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Review of Research on the Effect of Teacher Feedback on the Development of Students' Non-cognitive Skills in Primary Education

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Abstract

Feedback plays a crucial role in the learning process by providing information about student performance from teachers, peers, or through self-assessment. Its main purpose is to foster learning by helping students understand their strengths and improve their weaknesses. In primary education, feedback should be straightforward and positive, aimed at boosting self-confidence. Non-cognitive skills, such as self-regulation and social maturity, are essential for student development and success, especially during the early years of schooling. This research analyzed twenty-two studies published in the last decade, utilizing the PRISMA 2020 methodology to assess the impact of feedback on the non-cognitive skills of primary education learners. In summary, a substantial body of research indicates that feedback from teachers significantly benefits students' personal development. It contributes to enhancing self-regulation, self-esteem, resilience, self-efficacy, emotional management skills, as well as the development of positive mindsets and attitudes. Additionally, it boosts motivation and instills a sense of responsibility. However, fewer studies have demonstrated the positive

effects of feedback on social development, which includes promoting extroversion, communication, cooperation, and enhancing cultural awareness to foster an active social identity. Furthermore, feedback also improves skills such as critical thinking, creativity, and written argumentation within learning strategies.

Keywords: teacher feedback, non-cognitive skills, primary education, student's performance

1. Introduction

Feedback provides information to learners to support them systematically in improving their performance and achieving their learning goals (Brookhart, 2017). Its primary role lies in creating learning guidance that enhances the revision of thoughts and actions on the part of students, thus contributing to the enhancement of learning outcomes and the simultaneous cultivation of cognitive, metacognitive, socio-emotional and non-cognitive skills (Hattie & Timperley, 2007). Socio-emotional skills include fundamental abilities, such as understanding and managing emotions, building positive interpersonal relationships, making responsible decisions and responding effectively to social challenges (Goleman, 2006). These skills are critical for personal development, academic success, general adaptation and resilience in diverse life environments (Hattie & Timperley, 2007).

While there is a wealth of literature on feedback in education, research specifically addressing the effects of different types of feedback on cognitive skill development remains limited (Black & Wiliam, 1998; Pekrun et al., 2005; Dweck, 2006; Hulleman & Harackiewicz, 2009; Yeager & Dweck, 2012). Systematic reviews and meta-analyses have identified two primary areas of impact: a) enhancing teacher performance and instruction (Shute, 2008; Jonsson, 2013; Liu & Brown, 2015; Chen, 2016; Baliram & Youde, 2018) and b) improving students' cognitive and non-cognitive skills (Hattie & Timperley, 2007; Laici & Pentucci, 2019; Haughney et al., 2020; Wisniewski et al., 2020; Jensen et al., 2021; Hahn et al., 2021). Additionally, some studies have investigated the relationship between non-cognitive skills and academic performance (Smithers et al., 2018), self-assessment (Li et al., 2021; Badrun, 2024), interventions in higher education (Frantz et al., 2022), school climate (Zynuddin et al., 2023), and motivation in writing (Cen & Zheng, 2024). However, the effects of feedback on specific areas such as personal, social, and cultural development, as well as the fostering of learning attitudes and strategies among primary school students, have not been thoroughly examined.

Although previous research has greatly advanced our understanding of feedback's effects, there has been limited investigation into how feedback influences specific non-cognitive areas of learner performance in primary education. This includes aspects such as personal, social, and cultural development, as well as the formation of mindsets, attitudes, and learning strategies. Addressing this gap is the primary objective of the current study.

2. The impact of teacher feedback on primary students' non-cognitive skills. A theoretical approach

Feedback is a crucial component of the educational process, as it involves providing students with information about their performance (Hattie & Timperley, 2007). This information can originate from various sources, including teachers, peers, self-assessments, or automated learning systems (Brookhart, 2017). The main purpose of feedback is to enhance learning by helping students understand their strengths, identify areas for improvement, and take the necessary actions to close the gap between their current performance and their learning goals (Hattie, 2009).

For feedback to be effective, it should possess several key characteristics: a) it should be given immediately after task completion to ensure relevance and practicality (Shute, 2008); b) it should clearly define successful aspects of the work as well as areas that need improvement, avoiding vague or generalized assessments (Brookhart, 2017); c) it should offer specific, actionable steps for enhancing performance (Hattie & Gan, 2011); d) it should balance positive reinforcement with critical evaluation to maintain learner motivation (Brookhart, 2017); e) it should be tailored to meet the individual needs, capabilities, and learning profiles of the students (Nicol & Macfarlane-Dick, 2006); and f) it should be presented in a way that is easily understood and useful for the learner (Sadler, 1989).

Different forms of feedback address a variety of needs: a) Formative feedback is provided during the learning process and contributes to the continuous improvement and adaptation of learning strategies (Sadler, 1989), b) Summative feedback evaluates overall performance at the end of a learning unit or period (Hattie, 2009), c) Descriptive feedback offers detailed information about specific aspects of performance, clarifying which points need improvement (Brookhart, 2017), d) Evaluative feedback expresses a judgment about the quality of work, often conveyed through grades or qualitative assessments (Hattie & Timperley, 2007), e) Peer feedback encourages collaborative learning and the exchange of ideas among students (Nicol & Macfarlane-Dick, 2006), f) Self-feedback supports self-regulation and the development of independent learning skills (Nicol & Macfarlane-Dick, 2006).

To improve the quality of feedback, several specific strategies are recommended. These include the use of rubrics and checklists, which provide clear learning criteria (Brookhart, 2017); written feedback, which offers focused suggestions for improvement (Hattie & Gan, 2011); oral feedback, which is immediate and personal (Brookhart, 2017); and interactive feedback through technological tools, which engages students and provides prompt responses (Shute, 2008).

In primary education, feedback should prioritize the development of basic skills. Therefore, it should be simple, positive, and encouraging to boost self-confidence and foster a willingness to learn (Hattie, 2009). Additionally, sharing feedback with parents enhances their ability to support the learning process at home, thereby strengthening collaboration between school and family (Hattie & Gan, 2011).

Skills can be categorized into two main types: cognitive and non-cognitive. Cognitive skills pertain to logical thinking and cognitive processing abilities. These skills involve understanding complex concepts, adapting to different environments, learning from experiences, engaging in intricate reasoning, and overcoming challenges (Yeager & Dweck, 2012). They are associated with mental capabilities that are essential for various cognitive tasks, such as reading, writing, and arithmetic (Yeager & Dweck, 2012). On the other hand, non-cognitive skills—often referred to as socio-emotional skills or character skills—encompass a range of behaviors, attitudes, and personal traits that, while not directly linked to cognitive abilities, play a vital role in a learner's academic and personal growth. Non-cognitive skills include the patterns of thinking, feeling, and behaving that develop

through social interactions and can be nurtured throughout a person's life (Borghans et al., 2008). The term "non-cognitive skills" was first introduced by sociologists Bowles and Gintis (1976), who emphasized the significance of attitudes, motivations, and personal characteristics as critical factors for success in both the labor market and education. Modern research indicates that non-cognitive skills are essential for enhancing academic performance, socio-emotional development, and mental health (Heckman et al., 2006; Duckworth et al., 2007).

Integrating non-cognitive skills into the educational curriculum requires a comprehensive approach that acknowledges the importance of these skills beyond traditional academic subjects. Several effective strategies have been identified for teaching these skills: a) Social-Emotional Learning (SEL) Programs, which enhance self-awareness, self-management, social awareness, relationships, and responsible decision-making skills (Durlak et al., 2011), b) Project-based learning, which fosters critical thinking, collaboration, and self-regulation, c) Extracurricular activities, which help develop teamwork, discipline, and leadership skills (Eccles & Barber, 1999), d) Assessing non-cognitive skills, which provides insights into their development and incorporates practices that improve the learning process (Duckworth & Yeager, 2015).

Non-cognitive skills are often divided into various domains, including intrapersonal, interpersonal, social, cultural, attitudes, and mindsets (Blair & Raver, 2015). Personal development encompasses self-regulation, self-esteem, a growth mindset, and adaptability, all of which enhance emotional management and persistence in challenging situations (Schoon, 2006; Duckworth & Kern, 2011). A student's social development involves communication, collaboration, empathy, and conflict resolution skills, which improve the ability to interact effectively and cooperate in different social contexts (Goleman, 2006). At the mindset level, intrinsic motivation, responsibility, and integrity promote student autonomy and ethical behavior (Dweck, 2006). Additionally, cultural awareness and participation in community activities contribute to social responsibility and the inclusion of diverse cultures (Dweck, 2006). Developing learning strategies such as critical thinking, creativity, and metacognition enhances the ability to analyze situations and think innovatively (Sternberg, 1999; Zimmerman, 2001).

Recent research indicates that the development of non-cognitive skills is a dynamic process that does not follow a fixed trajectory throughout education (Zimmerman, 2001). In primary education, socio-emotional development, self-regulation, and social maturity are crucial for school readiness and early academic success (Jones et al., 2015). With the right support, teachers and policymakers can create environments that foster holistic student development and social inclusion (Johnson & Johnson, 1989; Goleman, 2006).

3. Previous research - Contribution of this review

Black and Wiliam (1998) highlighted the significance of formative assessment and timely feedback, asserting that teachers can support students in developing both cognitive and non-cognitive skills. This support is achieved by providing feedback that emphasizes

strategies, processes, and areas needing improvement. Similarly, Pekrun et al. (2005) developed a framework for understanding academic emotions and their impact on learning. While their study did not specifically focus on feedback, they concluded that feedback can positively influence students' emotional responses and enhance their non-cognitive skills. Additionally, Dweck's (2006) research on mindsets demonstrated a link between feedback and non-cognitive skills. It revealed that a growth mindset—which is the belief that students can enhance their abilities through effort—shapes how they perceive feedback and navigate challenges.

Hattie and Timperley (2007) conducted a meta-analysis of 12 studies to examine the types of feedback and their impact on learning outcomes. They concluded that effective feedback should be timely, specific, and focused on the task rather than on the individual. Similarly, Shute (2008) analyzed formative feedback in 180 studies, emphasizing that it should address the accuracy of performance on a task or problem while focusing on errors and misconceptions. She also noted that various factors, such as a student's individual characteristics and the demands of the task, influence the effectiveness of formative feedback.

Additionally, Hulleman and Harackiewicz (2009) found that feedback linking effort to improved performance can positively affect both cognitive and non-cognitive outcomes. In another study, Yeager and Dweck (2012) investigated how students' beliefs about their abilities impact their resilience and response to challenges. They concluded that feedback promoting a growth mindset can enhance persistence. Lastly, Jonsson (2013) reviewed 103 studies on feedback in higher education and discovered that a lack of strategies for understanding or utilizing academic discourse can hinder students' ability to make use of feedback.

Liu and Brown (2015) reviewed 32 studies and 12 dissertations on corrective feedback in second-language writing. They noted several methodological challenges, such as the lack of detailed reporting on the research context, which makes it difficult to compare results across studies. In addition, Chen (2016) focused on the use of technology to provide feedback in second language writing classes, examining the pedagogical implications and suggesting directions for future research. Following this, Baliram and Youde (2018) conducted a meta-analysis of eight empirical studies and highlighted the positive impact of feedback on academic achievement. Similarly, Smithers et al. (2018) linked non-cognitive skills to improved psychosocial and language outcomes, although they also identified potential biases within the studies. Meanwhile, Laici and Pentucci (2019) found active teaching strategies, which incorporate feedback processes, improve collaboration and enhance learning experiences.

Hahn et al. (2021) analyzed automatic grading and feedback, identifying both advantages and limitations. One significant limitation noted was the tendency for responses to focus more on the specifics of the question rather than on substantive learning. Additionally, Frantz et al. (2022) and Zynuddin et al. (2023) examined the relationship between school climate and the development of non-cognitive skills. Wisniewski et al. (2020) conducted a meta-analysis of

435 studies, emphasizing the importance of accurate and timely feedback and its measurable positive impact on learning outcomes. Finally, Li et al. (2021) explored peer assessment, highlighting its beneficial effects on non-cognitive skills. Cen and Zheng (2024) argued that feedback from multiple sources is the most effective approach to enhancing motivation in second-language writing.

Previous reviews have provided valuable insights into the various types of feedback, their applications and effectiveness, as well as their positive or negative effects on learners' cognitive and non-cognitive performance skills. However, none have exclusively focused on the impact of feedback on non-cognitive domains of performance in primary education. This analysis aims to address this gap by examining research that investigates the effect of feedback on specific categories of non-cognitive skills in primary school students. These categories include: a) Personal Development: self-regulation, self-efficacy, growth mindset, time management, adaptability, and resilience, b) Social Development: communication, collaboration, empathy, and conflict resolution, c) Cultural Development: cultural awareness and active social roles, d) Development of Mindsets and Attitudes: motivation, responsibility, and integrity, e) Development of Learning Strategies: critical thinking, creativity, and metacognition.

4. Purpose of the research - Research questions - Methodology

The primary purpose of this research is to investigate the effects of teacher feedback on the development of non-cognitive skills in primary education learners through a comprehensive literature review. The analysis is based on research published between 2014 and 2024, aiming to draw useful conclusions, identify gaps in literature, and formulate suggestions for future research. Specifically, this literature review seeks to answer the following research questions: To what extent does feedback contribute to the personal development of learners?

- To what extent does feedback contribute to their social development?
- To what extent does feedback enhance the development of mindsets and attitudes?
- To what extent does feedback promote cultural development?
- To what extent does feedback support the development of learning strategies?

Additionally, the review explores the fields of study, sample sizes and characteristics, data collection methods, and research tools utilized. The methodology for the review was based on the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement by Page et al. (2021). This updated guideline replaces the previous version from 2009 and includes new guidance covering the stages of identification, exclusion, eligibility assessment, and final selection of studies. Figure 1 presents a flow chart of this process and indicates the number of studies included at each stage.

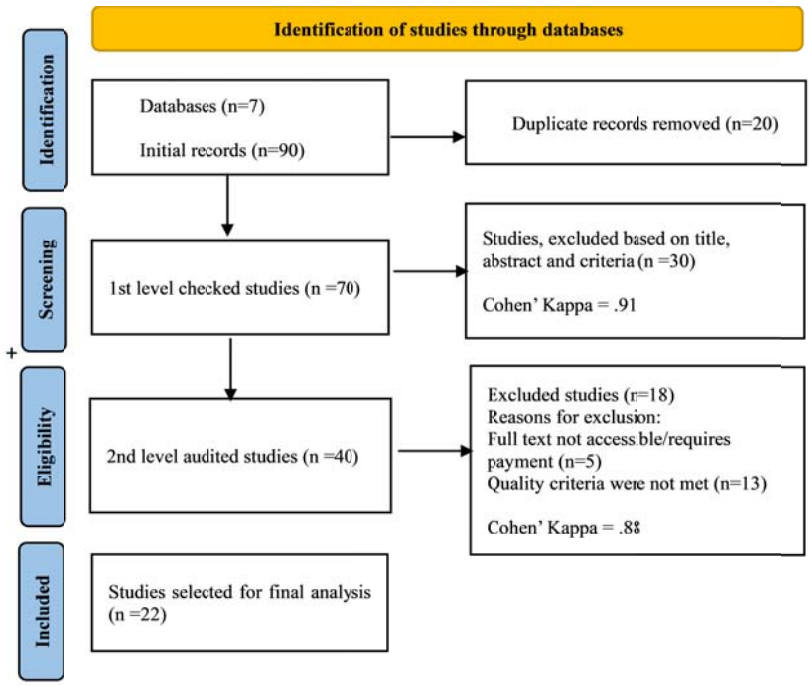

Figure 1. Flowchart of the literature review based on the PRISMA 2020 guidelines by Page et al. (2021)

The keywords and phrases used for the search included: "Feedback" AND "Non-Cognitive Skills," "Feedback" AND "Non-Cognitive Outcomes of Students' Performance," "Teacher's Feedback*" AND "Non-Cognitive Outcomes," "Feedback*" AND "Non-Cognitive Skills of Students' Performance," "Teacher's Feedback*" AND "Non-Cognitive Skills," and "Feedback*" AND "Soft Skills." Additionally, the term "social-emotional skills" was utilized. To expand the search, specific subcategories of non-cognitive skills were included, such as self-regulation, self-efficacy, growth mindset, time management, adaptability, resilience, communication, collaboration, empathy, conflict resolution, motivation, responsibility, integrity, cultural awareness, active social role, critical thinking, creativity, and metacognition. The search was also limited to primary education by using terms like "primary school," "primary education," "elementary education," and "schools." The search primarily focused on English terms, as most relevant literature is published in English.

This review was conducted across seven bibliographic databases: Scopus, IEEE Xplore, SAGE Journals, ScienceDirect, SpringerLink, ResearchGate, and Google Scholar. The aim was to broaden the search scope in comparison to previous systematic reviews in this field. Scopus and IEEE Xplore, two of the largest databases covering a variety of topics, were prominently used. Additionally, searches were conducted in ScienceDirect and SpringerLink, which feature thematic sections related to social sciences and humanities, as well as in SAGE Journals and ResearchGate. Google Scholar was also utilized, despite its limitations in search capabilities.

The search through the mentioned databases resulted in the identification of 90 studies. Of

these, 20 were found to be duplicates and were removed, leaving 70 studies for the first-level review. During this stage, the titles and abstracts of the studies were analyzed according to predefined selection criteria (see Table 1). To ensure consistency in the evaluation process, a small number of the same studies were assessed, and Cohen's kappa coefficient was calculated (see Figure 1). Following this review, 30 studies were excluded.

Table 1. Inclusion/exclusion criteria for studies in the review

Inclusion criteria	**Exclusion criteria**
Studies written in English and Greek.	Studies written in a language other than English and not available for translation.
Application in the field of education.	Not related to application in the field of education.
Reference to the effect of feedback on the non-cognitive skills of learners in primary education.	Not related to the effect of feedback on non-cognitive skills of learners in primary education.
The summary reports some information.	Reviews/theoretical studies
Publication year from 2014-2024	

A total of 40 studies were forwarded for the second level of review, during which the researchers analyzed the main text of each study. Five studies were excluded because they required payment for access. The remaining 35 studies were evaluated for quality based on the following criteria:

- Clarity of the context: Is the context regarding the effect of feedback on non-cognitive skills in primary education clearly described? This includes the cognitive domain and the type of research.
- Methodological design: Is the methodological design clearly outlined? This includes the type of data collected and the sample of participants.
- Data collection methods: Are the research methods and tools for data collection clearly described?

After assessment, 22 studies that met these criteria were selected for inclusion in the systematic review. Additionally, Cohen's kappa coefficient was calculated to ensure the internal consistency of the procedure (see Figure 1).

5. Results

The following tables present the studies analyzed in the literature review, focusing on the impact of teacher feedback on various categories of non-cognitive skills in primary education students. For each study, we provide the following information: the researchers, the time and country in which the study was conducted, its purpose, the type of study, the sample size, the subject area it examined, and the main findings. This information is organized by category of non-cognitive skills to enhance understanding of the relationship between feedback and the

development of skills such as personal, social, and cultural growth; the development of learning strategies; and the formation of attitudinal mindsets.

Tables 2, 3, and 4 illustrate the impact of teacher feedback on various aspects of learners' personal development in secondary education. Specifically, Table 2 highlights the contributions of teacher feedback in two subcategories: self-regulation and self-confidence among students.

Table 2. Results of teacher feedback's effect on learners' self-regulation and self-confidence in primary education

Researchers **Year** **Country**	**Purpose of research**	**Type of research** **Sample size** **Subject**	**Results**
Baadte & Schnotz 2014 Germany	Examining how feedback affects performance, motivation, and emotions alongside learners' self-perception.	Experimental Elementary school 72 students All the subjects Digital Media	Feedback led students with positive academic self-concepts to have reduced performance and mood but increased effort. In contrast, for students with negative self-concepts, feedback did not reduce mood but similarly did not enhance performance or motivation.
van Loon & Roebers 2017 Switzerland	Analyzing the impact of detailed feedback on students' self-assessments.	Experimental Elementary school 151 students (98 male, 53 female) Language	Feedback greatly enhanced students' ability to assess themselves, while also aiding their effective self-regulation.
Smit, Bachmann, Blum, Birri & Hess 2017 Switzerland	Evaluating the effectiveness of rubrics in teaching and assessing students' mathematical reasoning.	Experimental Elementary school 762 students (397 male, 365 female) Mathematics	Rubrics improve teachers' diagnostic skills and influence formative feedback and student self-assessment. They also significantly affect self-regulation and self-efficacy.
Ramlah, Riana & Abadi 2022	Examining the impact of feedback on learning Mathematics using interactive media.	Mixed Elementary school 30 students	Using interactive puzzle media to learn mathematics boosts students' self-confidence, enhances motivation, fosters

Indonesia		Mathematics Digital Media	independent learning, and helps them better recognize numbers and geometric shapes.
Heiskanen, Karhu, Koivula, Moisio, Savolainen, Vauhkonen & Närhi 2024 Finland	Examining the impact of two systemic preventive socio-emotional learning interventions in early childhood education by measuring teacher feedback and student behavior.	Experimental Preschool education 102 students All the subjects	The findings demonstrate the impact of interventions on children's behavior, including motivation, self-confidence, and self-efficacy.

Table 3 shows how teacher feedback affects learners' self-efficacy and self-esteem.

Table 3. Results of teacher feedback's effect on primary learners' self-efficacy and self-esteem

Researchers **Year** **Country**	**Purpose of research**	**Type of research** **Sample size** **Subject**	**Results**
Smit, Bachmann, Blum, Birri & Hess 2017 Switzerland	Evaluating how effectively rubrics assist teachers in instructing and assessing students' mathematical reasoning.	Experimental Elementary school 762 students (397 male, 365 female) Mathematics	Rubrics improve teachers' diagnostic skills, influencing feedback and student self-assessment. They also play a significant role in self-regulation and self-efficacy.
Mabbe, Soenens, De Muynck & Vansteenkiste 2018 Belgium	Examining the impact of feedback on students' autonomy and intrinsic motivation.	Experimental Elementary school 110 students All the subjects	Positive normative feedback significantly enhanced students' intrinsic motivation and autonomy during the task.

Ramlah, Riana & Abadi 2022 Indonesia	Exploring the impact of feedback on learning mathematics through interactive media.	Mixed Elementary school 30 students Mathematics Digital Media	Using interactive puzzle media to learn mathematics boosts students' self-confidence, increases their motivation to learn, promotes independent study, and helps them better understand how to recognize numbers and geometric shapes.
Aro, Koponen, Peura, Räikkönen, Viholainen & Aro 2024 Finland	Examining how emotional and motivational factors affect students' anxiety, responsiveness, and self-efficacy through feedback.	Experimental Elementary school 82 students Language	Cognitive predictors played a role in enhancing students' responsiveness, stress management, and self-efficacy.
Nunes, Cordeiro, Rocha, Limpo & Castro 2024 Portugal	Examine the significance of educational feedback within a Self-Regulatory Strategy Development model intervention.	Experimental Elementary school 69 students (37 male, 32 female) Language (writing)	The Self-Regulatory Strategy Development model intervention significantly improved students' writing planning and increased their motivation and self-efficacy.
Heiskanen, Karhu, Koivula, Moisio, Savolainen, Vauhkonen & Närhi 2024 Finland	Analyze the influence of two systemic, preventive socio-emotional learning interventions in early childhood education by assessing teacher feedback and student behavior.	Experimental Preschool education 102 students All the subjects	The results demonstrate the impact of the interventions on children's behavior, specifically regarding motivation, self-confidence, and self-efficacy.

In conclusion, the research on learners' personal development is summarized in Table 4, which displays the results regarding the impact of teacher feedback on students' emotional intelligence and resilience.

Table 4. Results of the impact of teacher feedback on the emotional intelligence and resilience of primary education students

Researchers Year Country	Purpose of research	Type of research Sample size Subject	Results
Truax 2018 USA	This study explores how teacher language and the incorporation of growth mindset feedback affect students' motivation for writing.	Experimental Elementary school 56 students Language (writing)	The findings indicate that objective feedback had a positive impact on students' writing motivation. Additionally, this feedback encouraged students to adopt a growth mindset, which in turn increased their motivation for writing and fostered a sense of responsibility in their development.
Thompson, Wiedermann, Herman & Reinke 2021 USA	Examining how daily teacher feedback influences student motivation and mental health outcomes.	Experimental Elementary school 58 students All the subjects	Negative feedback had a detrimental impact on students' daily motivation and their readiness for change, resulting in increased levels of depression and internalization.
Elgabbass 2022 Egypt	Examining the impact of two types of feedback—direct and indirect—on enhancing students' academic resilience.	Experimental Elementary school 75 students English as a Foreign language Digital Media	Immediate feedback significantly impacts the academic resilience scale.
Ramlah, Riana & Abadi 2022 Indonesia	Examining the impact of feedback on learning mathematics through interactive media.	Mixed Elementary school 30 students Mathematics Digital Media	Using interactive puzzle media to learn mathematics boosts students' self-confidence, enhances their motivation to learn, fosters independent learning, and provides a clearer understanding of recognizing numbers and geometric shapes.
Zhan, Wan, Chen & Wang	Examining the effects of feedback on student resilience and how performance	Mixed Elementary school 41.872 students	Teacher feedback greatly enhanced student resilience, both directly and indirectly. Student achievement goals

2023 Hong-Kong	goals mediate these effects.	(21.345 male, 20.527 female) All the subjects	played a mediating role in this indirect effect.
Gou, Yang, Chen, Cao & Chen 2024 China	Analyzing the relationship between three types of feedback and students' positive and negative emotions while considering the mediating effect of academic self-concept.	Mixed Elementary school 928 students Language	Providing constructive feedback on homework and checking it on the board had a positive influence on students' emotions, compared to simply grading the homework. Academic self-esteem mediated the relationship between teacher feedback on homework and students' emotional responses.
Aro, Koponen, Peura, Räikkönen, Viholainen & Aro 2024 Finland	Examining the effect of emotional and motivational factors on students' anxiety, responsiveness, and self-efficacy through feedback.	Experimental Elementary school 82 students Language	Cognitive predictors influenced students' responsiveness, stress management, and self-efficacy.
Heiskanen, Karhu, Koivula, Moisio, Savolainen, Vauhkonen & Närhi 2024 Finland	Assessing the impact of two preventive socio-emotional learning interventions in early childhood education by measuring teacher feedback and student behavior.	Experimental Preschool education 102 students All the subjects	The results highlight the impact of interventions on children's behaviors, including motivation, self-confidence, and self-efficacy.

Table 5 presents the results regarding the contribution of teacher feedback to learners' social development.

Table 5. Results of the impact of teacher feedback on learners' social development in primary education

Researchers Year Country	Purpose of research	Type of research Sample size Subject	Results
Schut, Van Mechelen, Klapwijk, Gielen & de Vries 2020 Netherlands	Examining the impact of a design feedback intervention on students' creative thinking.	Experimental Elementary school 27 students All the subjects	Constructive feedback dialogues can help young students engage and stimulate their creative thinking.
Beuchert, Eriksen & Krægpøth 2020 Denmark	Assessing how receiving negative feedback from standardized mathematics tests at an early age impacts later learning, in contrast to relatively positive feedback.	Experimental Elementary school 20 students Mathematics	Informing parents about their child's educational performance can enhance future outcomes. There is no correlation between negative feedback, academic confidence, and intrinsic motivation in low-achieving students.

Tables 6 and 7 display findings that emphasize the importance of teacher feedback in fostering positive attitudes and mindsets among primary school students, including increased motivation and a sense of responsibility. Given the extensive amount of research available, Table 7 features studies that employed experimental methods, while Table 8 includes research based on quantitative, qualitative, or mixed-method approaches.

Table 6. Results of the impact of teacher feedback on improving learners' motivation and responsibility in primary education (experimental methods)

Researchers Year Country	Purpose of research	Type of research Sample size Subject	Results
Baadte & Schnotz 2014 Germany	Exploring how feedback impacts performance, motivation, and emotions alongside learners' self-perception.	Experimental Elementary school 72 students All the subjects	Feedback caused students with positive academic self-concepts to experience reduced performance and mood, but increased effort. In contrast, those with negative self-concepts did

		Digital Media	not see a reduction in mood, but also did not experience an increase in performance or motivation.
Faber, Luyten & Visscher 2017 Netherlands	Analyzing the impact of a digital formative assessment tool on student performance and motivation.	Experimental Elementary school 79 students Mathematics Digital Media	The analysis showed positive impacts on student performance and motivation. Additionally, high-achieving students had higher achievement scores.
Truax 2018 USA	Investigating how teacher language and growth mindset feedback affect students' writing motivation.	Experimental Elementary school 56 students Language (writing)	Constructive feedback had a positive impact on students' writing motivation, fostering a growth mindset and increasing their responsibility and enthusiasm for writing.
Mabbe, Soenens, De Muynck & Vansteenkiste 2018 Belgium	Exploring the impact of feedback on students' autonomy and intrinsic motivation.	Experimental Elementary school 110 students All the subjects	Offering positive normative feedback increased students' intrinsic motivation and sense of autonomy.
Beuchert, Eriksen & Krægpøth 2020 Denmark	Examine how negative feedback from standardized mathematics tests at a young age influence later learning outcomes.	Experimental Elementary school 20 students Mathematics	Providing parents with information about their children's performance can improve future educational outcomes. There is no correlation between negative feedback, academic confidence, and intrinsic motivation in low-achieving students.
Thompson, Wiedermann, Herman & Reinke 2021 USA	Examining the effect of daily teacher feedback on student motivation and mental health outcomes.	Experimental Elementary school 58 students All the subjects	Negative feedback had a detrimental impact on students' daily motivation and their readiness for change, resulting in elevated levels of depression and internalization.
Shin, Kim,	Examining how	Experimental	A comparison of various

Kim & Son 2021 South Korea	cognitive assessment styles and types of feedback influence feedback acceptance and motivation.	Elementary school 50 students All the subjects	types of feedback on second language writing and their impact on student motivation.
Roothooft, Lázaro-Ibarrola & Bulté 2022 Spain	A comparison of various types of feedback on second language writing and their impact on student motivation.	Experimental Elementary school 75 students English as a second language	Students' written work showed significant improvement due to feedback. Throughout the intervention, students maintained high work motivation.
Nunes, Cordeiro, Rocha, Limpo & Castro 2024 Portugal	Examine the significance of educational feedback within a Self-Regulatory Strategy Development model intervention.	Experimental Elementary school 69 students (37 male, 32 female) Language (writing)	The Self-Regulatory Strategy Development model intervention significantly enhanced students' writing planning, motivation, and self-efficacy.
Heiskanen, Karhu, Koivula, Moisio, Savolainen, Vauhkonen & Närhi 2024 Finland	Investigating the effects of two preventive socio-emotional learning interventions in early childhood education and care by measuring teacher feedback and student behavior.	Experimental Preschool education 102 students All the subjects	The findings demonstrate the effects of the interventions, especially on children's behavior, including motivation, self-confidence, and self-efficacy.

Table 7. Results of teacher feedback effects on improving learners' motivation and responsibility in primary education (quantitative, mixed methods)

Researchers Year Country	Purpose of research	Type of research Sample size Subject	Results
Sianipar, Sitompul, Sanjaya, Puspa, Pertiwi & Qoiriyah 2021 Indonesia	Examining the impact of feedback on student motivation.	Quantitative Elementary school 115 students Physics	Regular feedback can boost students' motivation.
Ramlah, Riana & Abadi 2022 Indonesia	Exploring the Impact of Feedback on Learning Mathematics Through Interactive Media.	Mixed Elementary school 30 students Mathematics Digital Media	Using interactive puzzle media to learn mathematics boosts students' self-confidence, enhances their motivation, fosters independent learning, and improves their understanding of identifying numbers and geometric shapes.
Herian, Madjdi & Setiadi 2022 Indonesia	Examining the impact of electronic feedback through Google Classroom on enhancing learning outcomes and boosting student motivation.	Mixed Elementary school 40 students Natural sciences Digital Media	Electronic feedback greatly influences student learning outcomes and enhances student motivation.
Hotea & Turda 2024 Romania	Creating a feedback program based on scaffolding to enhance student motivation.	Mixed Elementary school 50 students All the subjects	Feedback, along with social incentives, plays a crucial role in enhancing student motivation.

Ultimately, Tables 8 and 9 illustrate the results concerning the role of teacher feedback in two significant areas: the cultural development of learners and the fostering of a learning strategy mindset.

Table 8. Results of teacher feedback's impact on learners' cultural development in primary education

Researchers Year Country	Purpose of research	Type of research Sample size Subject	Results
Wullschleger, Garrote, Schnepel, Jaquiéry & Opitz 2020 Switzerland	The study explores how teacher feedback on academic performance and social behaviour is related to social acceptance.	Mixed Elementary school 546 students (277 male, 269 female) All the subjects	Teacher feedback does not influence social acceptance; its effect varies with the context.

Table 9. Results of the impact of teacher feedback on the development of learning strategies and mindset in primary education

Researchers Year Country	Purpose of research	Type of research Sample size Subject	Results
Mabbe, Soenens, De Muynck & Vansteenkiste 2018 Belgium	Examining how feedback influences students' autonomy and intrinsic motivation.	Experimental Elementary school 110 students All the subjects	Giving positive normative feedback increased students' intrinsic motivation and autonomy in engaging with the task.
Schut, Van Mechelen, Klapwijk, Gielen & de Vries 2020 Netherlands	Investigating the impact of a design feedback intervention on students' creative thinking.	Experimental Elementary school 27 students All the subjects	Feedback can help young students engage in constructive dialogues, stimulating their creative thinking.
Ramlah, Riana & Abadi 2022 Indonesia	Examining the impact of feedback on learning mathematics using interactive media.	Mixed Elementary school 30 students Mathematics Digital Media	Using interactive puzzle media to learn Mathematics boosts students' self-confidence, enhances their motivation to learn, fosters independent study, and provides a clearer understanding of number recognition and geometric shapes.
Nunes, Cordeiro, Rocha, Limpo & Castro 2024 Portugal	A study on the significance of instructional feedback in a Self-Regulatory Strategy Development model intervention.	Experimental Elementary school 69 students (37 male, 32 female) Language (writing)	The Self-Regulatory Strategy Development model intervention significantly enhanced students' writing planning, motivation, and self-efficacy.

All selected studies were published in journal articles. The majority of these studies were recorded in 2024 (n=5), followed by 2022 (n=4), 2017 (n=3), 2020 (n=3), 2021 (n=3), 2018 (n=2), 2014 (n=1), and 2023 (n=1). Notably, no studies were recorded in 2015 and 2016. More than half of the studies originated from Europe (n=13, 59.1%), followed by Asia (n=6, 27.3%), the Americas (n=2, 9.1%), and Africa (n=1, 4.5%). In terms of the countries represented in the surveys, Switzerland (n=3) and Indonesia (n=3) had the highest number, followed by the USA (n=2), Finland (n=2), and the Netherlands (n=2). Additionally, Hong

Kong, Portugal, China, Romania, Germany, Belgium, Denmark, South Korea, Egypt, and Spain each had one survey recorded.

The majority of the research examined is experimental (n=15), followed by mixed methods research (n=3), with one study classified as quantitative. Notably, there were no studies identified that employed qualitative data collection methods. In terms of sample size, most studies included between 51 and 100 participants (n=8). This was followed by studies with samples of 101 to 500 participants (n=4), more than 500 participants (n=4), 31 to 50 participants (n=3), and 11 to 30 participants (n=3). Interestingly, no studies were found with samples of 1 to 10 participants. For the experimental research, the number of participants ranged from 20 to 762. In mixed methods research, the sample size varied from 30 to 41,872 participants, while the quantitative study included 115 participants.

The data analysis revealed insights into how feedback impacts the non-cognitive skills of primary education learners. It was found that feedback has been applied broadly across all subjects (n=9, 41%), with a notable focus on the humanities (n=7, 31.7%). Within the humanities, three specific fields of application were identified: Language (n=5, 22.7%), English as a second or foreign language (n=2, 9.0%), and in the sciences (n=6, 27.3%), which includes Mathematics (n=4, 18.2%) and Natural Sciences (n=2, 9.1%). Regarding participant demographics, most surveys (n=17, 77.3%) did not report the gender distribution of their samples. Of the remaining five surveys (22.7%), all provided information on the proportion of men and women in their samples. Importantly, no studies included participants exclusively of one gender. Additionally, five studies (22.7%) incorporated online, digital, and electronic media and tools (28.9%). Figure 2 illustrates the results related to the contribution of feedback to the non-cognitive skills of students in primary education.

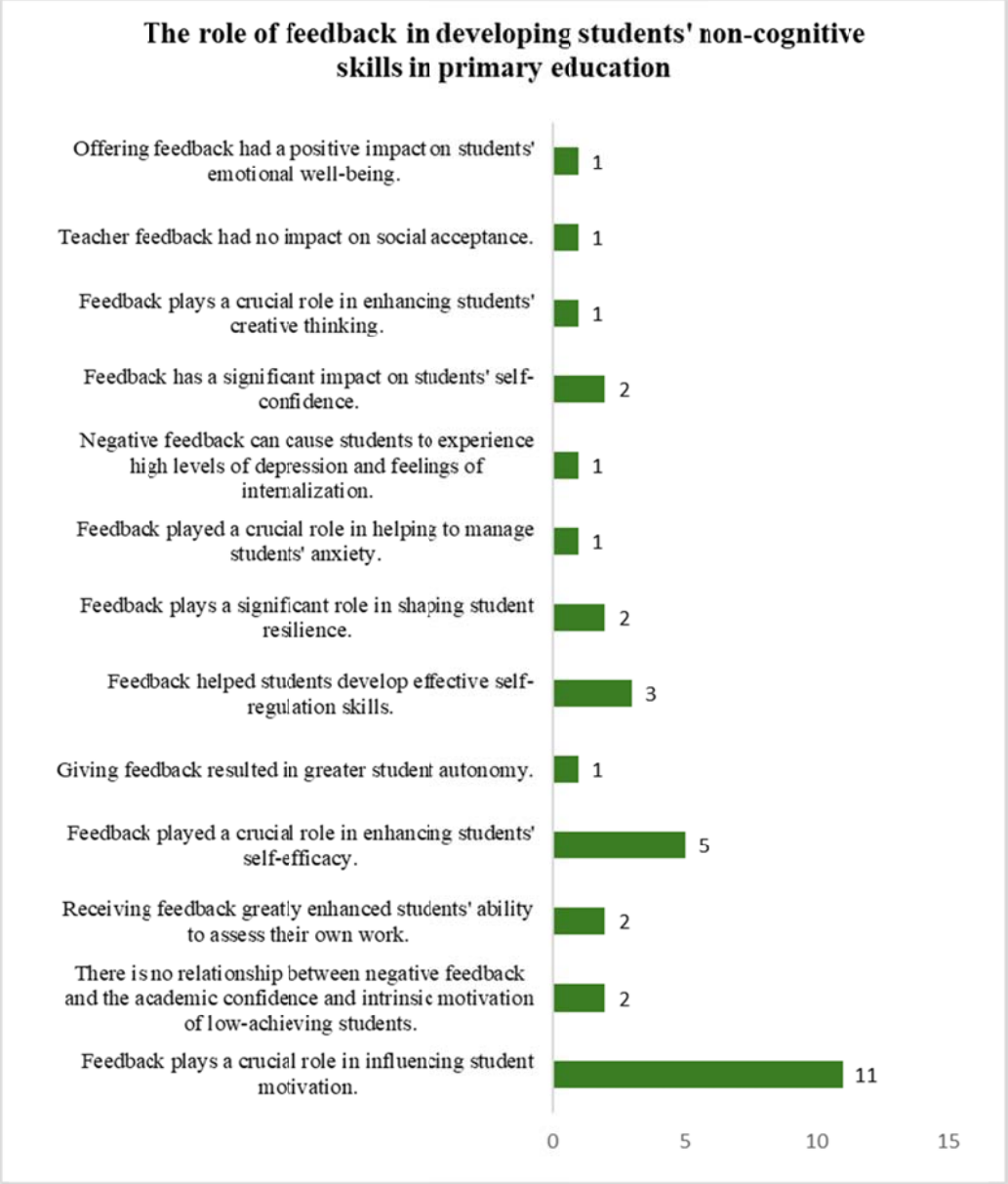

Figure 2. Results showing the contribution of feedback to students' non-cognitive skills in primary education

6. Discussion

Research on the role of educational feedback in developing non-cognitive skills is lacking in Greece (2014-2024), especially when compared to the international landscape (n=22). Most studies have been conducted in Europe (n=13), followed by Asia (n=6), while research activity in America (n=2) and Africa (n=1) remains limited. Switzerland and Indonesia stand out with the highest research output, each contributing three studies, whereas the USA, Finland, and the Netherlands each have two studies. The majority of research relies on experimental design (n=15), with fewer employing mixed methods (n=11). Notably, no studies have used a purely qualitative approach, which hinders a deeper understanding of the

subject's multidimensional aspects. In terms of sample size, most studies include between 51-100 participants (n=8). Mixed methods studies exhibit a wide range in participant numbers, from 30 to 41,872. Across the various subject areas, nine studies were identified: five focused on Language and specific skills like writing, four on Mathematics, two on Science, and two on English as a foreign and second language. Only a few studies (n=5) incorporate digital tools, and data regarding participants' gender (n=15) are often missing, limiting insights into demographic parameters. These findings underscore the need for methodological diversity and the integration of modern pedagogical practices in future research.

The investigation into the role of educational feedback in the personal development of primary school students provides valuable insights, revealing its multidimensional impact on cognitive, emotional, and psychosocial aspects. Research indicates that diverse and differentiated forms of feedback significantly enhance students' self-efficacy and contribute to the cultivation of their self-esteem (Smit et al., 2017; Mabbe, 2018; Ramlah et al., 2022; Nunes et al., 2024; Aro et al., 2024; Heiskanen et al., 2024). These findings align with foundational studies from prior years (Jonsson, 2013; Wisniewski et al., 2020; Haughney et al., 2020), reinforcing the enduring importance of quality educational interventions. Furthermore, some studies have emphasized the positive role of feedback in developing self-regulation skills (Baadte & Schnotz, 2014; van Loon & Roebers, 2017; Smit et al., 2017), equipping students with tools to manage their learning more effectively. Feedback also serves as a means to bolster self-confidence, enabling students to better handle challenging learning and social situations (Ramlah et al., 2022; Heiskanen et al., 2024). These insights are consistent with well-established theoretical models (Black & Wiliam, 1998; Hattie & Timperley, 2007), which recognize feedback as a foundational element of the educational process. Another significant finding from the literature is the critical impact of educational feedback on students' mental resilience (Elgabbass, 2022; Ramlah et al., 2022; Zhan et al., 2023). Strengthening resilience is essential for fostering a positive mindset and attitude toward life (Truax, 2018; Gou et al., 2024). Additionally, research shows that feedback enhances students' emotional intelligence, improving their ability to recognize and manage their emotions, leading to greater autonomy and mental balance (Ramlah et al., 2022; Gou et al., 2024; Heiskanen et al., 2024; Aro et al., 2024). These findings align with previous theoretical perspectives, such as those of Pekrun et al. (2005) and Li et al. (2021). However, one study highlighted that negative or unconstructive feedback could lead to adverse psychological effects, such as increased levels of depression or the internalization of emotions (Thompson et al., 2021). Additionally, a notable lack of research focus was observed in areas like time management and student adaptability, indicating a need for further investigation.

In social development, feedback plays a critical role. Two studies have shown that feedback positively impacts students' extraversion, improving their communication skills (Beuchert et al., 2020) and collaboration skills (Schut, 2020). These results align with research conducted by Laici and Pentucci (2019), which also highlighted the positive effects of educational

feedback on students' social development, enhancing their interaction and participation in group settings. However, there is a significant research gap regarding the impact of feedback on developing empathy, social intelligence, and conflict-resolution skills. These skills are essential for building healthy interpersonal relationships, yet they remain largely unexplored in the existing literature. This underscores the need for further focused studies to investigate how targeted feedback can enhance these aspects of social development, ultimately contributing to the development of more conscious, cooperative, and emotionally intelligent students.

The cultivation of attitudes and mindsets in learners through feedback has been the subject of extensive research, revealing the multidimensional impact of various types of feedback on student motivation and behavior. Specifically, types of feedback such as positive-normative feedback, electronic feedback, objective feedback, and growth mindset feedback, particularly when combined with social incentives, have been found to enhance learning motivation (Baadte & Schnotz, 2014; Faber et al., 2017; Truax, 2018; Mabbe, 2018; Beuchert et al., 2020; Sianipar et al., 2021; Thompson et al., 2021; Shin et al., 2021; Roothooft et al., 2022; Ramlah et al., 2022; Herian et al., 2022; Hotea & Turda, 2024; Nunes et al., 2024; Heiskanen et al., 2024). Additionally, research highlights the significant impact of these forms of feedback on developing student responsibility (Truax, 2018). These findings are consistent with results from similar studies (Hulleman & Harackiewicz, 2009; Dweck, 2006; Yeager & Dweck, 2012; Badrun, 2024; Cen & Zheng, 2024). However, the situation is not one-dimensional. Some studies have questioned the effectiveness of feedback, particularly for students with negative academic self-concepts. For example, Baadte and Schnotz (2014) found that feedback did not improve the performance and motivation of this group of students. Furthermore, the effects of negative feedback can be contradictory. Thompson et al. (2021) showed that negative feedback adversely affected students' daily motivation, while Beuchert et al. (2020) concluded that there was no association between negative feedback, academic confidence, and intrinsic motivation in low-achieving students. Notably, there is a gap in research regarding the effect of feedback on learner integrity. This complexity underscores the need for a differentiated and tailored approach to providing feedback, considering individual needs, self-concept, and specific learner characteristics. It also emphasizes the necessity for further research to deepen our understanding of how feedback can serve as either a facilitator or a deterrent, depending on the context and characteristics of the learners.

In the realm of learners' cultural development, only one study has been recorded, which found that teacher feedback did not impact students' cultural awareness and social acceptance. This suggests that these factors largely depend on the broader cultural context (Wullschleger et al., 2020). These findings are consistent with recent research (Eriksson et al., 2020; Gálvez-López, 2023). Additionally, there is a notable lack of research focusing on enhancing students' active social roles, leaving this area unexplored and underscoring the need for further in-depth investigation.

The development of learning strategies is closely linked to the provision of feedback, which plays a crucial role in enhancing students' fundamental skills. Research indicates that

feedback significantly improves critical thinking (Schut, 2020), creativity (Schut, 2020; Nunes et al., 2024), and autonomy (Mabbe, 2018; Ramlah et al., 2022). This enhancement allows students to analyze, evaluate, and interpret information with greater accuracy and depth of understanding. These findings reinforce the enduring value of feedback as an educational tool, a concept supported by previous studies (Black & Wiliam, 1998; London, 2014; Hattie & Clarke, 2019). However, it is important to note that the impact of feedback on metacognitive skills has not been thoroughly investigated. This gap highlights the need for further research to explore the role of feedback in developing students' ability to reflect on their own thinking. Such skills are essential for self-regulation and lifelong learning.

7. Conclusions-Suggestions for further research

Research on the role of educational feedback in developing non-cognitive skills has been largely absent in Greece over the past decade. In contrast, the international community has seen significant research activity in this area. Most studies are conducted in Europe and Asia, with a minimal presence in America and Africa. Countries like Switzerland and Indonesia are notable for their high volume of relevant research, while the USA, Finland, and the Netherlands contribute comparatively less. Most of the research employs experimental methodologies, although mixed methods are used less frequently. Qualitative approaches are notably missing, which limits our understanding of the complex dimensions of the topic. The samples in these studies vary widely, with many involving medium-sized populations, but there is also a diverse range in data collected through mixed methods.

Teacher feedback is essential for the personal development of primary school students, positively affecting their cognitive, emotional, and psychosocial growth. By providing diverse and differentiated feedback, teachers can enhance students' self-efficacy and self-esteem, which helps cultivate a positive self-image. This feedback also supports the development of self-regulation skills, enabling students to manage their learning more effectively. Additionally, constructive feedback boosts students' self-confidence, allowing them to navigate challenging learning and social situations successfully. It also fosters mental resilience, promoting a positive mindset and attitude toward life. Furthermore, it strengthens emotional intelligence, improving students' ability to recognize and manage their emotions, leading to greater autonomy and mental balance. However, unconstructive feedback can have negative consequences, such as increasing feelings of depression or causing emotional internalization. Moreover, there is a lack of research on aspects like time management and adaptability, highlighting the need for further exploration of these areas.

Teacher feedback is becoming an important catalyst for students' social development, positively influencing skills such as extroversion, communication, and collaboration. Studies indicate that feedback enhances students' ability to communicate effectively and participate creatively in group activities. These findings align with previous research highlighting the positive impact of feedback on students' interactions and participation in social settings. However, there is a significant gap in the literature regarding the influence of feedback on critical skills like empathy, social intelligence, and conflict resolution. This gap underscores

the need for further focused studies to examine how targeted feedback can improve these skills, ultimately fostering the development of socially aware and emotionally intelligent students.

Teacher feedback plays a crucial role in shaping student attitudes and mindsets, with different types of feedback having varying effects on their motivation and behavior. Positive forms of feedback, such as normative, electronic, and objective feedback, along with feedback that promotes a growth mindset or incorporates social incentives, are especially effective in enhancing students' motivation and accountability. These findings align with previous research that highlights the beneficial impact of feedback on both personal and academic development. However, the effectiveness of feedback is not universal. Research indicates that students with negative academic self-concepts may not gain as much from feedback, as it often fails to boost their motivation or performance, particularly when it is not tailored to their individual needs. Additionally, the outcomes of negative feedback are inconsistent. Some studies suggest that negative feedback adversely affects motivation, while others do not find a significant connection to students' academic confidence or intrinsic motivation. There is also a notable research gap concerning the impact of feedback on students' integrity, pointing to the necessity for further investigation. The complexity of these findings underscores the importance of providing differentiated and tailored feedback that takes into account students' individual needs and circumstances. More research is needed to understand how feedback can either facilitate or hinder learning, depending on the educational context and the characteristics of the learners.

Research on students' cultural development is limited. One study indicated that teacher feedback does not influence students' cultural awareness and social acceptance. This finding implies that these factors primarily rely on the broader cultural context, which is consistent with the conclusions of later studies. However, there is a notable gap in the literature regarding the impact of feedback on encouraging students to take on more active social roles. The lack of relevant research underscores the need for further investigation into how feedback might contribute to the development of a more conscious and active cultural and social identity among students.

Feedback plays a crucial role in developing effective learning strategies, as it is closely linked to improving students' fundamental skills. Research indicates that feedback enhances critical thinking, creativity, and autonomy. It helps students analyze, evaluate, and interpret information more accurately and with greater understanding. These findings emphasize the lasting importance of feedback as an educational tool, as noted in previous studies. However, the impact of feedback on metacognition has not been thoroughly investigated. Metacognition, which is vital for self-regulation and lifelong learning, remains underexplored in relation to feedback. This gap in research highlights the need for further studies focused on the role of feedback in fostering this essential skill.

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