve community people in indigenization for an accurate and culturally appropriate curriculum. The K–12 Basic Education Program must include areas for many cultures for student inclusion and educational relevance.

However, it was also revealed that science teachers needed to be more exposed and trained in special education, inclusive education, journalism, reading programs, and research. This is perceived as, to

some extent, knowledge acquired by the teachers, showing as the least obtained knowledge (Mdn - 3) in the LAC session. The findings imply that LAC contents should be explored more in other fields, the minor priority contents in the LAC, especially in the learner's diversity and inclusion and DepEd thrust and policy, for the teachers to adequately acquire knowledge in the identified fields. Also, it is essential to plan how to deliver such topics in the LAC sessions, making them more comprehensive and substantial for the teachers.

Rennie and Ortlieb (2013) compared addressing diversity to addressing student differences; each has perspectives that need to be developed. To meet each student's needs and provide learning opportunities beyond simply preventing failure and meeting minimum benchmark standards, LAC coordinators and science teachers participating in LAC sessions should decide what needs to be investigated through various theoretical lenses. It has been recommended that school administrators organize educational conferences and seminars to help develop teachers' beliefs and ideas to raise their levels of open-mindedness (Grape, 2024). It could help elevate the quality of education students receive (Grape, 2024).

CONCLUSION AND IMPLICATIONS

Science teachers shared their experiences with the LAC's views, attitudes, and knowledge. It was found that teachers favored the conduct of face-to-face school LAC over online LAC settings. It was found to have a significant impact on the participants, where they can participate and engage in the training physically. Furthermore, according to science teachers' responses, regional face-to-face LAC had no effect. Most science teachers in the region have yet to experience Regional LAC.

Science teachers believe that the Learning Action Cell helps them develop new teaching techniques, and they see the importance of the development program and how it can enrich their knowledge, skills, and capabilities as teachers. The positive attitudes of science teachers towards the LAC session imply that it was influenced by the teachers' disposition and the effectiveness of how the LAC was conducted. LAC increased teachers' attitudes toward professional development. LAC acknowledges flexibility and professional development efficiency.

Findings imply that science teachers receive and learn more ideas about content, assessment, ICT, and curriculum. LAC contents are essential to the professional growth of teachers. During this professional development, the teachers' enriched content knowledge provided ideas on how to make their subject matter understandable and relatable to the students. LAC supports science teachers in developing their instructional skills and understanding of content. The impact of LAC, as demonstrated by this study, is based on providing high-quality training with clearly defined objectives, highlighting its potential to improve educational outcomes in remote areas. As a result, practical training with specific goals is essential for LAC's success.

Moreover, this study implies that a regular assessment and evaluation should be conducted to implement LAC programs to address science teachers' challenges and professional needs in remote areas, particularly in Eastern Visayas. Also, school administrators should encourage teachers' participation in designing and planning LAC sessions, ensuring the topics are relatable and address the present issues and needs of the teachers in the classroom. Then, school administrators must be actively involved in LAC sessions by providing logistical support or participating in discussions to model the importance of continuous professional learning. Lastly, to establish local communities of practice where teachers can continuously share resources, discuss challenges, and provide mutual support beyond just the formal LAC sessions.

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