ACADEMIA International Journal for Social Sciences
Volume 4, Issue 3, 2025 ISSN-L (Online): 3006-6638

Understand the impact of Adaptive AI learning System on students with learning Disabilities

Tayiba Rasheed
tayiba.rasheed23@gmail.com
Riphah International University, Islamabad, Faculty of Social Sciences and Humanties
Corresponding Author: * Tayiba Rasheed tayiba.rasheed23@gmail.com

Received: 09-04-2025 **Revised:** 10-05-2025 **Accepted:** 15-06-2025 **Published:** 13-07-2025

ABSTRACT

This study examines the impact of Adaptive AI learning systems among learning-disabled students. In most cases, there are students who are having learning problems; hence, in a typical classroom, they cannot cope with the lessons offered in the classroom as the pace is too fast. They are excluded most of the time, lack motivation, and fear to pose questions. solution to this issue, special education and inclusive classrooms deployed adaptive AI learning systems. These software control lessons are according to the level of students and provide individual feedback. This study has been conducted on a sample of 180 students aged 10 to 16 years. They were set in two equal groups. Adaptive AI learning systems were applied to one group, and for the other group, the teaching method was pursued. The research design was quantitative and experimental. Academic performance scores, motivation and engagement tests, and independent learning skill checklists were used to collect data. The findings indicated that students using AI systems scored better in their schoolwork compared to the control group. The group of AI students became more motivated, interested, and active in the classroom as well. They were stronger and more self-reliant in studying. The students corrected their mistakes as quickly as possible and had fun due to real-time feedback and playful-interactive lessons. These results are consistent with the previous studies noting the advantages of AI tools in learning. In this work, it is proposed that schools are to implement adaptive AI systems as a way of enhancing learning achievement in students with disabilities. It is advised to conduct future research and evaluate such systems in other schools and on other kinds of learning difficulties.

Keywords: *Adaptive AI Learning Systems, learning disabilities, academic performance, student motivation, independent learning, real-time feedback, inclusive education, educational technology, special education, student engagement.*

INTRODUCTION

Education is another field being transformed by technology, and most schools today are adapting the new tools to enable their students to learn in a much better way. The Adaptive AI Learning System is one such new tool. The learning activities afforded in this system can be altered to suit individual student needs and student performance. It is useful in particular to those students who have learning disabilities since they tend to have difficulties in a typical classroom. Such students might have difficulties in reading, writing, recalling things, or solving problems. Others also cannot concentrate on lessons and know how to follow instructions. Consequently, they require additional assistance in order to be at the pace of their peers and excel in education. The conventional form of teaching and learning does not always favor them very well, and most of these students feel ignored or left behind in the ordinary classrooms. This may ultimately cause them to get disgusted with studies and lag behind others. The Adaptive AI Learning Systems can be a good answer to this question because they will enable learning that is more individual and dependent on the ability of a student (Wang et al., 2023).

Artificial Intelligence Adaptive AI learning systems are used to monitor and to know how the student is learning. In case the system can indicate that one student will be in trouble, then the system can change the lesson style, difficulty level, or type of the activity. It is able to introduce other training exercises, simpler explanations, or learning games based on the speed and the ability of the student. This makes the learning process easier and simpler among learners with learning disabilities. Students also obtain real-time feedback using these systems. And they need not even wait or ask the teacher whether their answer is correct or not, as the AI can merely verify it for them. This will help the students to make changes towards the positive point rather quickly and make them develop more confidence in the learning. The system also can contribute to the opportunity of a teacher to see the reports and to be informed about the need for additional effort from certain students and about the good ones in terms of learning and organizing their support (Ali et al., 2023). This form of real-time adaptation and feedback experience that Adaptive AI Learning Systems has enables the latter to be an effective tool that assists the student with disabilities in the classroom.

In recent times, research studies have demonstrated that the application of adaptive AI learning systems produces positive effects on students with learning disabilities. Such students excel in such skills as reading, writing, and math. They also become more interested in classroom activity and are motivated to learn. They are able to learn at their pace and in their own manner, and thus the burden that they experience whenever in a traditional classroom setupdiminishes. The past years saw a lot of schools, colleges, and universities employing these systems a lot more frequently. There is also the use of AI-based systems in online learning programs and special education services to enhance the provision of education to students with special needs. With the current increasing popularity of AI in education, most researchers consider that it will contribute to the fairer, more tailored, and accommodating nature of learning for all kinds of students and specifically those with disabilities (Ahmad, N.R et al 2025). However, in the list of benefits, it is possible to mention some challenges associated with the use of adaptive AI learning systems. Due to the unavailability of sufficient finances, not every school can afford to buy or even retain these systems. Otherwise, the teachers do not receive such comprehensive training that will allow them to be used in a classroom. Discussion of privacy and safety is also of high importance, as the collection and retention of personal data constitute the amount of information about a student. The study aim is to help teachers, parents, and education policymakers obtain an awareness of how the technology can bring benefits to achieve a more complete supported learning environment and improved learning experience for the children having learning disabilities (Ahmed et al., 2025).

Adaptive AI Learning Systems for Students with Learning Disabilities

The adaptive AI learning systems are proving to be a useful resource in the current teaching among the learning-disabled students. In most of the classrooms, students with learning problems tend to feel isolated in the classroom because they cannot learn as fast as the other students in their surroundings. This puts them off their research and makes them either depressed or nervous of attending school. The intelligent AI would support this issue by customizing the lessons based on the aptitude of individual students. The system simplifies that topic when it realizes that it is challenging to a student. The system makes the student work on more challenging tasks in case the student is good at something that will keep him interested. This will also make students learn at whichever pace and mode they want. The learning atmosphere becomes individual and familiar. All sorts of pressure and stress are removed from students by these systems, and they like their lessons. Silently, students gain confidence in studies and start trusting themselves. This leaves them not left out in the classroom and very much involved. This explains why most of the schools have turned to using the systems because of the fact that they yield desirable results and make a student a better person. In the case where the lessons developed accommodate everyone, then the learning environment would be virtually balanced (Smith et al., 2024).

The advantage that would be of most help regarding the Adaptive AI Learning System is that they will help overcome the fear held by most students having learning disabilities. Learners in traditional classrooms tend to become anxious because, in most cases, they find it hard to keep up with the lesson. They feel shy of asking questions in the presence of other students, and on other occasions, they are quiet even when they are not aware. The effects of this on their learning and confidence are dreadful. Adaptive AI-associated technologies create a safe and anonymous environment in which children who attend school receive education at their own rhythm without fear of any of the other individuals. They as well can redo the lessons or exercises as many times as they like under the system. This will enable them to understand delicate issues in an embarrassing and coerced way. The self-confidence is built with time. The students will perform better in school as soon as they feel equally capable of learning. They are active as far as the studies and are positively minded about going to school. This kind of attitude modification is of great importance among the learning-challenged students. The combination of the fear being gone results in the increase of their curiosity regarding learning as the logical next step, and they approach the activities in the classroom with a more confident mindset (Faiz et al., 2024).

The advantages of Adaptive AI Learning Systems use are many among the teachers. These systems are supposed to check how every student is doing and also show whether the student is doing well or when the student needs help. The system produces detailed reports about the learning developments of every student, and the same can be easily accessed by teachers. It enables the teachers to conveniently organize other lessons or special events that the students may require. This type of giving personal attention to the students will certainly make sure that each and every one of them will receive the support. The teaching staff, too, saves much time that is claimed by the AI system. This does not mean that they have to count each of the numbers and read through every response on the sheet of paper and mark out each of the tests because the AI is capable of handling such trivial tasks. The teachers can utilize this time saved to improve themselves and be of greater help to the students. This enhances order, additional, and cozy instruction in the classrooms for the students who have a barrier in learning. Moreover, having an idea of who is lagging behind and who is doing fine is as well a relief to the educators. The systems establish a balance in the classroom spaces as they help the students and teachers work together better (Kamaghe et al.,2021).

The other interesting thing with the Adaptive AI Learning Systems is they are also exciting and fun lessons. In the normal classes, majorities of students with learning disabilities are unable to cope with lectures and reading classes. They experience difficulties with understanding difficult words and problems like books. Yet, lesson guidance joined with adaptive AI systems, engaging homework like games, colored images, videos, and jokes accompanied with quiz questions are used to make a lesson clear and easier. This causes the students to become interested and pay attention during the lessons. They enjoy learning since they have the assumption that it is playing, not studying. It is with such playful educational activities that students do not get bored early enough and would wish to study more. It also helps to improve their reading, writing skills, math, and problem-solving. The system continues to reward students whenever they complete a lesson or solve an assignment with points, stars, or badges. These little rewards cause students to be happy and aid them in sticking to the job. It develops a healthy learning atmosphere for the students and makes them feel good about doing their work. This is important because they remain more in line with studying and perform better at school due to motivation (Ahmad, N.R. et al., 2025).

Positive Impact of AI Systems on Student Motivation and Engagement

Learning-disabled students are usually nervous and less inspired in normal classrooms. They become shy when they are not able to match other students in reading, writing, or math. Most of such students lose attention because they believe they will not perform well. This leads to the loss of interest in learning by

them. The adaptive AI learning systems are useful to such students in that they simplify learning and render it friendly. These systems provide individual sessions to a student depending on his/her level. In case of a subject that is too difficult, the system simplifies it. When the student is performing well, it provides it with tougher tasks to enable it to work better. This renders learning easy for students with disabilities. They need not fear other students or the teacher dragging ahead. Adaptive AI also provides feedback on a real-time basis to students. It instantly informs them whether they are wrong or right. By making the students aware of their performance, it would give the studentsthe feeling that they have performed well. The other factor that makes adaptive AI learning systems good at motivation is that they make learning fun (Habib et al., 2021)

Small rewards also find their use in creating immediate incentives in the adaptive AI systems to engage students. When a student completes a lesson or gets an answer right, these systems award points, stars, badges, or prizes. When students work hard, they receive such minor incentives, which makes them feel excited. It helps them take pride in what they are doing and gives them an incentive to study more. Students become happy and motivated when they are rewarded. These incentives urge them to explore new things and participate in other lessons. Students are ready to do even a difficult task as they want to have more stars or points. This develops a positive learning pattern. It keeps the learners busy in the lesson and prevents them from quitting on him/her. These are basic rewards that contribute a lot to gaining confidence. The students begin to feel that they are able to perform well as long as they continue to work. This also promotes friendly competition among students whereby they attempt to gain more rewards in an entertaining manner (Barua et al., 2022). The other good impact of the adaptive AI systems is that they enhance participation in the classrooms. Students with learning disabilities tend to remain silent in normal classes. They fear to ask questions since they believe other people will laugh at them.

It has also been reported that teachers also feel some heightened activity and self-confidence by the side of those students who employ the lessons on the basis of AI. Such systems breed a stress-free yet cordial environment that enables the students to talk, share, and acquire knowledge as a group. When they succeed in their Adaptive AI lessons, it changes their attitude to learning, it makes their classroom feel happier to them, and it helps them develop their social skills (Yousef et al., 2022). To begin with, few of the students with learning disabilities are afraid of making mistakes. However, they are less worried in situations where the system straightens them up in an amicable way and lets them get improved. They also believe that they can do it when they provide the correct answer or when, in case they are rewarded. They stop being afraid of making mistakes and start to enjoy the challenges. This performance is increased by this new attitude (which is positive). They are exceptional in reading, writing, and also problem-solving. It leaves students more interested in knowing novel problems and lessons. They take time to like the learning, and this is very much wanted among the disabled students. Thus, their trust, desire, and abilities are improving each day. These students become proud of what they managed to do and start setting their goals, which they would like to fulfill. It shows that AAI Learning Systems do not only teach the youngsters the subject matter of the school curriculum but also reinforce in them that as a student and even as a person, they are competent and powerful (Khan et al., 2023).

Research objectives

1. To examine the effect of Adaptive AI Learning Systems on the academic performance of students with learning disabilities.
2. To explore how Adaptive AI Learning Systems, improve motivation and classroom engagement among students with learning disabilities.
3. To investigate how personalized learning experiences provided by Adaptive AI systems support the skill development of students with learning disabilities.

Problem Statement

Learning disabilities normally expose the students to severe difficulties in the normal classrooms due to the incompetence of the normal mode of teaching to their learning abilities. They are unable to cope with the high rate of instructions, lack the ability to grasp complicated instructions and they also feel undermined when they are not able to actively respond as their peers during lessons. This would impact on their motivation, confidence and performance in academic aspects. In a large classroom setting, teachers also find it hard to attend to each student individually. This leads to poor performances caused by learning disabilities among most students and they end up becoming less interested in education. Over the past few years, Adaptive AI Learning Systems were proposed as a potential remedy to this problem. They enable personalized way of learning because they are flexible, interactive, and can offer an individualized learning environment with regard to the learning style, level and pace of the lesson within the ability of individual students. Nevertheless, in most learning environments, there have been no detailed areas of how these systems affect learning-disabled students. It is apparent that research is required to monitor the impact of the Adaptive AI tools on student motivation, involvement, skill acquisition, and performance.

Significance of the Study

The reason why this study is significant is the fact that the researchers will concentrate on the group of students that may easily be disadvantaged in ordinary classrooms and lack proper support in order to succeed. Children with learning disabilities also have difficulty reading, writing, solving problems, and other academic activities and this has a negative impact since it translates to low student confidence and engagement in learning. Since the time is limited and the classes are big, teachers cannot pay individual attention to each student. This solution is new and smarter: Adaptive AI Learning System can solve all these issues, now attending to individual needs of students respecting their abilities, learning pace, and interests and delivering lessons accordingly. This research will assist the educator, parents, school administrators, as well as policy-makers to develop an awareness on how these AI systems may enhance the performance, provide motivation, and grow the level of participation in the classrooms of students with learning disabilities. It will also demonstrate how adaptive AI will turn learning into an interesting task that is not that stressful and makes the students more confident and independent, as well as motivated.

LITERATURE REVIEW

A majority of the researchers have been interested in the manner in which the learning experiences of the students with learning disabilities are going to be improved, as these learners are found to have trouble in the normal classroom environment. He or she normally feels that they have been left behind because they cannot study the same material as other students in their classes. This has an effect on their self-esteem and morale in school. Several articles of research have discussed several teaching methods that can be applied to help such students, though the majority of the traditional methods do not consider individualized learning needs. Technology found a place in the educational sector, and sooner than later it became a relief to the teachers and to the students. The new methods, like software programs for learning, learning applications, and Internet sources, have allowed giving individual support to those students who have special education needs. Among such tools, adaptive AI learning systems took their rightful place as well, since they are able to identify the capability and progress of a student to adjust the learning activities to the needs of a student. The systems offer multidynamic and customized lessons that are likely to reduce pressure in the classrooms for the students with learning disabilities (Smith et al., 2022).

The recent research has indicated that adaptive AI learning systems do not only engage in adjusting lessons but are also supportive in aiding the students to acquire essential educational and living skills. Earlier it was only a matter of ameliorating academic results by taking extra courses and tutorials, but the adaptive AI systems offer a new solution that makes learning personal and friendly. They can know where a student has weaknesses in either reading, writing, or solving and will proceed to tutor him/her at the level at which he/she feels comfortable. This has helped to make the students interested and keen at

what they are doing. Some researchers believe that a student will be able to learn more provided that he or she likes lessons and is not so scared to make errors. The AI training tools allow students to learn at their speed, and this makes them comfortable and feel confident of their mastery. This makes them more active in classrooms and enables them to be prepared to acquire new subjects (Wang et al., 2024).

The other important area that the researchers have dared to explore is the use of the interactive activities in adaptive AI systems. The majority of the earlier studies were referred to as showing how learning-disabled students were becoming bored and out of touch with the monotonous lectures. Some typical forms of teaching, such as reading through the textbook and one-way teaching, could not keep them on track. Adaptive AI systems address this problem by using games and colorful videos, interactive quizzes, and feedback as they make lessons exciting and understandable. Studies have also found out that when the students are given activities that they like, they become more interested in the lessons, hence increasing the time spent learning. The more the students participate in learning, the better they will get to become. Such positive correlation of engagement and the advanced performance of students in their skills has been vividly proved in the new studies and presents the evidence of high significance of adaptive AI applications to support students with special needs in the learning process (Rahman et al., 2020).

This has been followed by other researchers pointing towards the relevance of reward and encouragement to ensure student motivation. Small achievements are rarely rewarded with personal rewards in the traditional classroom, and this has an impact on the confidence of students with learning disabilities. This gap is addressed with the help of adaptive AI systems that reward a student, e.g., with a star, point, badge, or positive message as soon as he or she has completed a task successfully. A number of recent studies established that students are very proud of these small rewards, and it causes them to be keen to practice new lessons. Such a reward system does not only boost their motivation but also their classroom participation. Researchers observe that students learn to ask more questions and work in groups; they also learn how to solve problems without additional help. One of the main reasons why these AI systems began to appear in the classrooms in many schools and special education programs is this growth in motivation and participation (Hopcan et al., 2023).

The recent literature sources have uncovered that the Adaptive AI Learning Systems condition students to be independent as well as learners. In the old days learning-disabled students were so dependent on teachers or even on their fellow students in a bid to guide them in various activities (AV et al., 2021).Smart AI systems do teach people to learn autonomously, starting slowly with the training of students to work without a detailed explanation and finally skipping additional instructive materials altogether. Other studies have discovered that in the long term, the students are capable of learning how to work out their learning schedule, and they select the subjects they like to study as well as decide how much time they want to take to do a certain activity. The independence also enables them to be good at decision-making, time management, and learning new things. The researchers agree that making students self-reliant learners can be classified as one of the most useful tasks in special education, and in this respect, adaptive AI tools are showing themselves to be quite substantial in serving this purpose. Numerous schools and well-educated individuals operating within this educational sector are recommending this type of system as far as providing fair, captivating, and productive learning opportunities to impaired students in the learning process.

Role of Adaptive AI in Personalized Learning for Special Needs Students

Through Adaptive AI Learning Systems, the students with learning disabilities have been assisted to learn in the way that best suits them. As it has been unveiled by several studies, the normal classes prove to be problematic to the students with disabilities because the lessons are all identical. This is a problem for the students, who are in need of special needs or other modes of learning. This is defeated by the adaptive AI whose system adjusts the lessons according to the achievement of individual students. These computers

check how the student answers the questions and then adjust the complexity and the way the lesson should be presented. This will make the students comfortable and glad to learn. Individual lessons, some of them have noticed, increase confidence and interest in the classroom among special needs students (Gerber et al., 2024). Research has in the recent past found out that students learn better when their lessons are arranged in line with their learning and interests. Some students feel good with videos being watched, some feel better when the material is read, and some feel better when some game is played.

The second advantage of personalized learning with the help of adaptive AI is that it enables students to progress at their pace. The past studies have elucidated the fact that the students in normal classrooms tend to be in a situation where they feel left behind due to the rapid advancement of the teacher to the next topic. This frustrates and puts pressure on students with learning problems. Adaptive AI systems are useful because they allow learners to retake lessons as many times as they require. The system does not hurry them up. In several studies, it has been pointed out that students do better in a situation where they are not under pressure and able to learn at a slow and gradual pace. Such a slow rate enhances their knowledge about the subject and encourages them to attempt to do something new (Harwell et al.,2008). Recent studies have alsobeen done on how adaptive AI systems can be applied in enhancing learning outcomes through additional practice activities. Most of the students with disabilities may take a long time before learning to read, write, or do math. Adaptive AI provides more exercises and questions every lesson. In case a student is not getting it right, the system gives him or her hints or other simpler activities to continually develop his or her skills. Research has indicated that this type of sustained and frequent practice assists students to develop gradually and at the same time without any pressure. According to researchers, students feel safe because of this personal support, which motivates them to work more and believe in their powers (Yousef et al., 2022).

Various researchers addressed the essence of real-time feedback within personalized learning systems. When in normal classes, the students are usually forced to wait until the teacher comes along and checks his work and makes corrections. Students are left confused by this waiting time concerning their mistakes. It also retards their learning pace. The feasible solution to this issue is adaptive AI systems that can provide timely feedback on each task. In case something goes wrong, the system enables the student to correct their mistake and indicates what he/she did wrong at great speed. It also presents some hint or simple explanation on how the mistake can be fixed. This prompt assistance helps students to understand their mistakes without loss of face. Studies have revealed that students remain motivated when they get immediate feedback. It helps them become more comfortable undertaking new things. Most of the researchers presently believe that the strongest capabilities of adaptive AI systems are real-time feedback. It makes the students busy and attentive throughout lessons. They also do not spend their time waiting till the teacher responds. This increases their performance in the classrooms and speed of learning as time goes by. It also assists them to have improved study skills and superior self-learning abilities (Batool et al., 2024).

Adaptive AI and Development of Independent Learning Skills

Students with learning disabilities tend to be dependent on teachers or other students to perform lesson and activities. This does not allow them to become independent learners. Many researchers have indicated that, independent learning is a major teaching aids that students with disability should learn. DC Adaptive AI Learning Systems has the potential to assist in developing this skill since, under the simple instruction, and step-by-step help, it is possible to guide the student through the course. These systems unlike the traditional learning systems make the students choose the areas of studies they like best as well as the time they wish to share on any of the venture. It has been noted by other works that this freedom increases the confidence and the capacity of the students to take decisions. It was recently found that the learning process becomes self-owned when the students are able to control the learning process (Demartini et al.,

2024). Adaptive Artificial intelligence systems help students follow their progress and make personal objectives. This program shows them what they did and what topics they should train. This is so that the students exercise on their weaknesses.

This type of self-observation has been discovered to enhance self-learning among students affected by learning disability. It trains students on planning their study time, undertaking challenging chores without any fear. Most of the students with disabilities more often than not lose hope when they are in a tough spot. This is one of the major factors as to why they develop slowly in normal classrooms. Adaptive AI Learning Systems also help such students make more attempts without being embarrassed. Their progress can be monitored by the system and they are led through lessons. In the case that the student is at loss, the AI offers tips and other advice that the student can use to get better. The second outstanding advantage of the Adaptive AI systems is that they decrease the fear of failure. When other people are around them, errors made by students in the traditional classrooms embarrass them and make them feel shy. The fear prevents them to ask and attempt new tasks. A number of researches have also verified that this will decrease anxiety of learning and classroom stress. Conducting practice in the solitude also feels safe to the students and they can improve their confidence in the long run. They are aware of the fact that they can still give it another shot in case of failure. This develops the confidence to explore and be independent learners without being concerned with the judgment (Jiménez et al., 2023).

The researchers have also stated the necessity of regular practice as the reason that led to the development of the independent practice. They also have more alternatives in the form of exercises, quizzes and games that adaptive AI systems are offered to the student to improve his/her skill. That practice may be repeated several times. Rather, when student does his tasks and ends up with little rewards the student feels proud. According to several researches, it can be said that when students receive little rewards and feedback regularly, they are more productive and motivated. He or she also starts to believe in his/her powers. This is a continuous process that is supported immediately, and therefore students become an independent learner without the help of other people (A Jarbi et al., 2024). Finally, other scholars indicate that Adaptive AI schemes prepare students ready to learn new information and exist in the future. This autonomy in learning is not only correct in school but also development. Once the learning disabled gain confidence to study without the help of others, they also handle better in their studies in the higher classes too. The creative artificial intelligence learns strong habits of personal learning, time management and problem solving. Such students have been proved to be more positive and stand on their own academically as well as socially.

Research Hypotheses

1. There is a significant positive correlation between Adaptive AI Learning System use and academic performance among students with learning disabilities.
2. There is a significant effect of Adaptive AI Learning Systems on student motivation and engagement levels among students with learning disabilities.
3. There is a significant predictive relationship between Adaptive AI Learning System use and the development of independent learning skills in students with learning disabilities**.**

METHODOLOGY

Research Design

In this study, quantitative and experimental kinds of research designs will be used to compile and analyze the research findings. The intent of this design is to determine the presence of effect on students with learning disabilities in regards to the Adaptive AI Learning Systems. It will also help in establishing whether the students will learn more after they apply systems based on AI in their teaching. The research will focus on four areas. The latter include academic, motivation of the learners, classroom participation

and self-learning skills. This research will have two groups of learning. Adaptive AI Learning Systems is to be implemented in the classroom lessons of one of the societies. The latter group of students will be called the experimental one. The second group is going to acquire more following the classical methods of teaching previously offered in a classroom lacking AI tools. This group shall be referred to as the control group. The same subjects will be administered to the two groups in a stipulated time interval. At the conclusion of the research, the performance of two groups will be compared with the result achieved. Such a comparison will show whether AI-driven learning systems improve the performance of students in leaning problems. The two groups will be cautious as the study measures academic outputs, the motivation of the students, and the learning of the skills.

Population

The sample in this study will be school aged children between 10 and 16 years. These students will be chosen in schools where the inclusive classroom teaching as well as special education is availed. Selecting students will be limited to only the ones who are officially diagnosed to have learning disabilities. These can be issues such as dyslexia, which hinders one in reading and dysgraphia which interferes with their writing ability. It can also involve mild mental challenges that makes a child slower in learning. The students are going to be drawn out of schools, which have already implemented the Adaptive AI Learning Systems or want to do it or have already planned to launch the Adaptive AI Learning Systems. This study will be approached to both government and private schools. School principals and parents would be allowed to make a permission to incorporate any student in the study.

Sample Size

The research study will target 180 students to be involved in the research. Regarding all these students, they will be divided into two equal groups. One will be called an experimental group and the other one called a control group as well. Each group is going to consist of 90 students. The students of the experimental group are going to use Adaptive AI Learning Systems in the lessons. The AI system will tailor their lessons based on their personal capabilities and pace in learning. The other group will be the control group that will be studying the normal methods of teaching in the classroom. The amount of time that the identical topics and subjects will be covered by both groups would be equivalent. This will help the researchers to make a sufficient comparisons of the learning outcomes of the two groups at the end of the study. The 180 students as sample size has been chosen intelligently in a manner that this research study is reliable.

Sampling Technique

The individuals will be selected based on the purposive sampling strategy. The method will be the best to use in this study because it will accommodate a specific population of students. The schools are supposed to document such students in learning disabilities. The records will show that the students will have reading, writing or learning problems. The students will be selected in special schools as well as the mainstream schools. It will make the findings of the study more effective and realistic. They will make sure that the students of different grades, background and representatives of both sexes are taken into account. The list of the schools will be drawn after contacting them. Informed of the research study will also be done to the parents of the respective students who will be selected. The schools will also be asked to give written consent along with their parents. None of the members will be forced to engage in the research. The sampling will be done on the final numbers who will include only students whose schools and parents are acceptable.

Ethical Considerations

All the major ethical guidelines were followed in this study IN order to ensure that rights, privacy as well as safety of the students who were used in the study was taken into consideration. The authors of the study made sure that all the subjects were provided with informed consent and that statistics was kept secret with the best of care. Furthermore, the study was reviewed and approved by an institutional review board to uphold ethical standards throughout the research process. School enrollment into which the research would be conducted would enroll with the official permission before it can give an entry into the research. The purpose and procedure of the study will also be explained to the parents and the guardians of the students. Having given them their written consent, they will be part of the research. None of the students will be forced to join the research. Students who are going to be selected are those that will be selected by their parents, who agree with them to offer them to their schools. All this will remain so secret on the basis of student names, test results, and academic past. Such data will only be used in research and not disclosed by any of the members of the study team. Any report or publication will not mention the names of the students. During the study, the students will be handled and treated with lots of care and respect. They would be free to withdraw anytime at their wish in the case they get uneasy.

DATA ANALYSIS

The current experiment helped to determine the effect of Adaptive AI Learning System among students with learning disabilities with the use of various statistical tests. After the data input of 180 students data, the data were placed in SPSS software. To prove the first hypothesis, correlation analysis was run in order to determine the correlation between academic performance of students and use of AI systems. The results revealed that the correlation of these two variables was positive and strong. As to the second hypothesis, I applied an independent samples t-test to explore the difference between the motivation and engagement levels in the group of students using AI systems and studying with the help of conventional techniques. The findings noted that motivation and involvement in AI group was higher. Taking an attempt to prove the third hypothesis, the regression analysis was carried to find out whether the application of the AI systems might be related to the learning ability of the students to create the independent learning results. According to the regression analyses, the AI system use significantly predicted a high independent learning skill in the positive direction. It was during these tests that the fact that Adaptive AI Learning Systems have the potential to improve academic achievement, motivation, and independence through the help that it provides students to learn entirely by themselves was proved. The results were deemed to be statistically significant and the analysis of all the analyses was at 0.05 level of significance.

Table 1: Demographic Characteristics of Respondents (N = 180)

Variable	*Category*	*Frequency (n)*	*Percentage (%)*
Gender	Male	96	53.3
	Female	84	46.7
Age Group (Years)	10–12	68	37.8
	13–14	60	33.3
	15–16	52	28.9
Type of Learning Disability	Dyslexia	72	40.0
	Dysgraphia	54	30.0
	Mild Cognitive Difficulties	54	30.0
School Type	Special Education School	110	61.1
	Inclusive Mainstream School	70	38.9

In this research, there were 180 students with learning disabilities in the demographic data. They consist of 53.3 percent men and 46.7 percent women, which is quite a balanced gender representation. Regarding age, the majority (37.8%) of the students were aged between 10 and 12 years, 33.3% between 13 and 14, and 28.9% between 15 and 16. Upon considering the type of learning disability, 40 percent of the students have dyslexia, 30 percent of students reported dysgraphia, and 30 percent of students reported a mild cognitive difficulty. Most of the students (61.1%) were attending special education schools, and the other 38.9 percent attended inclusive mainstream schools. These demographic findings indicate that there is good representation in the form of both age and gender, the type of school, and the type of learning difficulty, and as such, this would make the findings of the study quite just and actually able to be relied on by different groups of students.

Figure 1:

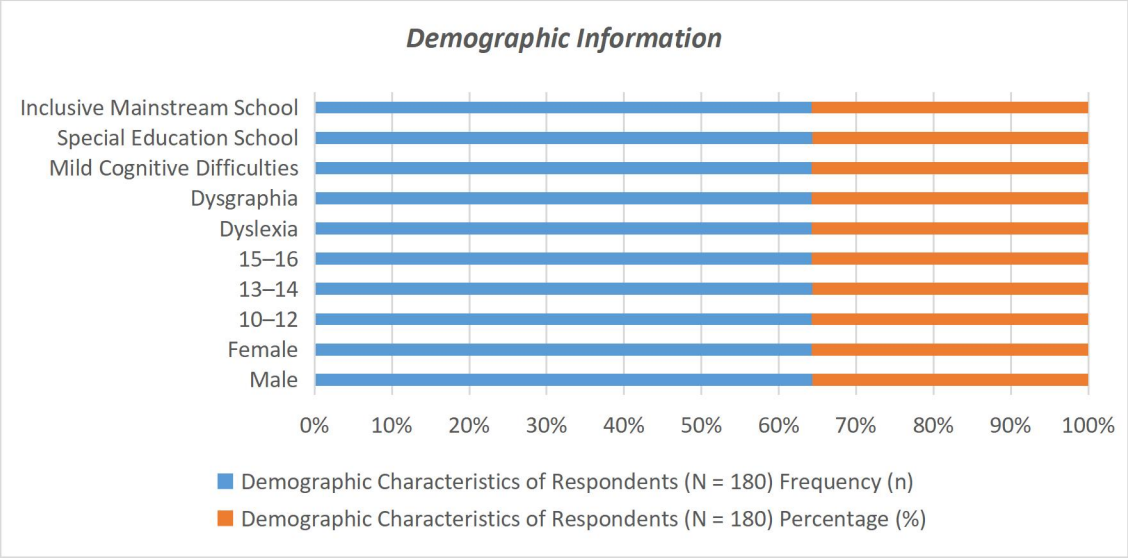
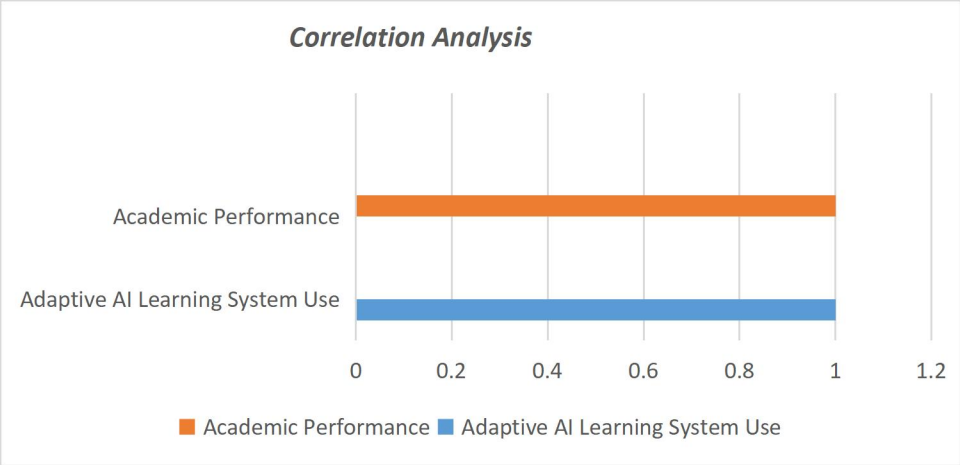


Table 2: Correlation Analysis

Variables	*Adaptive AI Learning System Use*	*Academic Performance*

Variables	*Adaptive AI Learning System Use*	*Academic Performance*
Adaptive AI Learning System Use	1.000	0.642**
Academic Performance	0.642**	1.000

Figure 2:



The Pearson correlation analysis shows a positive and significant relationship between the use of adaptive AI learning systems and academic performance among students with learning disabilities. The correlation value is 0.642, which indicates a moderate positive correlation between the two variables. This means that when students use adaptive AI learning systems more in their studies, their academic performance also improves. The relationship is statistically significant at the 0.01 level, as shown by the double asterisks (**). This result confirms that adaptive AI learning systems play an important role in supporting better academic outcomes for students with learning difficulties. It suggests that increasing the use of AI-based tools in classrooms can help students perform better in their lessons and tests.

Table 3: T-Test Table

Group	*N*	*Mean*	*Std. Deviation*	*t*	*df*	*Sig. (2-tailed)*
Experimental Group (AI)	90	78.45	6.23	7.612	178	0.000**
Control Group (Traditional)	90	69.32	5.87			

Independent Samples t-test indicates that there is a significant difference between the level of motivation and engagement of students when Adaptive AI Learning Systems were used to teach students and the conventional way of teaching students. The average score of the experimental group (M = 78.45) was higher than that of the control group (M = 69.32) with the participants using the AI systems. T has a value of 7.612 and d.f. = 178, and the significance level, p = 0.000 <0.05. This implies that this difference between the two groups is considered to be statistically significant. The findings prove that students with learning difficulties are more interested and enthusiastic when they study with Adaptive AI Learning Systems than taking classroom lessons.

Figure 3:

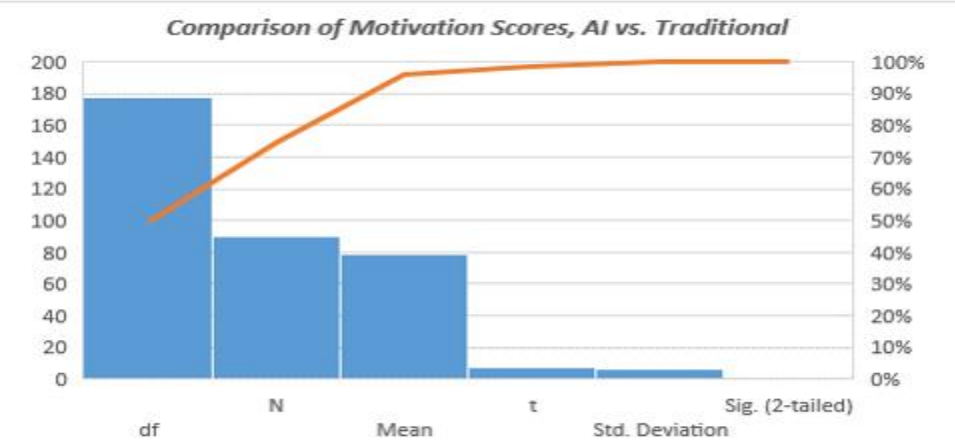
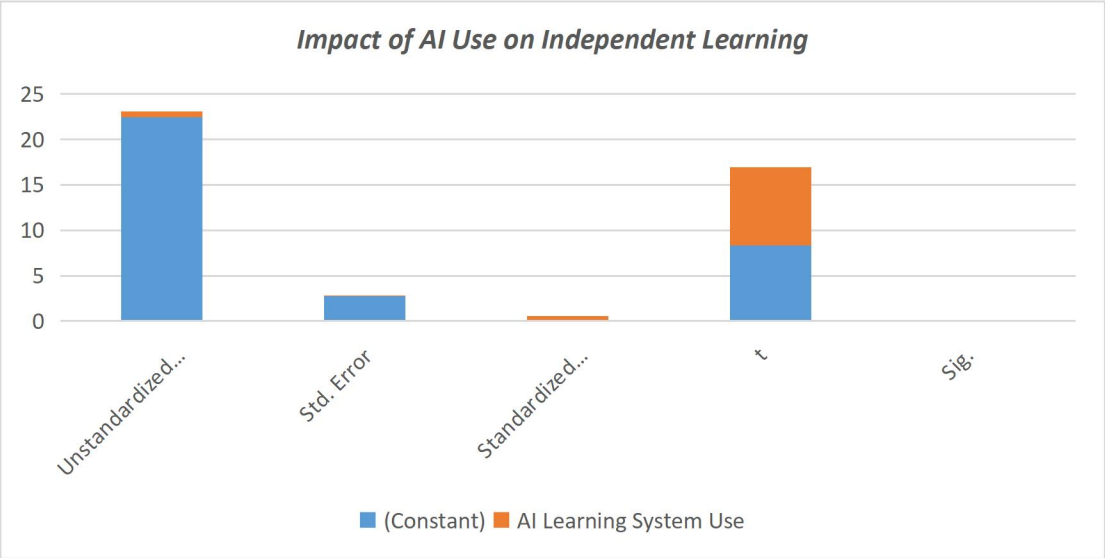


Table 4: Regression Coefficients

Model	***Unstandardized Coefficients B***	***Std. Error***	***Standardized Coefficients Beta***	***t***	***Sig.***
(Constant)	22.480	2.710	—	8.296	0.000**
AI Learning System Use	0.615	0.071	0.582	8.663	0.000**

The regression confidence indicates that there is a significant predictive relationship between the use of the Adaptive AI Learning Systems and the emergence of an independent learning skill among the learning students with learning disabilities. The unstandardized coefficient value (B = 0.615) indicates that with a single-unit rise in AI system use, the level of independent learning skills rises by 0.615 points. This shows that the strength of the relationship is positive but moderate, as the beta value is 0.582. Its p-value is 0.000, and this is under 0.05, indicating that the outcome is significant. $R^2 = 0.339$, i.e., 33.9 percent of the difference in independent learning skills of students can be attributed to the application of Adaptive AI Learning Systems. The value of insignificance (0.000) also indicates that the model fits well, as evidenced by the F-value of 75.04. These results prove H3 and the notion that adaptive AI tools can make students more independent learners.

Figure 4:



DISCUSSION

The results of this research proved how the academic achievements of students with learning disabilities were positively affected when they were taught by using adaptive AI learning systems. The correlation analysis indicated that the use of the AI system had a moderate positive association with the academic scores. It indicates that the academic performance of students with learning disabilities increased when they were compared to the tools based on AI. These results confirm the work of (Isaeva et al. 2025), who also revealed positive results regarding adaptive technologies enhancing the learning process and assisting the student population to learn more effectively, particularly those behind in their academic progress. The correlation between AI systems and deeper understanding of the subject and test performance is also confirmed as the right direction of personalized lessons is noticed.The independent samples t-test outcomes showed that the motivational level and engagement displayed by students using the Adaptive AI Learning Systems-based education were higher as opposed to the traditional teaching method. The members of the experimental group were more interested, motivated, and proactive during their lessons. The findings are comparable with the findings of (Chopra et al. 2025), who stated that interactive lessons powered by AI raised the interest and study participation of students in the classroom. We have fun activities, games, and videos that assist the AI systems to make students more than happy to learn. This motivational boost is highly crucial to the student attending school with learning disabilities since it will make him or her focus and love his or her learning process. Besides, the regression analysis results indicated that there was a significant predictive prospect between the implementation of adaptive AI learning systems and the attainment of autonomous learning skills by the students. The beta value showed that the more students used the AI system consistently, the more they turned into independent learners with time. This translates to the fact that the students had the freedom to learn at their own pace; they could repeat tasks and correct errors without necessarily having to wait until a teacher assisted.

The results are congruent with those of (Hughes et al. 2006), who concluded that adaptive learning systems decrease the level of anxiety in learning and self-directed learning. The findings of the study raise the significance of AI tools in developing trust in the students and providing them with the boldness to learn on their own. This demographic study was also helpful in that it presented information concerning the nature of the respondents. The findings indicated that the majority of the students attended special education schools and a little more male student than female. The majority of the students were between 10 and 12 years of age, whereas the greatest proportion of learning disabilities were connected to dyslexia.

The given distribution of the population confirms that cases of learning disabilities are frequent in younger students and proves that specific and early interventions are needed. It also proves that the systems of learning on the basis of AI or machine learning can be effectively used within different age groups, sexes, and types of schools. The findings also prove the need for real-time feedback to better the learning habits. The AI systems provided feedback to students in real time, therefore making them correct their errors quickly and learn more. education.

CONCLUSION

The Adaptive AI Learning Systems on students with learning disabilities were studied in this paper. The results showed that such systems are advantageous in a number of learning systems. The learners that had been involved in the AI systems performed better in their studies as compared to the students who had been taught under the traditional teaching approach. An individualized learning that led to lessons tailored with a particular student in mind and his/her improvement was also the result of the practice of AI tools. This helped in ensuring that the students are less stressful and relaxed in their studies. The study also revealed that interaction through AI activities such as games and quizzes motivated the students and kept them engaged as they learnt. These interesting activities assisted students to get interested in their lessons and enjoy them. The second key finding entailed that due to the assistance of Adaptive AI systems the students were getting independent in their study. Learners would be able to study, redo and correct without experiencing fear of doing so. The aspect of real time feedback among these systems gave the students the fast guidance and they were more assuring. To sum it all up, the study led to a confirmation that Adaptive AI Learning Systems proves to be very handy to learning impaired students.

RECOMMENDATIONS

1. The special education and inclusive classrooms must be encouraged with the application of Adaptive AI Learning Systems by the schools to cater to the learning disabled students.
2. The teachers are the ones who should be trained well on the use of Adaptive AI tools in their everyday lessons.
3. To keep the students motivated, schools are encouraged to select AI systems that instantaneously provide feedback and enjoyable, interactive learning processes.
4. AI tools should be used to develop special lessons according to the particular student who determines the level of learning, learning speed, and preferences.
5. The need to popularize AI learning systems among parents should be ensured and parents should be advised to utilize such tools at home.
6. Schools must make sure that the information on students gathered using AI systems is never exposed to anybody.
7. 7 The long-term impacts of Adaptive AI Learning Systems on the students with varying forms of learning disabilities ought to be studied further in more research studies.
8. Education policy makers ought to support and invest in AI based learning systems to enhance the quality of teaching among the students with special learning needs.

FUTURE IMPLICATIONS

The Adaptive AI Learning Systems have a possibility to bring radical changes in the learning process of students with learning disabilities in the future in the learning environment of schools. These systems may complicate and speed up as well as make the studies in the normal classrooms entertaining. Due to the

technological development, the AI tools shall be even smarter and more helpful to meet the individual requirements of learning of each student. The systems can also be used in schools to offer the students more assistance in some subjects like reading, writing and maths. It can also ensure that students become confident, self-dependent and motivated learners. The introduction of AI-based support instruments in the future is the possibility of increasing more schools, teachers, and parents, which will contribute to the learning experiences of the students with disabilities in the following years. The option of AI serving the students as they also have different forms of disability as well as separately in different learning environments must be addressed in future research. This will help make education inclusive and to the advantage of the students.

REFERENCES

Wang, Shuai, et al. "When adaptive learning is effective learning: comparison of an adaptive learning system to teacher-led instruction." *Interactive Learning Environments* 31.2 (2023): 793-803.

Ali, Majed Mustapha. "Academic Learning Disabilities in Primary School for Children in Egypt and Kuwait, Considering Some Demographic Variables: A Cross-Cultural Comparative Study." *Przestrzeń Społeczna (Social Space)* 23.4 (2023): 331-357.

Ahmad, Naveed Rafaqat, et al. "Investigating Stress, Burnout, and Organizational Factors Contributing to Psychological Well-being at Work." *Review of Education, Administration & Law* 8.1 (2025): 29-40.

Ahmed, Sara Moustafa, Magda Mahmoud Saleh, and Mahetab Eltieb Ahmed. "Artificial intelligence and safe digital learning for children with special needs." *International Journal of Instruction* 18.3 (2025): 197-216.

Smith, Sean J., et al. "A Guide for Special Education Leaders to Utilize Artificial Intelligence: Students' Perspectives for Future Consideration." *Journal of Special Education Leadership* 37.2 (2024): 77-92.

Faiz, Muhammad Asif, and Hina Fazil. "The Benefits of Artificial Intelligence Mobile Applications in Improving Learning for Children with Intellectual Disabilities: A Pilot Study Perspectives from Special Education Teachers." *Al-Mahdi Research Journal (MRJ)* 5.5 (2024): 302-313.

Kamaghe, Juliana. *Enhanced m-learning assistive technology to support visually impaired learners in Tanzania the case of higher learning institution*. Diss. NM-AIST, 2021.

Ahmad, Naveed Rafaqat, et al. "Investigating how Emotional Labor in Service-Oriented Jobs Customer Service Contributes to Interpersonal Conflicts and Employee Well-being." *Review of Applied Management and Social Sciences* 7.4 (2024): 1126-1137.

Habib, Husna, Shaik Abdul Khader Jelani, and Syeda Najla. "Revolutionizing Inclusion: AI in Adaptive Learning for Students with Disabilities." *Multidisciplinary Science Journal* 1.01 (2022): 1-11.

Barua, Prabal Datta, et al. "Artificial intelligence enabled personalised assistive tools to enhance education of children with neurodevelopmental disorders—a review." *International Journal of Environmental Research and Public Health* 19.3 (2022): 1192.

Yousef, Alharbi Hatim. "Primary school teacher's awareness and knowledge of dyslexia in Qassim Region-Saudi Arabia." *Pakistan Journal of Medical & Health Sciences* 16.05 (2022): 844-844.

Khan, Khadija T., Muhammad Arshad, and Afzaal Afzal. "Children with Intellectual Disabilities and Role of Public Sector Institutions: An Exploratory Study from District Lahore, Punjab, Pakistan." *Qlantic Journal of Social Sciences and Humanities* 4.3 (2023): 144-149.

Smith, Jennifer Elaine. "Creative self-efficacy: An essential transition skill for students With learning disabilities." *Intervention in School and Clinic* 57.4 (2022): 256-261.

Wang, Li-Chih, and Kevin Kien-Hoa Chung. "The influences of cognitive abilities on self-regulated learning in online learning environment among Chinese university students with learning disabilities." *The Internet and Higher Education* 62 (2024): 100947.

Rahman, N. Abdul, Ramlah Mailok, and Nor Masharah Husain. "Mobile augmented reality learning application for students with learning disabilities." *International Journal of Academic Research in Business and Social Sciences* 10.2 (2020): 133-141.

Hopcan, Sinan, et al. "Artificial intelligence in special education: A systematic review." *Interactive Learning Environments* 31.10 (2023): 7335-7353.

AV, H. A. (2021). Challenges Faced by Teachers of Learners with Learning Disability. *International Journal of Indian Psychology*, *9*(2).

Gerber, Beverly Levett, Doris M. Guay, and Jane Burnette, eds. *Reaching and teaching students with special needs through art*. Taylor & Francis, 2024.

Harwell, Joan M., and Rebecca Williams Jackson. *The complete learning disabilities handbook: Ready-to-use strategies and activities for teaching students with learning disabilities*. John Wiley & Sons, 2008.

Yousef, Alharbi Hatim. "Primary school teacher's awareness and knowledge of dyslexia in Qassim Region-Saudi Arabia." *Pakistan Journal of Medical & Health Sciences* 16.05 (2022): 844-844.

Batool, Aqsa, and Sarwat Sultan. "Understanding the Challenges in Screening of Students with Specific Learning Disabilities: Insights from Educators, Parents and Psychologists." *Journal of Development and Social Sciences* 5.4 (2024): 469-480.

Demartini, Claudio Giovanni, et al. "Artificial intelligence bringing improvements to adaptive learning in education: A case study." *Sustainability* 16.3 (2024): 1347.

Jiménez-Mijangos, Laura P., et al. "Advances and challenges in the detection of academic stress and anxiety in the classroom: A literature review and recommendations." *Education and Information Technologies* 28.4 (2023): 3637-3666.

A Jarbi, Yousef. *Influence of Assistive Technologies on Visually Impaired Students' Experiences of Social Inclusion in Higher Education in Qatar*. Diss. University of Leicester, 2024.

Isaeva, Rapiia, et al. "Enhancing learning effectiveness through adaptive learning platforms and emerging computer technologies in education." *Jurnal Ilmiah Ilmu Terapan Universitas Jambi* 9.1 (2025): 144-160.

Chopra, Aryan, et al. "Empowering Inclusive Education: Leveraging AI-ML and Innovative Tech Stacks to Support Students with Learning Disabilities in Higher Education." *Applied Assistive Technologies and Informatics for Students with Disabilities*. Singapore: Springer Nature Singapore, 2024. 255-275.

Hughes, Trudie A., and Laura D. Fredrick. "Teaching vocabulary with students with learning disabilities using classwide peer tutoring and constant time delay." *Journal of Behavioral Education* 15 (2006): 1-23.