SCIENTIFIC CULTURE
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SCIENTIFIC CULTURE, Vol. 12, No. 1.1, (2026), pp. 4762-4767
Open Access. Online & Print

DOI: 10.5281/zenodo.121126332

CIRCUMSTANTIAL LEARNING METHOD (MAC) AS A STRATEGY TO IMPROVE THE UNDERSTANDING AND PRACTICAL APPLICATION OF KNOWLEDGE IN SECONDARY SCHOOL STUDENTS

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Received: 01/12/2025
Accepted: 02/01/2026

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ABSTRACT

Objective: To evaluate whether the Circumstantial Learning Method (MAC) strengthens the understanding and practical applicability of knowledge in students in 2nd and 3rd grade of secondary school. Method: Quasi-experimental design with experimental group and control (N = 180; 90 per group). Both answered a 3-item questionnaire (what, how, what for) with a Likert scale from 1 ("Don't know") to 4 ("Tastes very good"), applied as a pre-test and post-test. Internal consistency was high (α = 0.90). Results: In question 3 ("Why did I learn?"), the experimental group reduced the "Don't know" level from 66.7% to 22.5% and raised the "Tastes regularly + Tastes great" category from 20% to 60%. The global mean went from 1.78 ± 0.62 to 2.73 ± 0.68 ($t = 14.3$; $p < 0.001$). In contrast, the control group did not show relevant variations (mean 1.78 ± 0.60 at both times; $t = 0.21$; $p = 0.835$). Conclusions: The MAC significantly improves understanding of the usefulness of knowledge; its curricular integration could support more significant learning.

KEYWORDS: circumstantial learning; transfer; secondary; quasi-experimental; comprehension; applicability.

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Resumen

Objetivo**:** Evaluar si el Método de Aprendizaje Circunstancial (MAC) fortalece la comprensión y la aplicabilidad práctica del conocimiento en estudiantes de 2.º y 3.º grado de secundaria. Método**:** Diseño cuasi experimental con grupo experimental y control (N = 180; 90 por grupo). Ambos respondieron un cuestionario de 3 ítems (qué, cómo, para qué) con escala Likert de 1 ("No sabe") a 4 ("Sabe muy bien"), aplicado como pretest y postest. La consistencia interna fue alta (α = 0,90). Resultados**:** En la pregunta 3 ("¿Para qué aprendí?"), el grupo experimental redujo el nivel "No sabe" de 66,7 % a 22,5 % y elevó la categoría "Sabe regularmente + Sabe muy bien" de 20 % a 60 %. La media global pasó de 1,78 ± 0,62 a 2,73 ± 0,68 ($t = 14,3$; $p < 0,001$). En contraste, el grupo control no mostró variaciones relevantes (media 1,78 ± 0,60 en ambos momentos; $t = 0,21$; $p = 0,835$). Conclusiones**:** El MAC mejora significativamente la comprensión de la utilidad del conocimiento; su integración curricular podría apoyar aprendizajes más significativos.

Palabras clave: aprendizaje circunstancial; transferencia; secundaria; cuasi experimental; comprensión; aplicabilidad.

1. INTRODUCTION

Secondary education in Peru faces a critical challenge: despite the competency-based approach taught, students are unable to internalize the practical usefulness of knowledge. This gap is reflected in the results of the Sample Evaluation (EM 2022) of the Ministry of Education. The results of students in the second grade of secondary school showed the following: Reading comprehension: 13.2% prior to start, 35.8% at the beginning, 31.9% in process and only 19.1% in satisfactory. Mathematics: 30.3% in pre-start, 36.8% in beginning, 20.1% in process and only 12.7% in satisfactory. In summary, in the second grade of secondary school, only 19.1% of students reached the satisfactory level of reading comprehension, while in mathematics only 12.7% achieved this level.

Despite the implementation of the competency-based approach, teaching in many classrooms still maintains a routine and traditional character. The development of knowledge, skills and attitudes related to the understanding and solution of problems is addressed in a limited way, with a predominance of empirical or theoretical learning without adequate practical application. In secondary education, activities that simulate or incorporate authentic situations are rarely designed, which restricts the understanding of the relevance and usefulness of what has been learned.

The objective is to design and apply a Circumstantial Learning Method (MAC) to improve the understanding and practical application of knowledge in second and third grade high school students.

The hypothesis is the implementation of the Circumstantial Learning Method (MAC) will significantly improve the understanding and practical applicability of knowledge in second and third grade high school students, compared to traditional teaching.

2. THEORETICAL FRAMEWORK

Experiential learning (Dewey, 1938) states that education is enriched when the student explores, reflects and applies what he or she has learned in meaningful contexts. This approach was expanded by Kolb (1970, 1984) with his cycle of concrete experience, reflection, conceptualization, and active experimentation, widely validated in higher and professional education. Orduz (2002) emphasizes that experience without reflection is incomplete and that theory without practice is meaningless.

In a complementary way, Ausubel (1968) argues that deep understanding arises when new knowledge is linked to previous knowledge. Lave and Wenger (1991) introduce situated learning, which highlights the role of communities of practice in making sense of knowledge in real contexts. Likewise, Perkins and Salomon (1992) emphasize transfer as a fundamental goal of learning, while Ryan and Deci (2000) highlight intrinsic motivation as a driver of lasting learning.

In this framework, the absence of research that conceptualizes "circumstantial learning" as a structured pedagogical method is evident. The Circumstantial Learning Method (MAC) is presented as a novel proposal by articulating real or simulated events with an explicit purpose, which lead to the provocation and experience of the practical event, followed by its description, analysis and guided reflection, culminating in the transfer and application of knowledge. This sequence distinguishes it from other active approaches by systematically integrating experience, reflection, and practical applicability.

3. METHODOLOGY

Approach: Quantitative, quasi-experimental.

Design: Two groups with pre-test (O_1) and post-test (O_2): experimental (O_1–X–O_2) and control (O_1––O_2).

Participants: 180 students (12 – 15 years old) from 6 sections of 2nd and 3rd year of secondary school (Experimental N = 90; Control N = 90), convenience sampling due to limited institutional accessibility.

Instrument and reliability: Three-item questionnaire (What? How? What for?) with a Likert scale of 1 ("Don't know")-4 ("Tastes very good"). Internal consistency: $\alpha = 0.90$; Each item correlated $r > 0.70$ with the total scale.

3.1. Procedure:

Pre-test: Traditional and routine class for both groups + questionnaire.

3.2. Intervention (experimental only):

Circumstantial Learning Method (MAC) in six phases:

1. Prepare the circumstantial event: The teacher contextualizes the topic, organizes the learning space and selects the available or previously prepared resources of the environment, considering the students' previous experiences.
2. Communicate the purpose: in the classroom or place of learning, the teacher communicates the purpose, clarifying what, how and for what purpose will be learned, generating motivation and meaning.
3. Theoretical foundations: Previous knowledge or previous experiences are recovered, the theoretical foundation is presented and the procedures to be carried out are described.
4. Provoke and experience the practical event: The

students, guided by the teacher, participate in a real or simulated experience directly linked to the topic (they develop the practice).

5. Describe and analyze the event: What happened is reconstructed and narrated, relating it to theoretical knowledge.
6. Transfer and apply: Reflect on the usefulness of what has been learned and project its application in everyday contexts or other realities.

Attention, evaluation, and feedback go along the MAC.

Post-test: Both groups answer the questionnaire again.

Analysis: Frequencies and percentages; Mean±SD and paired t-test by group. Consistency level α = 0.05; (Cronbach's α).

Ethics: Institutional approval, informed consent and anonymity.

4. RESULTS

4.1. Percentage distribution

Table 1: Pre-test (both groups had similar results)

Question / Value	1 "Don't know"	2 "Tastes limitedly"	3 "Tastes Regular"	4 "Tastes great"
What have you learned?	32 (35 %)	34 (37,5 %)	18 (20 %)	6 (7,5 %)
How did you learn it?	23 (25 %)	41 (45 %)	18 (20 %)	8 (10 %)
Why did you learn?	60 (66.7 %)	12 (13,3 %)	10 (11,1 %)	8 (8,9 %)

The high proportion (66.7%) of "Do not know" about the usefulness of knowledge in the third question shows a very low initial perception of practical usefulness. This void justified the intervention.

Table 2: Post-test – Experimental group (N = 90)

Question / Value	1 "Don't know"	2 "Tastes limitedly"	3 "Tastes Regular"	4 "Tastes great"
What have you learned?	16 (17,5 %)	18 (20 %)	32 (35 %)	24 (27,5 %)
How did you learn it?	14 (15 %)	20 (22,5 %)	23 (25 %)	33 (37,5 %)
What did you learn for?	20 (22,5 %)	16 (17,5 %)	29 (32,5 %)	25 (27,5 %)

According to this result regarding the usefulness of knowledge (question 3), there is an increase of 60% of students who "know regularly" and "know very well"

Post-test – Control group (N = 90)

Table 3: Post-test result (control)

Question / Value	1"Don't know"	2"Tastes limitedly"	3"Tastes regularly"	4"Tastes great"
What have you learned?	30 (33,3 %)	33 (36,7 %)	20 (22,2 %)	7 (7,8 %)
How did you learn it?	22 (24,4 %)	39 (43,3 %)	19 (21,1 %)	10 (11,1 %)
What did you learn for?	58 (64,4 %)	13 (14,4 %)	9 (10 %)	10 (11,1 %)

In the control group, slight oscillations were observed without statistical relevance; Response levels remained essentially similar to the pre-test ($p > 0.05$), in contrast to the significant increase recorded in the experimental group

4.2. Descriptive statistics and t-test

Table 4: Media, DE, p and d

Group	Moment	Stocking	OF	t	p	d
Experimental	Pre	1.78	0.62	14.3	<0.001	1.48
Experimental	Post	2.73	0.68			
Control	Pre	1.78	0.6	0.21	0,835	0.05
Control	Post	1.78	0.6			

4.3. Visualization

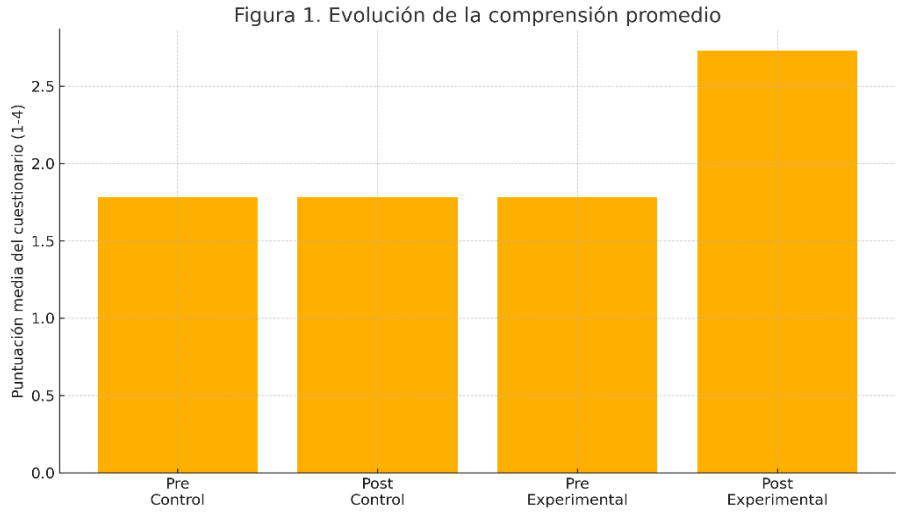

Figure 1: Evolution of the average score by group.

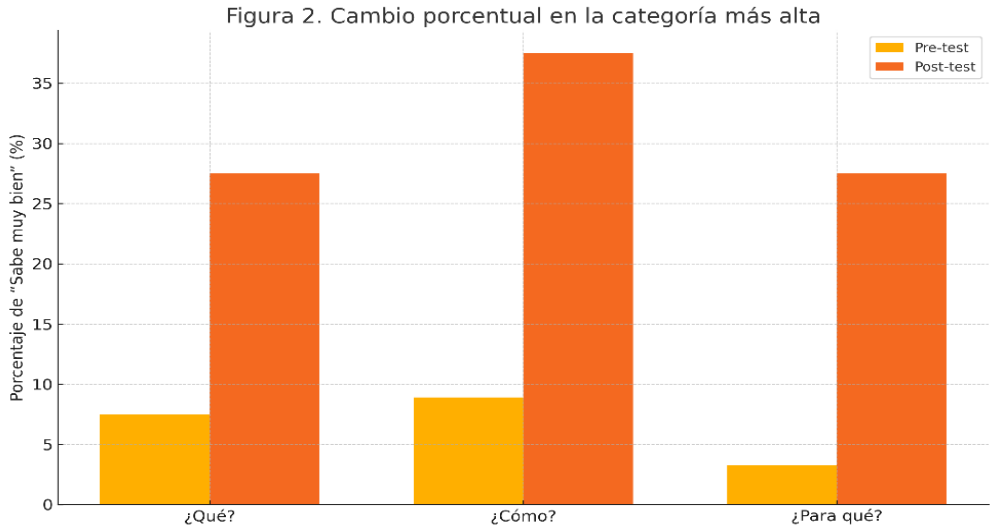

Figure 2: Percentage change in the category "Tastes great" (experimental group).

5. DISCUSSION

The Circumstantial Learning Method (MAC) demonstrated a substantial shift in responses toward the higher levels of the scale (3 = "Knows regularly" and 4 = "Tastes very good"), consistent with experiential and active learning approaches (Romero, 2010; Kolb, 1984). The experimental group exhibited a mean difference of 0.95 points between the pre-test and the post-test, which corresponds to a large effect size (d = 1.48). This finding substantiates the efficacy of the MAC in enhancing the comprehension and practical application of knowledge. The observed stability in the control group serves as a confirmation that the observed change is attributable to the intervention.

These findings are particularly salient in the national context, where the Sample Assessment (EM 2022) revealed critical gaps in learning achievement in the second grade of secondary school: in reading comprehension, only 19.1% of students reached the satisfactory level, while in mathematics only 12.7% achieved it. The findings indicate that a significant proportion of the students demonstrate an inability to transfer their learning to more complex cognitive tasks. In this scenario, the systematic application of the MAC has the potential to enhance the internalization of the practical usefulness of knowledge and facilitate the transition of students to higher levels of performance.

With regard to the limitations inherent in the use of convenience sampling, it should be noted that findings derived from such a sample cannot be generalized to populations that are similar to the population from which the sample was derived. It is recommended that the study be replicated in different regions of the country, using stratified random sampling and longitudinal designs that allow for the observation of the sustainability of the effects of the MAC.

The practical implications of this pedagogical approach are evident: the MAC serves as a structured guide, facilitating the transformation of conventional classes into meaningful learning experiences that incorporate practical application. The program's emphasis on circumstantial experience, guided reflection, and practical application aligns with the Peruvian competency-based curriculum, thereby offering a viable alternative to enhance learning and mitigate the observed discrepancy in the 2022 MA.

6. CONCLUSION

The Circumstantial Learning Method (MAC) is a structured approach comprising six phases. The first phase involves the preparation of the circumstantial event using the available or previously organized resources of the environment. The subsequent phase is the provocation and experience of the practical learning event. The final phase involves the description of the event, the relation of the event to the theoretical information, and the transfer of the learned concepts to other contexts. This approach has been demonstrated to significantly improve the understanding of the usefulness of knowledge in secondary school students. The decline in responses designated as "Don't know," concomitant with an increase in responses classified as "Yes," "No," or "Unsure," indicates that the MAC is conducive to more profound and pertinent learning.

Circumstantial learning is defined as the process of acquiring knowledge derived from real, immediate, and concrete situations in the student's environment. This approach utilizes the context of these situations to provide meaning to academic content. The implementation of this system in the national curriculum, particularly in critical areas such as mathematics and communication, has the potential to address the gaps identified in the 2022 Sample Assessment. Furthermore, it can enhance significant learning that is aligned with the competency-based approach.

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