The Impact of Metacognitive Practices on 6th Grade Students' Engagement and Academic Performance

Sofiane MNADLA[1], Wael ZOGHLMI[2], Ghada RAHALI[3], Ali ELLOUMI[4], Aicha JLASSI[5]

Abstract

This study focuses on the impact of metacognitive practices on students' engagement and academic performance. To collect the necessary data, an experiment was conducted with sixth-grade primary school students. It consisted of a series of activities supported by a metacognition worksheet and self-administered questionnaires designed to assess students' levels of engagement before and after the implementation of metacognitive practices. In addition, semi-structured interviews were conducted with primary school inspectors to gain deeper insight into the role of metacognition in the school context. The analysis of the collected data, using both qualitative and quantitative approaches, revealed correlations between metacognitive practices, student engagement, and academic performance. The findings highlight the importance of fostering metacognition from an early age to promote autonomous, confident, and reflective learners. This research therefore underscores the need to integrate metacognition into pedagogical strategies to enhance students' involvement in their learning journey.

Keywords: Metacognitive Practices, Engagement, Academic Performance.

Introduction

Flavell (1979), one of the first scholars to introduce the concept of metacognition, defined it as learners' awareness and understanding of their own cognitive processes, often described as "thinking about one's own thinking." In this regard**,** metacognition has been recognized as a key factor in the learning process. Consequently, numerous studies in literature have examined the correlation between metacognitive practices and students' academic outcomes. For instance, Dignath and Büttner (2008) demonstrated that teaching metacognitive strategies has significant positive effects on student performance, particularly in mathematics and reading. By promoting awareness of learning strategies and fostering self-regulation, metacognition is believed to enhance students' active participation in the learning process and improve their academic achievement. However, academic performance cannot be sustained through metacognition alone if students are not actively engaged in their learning. Engagement thus emerges as a crucial mediating factor, since motivation, persistence, and self-efficacy are necessary for translating metacognitive awareness into concrete academic gains. In line with this, Pintrich (2000) highlighted that metacognitive strategies enhance motivation and self-efficacy, which are central to student engagement. Subsequently**,**Efklides (2011) showed that metacognition fosters self-

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[1] Higher institute of applied studies in humanities, Zaghouan, Tunis university & LARIDIAME Laboratory University of Sfax, Email: alielloumi62@gmail.com
[2] Higher institute of applied studies in humanities, Zaghouan, Tunis university & LARIDIAME Laboratory University of Sfax
[3] Higher institute of applied studies in humanities, Zaghouan, Tunis university & LARIDIAME Laboratory University of Sfax
[4] Higher institute of applied studies in humanities, Zaghouan, Tunis university & LARIDIAME Laboratory University of Sfax
[5] Member of SILAB (sciences and information laboratory)

regulation and reflective thinking, thereby supporting active involvement in learning. More recent studies, such as Zhang et al. (2024) and Sercenia and Prudente (2023), confirm that metacognitive practices have a significant positive impact on students' engagement and academic performance.

This study was undertaken to address the crucial link between metacognition, engagement, and academic performance, recognizing that learning outcomes cannot be fully achieved without student involvement. Its aim is to examine how metacognitive practices foster both engagement and achievement, and to propose a practical method of integrating these strategies into primary education.

1   The design of the study:

The design of a study refers to the overall strategy or plan that a researcher uses to answer a research question. It specifies how the study is conducted, including the participants,methods, instruments, and procedures used to collect and analyze data.

1.1 Participants

Two categories of participants were voluntarily recruited for this study. The first category comprised sixty-seven sixth-grade students (M = 12.5, age range = 11–14 years) from primary schools in Birin (Tunis) and Jamel (Monastir). Participation was entirely voluntary, and written consent was obtained from both the students' parents/guardians and school administrations in accordance with ethical research guidelines

Table1: students who took part in the study

Group's Characteristics	Numbers	Gender		Ages	Schools
		M	F		
Literary group	30	11	19	Between 11and 14	Birin Primary school
Scientific group	37	14	23	Between 11and 13	Jammelpriamry school

Secondly, the study involved inspectors who were invited to take part.Volunteers areactive in different primary schools and different regions. The level of experience varied from one inspector to another (from 3 years to 14 years).

Table 2 : The inspectors that took part in the study

Inspectors	**Specialty**	**Regions**	**Length of service**
Inspector1	Arabic	Monastir (Zaremdin)	10 years

| Inspector2 | Frensh | Tunis (Kasar said) | 3 years |
| Inspector3 | Frensh | Ben Arous (El Mourouj) | 14 years |

1.2 Data collection procedures

In a sixth-grade classroom, we conducted an experiment to examine the role of metacognitive strategies in learning. The research experiment was organized over a period of three weeks. Assessments were administered in two different schools and in twodifferent subjects:Arabicat Birinschool (Tunis) and Science at Jamal school (Monastir). Prior to the activities, students were introduced to the fundamental concepts and the notion of meta-cognition to familiarize them with its concepts and to ensure clarity of purpose.

During the first week, exercise sheets in Arabic and Science were distributed without the metacognitive framework, accompanied by an engagement questionnaire designed to assess students' baseline level of school motivation. In the subsequent phase, The students were familiarized with the concept of metacognition, its notions, its foundations, and finally the principles of the implemented metacognitive practice. Afterward, students complete the execution of the activities with the metacognitive worksheet beside them. It proposes questions on activity progress to think about these three phases: planning, monitoring, and adjustment. Finally, A second questionnaire, administered afterward, assessed changes in engagement.

Table 3: the experiment procedure

Duration	Location	subjects	Sessions		
			Before the integration of MP	**After the integration of MP**	
			First week	**The second and third week**	
3 weeks (15 days)	Tunis (Birin primary school) Monastir (Jamel primary school	Arabic **(Grammar)** Science **(Biology)**	Conducting the activities <u>without metacognition Worksheet</u> + **1ˢᵗ summativeassessment** (At the end) + **1 ˢᵗMeasurement of learners 'level of engagement**	Introducing students to <u>metacognitive terms and familiarizing them with its concepts as well as the worksheet framework</u> (planning/monitoring /regulating)	Conducting the activities <u>with a metacognitive worksheet</u> + **2ⁿᵈsummative assessment** (At the end) +**2ⁿᵈ Measurement of learners 'level of engagement**

1.3 Instruments:

Throughout the experiment, we conducted an experiment using a metacognitive worksheet inspired by the three principles of metacognition (Planning-monitoring-adjustment).

Accordingly, to collect the necessary data, we employed a mixed-methods approach consisting of both quantitative and qualitative methods. For the quantitative component, we utilized self-reported questionnaires to measure students' engagement using assessmentrubric.Asfor the qualitativecomponent, we conducted semi-structured interviews with primary school inspectors.

Metacognitive worksheet:
A metacognitive worksheet was used in this study to support students' academic performance and engagement. Structured in three stages planning, monitoring, and adjustmentit guides learners to clarify activity goals, assess prior knowledge, track progress, and reflect on strategies for improvement. By prompting self-assessment and reflection at each stage, the worksheet fosters engagement across emotional, behavioral, and cognitive dimensions and encourages the development of transferable self-regulation skills.

Self-reported questionnaire:
In this study, a self-reported questionnaire was developed and completed by the learners to examine their engagement. The design of the questionnaire was informed by the work of Fredricks et al. (2004) and Appleton, Christenson, and Furlong (2008), as well as other psychological literature on student engagement. Drawing on these sources, which conceptualize engagement across three dimensions — behavioral, emotional, and cognitive — the questionnaire items were adapted from existing instruments in the literature to ensure they accurately captured these dimensions and were appropriate for the context of the present research.

The SEM questionnaire (School Engagement Measure; Wang, Willet, & Eccles, 2011) was used to assessthe engagement of Tunisians 6th grade students. The questionnaire consists of 23 items describing three variables: **behavioral engagement, emotional engagement, and cognitive engagement**. The same scale uses a five-point Likerttype scale.

Interviews:
The interviews were assisted by an interview guide containing 7 questions apart from the introducing and self-presenting. Those questions are divided into three categories:

- Understanding the metacognitive practices in general (Question1 and2)
- The impact of metacognitive practices on student engagement (Question 3 and 4)
- The impact of metacognitive practices on student academic performance (Question 5, 6 and 7)

2.Results
In this part of our study, we present, progressively, the results of each method. Subsequently, we will cross-reference the results of the different methods used in order to draw the most relevant inferences.

2.1 Semi-structured interview: Inspector's attitudes towards metacognitive practices.
The design of the semi-structured interview required us to develop the interview guide questions in relation to the variables of our research. These questions were divided into 3 sections. The first two questions focus on the understanding of metacognitive practices in general. Questions three and four are related to metacognitive practices and student engagement. The final questions are

related to metacognitive practices and academic performance.

- **Understanding the metacognitive practices in general (Question1 and2)**

The inspectors emphasized that metacognitive practices help students understand their own thinking processes, develop effective learning strategies, and regulate their approaches in case of errors or difficulties. They highlighted the importance of adapting teaching methods to foster metacognitive abilities, stressing that the focus should not only be on the final product but also on the intellectual processes and strategies used to achieve it.

- **The impact of metacognitive practices on student engagement (Question 3 and 4)**

Metacognitive practices significantly enhance student engagement by fostering motivation, active participation, and awareness of their learning process. They help students plan, identify strengths and difficulties, and achieve clarity in learning objectives. Observations show that incorporating these practices leads to positive changes, increased motivation, and improved academic results, as students learn both what and how to learn more effectively.

- **The impact of metacognitive practices on student academic performance (Question 5, 6 and 7)**

   Metacognitive practices enhance academic performance by deepening understanding, supporting planning and self-regulation, solving complex problems, and transferring knowledge to new contexts "when students were encouraged to reflect on the reading strategies they used in Arabic, their comprehension and retention improved significantly". For instance, organizing ideas with mind maps to monitor progress also strengthens outcomes.

In short, the inspectors made crucial suggestions regarding the integration of metacognitive practices in the classroom. Firstly, the effective implementation of metacognitive techniques requires teacher training and encouraging students to articulate their thinking to develop cognitive skills. Secondly, providing teachers with comprehensive training on metacognitive practices and the principle of metacognition is essential to effectively integrate these practices within schools and enhance students' learning outcome

2.2. Self-reportedquestionnaires: students get engaged in learning once they know how to learn.

A quantitative analysis was conducted to examine the effect of metacognitive practices on students' school engagement using self-reported questionnaires. The experiment wasexecuted with 2 different subjects in 2 different classes. For the objective of analyzing data, we utilized the **SPSS (Statistics version: IBM. 25).**
Results indicate a significant increase across all engagement dimensions emotional, behavioral, cognitive, and overall,over successive practice sessions.

Table 4: Engagement scores of 6ᵗʰ grade students before and after metacognitive practices

Dependent Variable	MP time (before / after)	Activity type	N	Means	Standard deviation
Emotional Engagement	Before MP	litteracy activity	30	2,517	,092
		scientificactivity	37	2,225	,083
	After MP	litteracyactivity	30	1,072	,092
		scientificactivity	37	2,950	,083
Behavior Engagement	Before MP	litteracyactivity	30	2,592	,098
		scientificactivity	37	2,223	,088
	After MP	litteracyactivity	30	3,067	,098
		scientificactivity	37	2,993	,088
Cignitive Engagement	Before MP	litteracyactivity	30	2,829	,124
		scientificactivity	37	1.98	,112
	After MP	litteracyactivity	30	3,462	,124
		scientificactivity	37	2,934	,112
Scolar Engagement	Before MP	litteracy activity	30	2,663	,091
		scientific activity	37	2,126	,082
	After MP	litteracyactivity	30	3,231	,091
		scientificactivity	37	2,954	,082

- **MP :**Metacognitive practices

The scores shown in the table demonstrate a relative improvement in the level of academic engagement of 6th grade students following the completion of literary and scientific activities with concurrent metacognitive practices. The value increased from 2.66 to 3.23 for the literary activity. The same improvement was observed for the scientific activity (2.12 before MP / 2.95 after MP). Metacognitive practices did not positively affect the emotional engagement of students completing a literary activity. However, the level of emotional engagement for students completing a scientific activity (means = 2.22 / 2.95).

Metacognitive practices did not positively affect the emotional engagement of students completing a literary activity. However, the level of emotional engagement for students completing a scientific activity (means = 2.22 / 2.95) was improved. Metacognitive practices contributed to improving the behavioral engagement level for students performing a literary activity (means = 2.59 / 3.06) and those performing a scientific activity (means = 2.22 / 2.99). At the same time, we noticed an improvement in the level of cognitive engagement following the metacognition exercises during the literary (means = 2.82 / 3.46) and scientific (means = 1.98 / 2.93) activities.

These findings demonstrate that metacognitive practices effectively enhance students' behavior engagement, active participation and cognitive involvement, highlighting their critical role in fostering comprehensive and sustained school engagement.

Marks givenduring literary and scientific activities:
Comparison of engagement across emotional, behavioral, cognitive, and overall dimensions

indicates that metacognitive activities have a greater positive impact in literary activities than in scientific activities.

Table 5: marks given to 6th grade students during assessment of literacy and scientific skills.

	N	Means	Standard deviation	Minimum	Maximum
Evaluation1 (scientific activity before MP)	37	2,59	1,10	1,00	5,00
Evaluation1 (litteracy activity before MP)	30	2.90	.22	1.00	8.00
Evaluation2 (scientific activity after MP)	37	9,05	,87	7,00	10,00
Evaluation2 (literacy activity after MP)	30	7.70	,22	2.00	10,00

The acquisition of new metacognitive strategies has contributed significantly to the development of literary and scientific skills of Tunisian 6th grade students. The average given to students in the science class increased from 3/10 to approximately 9/10. Students in the literacy exercise have made an equally significant improvement regarding the grade given by the evaluator. These results suggest that metacognitive practices more effectively enhance engagement in scientific contexts. In short, these finding reflect the adaptation of Tunisian students with the new strategy of learning.

2.3. The cross-referencing of quantitative and qualitative results.

To investigate the impact of metacognitive practices on students' academic engagement and performance, a triangulated step combining qualitative and quantitative methods was employed. Qualitative data from in-depth interviews indicated that metacognitive practices enhance learners' engagement and active participation, with the most academically successful students frequently utilizing self-assessment tools. Quantitative analysis of questionnaire responses corroborated these findings, demonstrating significant improvements in behavioral and emotional engagement, as well as deeper awareness of personal cognitive processes and the development of effective learning strategies. Collectively, the integrated findings underscore the critical role of metacognitive practices in fostering both student engagement and academic achievement.

3. Discussion

The findings from the interviews were analyzed by identifying units of meaning, grouping responses related to engagement into one set of categories and those related to academic

performance into another. This analysis indicates that metacognitive practices have a significant impact on enhancing students' engagement across its emotional, behavioral, and cognitive dimensions. Inspectors' observations support this conclusion, emphasizing that when students reflect on their learning strategies, use self-assessment tools, and articulate their thinking, both engagement and academic performance improve. Overall, the data confirms the positive influence of structured metacognitive practices in the classroom.

The analysis of students' academic performance in relation to metacognitive practices revealed noteworthy outcomes. Initial assessments, conducted before the introduction of metacognitive strategies, established a baseline for students' abilities and engagement, with average scores around 2 out of 10. Following the integration of these practices, students exhibited substantial engagement and marked improvement in their academic results. In many cases, scores doubled or even tripled over the course of the study. These findings suggest that implementing and integrating metacognitive practices enables students to better manage their work, optimize their time, and consistently monitor and enhance their learning. In conclusion, when students actively reflect on and regulate their own learning, they can achieve significant and measurable improvements.

The present study therefore confirms and extends previous research demonstrating the positive impact of metacognitive practices on academic performance and student engagement. Consistent with Dignath and Büttner (2008), implementing metacognitive strategies improved student performance, while high-achieving students frequently used self-assessment tools. In line with Efklides (2011) and Fredricks, Blumenfeld, and Paris (2004), students showed enhanced emotional, behavioral, and cognitive engagement, reflecting greater self-regulation and active participation. These results also support Pintrich (2000), Schraw and Dennison (1994), and Schunk and Zimmerman (2008), highlighting improved awareness of cognitive processes and effective learning strategies. More recent studies, including Zhang, Li, and Chen (2024) and Sercenia and Prudente (2023), similarly report correlations between metacognitive practices, engagement, and achievement.

Unlike many prior studies, the present research applied structured classroom interventions worksheets, guided reflections, and self-assessment tools and combined quantitative and qualitative measures, providing nuanced evidence of engagement across multiple dimensions.

Overall, these results are consistent with previous research demonstrating that metacognitive practices have a positive and substantial impact on students' academic performance.

Conclusion

The present research not only explores the correlation between metacognitive practices, Tunisian student's engagement, and academic performance but, more importantly, seeks to design and implement a practical, school-based approach to foster these skills in real classroom settings. This applied dimension represents a significant added value, as it moves beyond theoretical exploration to provide teachers with concrete tools such as self-assessment checklists, guided reflection prompts, and structured planning activities that can be directly integrated into daily teaching practice. By doing so, the project contributes to bridging the gap between research and practice, offering an evidence-based framework that empowers educators to actively cultivate students' metacognitive awareness. This approach not only improves academic outcomes but also equips learners with **transferable skills for lifelong learning**, making the findings relevant for curriculum development and teacher training initiatives.

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