Enhancing Learning Efficiency: Strategies for High School and College Students

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Abstract. Learning efficiency has always been an important topic in teaching, and there are many factors that affect learninge fficiency. In order to figure out which factors affect learning efficiency more. In this study, 105 high school and college students were surveyed by questionnaire to explore the methods to improve learning efficiency. The results have shown that study method is an important factor in improving study efficiency because the appropriate study method helps to understand the knowledge better. Most people believe that studying in the morning helps to improve learning efficiency. Learning rich in goals and learning motivation can greatly improve learning efficiency, such as focusing attention, arranging time wisely, and designating learning planning. In addition to the questionnaire, the literature method was also used to summarize that: conditions that slow down the pace of learning tend to improve retention later in the day. Four principles for improving memory: actively processing material, practicing retrieval, using distributed practice, and using metamemory.

Keywords: Learning efficiency, learning motivation, aggressiveness

1. Introduction

1.1. Background

Learning efficiency is a very important part of the learning process, about how to improve learning efficiency has always been a more important topic. Some students have not mastered the right learning methods for themselves, leaving them with unsatisfactory academic performance, which has led to a general increase in the stress of learning, which not only fails to improve the efficiency of learning, but also results in a number of negative impacts, such as depression, anxiety, and other frequently occurring symptoms.

1.2. The significance of the study

The high school and college levels are very important stages of learning, but the two stages are characterized by very different learning characteristics; college students are more active in processing information on their own and rely less on interpersonal relationships than similar high school students; college students place more emphasis on creativity and the answers to many questions than on the correct answer to a question, in contrast to high school students who are less abstract; and college students are more analytical than high school students.

By searching the literature, the author found four principles for improving memory: 1) actively processing material, 2) practicing retrieval, 3) using distributed practice, and 4) using metamemory [1]. Our discussion of each principle describes the underlying principle of

the current experimental research and explains how people can use the principle to improve their learning. Our proposed approach is designed to be efficient, that is, a person can learn more in the same amount of learning time than someone who uses a less efficient memorization strategy. A common thread among these four principles is that people learn best when they are actively engaged in their own learning. Most research on long-term memory uses an experimental approach that assigns participants to different conditions, with the condition being the measure of interest. This approach has repeatedly demonstrated that conditions that slow down learning tend to increase retention at later stages. A neglected question is whether the overall group-level finding (i.e., slower learning tends to improve memory) translates to the individual level. We found a discrepancy whereby slow learning tended to coincide with poor memory among people. The positive relationship between the rate of

learning (how fast one learns) and retention (how much one remembers after a delay) among people is known as learning efficiency [2]. More efficient learners can acquire information faster and remember more of it over time. We discuss the potential characteristics of efficient learners and consider future research directions.

These ideas are fragmented and do not form a comprehensive understanding, especially not organized for the learning characteristics of high school and college students, so this paper intends to organize the past methods of improving learning efficiency for the reference of high school and college students in need. The author wants to find out how to improve learning efficiency in order to better help students to release the stress of learning and live a better life. And confirm the research hypothesis is improving learning motivation and learning self-regulation can effectively improve students' learning efficiency.

2. Methodology

2.1. Questionnaire design

In the paper, the questionnaire design included nine multiple-choice questions and one ranking question. This survey aimed to gain insights into students' study habits and efficiency, exploring factors that might influence their academic performance. The data collection method employed was an online survey. Emphasis was placed on ensuring the questionnaire's effectiveness and reliability, involving rigorous testing and revision processes. Furthermore, the chosen methods for analyzing the questionnaire results were crucial in underpinning the research objectives and findings presented in the paper. By meticulously crafting the questionnaire and analyzing its outcomes, the study sought to shed light on students' perceptions of their study efficiency and habits, both in high school and college settings.

2.2. Participants

The questionnaire included 105 male and female students around the age of 18. The educational attainment of all participants was concentrated at the high school and college levels, which each accounted for 50% of the total.

2.3. Data analysis

1.) What is the approximate amount of time you spend studying each day? (The result is shown in Fig.1)

less than 1 hour -25 people chose this option.
1-2 hours -19 people chose this option.
2-3 hours -27 people chose this option.
3-4 hours -9 people chose this option.
more than 4 hours -25 people chose this option.

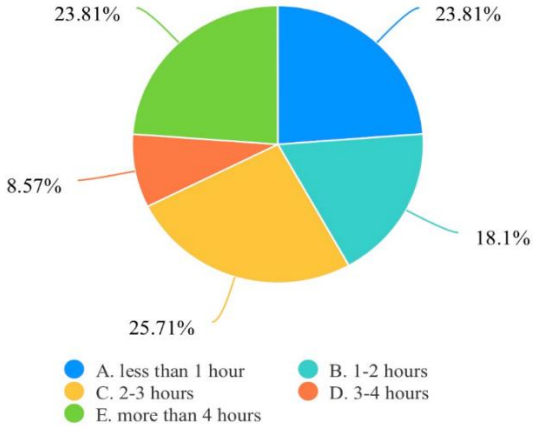

Fig. 1. Study hours per day (Photo/Picture credit: Original)

2.) How do you consider yourself to be in a state of learning? (the result is shown in Fig.2)
in high spirits -15 people chose this option.
a little tired -49 people chose this option.
very tired -12 people chose this option.
inability to concentrate - 29 people chose this option.

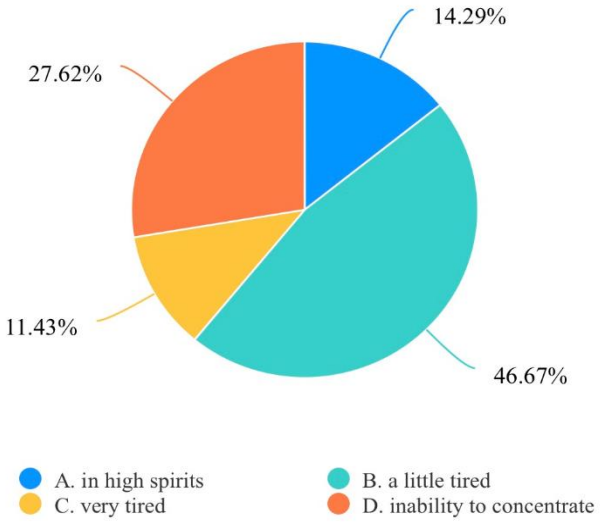

Fig. 2. State of learning (Photo/Picture credit: Original)

3.) What type of study do you usually choose? (the result is shown in Fig.3)
reading -47 people chose this option.
listening -30 people chose this option.
discussion -8 people chose this option.
practice -20 people chose this option.

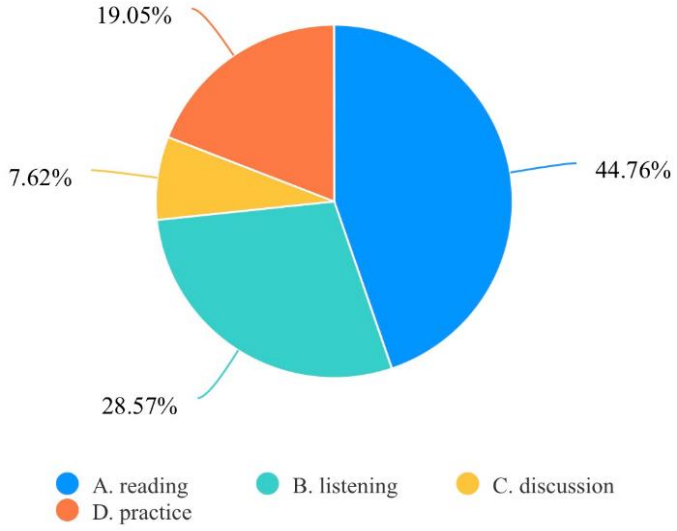

Fig. 3. Type of study (Photo/Picture credit: Original)

4.) What is the biggest difficulty you encounter in your study? (the result is shown in Fig.4)
lack of motivation -64 people chose this option.
can't understand -18 people chose this option.
not enough time -14 people chose this option.
other reasons -9 people chose this option.

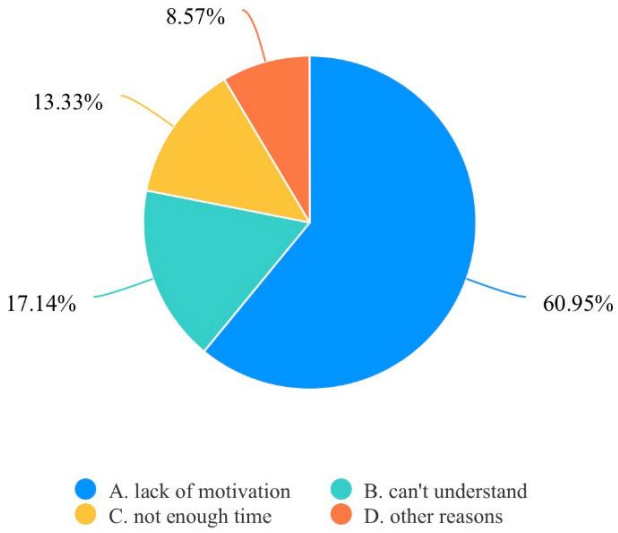

Fig. 4. Biggest difficulty in study (Photo/Picture credit: Original)

5.) What factors do you think affect your learning efficiency? (the result is shown in Fig.5)
noise -35 people chose this option.
tired -60 people chose this option.
accidental interruption -57 people chose this option.
lack interest -64 people chose this option.
lack of goals -43 people chose this option.
other reasons -23 people chose this option.

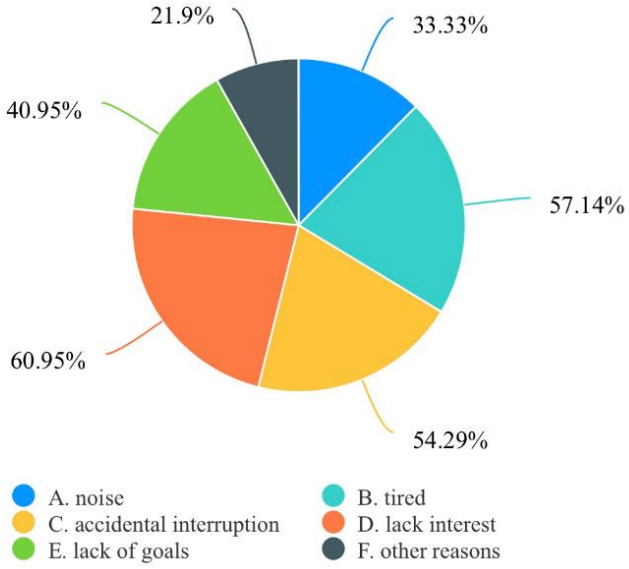

Fig. 5. Factors affect learning efficiency (Photo/Picture credit: Original)

6.) What tools do you usually use to assist your study? (the result is shown in Fig.6)
laptop -68 people chose this option.
mobile phone -69 people chose this option.
notebook -54 people chose this option.
ipad -44 people chose this option.
other tools -24 people chose this option.

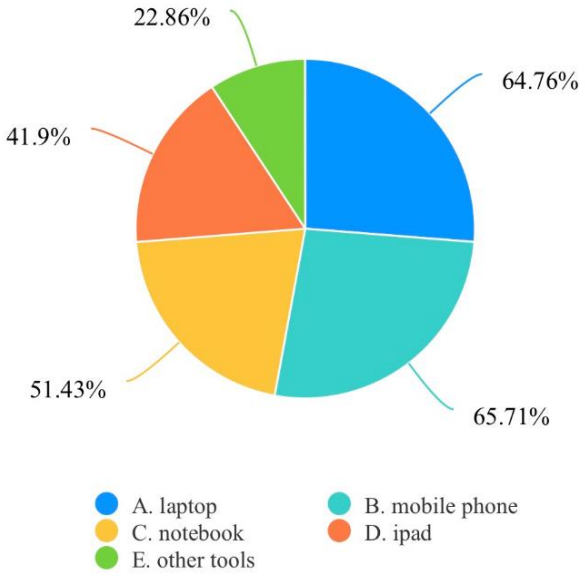

Fig. 6. Study tools (Photo/Picture credit: Original)

7.) What learning methods do you think can improve learning efficiency? (the result is shown in Fig.7)

designated study plan -62 people chose this option.
focus one's attention on -82 people chose this option.
do more practise -53 people chose this option.
rationalization of time -74 people chose this option.
ask your teacher or classmates -53 people chose this option.

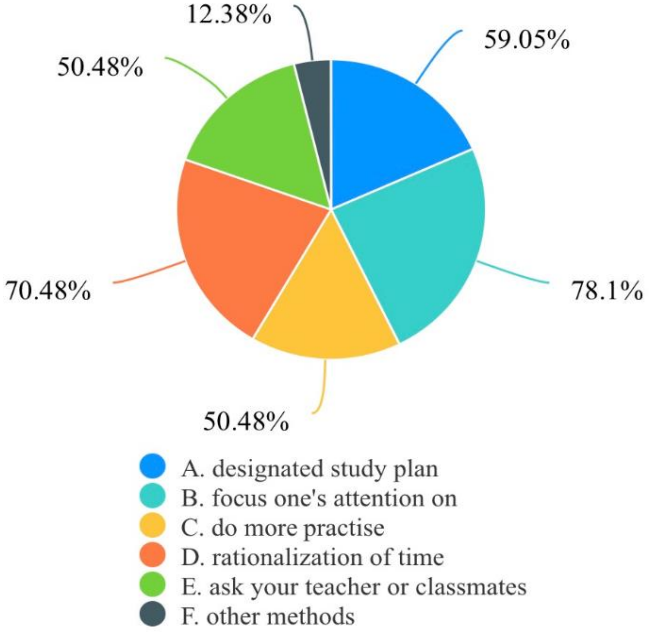

Fig. 7. Learning methods (Photo/Picture credit: Original)

8.) Which time periods do you think are most suitable for study? (the result is shown in Fig.8)

morning -37 people chose this option.
afternoon -14 people chose this option.
evening -23 people chose this option.
late night -31 people chose this option.

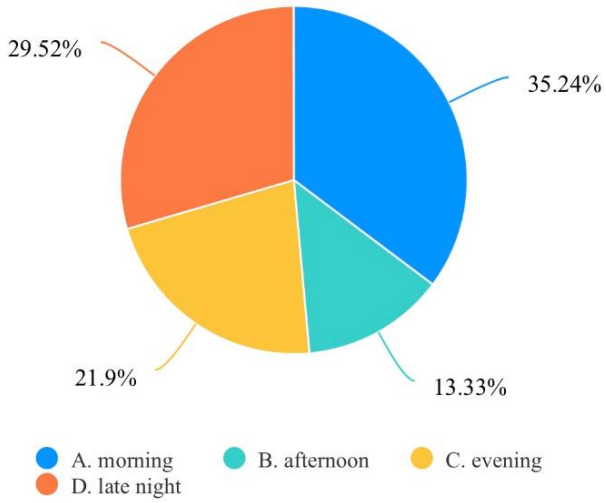

Fig. 8. Most suitable study time (Photo/Picture credit: Original)

9.) Are you satisfied with your learning efficiency? (the result is shown in Fig.9)
very satisfied -7 people chose this option.
satisfied -11 people chose this option.
average -43 people chose this option.
dissatisfied -27 people chose this option.
very dissatisfied -17 people chose this option.

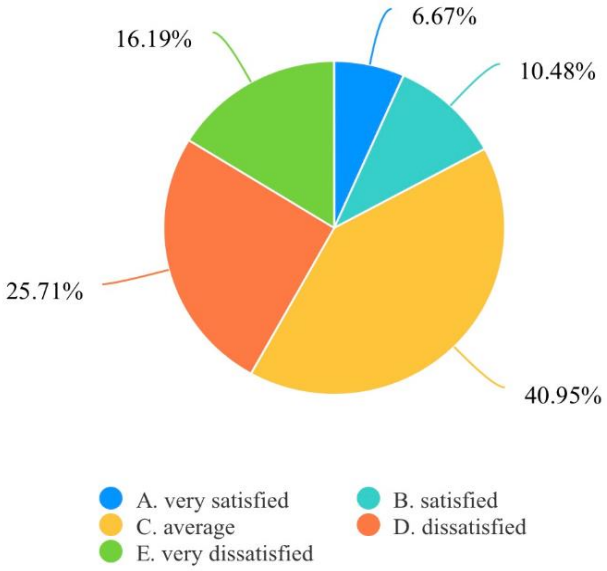

Fig. 9. Satisfaction with learning efficiency (Photo/Picture credit: Original)

The survey results provide valuable insights into the study habits and perceptions of students regarding study efficiency. The following analysis summarizes key findings from the survey:

1. Study Time: The majority of participants reported studying for 1 to 3 hours daily, with some students dedicating more than 4 hours to their studies. This suggests that students invest a significant amount of time in their studies.

2. Study Status: The survey indicates that most students often feel somewhat tired while studying, while a minority reported being in high spirits. Additionally, some students find it challenging to concentrate.

3. Study Methods: Reading is the most common study method, although a considerable number of students opt for listening, discussion, and practical exercises.

4. Study Challenges: Lack of motivation emerged as the most significant challenge students face in their studies, followed by difficulties in understanding and time constraints.

5. Factors Affecting Study Efficiency: Students generally believe that factors such as noise, fatigue, unexpected interruptions, lack of interest, and unclear goals have a significant impact on their study efficiency.

6. Study Tools: Most students rely on laptops and mobile phones as their primary study tools.

7. Methods to Improve Study Efficiency: Students suggested that creating clear study plans, focusing their attention, practicing more, managing time effectively, and seeking guidance from teachers or peers can enhance their study efficiency.

8. Preferred Study Time Periods: Students indicated that early mornings and late nights are the most suitable time periods for studying.

9. Satisfaction with Study Efficiency: The majority of students expressed moderate satisfaction with their study efficiency, although some students are dissatisfied.

10. Key Factors for Improving Study Efficiency: Students highlighted that study methods, study environment, study tools, study attitude, and study objectives are key factors in enhancing study efficiency.

2.4. Conclusion

The survey results demonstrate that study efficiency is influenced by a variety of factors, including study methods, study environment, and study attitude. To enhance study efficiency, students can implement strategies such as setting clear plans, allocating time wisely, and maintaining focus. Educators and institutions can also consider providing better study environments and support to help students improve their study efficiency. These findings underscore the importance of addressing multiple facets of the learning experience to optimize study outcomes.

3. Factors

3.1. The role of learning methods

It is important to choose learning methods that are suitable for different subjects and learning objectives, because different subjects and learning objectives require different strategies and methods. Different subjects involve different knowledge and skills, so choosing an appropriate learning method can maximize learning efficiency. For example, for math subjects, the emphasis should be on problem solving and practice, while for literature or history subjects, reading and understanding concepts may be more important. Students have different learning styles and strengths. Some people may be better suited to visual learning, while others may be better suited to auditory learning or hands-on learning. Choosing learning methods according to individual differences can better meet the needs of students. Choosing suitable learning methods can enhance students' interest and motivation. If students feel they are learning something meaningful and relevant, they are more likely to engage in learning. Different subjects may present different learning difficulties. Understanding how to deal with these challenges and how to choose appropriate learning methods can help students better overcome difficult problems. Students often set learning goals, such as improving grades, mastering specific skills, or completing specific projects. Choosing the right learning method can help them achieve these goals more effectively. Education is not just about responding to a specific test or task, it should also develop lifelong learning skills. Learning how to choose learning methods that are appropriate for different situations is a valuable skill that will benefit you greatly in your future studies and careers. In conclusion, learning to choose learning methods that suit different subjects and learning objectives is crucial to students' learning success. Educators and students should work together to explore and experiment with different learning strategies to find what works best for them so they can better cope with different subjects and learning challenges. This personalized learning approach helps to improve learning efficiency and meet students' learning needs.

3.2. Timing of study: morning vs. other times

The advantages of studying in the morning are clarity of thought, high concentration, a fresh start, and a stable body clock. Morning is usually the time when people are at their best mentally and their brains are clearer. This makes it easier to understand and absorb new knowledge in the morning. In the morning, there are usually fewer external distractions, which helps students concentrate better. There are usually fewer distractions such as social media and phone notifications. People usually feel fresh and motivated when they get up in the morning, which can help students actively engage in their studies. Studying in the morning helps maintain a stable body clock, and regular study time can improve sleep quality and study efficiency. Other time challenges are fatigue, social disturbances, biological clock differences, and living arrangements. In the afternoon and evening, many people may feel tired, leading to a decrease in learning efficiency. Brain activity typically declines as the day progresses. At other times, social activities and family commitments may increase distractions and make it difficult for students to concentrate. Everyone's body clock is different, and some people may be more awake at night, but others show higher learning efficiency in the morning. Students' daily living schedules and course schedules may affect the amount of time they are able to study. Therefore, sometimes you have to study at other times. It's important to note that everyone's lifestyle and body clock are different, so there's no one time that works for everyone. The key is to understand your habits and body clock, and try to study at the time that works best for you. At the same time, you can also try to study in different time periods to determine which time period is most beneficial to your learning efficiency. Ultimately, establishing a reasonable study schedule and scheduling your studies at the time that works best for you can improve your learning efficiency and academic performance.

3.3. Goals and motivation

Setting clear learning goals and maintaining a high level of motivation are key factors in learning success. At the same time, concentration, effective time management and a specific study plan are also key steps to achieve these goals. Learning objectives provide students with clear direction and help them know what results they want to achieve. This helps focus and prevents aimless learning. A clear goal can motivate students to learn. When they understand why they want to learn a topic or skill, they are more motivated to learn it. Learning objectives provide students with criteria against which to assess their progress. They can regularly check whether they have reached their goals and adjust their learning strategies. Clear learning goals help students maintain self-discipline. They can help students persevere in the face of difficulties or temptations. A high level of motivation helps students maintain interest in learning over the long term, not just at the beginning. When learning is difficult or frustrating, a high level of motivation can encourage students to persevere and find solutions. Learning motivation can stimulate students' creativity and innovation, making them more willing to try new methods and ways of thinking. A high level of learning motivation helps to maintain positive emotions and reduce learning anxiety and stress. Paying attention helps students learn and retain information more effectively and wastes less time; Can reduce errors and omissions, improve academic performance; It is easier for students to understand complex concepts and problems in depth when they are focused. Effective time management can help students make the most of their limited study time and ensure that each study session is fully utilized. Help students overcome procrastination and ensure they complete tasks on schedule. By allocating their time effectively, students can reduce academic and time pressure and improve the quality of their learning. Specific study plans help students organize their study time and tasks and avoid cramming at the last minute. The learning plan links learning to goals and ensures that each learning activity moves towards achieving those goals. A study plan can help students self-monitor, track their progress, and have a clear understanding of the adjustments that need to be made.

4. Enhancing memory and learning efficiency

4.1. Active learning

Active learning improves memory principles: Active participation in the learning process, such as questions, discussions, and summaries, helps memory and comprehension. Conduct regular self-tests and reviews to consolidate memory and identify areas that need further learning. Utilizing multi-sensory experiences, such as hearing, sight, and touch, can improve information retention and recall. Reorganize and organize learning materials to aid memorization and comprehension. Teach what you have learned to others to strengthen your own understanding and memory. Spreading learning over a period of time, rather than focusing on one study session, helps with long-term memory. Connect new knowledge to existing knowledge to improve the relevance and sustainability of memory. These principles emphasize an active, deep, and conscious approach to learning that helps improve memory and academic performance.

4.2. Retrieval practice

Regular retrieval practice has important benefits for long-term memory [3]. This learning strategy involves repeatedly recalling and applying what has been learned. Regular retrieval exercises help strengthen memory and make information easier to remember and extract. This is because each practice is equivalent to "exercising" the memory, making it stronger. With regular practice, the memory effects of information can be prolonged, helping to retain knowledge over a longer period of time. Regular retrieval exercises help transfer information from short-term memory to long-term memory, making knowledge more sustainable. Forgetting is a common learning challenge, but regular retrieval exercises can help students cope with forgetting and improve the persistence of memory. By constantly recalling and applying knowledge, students can gain a deeper understanding and mastery of the learning material, rather than just surface memorization. In general, regular retrieval exercises are particularly suitable for knowledge that requires long-term memory and mastery, such as academic subjects, vocational skills, and language learning.

4.3. Spaced repetition

Spaced repetition is an effective strategy for reinforcement learning, which improves the retention of information by regularly reviewing learned material and reviewing it before it begins to decay [4]. This approach helps in the formation and retention of long-term memories because it takes advantage of the so-called "memory forgetting curve," in which memories are recalled when they are most likely to decay to extend the retention of information. Spaced repetition also encourages deep learning because students need to constantly review and apply knowledge rather than just temporarily memorize it. This strategy has a wide range of applications across disciplines and areas of learning, helping to improve students' academic performance and persistence of knowledge.

4.4. Metamemory

Metamnesia refers to memorized memory, or knowledge about one's own memorized knowledge and skills [5]. This concept involves the cognitive control and monitoring of an individual's own memory processes, memory strategies, and how to remember and learn more effectively. Metamnesia plays a key role in effective learning, as it enables students to better understand their own memory strengths and to choose learning strategies that work best for them. By reflecting on and monitoring their own learning process, students can better plan learning, adjust learning methods, solve memory problems, and improve learning efficiency. Therefore, metamnesia helps students to master learning more autonomously and improve academic performance.

5. Individual learning efficiency

5.1. Defining learning efficiency

Learning efficiency refers to the speed and quality with which students acquire knowledge and skills in a given learning period [6]. It measures the relationship between the time and effort invested in the learning process and the learning outcomes achieved. Learning efficiency is crucial for both students and educators. For students, efficient learning methods can save time, reduce stress, and improve academic performance. For educators, understanding and promoting learning efficiency can help deliver more effective education and help students reach their full potential. To sum up, learning efficiency is not only about the individual development of students, but also about the quality and effectiveness of the education system.

5.2. Characteristics of efficient learners

Effective learners may have the following underlying characteristics: 1. Self-management skills, including time management and goal setting. 2. Highly self-motivated and goal-oriented. 3. Good focus and concentration. 4. Effective learning strategies such as active learning and metacognitive skills. 5. Adaptability and flexibility, can adjust learning methods according to different disciplines and situations.

5.3. Future research directions

Future research could explore the following areas of learning efficiency at the individual level: Delve into differences in learning efficiency between individuals, including cognitive styles, learning strategy preferences, and metacognitive skills, to understand why certain learning methods work well for some people and not others. Study the impact of emerging technologies (e.g., artificial intelligence, virtual reality) on learning efficiency in order to develop more personalized and efficient learning tools. Study the effects of emotion, mood, and motivation on learning efficiency to provide better emotional support and emotionally intelligent learning environments. Explore differences in learning efficiency across cultures to understand the impact of cultural factors on learning methods and achievement. Study the maintenance and improvement of long-term learning efficiency, including learning efficiency in lifelong learning and career development.

6. Practical strategies for enhancing learning efficiency

6.1. Cultivating learning motivation

Offer practical tips and techniques for boosting motivation among students.There are a number of practical techniques that educators can use to increase student motivation [7]. First, establishing clear learning goals is key to helping students understand why they need to learn a certain topic or skill. Secondly, providing positive feedback and encouragement can enhance students' self-confidence and motivation, prompting them to focus more on learning tasks. In addition, creating fun learning experiences, such as gamification and hands-on activities, can make learning more engaging. Personalized learning support and resources also help meet the needs of different students. Finally, setting challenging tasks, setting an example, and rewarding students for their efforts can all stimulate curiosity and motivation and promote deeper learning. The combination of these skills helps to create a positive learning environment that inspires initiative and motivation in students.

6.2. Improving self-regulation

In the learning process, strengthening self-regulation is the key to improving learning efficiency and success. First of all, set up a clear learning goal and plan, and make sure you know the direction and time of learning. Secondly, cultivate good time management skills, allocate time reasonably, avoid procrastination, and improve learning efficiency. At the same time, establish positive study

habits, including regular review and self-assessment, to ensure continuous progress. Also learn to be self-motivated, stay motivated and overcome setbacks to keep the learning process positive. Finally, reflect on and adjust learning strategies, constantly improving them based on experience to meet the needs of different disciplines and tasks. These strategies help students better manage their own learning, and improve academic achievement and self-growth [8].

6.3. Customization for high school and college students

Tailored learning strategies are needed to meet the unique needs and learning characteristics of high school and college students. For high school students, the focus can be on building a solid learning foundation, including an emphasis on self-discipline, time management, and goal setting. Provide them with specific study plans and supervision to ensure that they can develop good study habits. At the same time, pay attention to their emotional health, provide emotional support, and reduce academic pressure. For college students, more emphasis can be placed on autonomous learning and deep understanding. Provide more flexible study options such as independent research projects and interdisciplinary study to meet their interests and career goals. They are encouraged to actively participate in discussions and collaborations to promote critical thinking and creativity [9]. In addition, career development support is provided to college students to help them plan their future career paths. In conclusion, tailored strategies should take into account the age, stage and individual needs of students to meet their learning characteristics and help them succeed in their academic and personal development [10].

7. Conclusion

This article discusses the main findings and strategies for improving student learning efficiency. First, the author emphasized the importance of learning efficiency, pointing out that it is related to students' academic achievement and the quality of education. When exploring the factors of students' learning efficiency, it is found learning time, learning state, learning style, learning difficulties, factors affecting learning efficiency, learning tools, methods to improve learning efficiency, the most suitable time period, learning efficiency satisfaction and key factors to improve learning efficiency. The author proposed a range of strategies, including setting clear learning goals, providing positive feedback, creating fun learning experiences, personalizing support, setting challenging tasks, setting an example, rewarding students for their efforts, developing self-directed learning skills, and regularly reviewing and adjusting teaching methods. These strategies can help students improve their learning efficiency, better cope with learning challenges, and improve academic performance. Finally, the author emphasized the importance of research hypotheses, including individual differences, technology applications, emotions and learning, cross-cultural research, and sustainability of learning efficiency. These research hypotheses help guide future research, deepen our understanding of learning efficiency, and provide better learning support and educational strategies to meet the needs and learning characteristics of different students. In conclusion, improving students' learning efficiency is of great significance to both individuals and the education system, and continuous research and practice are needed to continuously improve learning methods and environments.

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