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## Implementation of the Learning Action Cell in the Teaching of Mathematics in Four Mega High School of Agusan Del Sur, Philippines

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### ABSTRACT

This study investigates the implementation of the Learning Action Cell (LAC) in Mathematics and its effect on teachers' development in the Division of Agusan del Sur. Specifically, it examines the extent of LAC implementation in terms of administrative support, provision of facilities and financial resources, monitoring and evaluation, and quality of teacher participation. It also explores its effects on teachers' instructional performance and sharing of expertise and resources. Employing a concurrent mixed-method approach, the study involved 125 Mathematics teachers from four mega-schools: Agusan del Sur National High School, Trento National High School, Prosperidad National High School, and Bayugan Comprehensive National High School. Quantitative data were collected through a validated questionnaire, while qualitative insights were obtained through interviews with LAC leaders. Findings revealed a very high extent of LAC implementation in administrative support, teacher participation, and monitoring, while provision of facilities and financial resources scored moderately. Teachers demonstrated remarkable development in instructional performance and collegial resource sharing. Spearman rho analysis confirmed a significant positive correlation between LAC implementation and teacher development. Notable strengths included competent human resources and a strong culture of collaboration. However, financial and time-related challenges emerged as key barriers to effective implementation. Based on these findings, the study concludes that while LAC is effectively fostering professional growth among Mathematics teachers, gaps in resource provision must be addressed. An intervention program is recommended to sustain and enhance LAC's effectiveness. The study offers practical implications for DepEd policymakers, school leaders, teachers, and future researchers in promoting sustained professional development through LAC.

### INTRODUCTION

Continuity of learning and professional growth among teaching and non-teaching personnel remained essential in enhancing instructional delivery and improving educational quality. Culajara (2023) emphasized that, similar to students, teachers required consistent support and opportunities for continuous improvement. Trainings and capacity-building initiatives served as key mechanisms for this purpose. However, financial limitations hindered many schools from sending a large number of teachers to expensive seminars and workshops (Cabral & Millando, 2019). In the Philippines, this challenge persisted, restricting educators' access to meaningful development programs (Macapobre, 2024).

The Department of Education (DepEd) introduced more sustainable and cost-efficient strategies. One of its major initiatives was the institutionalization of Learning Action Cells (LACs) through DepEd Order No. 35, s. 2016. LACs were designed to promote collaborative, school-based professional development where teachers could share expertise, improve instructional practices, and foster professional growth. Saquilabon *et al.* (2023) recognized LACs as effective platforms that supported learning without incurring high costs. In Agusan del Sur, this initiative was reinforced by Division Memorandum No. 595, s. 2023, also known as SIDLAC, which

emphasized strengthened implementation and delivery of LAC sessions in all schools.

The implementation of LACs in mathematics gained particular relevance due to persistent low performance in both national and international assessments. Filipino students continued to score below the international averages in key examinations such as the 2022 Programme for International Student Assessment (PISA), the 2019 Trends in International Mathematics and Science Study (TIMSS), and the 2019 Southeast Asia Primary Learning Metrics (SEAPLM). These assessments consistently showed that a significant number of students failed to meet minimum proficiency levels in mathematics.

Locally, the performance of students in Agusan del Sur, particularly from the four identified mega-schools, Bayugan Comprehensive National High School, Prosperidad National High School, Agusan del Sur National High School, and Trento National High School reflected similar issues. The 2024 National Achievement Test (NAT) scores indicated low academic performance in mathematics among Grades 10 and 12 learners. In response, these schools regularly conducted LAC sessions, typically held once or twice each quarter, to support instructional improvement and collaborative problem-solving among mathematics teachers.

Despite documented practices in other regions, limited

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research focused specifically on LAC implementation in mathematics in Agusan del Sur. This study aimed to examine the extent of LAC implementation in mathematics and its impact on teacher development in the four mega-schools in the division. The findings served as the basis for a proposed LAC primer that highlighted successful practices, common challenges, and evidence-based recommendations. The primer aimed to guide schools in optimizing LACs as cost-effective professional development tools, while fostering a culture of collaboration among school heads, master teachers, and classroom educators.

### Theoretical and Conceptual Framework

This study was grounded in Wenger's Community of Practice (CoP) theory, which described a group of individuals who shared a concern or passion for something they did and learned how to do it better through regular interaction (Cabral *et al.*, 2019). The Learning Action Cell (LAC) approach embodied this theory by providing teachers with a collaborative environment where they continuously enhanced their professional skills. In alignment with the goals of the K-12 curriculum, LACs offered ongoing, school-based opportunities for educators to improve their instructional practices and respond more effectively to student needs. Wenger's CoP theory proved especially relevant in examining how Mathematics teachers engaged in shared learning and reflective practice through LACs. These sessions served as platforms where educators came together to discuss instructional challenges, exchange strategies, and co-develop solutions aimed at improving mathematics instruction. Within these communities, teachers built professional identities, formed shared meanings around teaching practices, and strengthened their capacity to deliver quality education. The theory also facilitated the understanding of how collaborative engagement within LACs contributed to sustained professional growth.

Moreover, the core elements of Wenger's framework mutual engagement, joint enterprise, and shared repertoire were clearly reflected in the LAC process. Teachers demonstrated mutual engagement by actively participating in LAC activities, discussing common challenges, and supporting one another. The joint enterprise was evident in their collective aim to improve student outcomes in mathematics, while their shared repertoire included co-created lesson plans, assessment tools, and instructional techniques. Studying LACs through this theoretical lens allowed for a deeper analysis of how collaborative professional learning influenced instructional improvement and how such efforts addressed the long-standing issues in mathematics education in the Philippines.

The conceptual framework of this study centers on the implementation of Learning Action Cells (LACs) as a school-based professional development strategy aimed at improving Mathematics instruction. It considers how the

effectiveness of LAC implementation influences teaching practices and professional growth among educators. The study explores key factors such as leadership competence, quality of session content, administrative support, teacher engagement, and challenges encountered throughout the process. These components serve as mediating and moderating variables that affect the overall success of LAC initiatives. By examining the relationship between these factors and the outcomes of professional development, the study identifies essential practices and gaps within the current system. The end goal is to generate outputs such as a primer and implementation guide to strengthen LAC operations and promote sustained teacher competence in Mathematics teaching. Overall, the framework reflects the dynamic process of collaborative learning, where teachers collectively improve their instructional skills through structured support, shared goals, and reflective practice ultimately aiming to enhance student achievement and instructional quality.

### Research Questions

This study generally aimed to investigate the implementation of Learning Action Cells (LAC) and its effect on teachers' development in the Division of Agusan del Sur. Specifically, this research sought to answer the following questions: (1) What is the extent of the implementation of LAC in Mathematics according to the guidelines stipulated in DepEd Order No. 35, s. 2016 in terms of administrative support, provision of facilities and financial resources, monitoring and evaluation, and quality of teacher participation? (2) What is the extent of teachers' development in terms of instructional performance and sharing of expertise and resources? (3) Is there a significant relationship between the implementation of LAC and the teachers' development? (4) What are the strengths in the implementation of LAC as experienced by the teachers? (5) What are the weaknesses in the implementation of LAC as experienced by the teachers?

## MATERIALS AND METHODS

### Research Design

The study used a mixed-methods approach, integrating both quantitative and qualitative data gathering methods to gain a comprehensive understanding of the implementation of Learning Action Cells (LACs) in teaching Mathematics in mega schools. It focused on the perceptions of LAC leaders regarding the implementation of LACs, administrative support, quality of teacher participation, and the impact of LAC sessions on instructional supervision and teaching performance. Guided by Takele (2020), who employed a mixed-method approach to explore the use of active learning strategies in Mathematics classes, this study adopted a similar methodological framework to assess the effectiveness of LACs. The integration of both data types allowed for a more in-depth analysis of the strengths, weaknesses,

and overall impact of LACs, leading to evidence-based recommendations for enhancing professional learning communities in Mathematics education.

### Research Respondents

The respondents of the study were Mathematics teachers from four identified mega-schools in Agusan del Sur. A complete enumeration sampling technique was employed to ensure that all Mathematics teachers from these schools were included in the study. Agusan del Sur National High School had a total of forty-one (41) Mathematics teachers, with twenty-seven (27) from Junior High School and fourteen (14) from Senior High School. Bayugan Comprehensive National High School, under the City Division of Bayugan, also had forty-one (41) Mathematics teachers, comprising twenty-one (21) from Junior High School and twenty (20) from Senior High School. Prosperidad National High School had a total of nineteen (19) Mathematics teachers, fifteen (15) from Junior High School and four (4) from Senior High School. Trento National High School had twenty-four (24) Mathematics teachers, including seventeen (17) from Junior High School and seven (7) from Senior High School. Overall, the total number of respondents was one hundred twenty-five (125) Mathematics teachers, with eighty (80) from Junior High School and forty-five (45) from Senior High School.

### Research Instrument

This study utilized a researcher-made questionnaire and guide questions for the quantitative and qualitative components, respectively. The instrument was structured based on the study's problem statements and was divided into four parts. Part I consisted of a five-point Likert scale, where 5 indicated "strongly agree," 4 for "agree," 3 for "neutral," 2 for "disagree," and 1 for "strongly disagree." This section measured the extent of the implementation of LAC in terms of administrative support, provision of facilities and financial resources, quality of teacher participation, and monitoring and evaluation. Part II also used the same Likert scale to assess teachers' development in LAC sessions, focusing on instructional performance and the sharing of expertise and resources. Part III included open-ended questions designed to gather responses on the perceived strengths in the implementation of LAC, while Part IV contained open-ended questions aimed at identifying the weaknesses encountered. To ensure reliability, a test was conducted using Cronbach's alpha, and all variables yielded alpha values greater than 0.70, indicating strong internal consistency. The validity of the instrument was established through expert judgment.

### Data Gathering Procedure

The researcher analyzed survey results and conducted focus group discussions to develop policy guidelines for LACs based on the findings. The study involved junior and senior high school Mathematics teachers from four mega

schools, using both quantitative and qualitative methods. The quantitative part focused on the implementation of LAC in terms of administrative support, resources, teacher participation, and monitoring, as well as teacher development in instructional performance and sharing of expertise. The qualitative part explored the strengths and weaknesses of LAC implementation. The study aimed to gather comprehensive insights on LAC practices in Mathematics teaching.

### Ethical Considerations

Multiple ethical considerations were maintained throughout the study to protect the rights, privacy, and welfare of the participating teachers. The researcher requested written permission from the Schools Division Superintendent and sought approval from the principals of the identified mega-schools. Most importantly, informed consent was obtained from all participants. Each selected teacher received a written informed consent form outlining the study's objectives, procedures, and potential benefits and risks. To ensure anonymity, confidentiality protocols were strictly followed, using unique codes to protect the identities of participants. Furthermore, secure data storage and limited access were enforced to maintain the integrity and privacy of all collected information.

### Treatment of Data

The data acquired from the survey questionnaire were analyzed using descriptive statistics in this study. Descriptive statistics summarized and described the characteristics of the participants and their responses. The implementation of learning action cells in teaching Mathematics in mega schools was described using the mean. The qualitative data were subjected to thematic analysis to uncover recurring themes related to the perceptions and experiences of teachers involved in LAC sessions. Furthermore, a correlation analysis was conducted to examine the association between the implementation of LAC in teaching Mathematics and teachers' development, including the strengths and weaknesses experienced by the participants. A significance threshold of 0.05 was applied to all statistical tests to determine significance. These analyses aimed to explain the implementation of LAC in Mathematics instruction in terms of administrative support, provision of facilities and financial resources, teacher participation, monitoring and evaluation, and the resulting development in instructional performance and sharing of expertise in Agusan del Sur, Philippines.

## RESULTS AND DISCUSSION

Extent of LAC Implementation in Mathematics Based on DepEd Order No. 35, s. 2016

Table 1 evidently present the four parameters used to measure the implementation of LAC sessions in the mega schools of Agusan del Sur, the provision of facilities and financial resources is the area that needs the most improvement, as indicated by the lowest overall mean of

2.85. In contrast, the other three parameters received very high descriptive ratings based on their overall mean scores. Notably, the quality of teacher participation emerged as the strongest aspect of the program, with the highest mean of 4.43. Administrative support and monitoring and evaluation were also identified as key strengths, with overall mean ratings of 4.36 and 4.33, respectively. Overall, the findings highlight more strengths than weaknesses in the program. The limited availability of facilities and financial resources presents a clear opportunity for improvement that DepEd management may address in support of its goal of advancing the professional growth of both teaching and non-teaching personnel.

**Table 1:** Summary of Mean Scores for the Parameters Assessing the Implementation of LAC in Mathematics

| Parameters                                      | Mean Score | Extent    |
|-------------------------------------------------|------------|-----------|
| Administrative Support                          | 4.36       | Very High |
| Provision of Facilities and Financial Resources | 2.85       | Average   |
| Quality of Teacher Participation                | 4.43       | Very High |
| Monitoring and Evaluation                       | 4.33       | Very High |

Correos and Paler (2020) emphasized that monitoring and evaluation are vital in ensuring the effectiveness of LAC in mathematics by systematically assessing teaching practices and tracking progress. Wedia *et al.* (2024) added that teacher participation is essential, as active engagement fosters collaboration, reflection, and the sharing of best practices. Without it, LAC sessions may become less impactful (Cabaylo & Dado, 2025).

#### Extent of Teachers' Development in Instructional Performance and Sharing of Expertise and Resources

Table 2 presents the notable extent of teachers' development as a result of their participation in a series of LAC sessions in Mathematics. It can be gleaned from the table that both parameters of teachers' development are rated as having a very high extent. This is supported by the overall mean

scores of 4.33 for instructional performance and 4.51 for sharing of expertise and resources. These results suggest that teachers' development is strongly evident in the big schools of Agusan del Sur, in line with the very high implementation level of the LAC program in Mathematics. These findings reflect the ongoing efforts of the division management in fulfilling its duties and mandates.

**Table 2:** Summary of Mean Scores for the Parameters Assessing Teachers' Development

| Parameters                         | Mean Score | Extent    |
|------------------------------------|------------|-----------|
| Instructional Performance          | 4.34       | Very High |
| Sharing of Expertise and Resources | 4.52       | Very High |

Silva (2021) emphasized that LAC sessions help teachers discover effective solutions to students' learning needs in mathematics. Medina *et al.* (2023) also highlighted that LAC fosters collaboration by creating a supportive space for sharing resources and addressing teaching challenges. On the other hand, Cardenas *et al.* (2022) noted that LAC provides a structured platform for teachers, also Saro and Taray (2024) emphasized that to exchange ideas and improve instructional strategies provides a structured platform for teachers research capability and understanding.

#### Significant Relationship Between LAC Implementation and Teachers' Development

Table 3 presents the correlation results between LAC implementation and teacher development using Spearman Rho due to data non-normality. The results reveal positive and significant relationships between instructional performance and the four LAC indicators: administrative support ( $\rho = 0.700$ ), provision of resources ( $\rho = 0.602$ ), teacher participation ( $\rho = 0.819$ ), and monitoring and evaluation ( $\rho = 0.891$ ), all with p-values  $< 0.05$ . These findings imply that stronger LAC implementation enhances teachers' instructional performance, supported by relevant studies linking administrative support, adequate resources, active participation, and monitoring to improved teaching outcomes.

**Table 3:** Correlation Analysis Between LAC Implementation and Teachers' Development Using Spearman's Rho Coefficient

| Teacher Development Indicators     | Statistics     | Administrative Support | Provision of Facilities and Financial Resources | Quality of Teacher Participation | Monitoring and Evaluation |
|------------------------------------|----------------|------------------------|-------------------------------------------------|----------------------------------|---------------------------|
| Instructional Performance          | Spearman's rho | 0.700                  | 0.602                                           | 0.819                            | 0.891                     |
|                                    | p-value        | <.001                  | <.001                                           | <.001                            | <.001                     |
| Sharing of Expertise and Resources | Spearman's rho | 0.622                  | 0.444                                           | 0.650                            | 0.705                     |
|                                    | p-value        | <.001                  | <.001                                           | <.001                            | <.001                     |

Additionally, the findings also shows that strong monitoring and evaluation efforts positively influence teachers' instructional performance, as supported by Correos (2020), who emphasized that regular feedback

helps improve teaching practices. A Spearman rho of 0.622 reveals that administrative support significantly boosts teachers' sharing of expertise and resources. This aligns with Cabaylo and Marmol-Dado (2025) and Antig

and Ubayubay (2024), who found that effective leadership fosters collaboration and resource sharing. Provision of facilities and financial support ( $\rho = 0.444$ ) also correlates with higher collaboration, as adequate spaces and tools encourage active participation (Olujuwon *et al.*, 2022). More so, teacher participation ( $\rho = 0.650$ ) enhances sharing of strategies, as noted by Culajara (2023). Lastly, monitoring efforts also strengthen this culture of collaboration, echoing Velasco's (2023) findings on the impact of evaluation on professional growth.

### Strengths in the Implementation of LAC as Experienced by the Mathematics Teachers

Table 4 presents the thematic analysis that highlight the strengths of LAC implementation in Mathematics. These findings support the quantitative results showing high levels of LAC implementation and teacher development. The actual experiences shared by respondents led to the emergence of key themes that describe the strengths of LAC sessions within the school setting.

**Table 4:** Thematic Analysis of Strengths in the Implementation of LAC Sessions in Mathematics

| Coded Responses                       | Sub-themes                                   | Themes                                                                                   |
|---------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------|
| Presence of internal experts          | Human resource capabilities                  | Utilization of internal and competent human resources in different fields of expertise   |
| Trained teachers and trainers         |                                              |                                                                                          |
| Good leadership of department heads   |                                              |                                                                                          |
| Participative teachers                |                                              |                                                                                          |
| Strong collaboration between teachers | Positive collaboration and collegial culture | Presence of conducive environment and culture for interactive and collaborative learning |
| Exchange of ideas and materials       |                                              |                                                                                          |
| Internal mentoring and coaching       |                                              |                                                                                          |

### Theme 1: Utilization of Internal and Competent Human Resources in Different Fields of Expertise

In many schools, LAC sessions are facilitated by experienced teachers, especially Master Teachers, who are often trained by the division to ensure the transfer of new knowledge. These sessions also serve as opportunities for teachers without access to division-level trainings to learn from colleagues with expertise in mathematics and related areas. Teachers with advanced studies or research outputs are invited to share best practices during LAC, as noted by Respondent A: "One of the strengths that we have at school is the presence of competent teachers who are capable to share experiences and new insights in the teaching-learning process of mathematics. Usually, the Master Teachers are tasked to facilitate the LAC sessions. But as long as any teacher has something useful to share, we allow it in the LAC Sessions." This is supported by Sales (2022), who emphasized the importance of maximizing teacher potential in professional development. In addition, strong leadership from school heads backed by very high administrative support as found in the quantitative data ensures a supportive structure for LAC. Medina *et al.* (2023) and Saro *et al.* (2022) affirmed that administrators play a vital role in fostering a culture of continuous improvement. Furthermore, the high quality of teacher participation, also highlighted in the quantitative results, confirms that active engagement among teachers significantly contributes to the success of LAC implementation.

### Theme 2: Presence of a Conducive Environment and Culture for Interactive and Collaborative Learning

Another strength that emerged from the thematic analysis is the existence of a supportive environment that promotes interactive and collaborative learning. Despite

logistical and financial limitations, teachers reported a strong culture of collaboration and mutual support. A conducive LAC environment is seen not only as a physical space but also as one where teachers willingly engage in shared learning. Antig and Ubayubay (2024) similarly found that teachers maximized peer learning opportunities even with limited internet or technological access. As Respondent B shared: "I think the strong collaboration with one another is a remarkable strength. Teachers are helping one another, sharing resources and expertise. While the physical environment is beyond our control, the spirit of collegial work to improve teaching-learning is highly evident. This is what we are proud of amidst the grapples in other aspects." This insight aligns with the quantitative finding of very high teacher participation in LAC sessions. Aquino *et al.* (2023) and Saro *et al.* (2023) also observed that motivation and interest in learning from peers are common among public school teachers, who use school-based activities as platforms for continuous learning, experience sharing, and professional growth.

### Weaknesses in the Implementation of LAC as Experienced by the Mathematics Teachers

Table 5 presents the thematic analysis results revealing the weaknesses in the implementation of LAC sessions in Mathematics. Contrary to the strengths previously observed, certain challenges remain evident. Consistent with the quantitative findings, the lack of facilities and limited financial resources are common hurdles encountered by the respondents. Two major themes that emerged from the participants' actual responses: budget-related constraints and time-related issues. These themes reflect ongoing concerns that impact the overall effectiveness and sustainability of LAC implementation within schools.

**Table 5:** Thematic Analysis on the Weaknesses in the Implementation of LAC Sessions in Mathematics

| Coded Responses                       | Sub-themes                                 | Themes                                                                             |
|---------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------|
| Insufficient budget allocation        | Financial resource limitations             | Limited access to essential facilities due to budget constraints                   |
| Small MOOE allocation                 |                                            |                                                                                    |
| Internet subscription issues          |                                            |                                                                                    |
| Budget for food and training kits     |                                            |                                                                                    |
| Time management issues                | Time barriers in the implementation of LAC | Time-related issues including conflict in school activities and training time span |
| Conflict of Schedules                 |                                            |                                                                                    |
| Lesser prioritization of LAC schedule |                                            |                                                                                    |

### Theme 1: Limited Access to Essential Facilities Due to Budget Constraints

As reflected in both the qualitative and quantitative findings, budget constraints significantly affect the implementation of LAC sessions. Many respondents revealed that expenses for food during sessions are often personally shouldered by teachers, and some schools lack stable internet connectivity. Several participants emphasized that the school's MOOE (Maintenance and Other Operating Expenses) is insufficient, and funding for LAC sessions is not prioritized due to competing OPCR targets and deliverables. Supporting this concern, Respondent C shared: "The prime problem in many schools is budget. It's true that it is very hard to operate or implement LAC without budget. In many cases the limitation in financial resources negatively affects the quality of program implementation. Moreover, without budget, teachers could hardly access technological facilities and other machineries needed especially about research." This statement echoes the findings of Vega (2020), who highlighted financial constraints as a key challenge in sustaining LAC sessions. Bartolay *et al.* (2024) also noted that without sufficient funds, schools may struggle to provide access to modern teaching tools, training, and updated resources. Cardenas (2022) emphasized that such financial limitations hinder teacher development and their ability to deliver high-quality instruction, thereby impacting student outcomes.

### Theme 2: Time-Related Issues Including Conflict in School Activities and Training Time Span

Time constraints also emerged as a prominent challenge in implementing LAC. Findings shows that time-related issues such as scheduling conflicts, lack of prioritization, and compressed session durations limit the effectiveness of LAC implementation. Teachers often face competing responsibilities, and LAC sessions are sometimes deprioritized amid packed school calendars. This leads to sessions being held merely for compliance rather than genuine professional growth. Respondent D remarked: "I have encountered many times that LAC sessions only occurred in 2–3 hours because of conflict in schedules. LAC is not given much priority compared to those posted in the school calendar. Also, because of the various functions of teachers, not all of them can effectively manage time for LAC sessions. In effect, LAC sessions are

conducted for compliance." Vega (2020) also identified time constraints as a common barrier to meaningful teacher engagement in LAC. Pobre (2022) added that without structured and dedicated time, teachers cannot deeply participate in discussions, share classroom insights, or engage in reflective practice. Rushed and disorganized sessions undermine the collaborative and developmental goals of LAC, thus limiting its long-term impact.

### CONCLUSION

Based on the findings, several conclusions can be drawn regarding the implementation of LAC in Mathematics. The program continues to thrive due to strong administrative support, high-quality teacher participation, and consistent monitoring and evaluation. Nonetheless, the provision of essential facilities and financial resources remains a critical area for improvement, which calls for support beyond the local school administration. Despite these challenges, teacher development has been significantly enhanced through LAC, as educators demonstrated notable improvements in skills and knowledge. The positive correlation between the extent of LAC implementation and teacher development further implies that enhancing LAC strategies will lead to greater teacher effectiveness. Among the most notable strengths are the effective utilization of internal, competent human resources and the strong culture of collegiality and collaboration within schools. However, for LAC to reach its full potential, increased budgetary support and better prioritization in school schedules are necessary. Therefore, an intervention program is recommended to ensure the continuity and sustainability of teacher professional development through effective LAC implementation.

### Recommendations

Based on the findings, it is recommended that DepEd use this study to address challenges in LAC implementation and support sustainability efforts. School heads may integrate the proposed intervention into their School Improvement Plans. Teachers are encouraged to maximize LAC opportunities despite budget constraints. Future researchers may build on this study by including more schools or exploring the link between LAC and student learning outcomes.

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