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## **The effects of formative assessment on improving pupils' performance and learning skills: a systematic review**

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### **Abstract**

Formative assessment is regarded as a key pedagogical tool for improving student learning; however, despite the growing interest it is generating, it remains underused in classroom practice. This study focuses specifically on primary education, a stage at which the development of fundamental skills and learning plays a decisive role in pupils' future academic success. The aim of this systematic review is to explore and analyse the effects of formative assessment on improving academic performance and the development of learning skills among primary school pupils. The study adopted the PRISMA 2020 systematic review methodology. The results confirm that formative assessment practices are strongly associated with a significant improvement in academic performance and promote the development of students' self-regulation skills, self-efficacy and intrinsic motivation. However, the analysis reveals that effectiveness is contingent upon the fidelity of implementation. The main challenges identified relate to the lack of specific training for teachers on formative assessment, as well as time constraints and overloaded curricula. This review makes an important contribution by providing an up-to-date and focused synthesis of empirical studies on formative assessment in primary education, highlighting its effects on academic performance and pupils' learning skills, whilst identifying the conditions for success and the obstacles to its implementation.

**Keywords:** Formative assessment; Student learning; Learning skills; Student performance; Primary education.

### **Introduction**

Assessment plays a vital role in the teaching and learning process, particularly formative assessment, which is characterised by its interactive approach, involving both the teacher and the pupils in the learning process, in order to promote more effective learning tailored to pupils' individual needs. This type of assessment is very important in contemporary education systems, where the aim is the continuous improvement of teaching practices and pupil performance; It helps teachers to identify the difficulties encountered by their pupils, and the skills and knowledge they have not yet acquired, so that they can provide remedial support and adapt new teaching methods to achieve the set objectives; This adaptation enables regular monitoring of pupils and helps to improve their academic results; moreover, this assessment is not always graded, but rather an opportunity for pupils to reflect on their mistakes, which enhances their learning, and thus the pupil becomes motivated to improve their skills; Feedback helps pupils improve their learning and also helps teachers adapt and adjust their teaching methods; Thus, formative assessment appears to be a key lever for improving the teaching-learning process. However, despite its widely recognised importance, its implementation often remains limited and uneven in school settings. Furthermore,

the development of fundamental skills and learning at primary level is a crucial step for pupils' subsequent academic success, which reinforces the need to examine the actual effectiveness of formative assessment practices at this key stage of schooling. In this context, the present study aims to analyse the extent to which formative assessment practices effectively contribute to the development of learning skills and the improvement of primary school pupils' performance.

The objective of this systematic review is to conduct an in-depth examination of research published between 2010 and 2025 on formative assessment in primary education. It aims to identify and analyse the effects of these practices on the development of skills and the improvement of pupils' learning performance, as well as to highlight the factors that promote or limit their effectiveness. To this end, the review draws on studies selected from international scientific databases (such as Web of Science, Scopus, etc.), according to specific inclusion criteria: articles published in peer-reviewed scientific journals, focusing specifically on formative assessment in primary education, and written in French or English.

This review seeks to answer the following questions:

1. **What are the effects of formative assessment on the skills and academic performance of primary school pupils?**
2. **What contextual factors promote or hinder the implementation of formative assessment in primary school classrooms?**

This review is not limited to a specific national context; it includes studies conducted across different education systems in order to provide a comprehensive and comparative overview of the effects of formative assessment in primary education. This systematic review contributes to a deeper understanding of the role and effects of formative assessment on the development of skills and the improvement of learning among primary school pupils, by providing a structured and up-to-date synthesis of empirical research published over the last decade, identifying the most effective formative assessment practices, the observed effects on learning, and the factors that influence their implementation in school settings.

## Methodology

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Haddaway et al., 2022). Using the PRISMA flow diagram, this systematic review

outlined the process for selecting publications for inclusion and exclusion.

To collect and analyse all eligible publications between June 2010 and July 2025, a list of keywords used, in English and French, included: “formative assessment”, “assessment for learning”, “primary education”, “l'évaluation formative”; “école primaire” and “effects of formative assessment” was used to search for relevant literature.

This literature search was conducted in several specialised and multidisciplinary databases, notably Scopus, Web of Science and ScienceDirect. The inclusion criteria covered articles published between 2010 and 2025, in French or English, specifically addressing formative assessment in primary education and its effects on the development of pupils' skills and performance. The exclusion criteria eliminated studies focusing solely on secondary or higher education, exclusively summative approaches, and non-scientific documents;

The inclusion and exclusion criteria applied are as follows:

- **Inclusion:** Empirical or theoretical articles directly addressing formative assessment and its effects on academic skills at primary level;
- **Exclusion:** Off-topic research (e.g. summative assessment only), articles lacking reliable data, and studies focusing solely on secondary or higher education.

Therefore, any study meeting the inclusion criteria and not excluded under the exclusion criteria will be considered eligible for inclusion in this systematic review. The selection flowchart (**Figure 1**) illustrates the search method used for article selection. Based on the inclusion and exclusion criteria, a total of **13 relevant studies** were selected from an initial set of 400 articles identified in Scopus, Web of Science and ScienceDirect. These 13 studies were analysed in detail to examine the effects of formative assessment. By employing a rigorous methodology, systematic reviews minimise bias in the selection of studies and facilitate a rigorous synthesis and analysis of data from multiple qualitative and quantitative studies.

Indeed, systematic reviews play an important role in identifying gaps in the existing literature, thereby guiding future research opportunities. Due to their comprehensive and impartial analysis of all previous studies, systematic reviews offer valuable insights both for researchers seeking to advance scientific knowledge and for practitioners and decision-makers looking for reliable data to guide their decisions. Their

structured methodology allows for **robust conclusions** to be drawn on a research question or issue.

## Results and discussion

This section presents a detailed analysis of the results from selected studies on the effects of formative assessment on improving the learning performance and skills of primary school pupils. (See Table 1)

Based on the analysis of all the studies, it is found that formative assessment has positive effects on improving pupils' learning skills, as well as critical thinking, motivation and engagement. The thirteen studies included in this systematic review (Table 1) show overall that formative assessment, and particularly formative feedback, has a positive effect on the academic performance and learning skills of primary school pupils. It plays an important role in the development of metacognition and self-regulated learning, which makes the learner more active and independent, enabling them to assess their own progress towards objectives. This has a direct and positive impact on their motivation and academic performance. (Clark, 2012)

Formative assessment therefore has a significant effect on the self-regulation of learning; pupils who have benefited from this form of assessment in their classrooms become more independent, set their own goals, self-assess and are able to adjust their learning. (Granberg et al., 2021). Indeed, studies show that the practice of formative assessment improves pupils' autonomy and self-efficacy in mathematics, which helps them to improve and develop their skills, namely: reasoning, problem-solving and critical thinking, and thus automatically leads to an improvement in their mathematics scores in national and international tests. Furthermore, constructive and formative feedback has a positive effect on mathematical reasoning as well as pupils' intrinsic motivation in mathematics, which strengthens their engagement with complex tasks (Aust et al., 2024).

Studies also reveal that the use of digital tools in formative assessment influences its effectiveness and contributes to the development of pupils' skills; specifically, high-achieving pupils showed significant improvements following this digital formative assessment (Faber et al., 2017).

The results of this systematic review answered our research question and demonstrate the significant effect of formative assessment on the development of students' learning skills, namely conceptual understanding. This conceptual understanding was developed across all cognitive levels of Bloom's taxonomy through this assessment, not only in

lower-order cognitive processes (recall, comprehension), but also in higher-order cognitive processes (application and analysis) (Orosova et al., 2022). Furthermore, pupils who have benefited from structured formative assessment, particularly with targeted feedback, achieve significantly higher scores in reading comprehension, grammar and mathematics. These are the core skills that all pupils must master at this stage of primary education in order to progress successfully through their school career.

However, studies also show that these effects of formative assessment depend heavily on the conditions under which it is implemented. They vary according to the subject, the type of formative assessment practice, the quality and consistency of its implementation, time constraints, pupils' initial level, and teacher training. Teachers' ability to provide targeted formative feedback also varies according to context and conditions; this formative feedback plays a very important role in improving pupils' performance. (Sortwell et al., 2024).

Studies indicating non-significant effects confirm that the cause is linked to difficulties in teachers' faithful implementation of formative assessment. Furthermore, some teachers provide feedback that is primarily summative rather than formative, which limits the positive effects of feedback and formative assessment. (Goertzen et al., 2025)

All these elements are factors that can influence the effectiveness of formative assessment. Furthermore, the review also reveals that this effectiveness depends heavily on the proper implementation of formative assessment within the teaching and learning process.

Overall, the analysis of the thirteen studies included in this systematic review, summarised in the table below, confirms that formative assessment is considered an effective strategy for improving pupils' learning, provided it is properly implemented. When implemented rigorously and consistently, it is an effective tool for supporting learning and improving the performance of primary school pupils.

**Table1 : Details of the included studies**

Article	Title	Objectives	Methodology	Results
1	Goertzen, L., Heeneman, S., & Schils, T. (2025). The impact of formative assessment on pupil academic achievement: An empirical study of the effects of a formative assessment practices programme that was co-designed in a teacher community. <i>Learning and Instruction</i> , 99, Article 102153. <a href="https://doi.org/10.1016/j.learninstruc.2025.102153">https://doi.org/10.1016/j.learninstruc.2025.102153</a>	This study examines the effect of a formative assessment programme co-designed by teachers within a professional learning community on the academic performance of primary school pupils.	A quasi-experimental pre-test/post-test study with a pre-established intervention group and control group.	The results indicate that pupils in the intervention group did not achieve significantly higher results than those in the control group. This study also provides valuable insights into the challenges involved in implementing formative assessment practices.
2	Bellido-García, R., Lozano-Gonzales, B., Cruzata-Martínez, A., Rodríguez-Huamán, M., & Rejas-Borjas, G. (2025). Formative assessment and its contribution to the improvement of reading comprehension in a public school in Lima. <i>European Public &amp; Social Innovation Review</i> , 11, 1–18. <a href="https://doi.org/10.31637/epsir-2026-1956">https://doi.org/10.31637/epsir-2026-1956</a>	This article analyses how formative assessment influences pupils' reading comprehension in a state school in Lima.	This is a quantitative correlational and causal study; it uses highly reliable instruments : 0.885 and 0.909, respectively , for formative assessment and reading comprehension. A statistical analysis of the relationships between formative assessment and reading comprehension.	The results show that formative assessment has a positive effect on pupils' reading comprehension. Furthermore, formative assessment (feedback) contributes to the development of pupils' skills such as metacognition, teamwork and self-regulation ...
3	Aust, L., Schütze, B. & Hochweber, J. (2024). Effects of formative assessment on intrinsic motivation in primary school mathematics instruction. <i>European Journal of Psychology of Education</i> , 39, 2177–2200. <a href="https://doi.org/10.1007/s10212-023-00768-4">https://doi.org/10.1007/s10212-023-00768-4</a>	This research analyses the effect of implementing formative assessment in primary school mathematics on pupils' intrinsic motivation.	A quasi-experimental field study involving three groups. Teachers in Group 1 used a digital tool, whilst teachers in Group 2 received additional support in the form of materials for feedback and differentiated teaching.	The results show that both intervention versions (LPA and LPA + support) have a positive effect on pupils' perceived sense of competence compared to the control group. - A significant indirect effect on intrinsic

			Teachers in the control group delivered their usual teaching.	motivation was observed for the LPA group but not at a statistically significant level for LPA + support.
4	Sortwell, A., Trimble, K., Ferraz, R., Geelan, D. R., Hine, G., Ramirez-Campillo, R., Carter-Thuillier, B., Gkintoni, E., & Xuan, Q. (2024). A systematic review of meta-analyses on the impact of formative assessment on K-12 students' learning: Toward sustainable quality education. <i>Sustainability</i> , 16(17), Article 7826. <a href="https://doi.org/10.3390/su16177826">https://doi.org/10.3390/su16177826</a>	This comprehensive review systematically examines meta-analyses investigating the effects of formative assessment on student learning, in order to assess the magnitude and robustness of the observed effects and to identify implications for quality and sustainable education.	This is a systematic review in which the authors included thirteen (13) meta-analyses examining the effect of formative assessment on student learning in K–12, based on inclusion and exclusion criteria.	Generally, the meta-analyses show positive effects of formative assessment on student learning. These effects vary depending on the skill being studied, the level, the context... They also show significant effects when formative assessment includes targeted feedback.
5	Orosová, R., Ganajová, M., & Sotáková, I. (2022). The effect of formative assessment on the development of conceptual understanding in students. <i>AD ALTA – Journal of Interdisciplinary Research</i> , 12(1), 122–129.	This research examines the effect of formative assessment tools in chemistry teaching on the development of students' conceptual understanding, according to the cognitive levels of Bloom's taxonomy.	The study uses a quasi-experiment as its main research method. The research instruments in the control and experimental groups comprised two standardised cognitive tests (pre-test and post-test).	The research results show a significant effect of formative assessment on the development of students' conceptual understanding, not only in lower-level cognitive processes but also in higher-level cognitive processes.

6	Smit, R., Dober, H., Hess, K., Bachmann, P., & Birri, T. (2022). Supporting primary students' mathematical reasoning practice: The effects of formative feedback and the mediating role of self-efficacy. <i>Research in Mathematics Education</i> , 25(3), 277–300. <a href="https://doi.org/10.1080/14794802.2022.2062780">https://doi.org/10.1080/14794802.2022.2062780</a>	This study examined whether formative feedback perceived by pupils promotes the development of mathematical reasoning skills in primary school pupils, by exploring the mediating role of self-efficacy.	This was a 10-week observational study, integrated into a training programme involving 1,261 pupils across 71 primary school classes. A questionnaire to assess pupils' perceptions of formative feedback, a mathematical self-efficacy scale, and a mathematical reasoning test were used.	The results indicate that, at the class level, formative feedback has a positive effect on mathematical reasoning, and this effect is mediated by pupils' self-efficacy. However, at the individual level, there is no direct effect on mathematical reasoning.
7	Sonmez, M., & Cetinkaya, F. C. (2022). The effect of formative assessment on reading comprehension. <i>International Journal of Assessment Tools in Education</i> , 9, 88–108. <a href="https://doi.org/10.21449/ijate.1104868">https://doi.org/10.21449/ijate.1104868</a>	The aim of this study is to examine the effect of formative assessment methods on reading comprehension among primary school pupils.	The study was designed as a quasi-experimental model, one of the quantitative research models. This research model is a non-balanced pre-test post-test quasi-experimental design with a control group.	The research findings show that pupils who benefited from formative assessment achieved higher scores than those in the control group. Feedback has a positive effect on improving pupils' reading skills, as well as their motivation and engagement.
8	Moyo, S. E., Combrinck, C. & Van Staden, S. (2022). Evaluating the Impact of Formative Assessment Intervention and Experiences of Standard 4 Teachers in Teaching Higher-Order-Thinking Skills in Mathematics. <i>Frontiers in Education</i> , 7. <a href="https://doi.org/10.3389/educ.2022.771437">https://doi.org/10.3389/educ.2022.771437</a>	This research aims to analyse the impact of a formative assessment intervention on higher-order thinking skills (HOTS) in mathematics among pupils.	The study employed mixed-methods research, using a sequential single-group design with a pre-test, an intervention (training) and post-test instruments.	The results indicate that pupils showed a significant improvement, demonstrating the positive effect of formative assessment on their mathematics outcomes.

9	Granberg, C., Palm, T., & Palmberg, B. (2021). A case study of a formative assessment practice and the effects on students' self-regulated learning. <i>Studies in Educational Evaluation</i> , 68, 100955. <a href="https://doi.org/10.1016/j.stueduc.2020.100955">https://doi.org/10.1016/j.stueduc.2020.100955</a>	This study examines the effects of formative assessment implemented by a mathematics teacher on pupils' self-regulated learning (SRL).	This is a case study. A questionnaire was administered to pupils before and after the intervention in comparison with the two control classes.	The results show the positive effect of formative assessment on pupils' perceived autonomy and self-efficacy after the intervention, compared with the control classes.
10	van den Berg, M., Bosker, R. J., & Suhre, C. J. M. (2018). Testing the effectiveness of classroom formative assessment in Dutch primary mathematics education. <i>School Effectiveness and School Improvement</i> , 29(3), 339–361. <a href="https://doi.org/10.1080/09243453.2017.1406376">https://doi.org/10.1080/09243453.2017.1406376</a>	This research examines the effectiveness of classroom formative assessment on the mathematics performance of primary school pupils.	A quasi-experimental study with pre- and post-tests was conducted between the class group using a structured model of formative assessment and the control group.	The results show that there are no significant differences between the two groups. However, there were significant differences regarding their use of formative assessment and immediate pedagogical feedback.
11	Faber, J. M., Luyten, H., & Visscher, A. J. (2017). The effects of a digital formative assessment tool on mathematics achievement and student motivation: Results of a randomised experiment. <i>Computers &amp; Education</i> , 106, 83–96. <a href="https://doi.org/10.1016/j.compedu.2016.12.001">https://doi.org/10.1016/j.compedu.2016.12.001</a>	The aim of the study is to examine the effects of a digital formative assessment tool on mathematics achievement and motivation among Year 3 primary school pupils.	This research uses a randomised experimental design. The experimental schools used the digital formative assessment tool, whilst the control schools continued with their usual teaching methods.	The results indicate positive effects on pupils' performance in mathematics, as well as on their motivation. The effect is strongest among the highest-achieving pupils.
12	Sheard, M. K., & Chambers, B. (2014). A case of technology-enhanced formative assessment and achievement in primary grammar: How is quality assurance of formative assessment assured? <i>Studies in Educational Evaluation</i> , 43, 14–23. <a href="https://doi.org/10.1016/j.stueduc.2014.02.001">https://doi.org/10.1016/j.stueduc.2014.02.001</a>	This article examines the effects of technology-enhanced formative assessment on pupils' grammar learning.	An experimental study: teachers in the intervention and control classes were given a list of grammatical learning objectives to be covered during the study.	The results indicate that pupils using technology-enhanced formative assessment show significant improvements in grammar.

13	Clark, I. (2012). Formative assessment: Assessment is for self-regulated learning. <i>Educational Psychology Review</i> , 24(2), 205-249. <a href="https://doi.org/10.1007/s10648-011-9191-6">https://doi.org/10.1007/s10648-011-9191-6</a>	This article examines the role of formative assessment and formative feedback in the development of students' self-regulated learning.	This study draws on 199 sources devoted to assessment, learning and motivation to present a detailed analysis of the values, theories and effects of formative assessment.	The results show that formative feedback has a positive effect on strengthening students' self-regulated learning. Consequently, it also enhances their motivation and academic performance.
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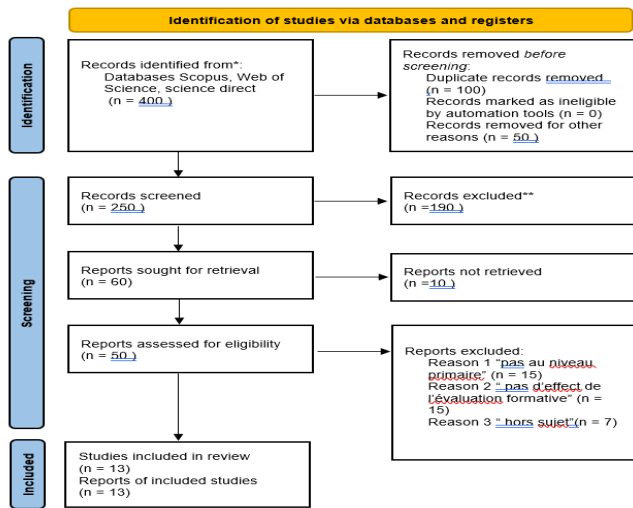


Figure 1 : Flowchart

## Conclusion

The aim of this systematic review is to analyse the effects of formative assessment on improving the learning skills and academic performance of primary school pupils. Analysis of the fourteen studies demonstrates the positive effect of formative assessment and feedback on improving pupils' results in various subjects, notably mathematics, grammar and reading comprehension, in addition to its effect on the development of pupils' learning skills, namely: self-regulation, motivation and engagement. This is particularly important for primary school pupils, a stage at which fundamental learning is established.

However, the studies reveal that the significant effect of formative assessment depends on its faithful implementation, as well as the quality of formative interaction, particularly feedback. This is because the feedback that teachers provide to pupils plays an important role in improving pupil performance and must be constructive and well-targeted.

According to the findings, there are barriers that limit the effective implementation of formative assessment in classroom practice, notably a lack of training in assessment, time constraints and the complexity of the curriculum.

This highlights the need to support primary school teachers through professional development focused on feedback strategies and the practical integration of formative assessment in the classroom, as they must understand that this form of assessment is a regulatory tool centred on pupils' progress; consequently, the feedback they provide to pupils must be formative, constructive and well-targeted. Furthermore, training on the integration and use of digital tools in formative assessment is needed to facilitate teachers' work and provide them with tools, resources and strategies to alleviate the pressures associated with overloaded curricula and time constraints, thereby ensuring the effective implementation of formative assessment within the teaching and learning process.

This systematic review helps to provide teachers and trainers with clear information on the most promising formative practices, notably constructive feedback, explicit learning objectives and the use of digital tools. Furthermore, for policy-makers, it highlights the importance of creating favourable conditions to enable teachers to adopt these practices effectively. Finally, for researchers, the review highlights several avenues for further research in this area.

Despite the accuracy of this systematic review, limitations remain, notably the methodological heterogeneity of the included studies, the number of studies, and the difficulty in generalising the observed effects due to specific contextual factors. These limitations open up several avenues for future research, namely: the role of peer feedback, and the variables that ensure the faithful and sustainable implementation of formative assessment in the classroom.

In summary, this systematic review contributes to a better understanding of the effects of formative assessment in primary education. It also paves the way for future work analysing the effective integration of formative assessment within the Moroccan educational context, specifically at primary level, in order to examine its effects on improving pupils' skills and performance.

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