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Attention Deficit Hyperactivity Disorder (ADHD) and Learning Outcomes in Mathematics and Technology Education Students in Colleges of Education

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Abstract

Attention deficit hyperactivity disorder (ADHD) is a prevalent neurodevelopmental disorder continuing to adulthood that is increasingly prevalent among college students. This paper examines the way ADHD influences learning outcomes of students in colleges of education studying technology education and mathematics. Cognitive domains such as working memory, executive functioning and sustained attention are often impaired among individuals with ADHD and they are required in math and technology subjects. The paper summarizes the information about the negative impact of ADHD symptoms, particularly inattention, on academic achievement, ability to solve problems, and enrollment in math and technology classes based on the latest empirical and theoretical studies. Moderating variables that are also studied include academic anxiety, deficiencies in executive functions, instructional design, and learning environment. The learning outcomes play a fundamental role in academic success and professional competence due to the unique context of Colleges of Education, students are ready to teach mathematics and technology. To enhance equal academic performance in mathematics and technology education programs, it concludes with recommendations that are legislative and pedagogical that will enhance curriculum design, teacher preparation and support systems within institutions.

Keywords: Attention Deficit Hyperactivity Disorder, Learning outcomes, Technology, Education, and Students in Colleges.

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is characterized by attention problems, impulsiveness and hyperactivity that may hamper the performance of students in school. These challenges are especially serious in Colleges of Education where individuals are prepared to be future educators, particularly in such disciplines as Mathematics and Technology Education where attention needs to be concentrated, logical, and problem-solving skills. Lack of concentration, organization of tasks and completion of academic tasks are common problems among students with ADHD and may adversely affect their performance in the subjects. The school performance problems of these students might also have an impact on their future classroom performance, since they are the future teachers. It is important to analyze the impact of ADHD on their learning outcomes. Also, when educational technology is not effectively regulated, it can be used as a distractor despite the fact that it can be used to facilitate learning as it enhances engagement. To employ counseling to educate effective teaching practices and support systems.According to the American Psychiatric Association (2022), neurodevelopmental disorder is called Attention Deficit Hyperactivity Disorder (ADHD) and characterized by repetitive cycles of impulsiveness, hyperactivity and inattention that hinder the functioning in any of the spheres of life including school. ADHD used to be believed to be mainly a childhood issue, but it is now generally accepted that it is an illness that more often persists into adolescence and adulthood, and that it has a significant effect on postsecondary academic performance. Recent studies point to 2 to 8 percent of college students around the world having clinically significant symptoms of ADHD; many of them are either underdiagnosed or undertreated in colleges and universities (Faraone et al., 2021; DuPaul et al., 2021). Attention Deficit Hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by recurring impulsivity, hyperactivity, and inattention, which affects the functioning in various contexts, including the classroom (American Psychiatric Association, 2022). Thought to be a childhood problem, ADHD has recently become more and more understood

as a problem that can often continue into adolescence and adulthood and can greatly impact academic success in postsecondary education. The most recent estimates indicate the number of college students whose symptoms of ADHD are clinically significant as 2 to 8 percent worldwide; a significant number of such students are misdiagnosed or poorly treated in educational institutions (Faraone et al., 2021; DuPaul et al., 2021).

Mathematics and technology education programs at College of Education are vital in the education system. These programs are tasked with the responsibility of equipping future teachers who will teach technology and math at the primary and secondary levels. Therefore, the academic success of these programs predetermines the future quality of instruction and the national level of education development as well as the personal student success. The academic development and career readiness of students with ADHD attending such programs can be put at risk because of the problem to grasp mathematical concepts, technological resources, and instructional techniques. Though literature on ADHD in higher education is on the rise, there is still a gap in literature that specifically examines the impact of ADHD on students pursuing mathematics and technology education in education colleges. A gap in knowledge concerning the effects of ADHD on teacher-education students who have to simultaneously acquire subject-matter knowledge and pedagogical skills exists since most of the existing studies are conducted on the STEM students or those students who learn at primary and secondary schools. This discrepancy is particularly evident in the new educational settings, where the inclusive methods of teaching and institutional support might be insufficient.

Furthermore, children with ADHD have opportunities and challenges due to the ongoing shift towards technology-mediated learning environments containing digital tools, programming tools, and online learning resources. In cases where educational technologies are not designed to consider neurodivergent learners, it can lead to increased cognitive load and distraction despite the ability to facilitate personalized learning and engagement. Thus, to enhance the learning outcome of technology education courses, it is necessary to comprehend the interaction of ADHD with diverse learning settings. Based on this, this paper explores the relationship between learning outcomes and a ADHD among college students studying mathematics and technology education. To enhance equity and mathematics and technology education, this research will help to inform curriculum development, teacher education and policy. It considers ADHD as a critical determinant in learning performance and not a side issue (Rhiannon, 2020).

ADHD in Higher Education: Academic Difficulties and Prevalence

i) ADHD's prevalence in higher education

Attention Deficit Hyperactivity Disorder (ADHD) is a condition that is starting to be taken seriously by higher education institutions throughout the world. The increased rates of identification among college and university students can be explained by the advance in the diagnostic process and the awareness of adult ADHD. The current estimates indicate that 2 to 8% of college students meet the diagnostic criteria of ADHD, and a greater proportion of them exhibit subclinical symptoms, which, nevertheless, impact academic performance (DuPaul et al., 2021; Faraone et al., 2021). These figures are likely to be underscored due to stigma, limited access to diagnostic services, and differences in institutional screening processes. The high incidence of ADHD has specific implications to colleges of education. Students with ADHD might struggle to meet these requirements due to problems with organization, time management and regulation of attention. Moreover, untreated or misdiagnosed ADHD may cause an increase in the degree of stress, academic burnout, and a lack of motivation, particularly in demanding areas such as technology education and mathematics (Sahmurova, Arikan, Gursesli, and Duradoni, 2022).

Difficulties in Academic Adjustment and Transition

Numerous students encounter significant challenges on the transition between secondary school and college but ADHD sufferers often experience a lot more. The situation in higher education is typically more independent, self-directed, and less structured than the past environment of education. As many studies show, first-year college students with ADHD struggle academically to adjust. They complain about reduced academic self-efficacy, worse study habits, and increased levels of academic stress (Oquendo-Colón et al., 2024). Academic adjustment problems are especially evident in mathematics and technology education courses, where students must solve complex problems, handle multiple tasks at once, and have abstract understanding (Galope and Gumanoy, 2025).

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ii) **Learning Outcomes and Deficits in Executive Functions**

Much of the scholastic difficulties of students with ADHD can be understood relying on the executive functioning deficiencies. The executive functions include working memory, cognitive flexibility, inhibitory control, and goal-directed behavior. These processes are crucial in academic achievement, particularly in areas that require sequential reasoning and long-term attention. As an example, weak inhibitory control results in distractibility when lecturing and studying alone, but deficits on working memory have been linked to difficulties in storing and manipulating mathematical information (DuPaul et al., 2021). Technology education Executive dysfunction may cause students to struggle with debugging code, tracing and uncovering complex programming logic, or managing multi-phase design projects (Misili and Komis, 2023).

iii) Academic Performance, Retention, and Persistence

Studies indicate that grade point averages (GPAs) of students with ADHD are generally lower and the students are more likely to withdraw courses as compared to their colleagues without ADHD. Such tendencies are particularly evident in STEM-related areas where cognitive tasks are essential and the pace of academic learning is often rapid (Oquendo-Colón et al., 2024). This may subsequently damage the academic self-concept and motivation of the students leading to a vicious cycle of poor academic performance. The latter students with ADHD will tend to quit or change programs due to academic difficulties and perceived lack of support (Gavin, Holme, Minihan, O'Reilly, and McNicholas, 2023).

iv) **The Social and Psychological Aspects of Academic Difficulties**

Besides intellectual issues, social and psychological problems are prevalent among ADHD college students, which also affects the learning outcomes. ADHD in college students has been reported to be associated with increased emotional dysregulation, test anxiety, and academic anxiety, particularly in quantitative courses such as mathematics (Swanson and Fung, 2023). These affective factors may reduce performance, enhance avoidance behaviors, and reduce engagement during tests. Also, ADHD children can experience the inability to cooperate with peers and communicate, which are now becoming more emphasized in contemporary mathematics and technology classes. These social problems may have a considerable impact on academic performance and the learning process as a whole without proper treatment.

v) **Support Systems and Institutional Context**

Institutional support systems play a major role in determining the academic experiences of students with ADHD. Researchers have found that students with ADHD are able to perform much better when they are provided with structured academic support services, learning skills workshops, academic coaching, and accommodations. These services are often poorly developed in Colleges of Education and access to and use of them differ widely across institutions. The attitudes and methods of education of the faculty also affect the academic performance of students. The teaching environment better accommodates children with ADHD when educators apply a structured teaching method, have clear objectives and give timely feedback. Conversely, unorganized courses and unspecified evaluation criterion may be obstacles to learning outcomes.

ADHD and Mathematics Learning Outcomes

Some researchers worked on ADHD and Mathematics Outcomes with different views;

a) Math as an Extensive Executive Function Discipline

Kilic and Ahmetoglu (2025) described that mathematics relies on working memory, sustained attention, abstract thinking, and sequential processing; it is often believed to be among the most cognitively challenging academic subjects. To achieve success in mathematics, students should be capable of retaining and manipulating numeric information, accurately follow instructions and monitor their problem-solving activity in real-time. These cognitive needs are closely aligned with executive functions, which are often impaired in individuals with Attention Deficit Hyperactivity Disorder (ADHD) (Faraone et al., 2021). The cognitive load of students in the education colleges that focus on mathematics education is further increased by the expectation to master the material as well as be able to teach. Consequently, students with ADHD might experience disproportionately more challenges in meeting academic standards, particularly in higher-level mathematics courses, which refer to abstraction, evidence, and knowledge acquisition (Logan and Lim, 2025).

b) Symptoms of ADHD and Mathematical Performance

Empirical studies in all levels of education have constantly found a negative relation between math performance and symptoms of ADHD. Inattentive symptoms rather than hyperactive-impulsive ones are associated more with poor performance in math, including difficulties in maintaining attention, committing thoughtless errors often, and spending a lot of time to complete the assignment (DuPaul et al., 2021). These challenges are carried into higher education where academic support systems are less explicit, and the teaching is more rapid. College students with ADHD often struggle to listen to the long mathematical explanations that are often used during lectures that are primarily based on verbal reasoning and symbolic notation. Such difficulties can create information lacuna and disjointed understanding, which will affect the performance in subsequent courses. Such gaps could also affect the confidence and identity of students in the teacher education programs as future mathematics teachers (Adamou, Kehagias, and Antoniou, 2025).

c) Problem-solving, processing speed, and working memory

Working memory is essential to mathematics education as it allows students to conduct multi-step procedures, to integrate different pieces of information and to recall prior steps (Peng, Namkung, Barnes and Sun, 2020). Indeed, as research has revealed, working memory impairment plays a crucial role in the link between ADHD and arithmetic achievement (Swanson and Fung, 2023). ADHD students may be unable to connect new information with the previously acquired knowledge, forget about the taught rules or lose the ability to find solutions. Another factor that affects arithmetic performance is the processing speed. ADHD students also have slower processing speeds, which means they may be unable to finish the task on time and in cases when tests are timed. The authenticity of traditional assessment methods in mathematics is thus questioned as ADHD children can fail in the test despite sufficient knowledge of the concept (Fuchs, Fuchs, Compton, Lambert, Hamlett, and Powell, 2021).

Anxiety and Emotional Control in Mathematics

Barroso, Ganley, McGraw, Geer, Hart, S. A., & Daucourt (2021). Students with ADHD are prone to suffer from arithmetic anxiety and cognitive disabilities. Mathematics anxiety is the anxiety and stress that interferes with arithmetic performance. Previous studies have shown that mathematics anxiety is a consequence of and contributes to poor mathematics achievement, creating a bidirecional and vicious circle that hampers learning (Swanson and Fung, 2023). Mathematics anxiety might be more common in ADHD students because of negative feedback or experiences of failure or incompetence in quantitative tasks. This anxiety can have long-term effects on pre-service teachers in colleges of education. Math anxiety can decrease self-confidence in students, influence learning approaches, and in turn affect their mathematics teaching practices with students (Namkung, Peng, & Lin, 2019).

Teaching Methods and Learning Outcomes in Mathematics

The design of mathematics teaching and learning plays an important role in the success of students with ADHD (Brookhart, 2020). Such students may not learn as effectively from lecturing methods, which are largely based on attention and passive processing. However, it has been shown that engaged, structured teaching strategies increase student engagement and understanding. What we know is the teaching approaches outlined below are particularly beneficial for math students with ADHD (Powell, Bos, & Lin, 2021):

- Explicit instruction: Working memory is helped and cognitive load is reduced by using clear learning goals, demonstrations and worked examples.
- Task segmentation: Breaking mathematics problems into smaller steps increases accuracy and completion of tasks.
- Ongoing formative feedback: Frequent feedback can help to resolve confusion and promote motivation.
- Active learning strategies: Sweller et al. (2019) reports that issue-based learning, peer tutoring and reciprocal problem solving increase sustained engagement and understanding.

d) Evaluation Procedures and Fairness in the Teaching of Mathematics

Maths tests are a challenge for students with ADHD (Logan & Lim, 2025). High stakes testing, time-constrained tests and summative assessment can be disadvantageous for students who take longer to respond to questions and process information (Fuchs & Fuchs, 2022). Evidence shows that, while maintaining academic standards, accommodations such as extra time, alternative assessment formats and continuous assessment models can give more justifiable assessments of students' mathematics learning (DuPaul

et al., 2021). It also featured open-book exams and ongoing assessment, which can provide a more accurate assessment of students' maths understanding without compromising rigour (Fuchs & Fuchs, 2022).

Learning Outcomes for ADHD and Technology Education

Technology education as a high executive-function domain

Technology-enhanced education is complex and challenging. For example, it may involve digital literacy, computational thinking, creativity and technology use. Those students with Attention Deficit Hyperactivity Disorder (ADHD) often struggle with a range of executive functions that are crucial to learning, such as planning, self-control, working memory, sustained attention and flexibility (Faraone et al., 2021). Students in technology education programs in colleges of education are required to showcase their pedagogical knowledge about the improvement of teaching and learning with technology, as well as their technical skills. Students with ADHD may struggle to balance these two areas if they have problems with attention and organisation (DuPaul et al., 2021).

Learning Environments Mediated by Technology and Attention Regulation

Online learning platforms are key to technology education, but they can be difficult for children with ADHD. Engagement and multimedia can help people get more interested in the situation, but if it is not done correctly, it can also help people get more distracted and "cognitively loaded". According to cognitive load theory, people with ADHD are more affected by extraneous information than others because they have a reduced ability to process important information (Sweller et al., 2019). New research suggests that distractions such as notifications, multitasking and non-sequential navigation structures disrupt the attention of students with ADHD in blended and online learning environments (Halpin et al., 2025). Without considering principles of attentional regulation in the design of the instruction, these distractions can negatively influence performance in technology education courses that mainly rely on computer programming platforms, learning management systems and simulation software.

ADHD, Computational Thinking, and Programming

Students with ADHD face numerous challenges with fundamental topics in technology education, programming, and computational thinking (Misili & Komis, 2023). Coding involves debugging, logic and concentration. Studies show students with ADHD have more trouble with algorithmic thinking and debugging, due to reduced working memory capacity and weaker inhibitory control (Sedgwick et al., 2021). Computer education research shows students with ADHD tend to use trial-and-error approaches for problem-solving instead of systematic methods, resulting in inefficiencies and frustration (Halpin et al., 2025). This is especially important in educational contexts, since the students are expected to teach computational concepts. Therefore, substandard learning during the training period can affect their future teaching practices (Misili & Komis, 2023).

In technology education, project-based and collaborative learning

Project-based learning (PBL) and collaborative activities are common in technology education to foster creativity, problem solving and technology use (Bell, 2021). PBL is active, which is exciting for children with ADHD, but it can also make it more challenging for them to plan, stay focused, and do activities for long lengths of time (Pfeifer et al., 2023). Studies show that carefully designed projects with well-defined roles, deadlines and frequent feedback sessions help students with ADHD to do better in project-based learning (DuPaul et al., 2021). Without this type of support, students may struggle to complete their work, collaborate in projects, or meet the assessment criteria. This could impact on their learning and reduce their self-esteem.

Technologies for Education and Assistance as Facilitators

Surprisingly, the same technology that can make learning difficult for students with ADHD, can also be a valuable tool. Researchers have demonstrated that assistive technologies such as task-management programs, reminder apps, visual organisers and adaptive learning programs can help students stay focused and engaged at school (Universal Access in the Information Society, 2025). Game-based learning materials and simulations have correlated with higher levels of motivation and persistence in students with ADHD when targeted towards learning outcomes. Academics warn that assistive technologies should not be used in isolation; they are best used in a pedagogical framework (Pfeifer et al., 2023).

Technology Education Assessment Techniques

In technology education tests, there is more emphasis on practical skills such as project work, software design and development, and creating teaching resources.

While these types of tests may be more authentic than other tests, children with ADHD may still face difficulties if the tasks are not well explained or if there is too much time pressure. In higher education, inclusive assessment methods (such as scaffolded tests, rubrics, flexible deadlines, and revision) are positively associated with better academic outcomes for students with ADHD (Oquendo-Colón et al., 2024). Process, reflective and incremental tests are very valuable in technology education as they are compatible with the learning styles of students with ADHD.**Expanded: Inclusive Pedagogy and Instructional Practices for Students with ADHD**

a) **Neurodiversity Pedagogies that are Inclusive and Affirming**

In order to provide an accessible and engaging learning experience for students with different cognitive abilities, like ADHD, recent research is increasingly revealing the importance of neurodiversity-friendly teaching and learning practices that go beyond merely accommodating (Butcher & Lane, 2025; Zastudil et al., 2025). This perspective positions ADHD as students' differences in how they experience and engage with learning tasks rather than a disability, which supports designing teaching and learning to accommodate learners' strengths, interests and self-regulation skills. An ecological approach to learning suggests that to be inclusive, learning environments must be created that promote accessibility across a range of affordances (curriculum, pedagogic practice and classroom environment) rather than just making adjustments (Butcher & Lane, 2025). Studies with neurodivergent university students (Butcher & Lane, 2025) indicate that routines, scaffolding and opportunities for collaboration are more stimulating and accessible.

In postsecondary settings, Universal Design for Learning (UDL)

Universal Design for Learning (UDL) is an important aspect of inclusive education that provides multiple options for representation, interaction, and expression to meet the varied needs of students with ADHD (CAST, 2018; Zastudil et al., 2025). While there is a wealth of K-12 research on UDL, the principles are always relevant to higher education through facilitating flexible learning pathways.

Some UDL-compatible strategies include:

Several ways to represent: Interactive demos, notated notes, course content represented visually and audibly, reduce cognitive load and support concentration.

Multiple forms of participation: When students can choose their project topics and problem sets, they can have intrinsic motivation that supports focus.

Several ways to express knowledge: Accommodating individual student strengths can be done by allowing students to demonstrate learning through portfolios, audio recordings, exams, or digital artifacts (such as a code walk-through). As recent research indicates, UDL-compatible teaching boosts self-regulation and autonomy in learning, which helps neurodivergent students, such as ADHD, with engagement and learning outcomes (Zastudil et al., 2025).

Collaborative and Active Learning Frameworks

Peer education, team-based problem solving, and project-oriented modules are examples of active learning strategies that promote deeper engagement and sustained attention, which can help students with ADHD in technical and quantitative coursework. According to empirical research in computing education, neurodivergent students, including those with ADHD, respond favorably to active learning environments when they are pedagogically structured and allow them to interact with the content through discussion, introspection, and iterative practice (Zastudil et al., 2025).

Effective active learning techniques frequently consist of:

• Peer cooperation that is organized with distinct responsibilities and checkpoints.
• Practice exercises are dotted with brief, targeted teaching segments (also known as a "chunk and check" design).
• Activities for guided reflection that assist students in tracking their comprehension and making plans for the future.

By offering regular chances for formative feedback and mastery experiences, these strategies aid in the management of attentional barriers and the reduction of anxiety.

b) **Support for Metacognition and Self-Regulation**

An evidence-based method for enhancing performance in math and technology classes for students with ADHD is to explicitly teach metacognitive and self-regulation abilities. Structured self-monitoring, goal-setting, and task decomposition greatly enhance attention, persistence, and problem-solving success, according to general educational psychology literature, even though

research in higher education in particular is still in its infancy (e.g., Frolli et al., 2023; Zastudil et al, 2025).
Metacognitive scaffolds include, for example:
• **Worksheets for planning** that divide tasks into distinct phases.
• **Self-checklists** for completing mathematical problems or troubleshooting programs.
• **Progress notebooks**, in which pupils examine tactics that succeeded or failed.
All students, including those with ADHD, will acquire the executive control skills necessary for success in STEM fields if these aids are integrated into the course design rather than offered as elective extras.

c) **Support Structures Mediated by Technology**

New ways of teaching can help and challenge students with ADHD. Interactive platforms that offer adaptive routes, instant feedback, and information segmentation can help people learn better and lower their cognitive load. Digital tools that let students learn at their own pace or show the order of problems visually could be very useful for teaching maths and programming, for example. Personalised pacing, progress tracking, and interactive simulations can enhance attention and engagement when aligned with instructional objectives rather than mere novelty; however, research regarding the integration of technology for ADHD learners in higher education is still evolving (Barkley, 2020).

d) **Psycho-educational support and peer communities built on strengths.**

Evans, Owens, and Bunford (2020) said that psycho-educational programs and peer-supported learning environments are new ways to help students with ADHD get into college. Peer communities based on strengths encourage responsibility, a sense of shared identity, and help with each other's executive skills, like planning study time and managing time. These community-oriented programs improve formal education by creating social and cognitive supports that make students feel less alone and more confident in their academic abilities. Anecdotal and programmatic evidence indicates that structured peer groups and ADHD-focused support workshops can assist students in effectively managing academic challenges, despite the nascent stage of formal research in colleges of education (DuPaul & Stoner, 2019).

Professional Growth for Inclusive Education

Instructor readiness is a crucial component of inclusive pedagogy. Study indicates that more supportive teaching methods, more transparent communication, and more equal assessment design are all favorably correlated with faculty understanding and training in neurodiversity and ADHD (Frontier study on teachers' attitude, 2022).
Priorities for professional growth include:
• Being aware of learning profiles for ADHD and cognitive variety.
• Creating transparent and adaptable tests.
• Including active learning and UDL concepts in STEM education

Research Vulnerabilities and Prospects

Even though there has been more research on Attention Deficit Hyperactivity Disorder (ADHD) in higher education, there are still a lot of things we don't know, especially about how ADHD affects how well students learn maths and technology at colleges of education. These deficiencies hinder the ability of researchers, educators, and policymakers to develop inclusive curricula, evidence-based support systems, and effective interventions tailored to this specific learner demographic.

✓ **Restricted Attention to Teacher Education Situations**

Few studies have specifically examined teacher preparation programs; the majority of research on ADHD in higher education has concentrated on general student populations or broadly categorised STEM fields. It is more difficult to understand how ADHD affects future teachers' ability to teach maths and technology because studies on ADHD in colleges and universities often group students from different fields together without separating those in education programs. For example, a recent systematic review on ADHD and college academic performance integrated research from multiple disciplines without concentrating on education majors. It identified a general correlation between ADHD symptoms and diminished academic performance, yet it lacked insights specific to particular disciplines (Ramirez et al., 2024).

✓ **Insufficient Representation of Diverse Populations**

These days, samples for studies usually come from one place or institution, and they are usually from wealthy countries. This limits the applicability of the findings to larger, socioeconomically and culturally diverse groups. For instance, although evidence indicates that the prevalence of ADHD and its effects on academic performance differ across sociocultural contexts, research from Africa, Asia, and Latin America remains limited. Conversely, research from North America and

Europe predominates the literature. Moreover, students and professors in under-researched domains persist in their misconceptions about ADHD, particularly concerning diagnosis and aetiology, highlighting deficiencies in institutional and educational comprehension that affect both identification and assistance (Kandasamy et al., 2025).

- ✓ **Methodological Restrictions and Difficulties with Measurement**

Methodological inconsistency is a persistent challenge in ADHD research, particularly regarding the assessment of academic performance, psychosocial factors, and ADHD symptoms. The dependability and cross-context comparability of findings are compromised due to the reliance on self-report instruments or limited convenience samples in numerous studies. There remain a limited number of longitudinal designs, essential for understanding the causal relationships between academic trajectories and ADHD symptoms (Smith et al., 2023). In a similar way, tools made for the general population instead of ADHD-specific situations are often used to test complex traits like technological self-efficacy, statistical literacy attitudes, and fear of maths. Recent research indicates the necessity for enhanced measurement frameworks that accurately reflect emotional and cognitive dynamics in quantitative disciplines, revealing that students with ADHD can attain statistical literacy outcomes similar to their peers, despite heightened anxiety and adverse attitudes. This discovery contests established beliefs regarding performance deficiencies (Ryder et al., 2025).

- ✓ **Under Examined Educational Factors**

There is insufficient empirical research linking specific pedagogical methods to measurable enhancements in mathematics and technology learning outcomes for tertiary-level students with ADHD, despite the general exploration of teaching strategies and accommodations for ADHD. Most of the advice on how to teach comes from theory or is based on what works in K–12 settings, not from higher education settings where they are fully tested. The connection between classroom practices and variables such as academic adjustment, sense of belonging, and faculty interaction, which are likely significant yet insufficiently researched, remains unclear, as demonstrated by recent efforts like the American Society for Engineering Education initiative focused on STEM students with ADHD (ASEE, 2025).

- ✓ **Gaps in Digital and Technological Learning**

There are pressing issues concerning the interplay between ADHD, technology design, and learning engagement, particularly in light of the pervasive utilisation of digital platforms in mathematics and technology education. Even though there hasn't been a lot of research on this yet, early results show that students with ADHD have trouble using productivity tools and programming environments (Halpin et al., 2025). Furthermore, although digital support solutions (including gamified practice modules and adaptive learning software) show promise, their effectiveness and fairness for ADHD students in higher education have not been adequately evaluated.

- ✓ **Combining Psychosocial and Emotional Aspects**

In higher education, ADHD research often emphasises academic and cognitive metrics over emotional and psychosocial factors such as student identity, learning attitudes, and academic anxiety. Studies indicate that students with ADHD exhibit diminished positive attitudes and elevated anxiety levels in quantitative courses, potentially affecting learning outcomes through cognitive interactions (Ryder et al., 2025). Future teachers, who need to get over their own academic problems while also building their confidence in the subjects they will teach, will find this emotional aspect very important.

Implications for Counseling

1) The impact of ADHD on arithmetic learning outcomes extends beyond academic performance to encompass professional practice and teacher preparation. Students who have not yet figured out their math problems may graduate with a poor understanding of the subject or a bad attitude toward it. This shows how important it is to deal with ADHD-related problems in teacher training programs. Colleges of Education can help create confident and skilled maths teachers by including clear explanations of neurodiversity, supportive assessment methods, and inclusive teaching methods in their maths education programs. These programs help make the school system more diverse so that it can meet the needs of different kinds of students.

2) The effect of ADHD on learning outcomes in technology education has significant implications for teacher training. Students in technology education who

continue to have trouble learning may not feel very confident in their tech skills when they graduate. This could affect their ability to teach well and their willingness to use technology in the classroom in the future. Counsellors should talk about learning problems related to ADHD during teacher training. Colleges of education can help teachers become more inclusive and better with technology. Future teachers are better able to help students with different needs, like those with ADHD, when they learn about accessible design principles, structured teaching methods, and fair testing methods.

3) Counsellors should put disciplinary comparisons between teacher education cohorts at the top of their list of things to do. They should pay special attention to how ADHD affects students in Technology Education and Mathematics differently than it does in other majors.

4) To get the views of different types of students, including those in developing educational settings where institutional resources and support systems may be very different, counsellors should make sure to include groups that are not well represented and use stratified sampling methods.

5) To enhance robustness, psychologists ought to advocate for the implementation of standardised, validated metrics for academic performance and ADHD symptomatology. They should also use more than one method, such as observational data, performance evaluations, and cognitive tasks.

6) In both controlled and naturalistic settings, counsellors must evaluate the efficacy of inclusive instructional strategies (including active learning, scaffolded feedback, and UDL implementation) for teacher education students diagnosed with ADHD.

7) Psychologists and subject teachers should look into how certain technological features (like how quickly feedback is given and how hard the interface is to use) affect students' interest, cognitive load, and performance in math and technology classes.

8) To elucidate learning outcomes, counsellors ought to examine the application of holistic models that integrate social, emotional, and cognitive components. They should also look into how these relationships change as they go through training and grow in their careers.

Recommendations

These ideas are about the curriculum and how to teach it, school rules, how to prepare teachers, and how to use technology to help students with ADHD do better in school and succeed in college math and technology classes:

1. Curriculum designers should include Universal Design for Learning (UDL) because it will help students learn by letting them practise what they learn in different ways. You can teach math concepts using interactive problem-solving tools, simulations, and visualisations, for example. You can also work on tech projects that involve both coding and design.

2. Teachers should use active learning methods like group problem-solving, project-based assignments, and scaffolded activities to keep students interested and help them understand better.

3. The teachers or instructors are responsible for giving students clear goals, due dates, and ways to give and get feedback on their work. You can learn more and lower your mental stress by breaking up difficult tasks into smaller ones.

4. Teachers or tech teachers should give students a lot of different ways to show what they know, such as digital projects, oral presentations, and portfolios.

5. Academic support services should include technology support systems. These should include workshops on study skills, learning coaches, and mentorship programs made just for kids with ADHD. The school's rules should also include this.

6. Teachers should be ready for ADHD by making rules about attendance and project submission that are flexible. This will help students show that they have learned the material and lower their stress.

7. Institutional rules should let pre-service teachers work with neurodiverse students in classrooms that use UDL and active learning.

8. The curriculum planner should make sure that there is enough instruction on how to use executive function and self-regulation techniques. This helps future teachers learn how to teach different groups of students and also how to deal with problems.

Conclusion

Based on the points made above, ADHD affects cognitive processes that are important for learning in STEM fields, and it makes teaching maths and technology harder in ways that are different from other subjects. Targeted research in Colleges of Education remains insufficient, despite STEM research indicating various factors that influence success. By using inclusive teaching methods, assistive technology, and well-organised support networks, students with ADHD can do better in school and become successful learners and teachers in the future.

References

Adamou, M., Kehagias, A., & Antoniou, G. (2025). The dynamic nature of ADHD symptoms and their impact on academic performance. *Frontiers in Psychiatry*, *16*, 1671764.

Antonini, T. N., O'Brien, K. M., Narad, M. E., Langberg, J. M., Tamm, L., & Epstein, J. N. (2013). Neurocognitive and behavioral predictors of math performance in children with and without ADHD. *Journal of Attention Disorders*, *20*(2), 108–118.

Barkley, R. A. (2020). Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment (4th ed.). Guilford Press.

Barroso, C., Ganley, C. M., McGraw, A. L., Geer, E. A., Hart, S. A., & Daucourt, M. C. (2021). A meta-analysis of the relation between math anxiety and math achievement. *Psychological Bulletin*, *147*(2), 134–168.

Bell, S. (2021). Project-based learning for the 21st Century: skills for the future. The clearing House: A journal of Educational Strategies, Issues, and ideas, 94(2), 39-43.

Brookhart, S. M. (2020). *Classroom assessment and grading that work* (2nd ed.). ASCD.

DuPaul, G. J., & Stoner, G. (2019). ADHD in the Schools: Assessment and Intervention Strategies (3rd ed.). Guilford Press.

Evans, S. W., Owens, J. S., & Bunford, N. (2020). Evidence-based psychosocial treatments for children and adolescents with ADHD. *Journal of Clinical Child & Adolescents Psychology*, 49(2), 158-201.

Fuchs, L. S., & Fuchs, D. (2022). Special education and mathematics assessment: Improving outcomes for students with learning difficulties. *Exceptional Children*, *88*(3), 275–290.

Fuchs, L. S., Fuchs, D., Compton, D. L., Lambert, W., Hamlett, C. L., & Powell, S. R. (2021). The role of cognitive processes in mathematical problem solving. *Journal of Educational Psychology*, *113*(6), 1095–1110.

Halpin, L., Benachour, P., Hall, T., Houghton, A.-M., & Winter, E. (2025). Accessible design in integrated development environments: A think-aloud study exploring the experiences of students with ADHD. *arXiv*.

Kılıç, K. M., & Ahmetoğlu, E. (2025). The role of executive functions in early mathematics skills. *Early Child Development and Care*. Advance online publication.

Krajcik, J.S. & Blumerfeld, P. C. (2020). Project-based learning. In R.K Sawyer (Ed), The Cambridge Handbook of the Learning Sciences (2nd end), pp. 275-297. Cambridge University Press.

Logan, N. E., & Lim, M. (2025). Executive functioning deficits and academic outcomes in children with ADHD. *Pediatric Research*. Advance online publication.

Misili, A. & Komis, V. (2023). Computational Thinking in early childhood Education: The impact of Programming a tangible robot on developing debugging Knowledge. *Early Childhood Research Quarterly*. 65, 4th Quarter, 139-158.

Namkung, J. M., Peng, P., & Lin, X. (2019). The relation between mathematics anxiety and mathematics performance among school-aged students: A meta-analysis. *Review of Educational Research*, *89*(3), 459–496.

Oquendo-Colón, N. O., Li, X., Carroll, L., & Finelli, C. J. (2024, June). Board 355: Project update: Academic success of STEM college students with ADHD and the role of classroom teaching practices. *2024 ASEE Annual Conference & Exposition*.

Peng, P., Namkung, J., Barnes, M., & Sun, C. (2020). A meta-analysis of mathematics and working memory: Moderating effects of working memory domain, type of mathematics skills, and sample characteristics. *Journal of Educational Psychology*, *112*(3), 455–473.

Pfeifer, M. A., Cordero, J. J., & Stanton, J. D. (2023). What I wish my instructor knew: How active learning influences the classroom experiences and self-advocacy of STEM majors with ADHD and specific learning disabilities. *CBE—Life Sciences Education*, *22*(1).

Powell, S. R., Bos, S. E., & Lin, X. (2021). The effects of explicit instruction on mathematics achievement. *Learning Disabilities Research & Practice, 36*(2), 85–96.

Rhianno Jones (2020). A phenomenological Study of Undergraduates with Attention Deficit Hyperactivity Disorder and academic library use for Research. *Academic Librarianship*. 27(1); 1-8.

Sedgwick-Müller, J. A., Müller-Sedgwick, U., Adamou, M., Catani, M., Champ, R., Gudjónsson, G., Hank, D., Pitts, M., Young, S., & Asherson, P. (2022). University students with attention deficit hyperactivity disorder (ADHD): A consensus statement from the UK Adult ADHD Network (UKAAN). Bio-Medical Central Psychiatry, 22, 292.

Springer Nature Review. (2026). STEM education and ICT-enhanced tools for students with disabilities: A five-year review. *Universal Access in the Information Society*.