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A Study of the Relationship Between Learning Motivation and Learning Strategies in Primary School Students

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Abstract

In the past decade or so, educators have carried out a number of studies centered on the important topic of "teaching students to learn", among which the studies on learning motivation and learning strategies have attracted particular attention. Under the current exam-based education system in China, academic performance is the fundamental means of measuring students' learning, and motivation and learning strategies, as extremely important factors affecting students' learning, have a direct impact on students' academic performance. Good learning motivation and scientific learning strategies have a certain improvement effect on students' learning attitudes and behaviors, which can help students, learn more effectively and improve their knowledge and academic performance. The purpose of this research is to study the relationship between learning motivation and learning strategies of primary school students.

The present study aims to bridge this gap by conducting a questionnaire survey among elementary school students in an elementary school in Kunming, Yunnan Province, to provide insights into the relationship between motivations and learning strategies among elementary school students, taking into account the influence of a more comprehensive set of variables. The study found that students with higher intrinsic motivation tended to use effective learning strategies to help them learn, and that girls tended to use the right learning strategies to learn more than boys.

This study will help to improve our understanding of the learning process of primary school students and provide parents, teachers, and policy makers with further insights and guidance that will help to improve students' motivation and adoption of effective learning strategies.

Keywords: motivation, learning strategies, learning behavior, habits of primary school students, teaching strategies, educational improvement

1. Introduction

1.1 Background

In contemporary educational research, the focus on the relationship between motivation and learning strategies among elementary school students has gradually increased, stemming from the urgent need to improve students' learning outcomes and promote individual development. With the evolution of the education system, primary school students face increasing academic pressures. Therefore, it becomes crucial to gain a deeper understanding of their motivation and the learning strategies they adopt in order to support their learning process more effectively. Numerous studies have clearly demonstrated that motivation plays a crucial role in students' learning process and this is generally recognized by the academic community. Adequate motivation for learning not only effectively enhances students' learning efficiency, but also improves the staying power of learning and positively affects the quality of learning (Deci & Ryan, 2012). Moreover, it is widely recognized in the academic community that motivation plays an important role in student performance and academic achievement. Students'

motivation helps to stimulate their interest in learning and motivates them to invest more time and effort into their studies, which ultimately leads to better grades and academic success (Elliot & McGregor, 2001). Deci et al. noted in their 1971 study that extrinsic rewards may diminish intrinsic motivation, whereas appropriate punishments help to persevere in learning goals. In addition, Dweck and Leggett showed that academic motivation and behavioral performance are deferentially affected by goal orientations, such as learning goal orientation and performance goal orientation (Dweck & Leggett, 1988). Bandura in his 1977 study emphasized the effect of self-efficacy on motivation, suggesting that a person's self-efficacy affects his behavioral choices, goal setting, and emotional responses. Deci and Ryan self-determination theory also stated that autonomy support in situations is essential for developing intrinsic motivation (Deci & Ryan, 2000).

At the same time, it is worth mentioning that learning motivation is a complex concept that may be defined differently by different researchers and theorists. One common definition stems from the work on self-determination theory presented by Ryan and Deci (2000), who defined learning motivation as an internal force that drives individuals to acquire new knowledge and skills and to improve themselves. It is worth noting that many theories and perspectives exist in the discussion and study of learning motivation and new avenues and approaches are constantly being researched and applied. The theory of motivational factors was proposed by Herzberg in 1959 (Herzberg, 1959) and the theory of types of motivation such as integrative versus instrumental motivation was proposed in 1985 by Gardner (Gardner, 1985). The theory of motivation has been used in the study of learning motivation and theories of motivation have been developed and applied to the study of learning motivation and its effects on the individual.

Learning motivation is closely related to learning strategies which are described as the active and purposeful selection and use of a specific set of techniques and methods by individual learners in order to improve their knowledge acquisition as well as language use. Learning strategies are the focus of attention in cognitive psychology research and an important element in the study of teaching methods. According to Wolfgang and Niedermeyer's (2010) definition of learning strategies, learning strategies are regarded as the ability of students to regulate their associations, thinking, memorization, and their cognitive activities during the learning process, i.e., how students create and use effective learning resources.

As researchers suggested, the right learning strategies can enhance learning efficiency: by training learners to use learning strategies that are appropriate for them, they will better process and understand new information, which will change their learning behaviors, accelerate and enhance the quality and efficiency of learning (Oxford, 1990). O'Malley & Chamot (1990) found that effective learning strategies can build self-confidence, and that by coordinating and applying learning strategies, learners will be more confident, increasing the likelihood that people will be satisfied with their own learning outcomes. In addition, Effective learning strategy training can also develop learners' independent learning skills, which will enable them to identify, think and solve problems under the guidance of the teacher (Weinstein, 2002).

There is a strong relationship between learning strategies and motivation. According to a large body of research in the field of psychology, learning strategies are methods or means used by students to understand, learn, and remember knowledge, and refer to behaviors and thought processes employed by students that are designed to enhance their learning and mastery of learning material (Weinstein, C. E. & Mayer, R. E., 1986).

Whereas motivation is the intrinsic drive that facilitates the learning process, Ryan and Deci (2000) defined intrinsic motivation as engaging in an activity due to its inherent pleasurability and fulfillment, rather than due to the challenges or pressures posed by the desired outcome. In contrast, extrinsic motivation is described as performing an activity to achieve an end unrelated to the behavior itself. In other words, if a person is strongly motivated to learn, he or she is more likely to adopt effective learning strategies.

Effective learning strategies often encompass several aspects and need to be specifically adapted to the content, personal characteristics and goals of the study. The following are some of the learning strategies that are generally recognized as effective. First, for example, Spaced Practice, proposed by Cepeda et al. in 2006, is a strategy that involves spreading learning over a period of time rather than focusing on a short period of time.

Studies have shown that spreading out learning can enhance long-term memory. Next is the Testing Effect, also known as retrieval practice, proposed by Roediger and Karpicke in 2006, which refers to the strategy of improving memory by testing learners. Even testing without feedback has been found to promote learning. There is also Interleaved Practice, proposed by Rohrer, D., & Taylor, K. in 2007, a strategy that involves switching between learning multiple topics or skills rather than focusing on one at a time (i.e., block learning). There are also the more familiar Metacognitive Strategies, developed by Flavell, J. H. (1979), which involve strengthening the learner's awareness and control of his or her own learning process, e.g., by setting goals, monitoring progress, and evaluating effectiveness. The effectiveness of each learning strategy may also vary from person to person, so the author suggests that learners should try them out in their personal context and adjust them in the process. At the same time, applying these strategies is not limited to a single learning environment or content,

but can be used flexibly across domains. Overall, effective learning strategies often involve active learning, regular review, in-depth understanding and reflection, and active metacognitive monitoring. A study by Pintrich & De Groot (1990) found a significant positive association between motivation and the use of cognitive learning strategies. Their study showed that students who were highly motivated tended to use deep processing strategies and were more actively involved in learning activities. Wolters (2003) showed that motivation was a key factor in whether students used self-regulated learning strategies. Students who are highly motivated have clear goals and expectations for learning, which drives them to use more successful learning strategies. In this regard, it can be concluded from previous studies by scholars that motivation and learning strategies support each other. Motivation can drive strategy use, and targeted strategies can in turn increase effectiveness and interest in learning, further enhancing motivation.

Although there have been many studies to date that have explored the relationship between learning strategies and motivation (Pintrich & De Groot, 1990), most of them have focused on older students. However, relatively little research has been conducted with elementary school students. But elementary school students are in a critical period of growth and have unique situations in terms of learning and developmental needs that require more attention and research. Moreover, most of the past research were based on quantitative research designs which suggests collecting data through questionnaires. This method should be utilized with caution when it is used for elementary school students as they may not fully understand the questions and therefore fill in the information not accurately enough. This issue is attempted to be solved in this study.

1.2 Research Purpose and Significance

The main purpose of this study is to study the relationship patterns between learning motivation and learning strategies of primary school students. Through in-depth analysis of the mechanisms by which learning motivation influences the selection and execution of learning strategies, it reveals the interaction between learning motivation and learning strategies.

By studying the relationship between learning motivations and learning strategies, firstly, teachers can adopt different teaching strategies according to the type of students' motivation, making teaching more targeted and thus improving the quality of teaching. Secondly, it can promote students' individualized development. Each child may have different motivation and learning strategies. Understanding such differences can help teachers to individualize instruction for each student and support their individualized development. This finding can also enhance student learning. Appropriate learning strategies can optimize students' learning process and stimulate their interest in learning, which in turn can improve learning outcomes. The findings can also help to develop students' lifelong learning ability. Strong motivation and effective learning strategies are the basis for developing students' lifelong learning ability. Through the study, teachers and parents can understand how to guide and motivate students to form positive learning habits and lay the foundation for their future learning and life. Finally, the findings of the study contribute to policy development. Policymakers can adjust educational policies based on such research to meet the learning needs of more students and make more effective use of educational resources.

1.3 Importance of the Study

The study of the relationship between motivation and learning strategies of elementary school students has important practical and theoretical value. First, knowing and understanding this relationship helps educators to design and implement appropriate teaching strategies for different types of learning motivation in order to improve teaching effectiveness and students' academic performance. Second, this study can help us identify and solve some problems that affect students' motivation and learning strategies, such as classroom atmosphere, teaching methods, and family education, and then improve the quality of students' learning and their interest in learning. Third, this study can further improve and enrich the relevant theories of educational psychology and pedagogy theoretically, and provide scientific theoretical guidance for school education practice. Especially under the current pressure of exam-oriented education, the study of students' learning motivation is particularly important.

Therefore, the study of the relationship between learning motivation and learning strategies of primary school students is of great significance from both theoretical and practical perspectives.

1.4 Research Questions

To investigate the relationship between elementary school students' learning motivation and learning strategies, this research seeks to answer the following research questions:

(1) Is there a correlation between motivation and learning strategies?

(2) What is the effect of learning motivation on the choice of learning strategies in the selection and use of learning strategies among students with different learning motives?

(3) What type of motivation is more helpful for students? And what type of motivation is more helpful for students to use effective learning strategies?

(4) Are there any relationships between students' purpose of studying and gender? And are there any relationships between students' learning strategies and gender?

2. Literature review

2.1 Definition and Theoretical Applications of Learning Strategies

In the field of research, the scientificization and wide acceptance of the concept of learning strategies is the basis for pushing learning research forward. Only through in-depth research and a clear conceptual definition of learning strategies can we fully understand the relevant mechanisms and influencing factors in the learning process and provide a scientific basis for educational practice and improvement. Learning strategy is widely defined as a way of being aware of and actively participating in recognizing what is being learned, adapting to different environments, and transforming knowledge into practice. It can be further subdivided into cognitive strategies, metacognitive strategies and resource management strategies. The following are some of the widely agreed upon literature definitions of learning strategies: "Learning strategies refer to a set of strategies that people use in order to control their learning process" (Azinga, 2020). "A learning strategy is the way an individual accomplishes a task. It includes how a task is planned, executed, and evaluated as well as the individual's learning process" (Schmeck, 2013).

There are different categorizations regarding learning strategies based on different classification criteria. One common categorization is through the learning process and how learning strategies are used.

Firstly, learning strategies include cognitive strategies. Cognitive strategies are strategies that individuals use to activate, control and modify cognitive processes at various stages of information processing in order to improve learning efficiency. It is theorized that the mastery and rational use of cognitive strategies can effectively enhance an individual's academic performance and metacognitive level and promote effective learning. They include strategies such as repetition, refinement, organization, and complex cognition, which emphasize the processing and understanding of learning information (Weinstein & Mayer, 1986). In terms of definition, Weinstein and Mayer (1986) defined cognitive strategies as "sequences of behaviors or thoughts that manipulate and transform known information". O'Malley & Chamot (1990) described cognitive strategies in more detail as ways of responding to learning tasks, processing, organizing, storing, and retrieving learning materials. and retrieving learning materials.

Cognitive strategies play several roles in learning. Firstly, they can improve information processing skills. By utilizing various learning strategies such as rehearsal, elaboration, it helps to improve information processing efficiency (Weinstein & Mayer, 1986). Secondly, it can help learners to self-regulate their learning: the use of cognitive strategies can help learners to actively control their own learning process, how to acquire process and memorize information, making learning more efficient (Zimmerman, 2002). It can also optimize problem solving: using appropriate cognitive strategies, problems can be understood and solutions found more effectively (Bransford & Stein, 1993).

Secondly, learning strategies include metacognitive strategies. Metacognitive strategies refer to strategies that actively coordinate and adapt cognitive strategies, including planning, monitoring, and evaluating self-learning. As an advanced cognitive activity, metacognitive strategies can be applied purposefully to the process of problem solving and task completion, thereby enhancing learners' learning (Flavell, 1979). Metacognitive strategies play an important role in learning in several ways. First, it helps to improve students' thinking skills. By using metacognitive strategies, students transform their learning process into a metacognitive process so that they can self-perceive and understand their thinking process, enhance their ability to self-monitor and regulate, and form more effective problem-solving strategies (Zhou Zongkui, Zhang Zhidong, Wei Min & Zhao Qinghe, 2006). Secondly, metacognitive strategies can improve students' academic performance. The use of metacognitive strategies helps students to understand and memorize new knowledge, thus improving academic performance (Schraw G. & Moshman D., 1995). In addition, metacognitive strategies can enhance learners' self-directed learning. By using metacognitive strategies, students can better understand their learning process and learn in a purposeful and planned way, developing the ability of independent learning (Zimmerman B.J., 1990).

Learning strategies also include resource management strategies. Resource management strategy refers to how learners can effectively, orderly and rationally configure and use all kinds of available resources, including human resources, material resources, information resources, time resources and so on, in order to achieve a certain goal. In the learning process, resource management strategies may involve how to understand and process information, how to plan and organize learning time and tasks, and how to call on appropriate helping resources (Pena-Mora, F., & Vadhavkar, S., 1995). The role of resource management strategies in learning is that

first of all he can improve the efficiency of learners. By using various learning resources wisely, it can help the learners to save time and energy and achieve better learning outcomes (Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, W. J., 1991). Secondly it improves learners' motivation to learn. Resource management strategies can increase learners' interest and motivation by making the learning process more structured and goal-oriented. Adopting resource management strategies can also train learners' planning, decision-making and implementation skills, as well as increase their resilience and self-regulation in the face of difficulties (Zimmerman, B. J., 2002).

Finally, there are helping strategies, which include strategies such as emotional control, use of environmental structure, time management and help-seeking, which can help to improve learning effectiveness and facilitate the use of cognitive and metacognitive strategies (Oxford, 1990).

The above types of strategies do not exist in isolation, but are interdependent and work together in the specific learning process.

When teachers assess students' learning strategies, the first task is to academically assess students' core strategies. These core strategies are extremely important because they contribute directly to comprehension and knowledge construction (Dunlosky & Bjork, 2014; Nelson & Narens, 1994). They serve different and important functions than cognitive and metacognitive strategies. Basic cognitive learning strategies include elaboration and organization. The primary function of organization is to identify relationships and hierarchies among new learning content (e.g., identifying main ideas). The primary function of elaboration is to integrate new learning content with prior knowledge or experience (e.g., by thinking of examples of new concepts). An important metacognitive learning strategy (directly related to the development of comprehension) is planning and monitoring cognitive strategies and one's own comprehension. By monitoring comprehension, students can identify gaps in their comprehension and remedy them. Teachers should be aware of the specific functions of these strategies and be able to differentiate between them. (Lohse-Bossenz et al., 2013)

In addition to helping students recognize their comprehension deficits and improve on them, monitoring comprehension can also help students gain better knowledge. For example, when students read a scientific article, they can use monitoring strategies such as repeatedly paraphrasing key information from the article, asking their own questions, and trying to apply what they have learned to real-world scenarios. Through these monitoring strategies, students can gradually identify the difficulties they encounter in understanding certain concepts or applying certain knowledge, and remedy them through further study and practice.

Therefore, by clarifying the scientific and widely accepted concept of learning strategies, we can better understand the feasibility of empirical cognition, and thus provide more in-depth guidance and more effective educational methods for learning research plus the definition and theory of learning strategies.

2.2 Definition and Current State of Research on Learning Motivation

Learning motivation is defined as the mental state of an individual in the learning process that psychologically generates and sustains the desire and effort for learning activities (Pintrich, 2003). Motivation is one of the key factors for learning success as it directly affects the level of commitment and persistence of a person to a learning task. Understanding and motivating an individual's motivation to learn is critical to the success of education and learning. Educators and parents can effectively motivate students by creating a positive learning environment, providing interesting learning resources and curriculum design. At the same time, individuals themselves can increase their motivation to learn by developing an interest and willingness to learn and by setting clear learning goals. In this way, learning is no longer a task but a fun and enjoyable state of mind, which leads to better achievement of learning goals.

The concept of learning motivation involves the individual's interest, expectations, goals, and level of commitment to learning (Deci & Ryan, 1985). At the level of motivation, learning motivation is an intrinsic driver of learning behaviors that can influence which learning activities an individual chooses to engage in and how they invest their time and effort. A study by Hidi (2006) found that students are more motivated by courses that are interesting and relevant to their interests. This was because they were interested in the practical applications and potential rewards of the course, and this motivation could inspire them to take the initiative to learn more. Conversely, individuals may be less motivated to learn a course that is difficult to understand or unrelated to their interests because they cannot see the practical value associated with it. In addition, motivation to learn can be influenced by an individual's expectations and goals. When an individual sets clear learning goals and believes that they can achieve these goals through hard work, their motivation to learn is usually higher. A student, for example, will be more motivated to engage in learning activities if he sets goals to achieve high grades because he believes that his efforts will be rewarded. And the level of effort is also one of the important factors in determining learning motivation. The more time, energy and effort an individual puts into learning, the higher the motivation is usually.

To summarize, motivation involves an individual's interest in learning, expectations, goals and level of

commitment. These factors interact with each other and together influence an individual's motivation to learn, thus positively affecting his or her learning behavior and learning outcomes.

Motivation has a significant and profound impact on learning behavior and academic achievement (Wigfield & Eccles, 2000). Students' level of motivation is directly related to their motivation to engage in learning and their commitment to academic tasks. A highly motivated learner motivates students to continue learning and to pursue higher levels of academic achievement. A student who is strongly motivated to learn and who understands the importance of learning for his or her own development and future will invest a great deal of time and effort in studying course material and participating in a variety of learning activities. A student who is motivated to learn will be driven to pursue academic excellence and thus achieve high grades in school (Gottfried, A.E., Fleming, J.S. & Gottfried, A.W., 2001).

In contrast, if a student lacks motivation, he/she may exhibit a negative attitude toward learning. Students, who show little interest in school, rarely take the initiative to participate in class discussions and complete assignments. And they lack clear learning goals and motivation, which will lead to relatively poor academic performance. As a result, they feel bored and tired, and have doubts about the meaning and value of learning (Abeysekera, L., & Dawson, P., 2015).

Therefore, developing positive motivation in students is crucial for improving learning outcomes. Educators and parents can promote students' motivation by stimulating their interest, establishing a good communication and support system with them, and providing challenging and meaningful learning tasks. Coercion or external rewards alone are not enough; the key is to stimulate students' intrinsic motivation so that they realize the importance of learning and enjoy the pleasure of knowledge acquisition and growth.

In theoretical analysis research, cognitive theory of motivation is usually used to elaborate learning motivation. "Classroom Applications of Motivational Cognitive Theory" presented by Nona Tollefson (2000) as an example of her application of motivational cognitive theory to classroom instruction. According to her observations, teachers can draw on motivation theory to assess teacher-student interactions and develop models of interactions that enhance students' desire to show more effort in tasks related to reaching goals. By applying the theory, teachers can better understand the changes and drivers of students' motivation and thus adjust their teaching strategies to motivate students. This research has positive implications for enhancing students' learning outcomes. Houle used interviews in her study to gain insight into students' motivation. The results of the study showed that the types of learner motivation can be categorized into three types: goal orientation, activity orientation and learning orientation. Goal orientation refers to individuals who are driven to learn by setting clear learning goals, while activity orientation is motivated by the need for social contact.

Welters' (1998) view is that there is usually interplay between motivation and learning rather than a unidirectional association. In the field of education, the complexity of this interplay is reflected in how students' motivation affects their learning performance, while the process of learning may also shape or adjust their level of motivation. This concept has been validated in real-life contexts in different fields (Ryan, R. M., & Deci, E. L., 2000). In education and professional development, understanding and promoting this interplay is crucial for improving learning outcomes and job performance. Furthermore, motivation is not an indispensable condition for learning. Therefore, it is not inevitable to postpone learning activities until students have developed appropriate interest and motivation. Often, the most effective way to teach a student who lacks motivation is to briefly ignore his or her motivational state and focus on teaching him or her in the most effective way (Ryan, R. M., & Deci, E. L., 2000). In practice, we are often faced with a variety of students, some of whom may be overwhelmed by a lack of motivation in a particular subject. However, it is through flexible teaching strategies that we can stimulate their interest in learning. In addition, there may be times when students need more individualized care and guidance to better understand the subject matter. In one-on-one instruction, educators can adjust the lesson plan to better match students' learning preferences based on their interests and subject needs.

In Barry J. Zimmerman's book, *Self-Efficacy: A Necessary Motivation for Learning*, the importance of self-efficacy beliefs in transforming students' academic situations, as well as their interplay in the process of self-regulated learning and in the transmission of ideas about students' academic achievement, is explored in detail. In Bernard Weiner's article, "Interpersonal Theories of Motivation from Attribution," two related theories of motivational attribution are further elaborated. One is the intra-personal theory, which includes self-directed intentions (especially expectations of success) and self-directed emotional factors (e.g., pride, guilt, and shyness). The other is an interpersonal theory that includes beliefs related to others' accountability and emotional factors such as anger and empathy that are orientated towards others. Each of these two theories has been guided by instructors in two different fields — one a scientist and the other a judge — and in this scholarly article by Weiner, several experimental evidences supporting the concepts of the above theories, as well as the phenomena in which these concepts are combined, are also examined. In this scholarly article, by analyzing in depth the synergistic role of scientists and judges in the development of theories, the authors emphasize the importance of

interdisciplinary collaboration. This synergistic model provides a solid foundation for the uniqueness and widespread application of the theory and opens up new directions for research in related fields. The originality of this research methodology provides insightful thinking for academics and sheds light on future research and practice.

Domestic studies on learning motivation can be divided into two main categories, namely, theoretical studies and empirical studies. Among the two, empirical research focuses more on correlational and intervention studies. Empirical research has been widely conducted in China, mainly in the form of a series of academic treatises, which cover studies such as Zhenhong Wang (2000), Ping Liu (2000), Yan Zhang (1999), Xiting Huang (1999), Jianhui Song (1998), Dejun Guo (1998), Fang Yuan (2000), Beili Zhu (2000), Haimei Liang (1998), Dejun Guo (1998) and Guiliang Zhang (1998). Taking different theories and concepts of the cognitive view of motivation as a starting point, these studies have examined in depth their effects on aspects of academic achievement and achievement motivation. In addition, intervention studies focusing on academic achievement motivation have mainly concentrated on attributional training tools, such as Guangyuan Sui (1991) and Rensheng Han (1998). Through attributional training, the studies worked to enhance the level of students' academic achievement motivation. These intervention studies are mainly oriented towards primary and secondary school students and are closely related to subject teaching activities.

According to Guiliang Zhang (1998), two types of feasible motivation change programmes can be proposed to address the current status of academic motivation research in China. One category focuses on individual differences, and it aims to adjust an individual's cognitive structure to adapt to the learning environment more effectively. This type of programme requires targeted selection of individuals for intervention. The other type of motivational change programme focuses on the general classroom situation and is based on the premise that it will have a positive effect on all students. Both programmes are feasible at an academic level. The former focuses on the detailed analysis of individual differences, with precise interventions leading to individual motivational change. The latter emphasizes the overall educational environment of the classroom and promotes the motivation of a wide range of students through generic improvements.

The presentation of this academic viewpoint is of positive significance for the in-depth advancement of learning motivation research in China. In future research, the practical operation of these two types of motivational change programmes and their applicability in different disciplines and teaching scenarios can be further explored, so as to provide more targeted strategies for enhancing students' learning outcomes.

2.3 Shortcomings and Prospects

The constructivist conception asserts that learning is a spontaneous activity in which the learner constructs correlations between existing knowledge and new experiences in order to gain a fresh understanding (Piaget, 1926; Vygotsky, 1978; Wittrock, 2010). Generative Learning Strategies (GLSs) (Fiorella & Mayer, 2016) represent a group of academic approaches inspired by constructivist learning theories, which urge learners to actively develop a deeper understanding of the information they are about to be exposed to and to skillfully integrate it into the structure of the knowledge they have already acquired (Fiorella & Mayer, 2016; Wittrock, 2010). The aim of these strategies is to enhance memory effectiveness as they introduce a degree of challenge (Bjork, 1994; Bjork & Bjork, 2011), requiring learners to retrieve prior knowledge rather than simply rereading information. The importance of the retrieval process is not only that it provides a more effective learning opportunity than simply relearning the material, but also that it plays a positive role in facilitating the formation of long-term memory, a view supported by the research of Karpicke and Roediger (2008). Indeed, by actively participating in retrieval, learners are more likely to store information firmly in their memory and are better able to apply what they have learnt. A study on language learning showed that by repeatedly retrieving newly learnt vocabulary, students not only improved their memory of these words, but also used them more fluently in real contexts. This kind of active learning is more conducive to deeper understanding and flexible use of knowledge than passive reception of information. Therefore, active participation in the retrieval process is not only an important finding in academic research, but also has wide applicability in both real life and professional development, providing individuals with more effective learning opportunities and facilitating deeper understanding of knowledge and long-term memory formation.

The academic field, although constructivist learning theories were originally proposed to elucidate developmental differences in learning (Piaget, 1926; Vygotsky, 1978), little research has been conducted on the effectiveness of learning systems at younger ages. Current research has tended to focus on one strategy or has not directly compared learners from different age groups, and when comparisons have been made, age has only been considered as a proxy for different levels of prior knowledge (Chularut & DeBacker, 2004; Gurlitt & Renkl, 2008). However, when delving into learner differences, we should not only focus on the dimension of age, but also take into account the combined effects of many factors. In addition, the study can also be extended to the influence of social factors, such as family environment, social circle, and educational resources. Taking family

environment as an example, students from different backgrounds may have significant differences in motivation and learning styles, thus requiring more specific customization in the choice of teaching strategies. By comparing the academic performance of students of different age groups in different home environments, we can better understand the combined effects of these factors on academic performance. Therefore, future studies can focus more on multi-dimensional comparisons to dig deeper into the characteristics of learner groups and improve the relevance and effectiveness of teaching strategies. In addition, an important finding of these studies is that learning strategies for younger learners need to be adapted to more fully support learners with lower levels of prior knowledge (mainly younger learners) (Fuchs, L.S., Fuchs, D., Hosp, M.K. & Jenkins, J.R., 2001).

In recent years, as educational philosophy has evolved, more and more attention has been placed on personalized education. One successful strategy in dealing with learners with lower levels of prior knowledge has been the use of differentiated instructional approaches. By implementing different levels of content in the classroom, teachers are better able to meet the learning needs of their students. For example, for a math course, multiple levels of math problems can be set to ensure that each student is able to actively participate in learning at a level appropriate to them. In addition, the use of technology in education opens up new possibilities for adapting learning strategies. Through the introduction of personalized learning platforms, students can learn at their own pace and understanding, while teachers are able to monitor their progress and provide personalized guidance in real time. This personalized approach to learning allows each student to learn in the environment that best suits them, leading to better understanding and assimilation of knowledge.

Although significant progress has been made in the study of learning strategies, there are still some flaws and shortcomings. Firstly, in the authors' survey, it was found that there is an ambiguity in the definition of learning strategies: academics have not yet reached a universal definition of learning strategies, and different authors have given different interpretations of learning strategies (Weinstein & Mayer, 1986; Oxford, 1990), which has caused problems for researchers when they operationalize learning strategies in practice. Therefore, the definition of learning strategies still needs further refinement. Secondly, there is no uniformity in the way learning strategies are categorized. How to systematically classify various learning strategies not only involves researchers in understanding, applying and developing theories of learning strategies, but also affects scholars in designing and evaluating learning strategies educational practice programmes (O'Malley & Chamot, 1990). Furthermore, the causal relationship between learning strategies and learning outcomes is unclear. Although many studies have found a correlation between the use of specific learning strategies and better learning outcomes, it remains uncertain whether this relationship is truly causal (Dignath, Buettner & Langfeldt, 2008). Further, the measurement of learning strategies is problematic. Most measures of learning strategies rely heavily on questionnaires, and this subjective self-report method of data collection can be subject to bias (Winne & Perry, 2000). In addition, the accuracy of learning strategy measurement instruments, such as reliability and validity, needs to be improved. Finally, some studies lack attention to the learning environment and individual differences. Most studies assume that learning strategies are fairly universal, ignoring the effects of differences between learning environments and individual learners on outcomes, which may limit the validity and applicability of some findings (Cohen, 2014).

Here are some of the author's improvements. First of all is the improvement of the author's research focus. The author's study focuses on younger children, learners in elementary school. Most of the previous studies on the relationship between learning strategies and motivation have investigated older learners. In the author's teaching of primary school students, she found that many students' learning strategies and motivation are inappropriate. Elementary school is not to be ignored, as it has a critical impact on one's career development, and correct learning strategies and motivation play a crucial role in the process of digesting and absorbing new knowledge. Cultivation from elementary school can help children form good study habits. These habits will form the basis of their future learning career, such as self-management, planning and organization. The right learning strategies can help students learn more effectively. For example, with targeted reading, memorization, and review strategies, children are better able to understand and remember new information, reducing the likelihood of forgetting. And strong motivation can inspire students to learn, making them more willing to spend time and energy on learning and to maintain a positive attitude in both difficult and easy subjects. Whether they face setbacks or successes, they can maintain a steady motivation to learn. Knowing how to learn is an important life skill. Childhood is an ideal time to develop this skill because children at this stage have a great deal of creative thinking and imagination that can be directed to develop their critical thinking skills. The development of learning strategies and motivation prepares children early for the academic pressures of higher learning challenges such as high school, college, and even graduate school. Therefore, the right learning strategies and motivation should be developed from elementary school onwards, so that children can go farther and smoother on their academic path.

Secondly, there is an improvement in the research question. Since the specific relationship between learning strategies and motivation has not been clarified in previous studies, the results of different studies have given

different conclusions, with some suggesting that learning strategies affect motivation, while other studies suggest that it is motivation that drives the use of learning strategies (Zimmerman, B.J., & Schunk D.H., 2001). Several research questions designed by the author delved deeper into the relationship between the two: (1) Is there a correlation between motivation and learning strategies? (2) What is the effect of learning motivation on the choice of learning strategies in the selection and use of learning strategies among students with different learning motives? (3) What type of motivation is more helpful for students? And what type of motivation is more helpful for students to use effective learning strategies? (4) Are there any relationships between students' purpose of studying and gender? And are there any relationships between students' learning strategies and gender? The in-depth investigation of these questions is helpful to explain the interaction between learning motivation and learning strategies more clearly, and help learners to improve their learning methods, optimize their learning strategies, and improve their learning efficiency.

Finally, the questionnaire is improved. Unlike the previous questionnaires which might lead to the respondents not being clear about the meaning of the questions, the author made it clear before distributing the questionnaires that because the respondents were young, they could ask their teachers and parents if they were not clear about the questions. The validity of the questionnaire results is guaranteed. And the author designed the questionnaire. Each question and option is designed based on the relevant theories of learning motivation and learning strategies, with sufficient theoretical basis to ensure the credibility of the questionnaire.

3. Methodology

3.1 Research Design: Quantitative Study

This study utilizes the quantitative research design. Data will be collected through a questionnaire. Quantitative questionnaire is a method of data collection whose main goal is to quantify variables or concepts so that the results of these observations can be generalized to a larger population through statistical analysis (Fowler, 2013). The main advantage of quantitative questionnaires is that it allows for the rapid and systematic collection of a large amount of data on participants' perceptions, attitudes, behaviors, etc., by setting up specific questions with pre-set answer options (Babbie, 2010).

In studying the relationship between motivation and learning strategies of primary school students, the author chose to use quantitative questionnaires because firstly, quantitative questionnaires can be distributed to a large number of primary school students at the same time and collect a large amount of data. Secondly, by setting quantitative questions and options, the motivation and learning strategies of primary school students can be quantitatively described, which is convenient for subsequent data statistics and analysis. Thirdly, the researcher's subjective influence can be avoided, and primary school students can answer according to their own actual situation, which improves the objectivity of the study. And the results obtained are easy to compare and analyze the differences, through the quantitative data can be more clearly seen between different primary school students, or the same primary school students in different times and situations of learning motivation and strategy differences. Finally quantitative data can be used to build mathematical models to further explore the relationship between motivation and learning strategies, or even to make certain predictions. Overall, the use of quantitative questionnaires can be used to collect and understand relevant data more effectively and reveal the relationship between learning motivation and learning strategies of primary school students in a scientific way.

3.2 Research Method

For the topic of studying the correlation between elementary school students' motivation and learning strategies, the author adopts a correlation survey design. The purpose of the correlation survey is to explore the degree of correlation between the variables by collecting data, i.e., to find out whether there is a correlation between learning motivation and learning strategies and the strength of the degree of correlation. The author's correlation survey design is as follows:

Firstly, on the selection of the research subjects, the author chose elementary school students from an elementary school located in Kunming City, Yunnan Province, China as the research subjects. The author chose three grades of elementary school students from fourth to sixth grade, and the sample size was originally determined to be 90, 30 for each grade, according to the purpose and feasibility of the study. The number was later increased to 111 students due to the high number of participants.

The next step was the selection of measurement tools. The questionnaire designed by the author included questions on both motivation and learning strategies. The questionnaire included 15 questions in total. Regarding learning motivation, the author adopted the theoretical basis related to learning motivation for the design, using, for example, the definitions of intrinsic motivation and extrinsic motivation in the self-determination theory proposed by Ryan, R. M., & Deci, E. L. (2000), which ensured the credibility of the designed questions. In terms of learning strategies, the author designed some questions to understand the strategies that students often use in learning. Metacognitive strategies (Flavell, 1979) were included, defining that metacognitive strategies are

strategies used by individuals to control, monitor, plan, and regulate their cognitive processes while performing cognitive activities. Cognitive strategies (Weinstein & Meyer, 1986), defined that cognitive strategies are strategies that students use to improve their learning skills in order to improve their academic performance. As well as resource management strategies (Pintrich, 2000), which defines resource management strategies as a strategy that focuses on how individuals manage and organize their time, effort, material resources, and other external conditions in order to improve their learning abilities, and social support theory (Cohen & Wills, 1985) among other learning strategies such as comprehension of information, memorization, thinking and problem solving, reviewing, note-taking, etc. The questionnaire includes some basic personal information questions such as grade level, gender, etc. in order to analyze and compare the differences between different ages. The questionnaire is presented in Appendix.

Then is the collection of data. Before distributing the questionnaires, it was explained to all participants and their guardians that participation was voluntary.

Participation in the questionnaire would not result in any reward for participating in the study, but the results of the survey would be helpful to the children in the future. Prior to the study, all participants signed a consent form and were informed that they could withdraw from the study at any time and that it was voluntary throughout. The selected sample received the questionnaire and the data collection was done in traditional paper format. This choice of data collection method has certain rationality and practicality. The traditional paper format of questionnaire has some advantages in data collection. The use of paper questionnaires can ensure the accuracy and completeness of data.

Participants can fill in the answers directly on the paper, which avoids misuse or omission due to the participants' young age and unfamiliarity with online questionnaire tools. The author's choice takes into account both data accuracy and participant convenience, and combines the advantages of both paper and online tools. By using different data collection methods in a reasonable and flexible manner, the needs of the study can be better met, high-quality data can be obtained, and strong support can be provided for subsequent analysis. The purpose and importance of the survey were explained to the participants before the questionnaires were distributed, and participants were assured of the privacy of the questionnaires and that the results of the questionnaires would only be used for the study, and this operational process ensured both privacy and confidentiality of the questionnaire's completion process.

Finally, the data results were analyzed. Different questionnaires have different methods of analysis, as most of the questions on this questionnaire of the author are nominal questions. A common method of data analysis for nominal questionnaires is the chi-squared test. Chi-squared test is a hypothesis test in statistics used to test whether there is a significant relationship between two or more categorical variables. It is a type of non-parametric test that can be used in two main statistical scenarios:

One is Goodness of fittest. The chi-square dominance test can be used when a researcher wants to test whether the distribution of a sample of data conforms to some theoretical distribution. The second is Test of independence, which can be used when we want to test whether two categorical variables are independent from each other. In performing the chi-square test, we first setup an original hypothesis (H0), which usually indicates that no effect exists, i.e., that the two sets of data are independent or that the distribution of one variable does not differ from the reference distribution. The chi-square statistic is then calculated and the rejection of the original hypothesis is determined by comparing it to a threshold at a specified level of significance for the chi-square distribution. If the statistic is greater than this threshold, then we consider that the data provide sufficient evidence to reject the original hypothesis, indicating the presence of statistical significance. The chi-square test has a wide range of applications in the social sciences, market research, and other fields, and is especially useful when dealing with categorical data.

3.3 Selection of Research Samples

(1) Quota sampling: Quota sampling is an on-probability sampling technique that ensures that individuals in a sample that include certain characteristics match the proportion of those characteristics in the overall population. In quota sampling, the researcher first identifies a few key demographic characteristics and then decides how many respondents are needed in each subgroup (or quota) accordingly. Earl Babbie (2016) explain show quota sampling operates and its use in practicing social research. He noted that this sampling method allows the researcher to control the composition of the sample while maintaining sample diversity so that the sample is a better reflection of the important characteristics of the target population. To use quota sampling, the researcher needs to first analyze the aggregate and decide on the characteristics that will serve as the basis for the quota (e.g., age, gender, level of education, etc.), which should be relevant to the research question. After that, the aggregate is divided into subgroups based on these characteristics, and then the quota that each subgroup should have in the sample is set.

Next, the researcher selects individuals from each subgroup using anon-randomized approach until each quota is met. Quota sampling is simpler and faster to perform and relatively inexpensive compared to probability sampling methods such as simple random sampling or stratified sampling, but due to the lack of randomness, its results are not statistically representative, increasing the risk of selection bias and making it difficult to extrapolate from the sample to the whole. Quota sampling is widely used in market research and opinion surveys, but it is usually not recommended for studies that require a high degree of accuracy and generalizability.

(2) Age selection: The author chose elementary school students in grades 4-6, who are generally around nine to twelve years old. The reason for choosing students in this grade is that their minds are relatively more mature at such a young age as elementary school, and students in this grade will soon take part in the Primary School Entrance Examination, so they need to master the correct learning strategies and motivation for learning, and they have their own opinions about learning strategies and motivation.

(3) School selection: The author chose students from an elementary school in Kunming, Yunnan Province, as the target population.

(4) Sample size: The author chose a sample size of 111 students in total, of which there are 56 boys, accounting for 50.45%, and 55 girls, accounting for 49.55%. There were 30 students in the fourth grade with a percentage of 27.03%, 48 students in the fifth grade with a percentage of 43.24%, and 33 students in the sixth grade with a percentage of 29.73%.

(5) Participant Consent: Before selecting the sample and conducting the survey, the author obtained the consent of the school and communicated with the elementary school students and their parents or guardians to ensure that the content of the questionnaire would not involve personal privacy, that the participants would participate anonymously, and that the questionnaire would not disclose personal information. All data will be anonymized and securely stored on a hard drive. Only the researcher will have access to the raw data. The actual data will be kept for six months. And the study does not involve any criminal activities. The results of the questionnaire will also be used for research purposes only, with their consent to participate in the study. The participation is voluntary and the participants are free to withdraw at anytime without any adverse effects on the participants.

4. Results

Result of Q1&Q2: Is there a correlation between motivation and learning strategies? What is the effect of learning motivation on the choice of learning strategies in the selection and use of learning strategies among students with different learning motives?

Table 1.

2. What do you think are the main factors affecting your academic performance? * 15.8 Ask a teacher or parent for help (resource management strategy) 交叉表

计数

		15.8 Ask a teacher or parent for help (resource management strategy)		
		not checkrd	checked	总计
2. What do you think are the main factors affecting your academic performance?	intelligence	10	11	21
	learning fundamentals	15	2	17
	teachers	32	8	40
	self-effort	28	5	33
总计		85	26	111

卡方检验

	值	自由度	渐进显著性（双侧）	精确显著性（双侧）	精确显著性（单侧）	点概率
皮尔逊卡方	12.626[a]	3	.006	.005		
似然比	11.360	3	.010	.014		
Fisher-Freeman-Halton 精确检验	10.853			.011		
线性关联	7.199[b]	1	.007	.009	.005	.002
有效个案数	111					

a. 2 个单元格 (25.0%) 的期望计数小于 5。最小期望计数为 3.98。

b. 标准化统计为 -2.683。

After the author's analysis, it was found that regarding the relationship between learning strategies and learning strategies, the following tables can illustrate the relationship between the two very well. In Table 1, the relationship between the factors that learners believe influence their learning (intrinsic motivation or extrinsic motivation) and the learning strategies that they often adopt in their learning (this question examines resource management strategies) is explored. First of all, in the question of what learners believe to be the main factors affecting their academic performances, the intellectual factors, the learning foundation, and the teacher's influence in the options belong to the extrinsic factors, which are factors affecting the learner's extrinsic motivation, while self-effort belongs to intrinsic motivation. In the table, about 27% of the students who relied on extrinsic motivation chose the strategy of asking for help from others, i.e., resource management strategy, while only about 17% of the students who relied on intrinsic motivation chose to rely on asking for help from others ($x^2=12.626$, $p<0.05$).

A study by Wolters (1999) found a link between the use of resource management strategies and motivational regulation. This study noted that while those students who tended to self-regulate their motivation were more likely to use resource management strategies such as time management and asking for help. This study focused on self-regulated intrinsic motivation, but some of the findings could also apply to students who are driven by extrinsic factors, especially if they try to improve their learning by using resource management strategies. Thus, students who rely on extrinsic motivation are also likely to be more inclined to use resource management strategies than students who rely on intrinsic motivation.

Table 2.

3. Do you think we should study hard for our ideal since childhood? * 9. When you have a problem, you tend to: 交叉表

计数

		9. When you have a problem, you tend to:				
		Put it aside and wait for the teacher	Ask the teacher first, then do it yourself	Ask your classmates first, then do it yourself	Think it over and over before you ask others	总计
3. Do you think we should study hard for our ideal since childhood?	Whether I study well or not has nothing to do with my ideal.	2	5	7	1	15
	It's a long way from growing up. We'll see.	5	4	13	8	30
	Well, it's very necessary.	5	10	11	40	66
总计		12	19	31	49	111

卡方检验

	值	自由度	渐进显著性（双侧）	精确显著性（双侧）	精确显著性（单侧）	点概率
皮尔逊卡方	22.716[a]	6	<.001	<.001		
似然比	24.600	6	<.001	<.001		
Fisher-Freeman-Halton 精确检验	23.971			<.001		
线性关联	10.526[b]	1	.001	.001	<.001	.000
有效个案数	111					

a. 4 个单元格 (33.3%) 的期望计数小于 5。最小期望计数为 1.62。

b. 标准化统计为 3.244。

Table 2 explores the relationship between whether learners believe that they should study hard from an early age for the sake of their ideals (intrinsic learning motivation) and what solution strategies learners tend to choose when they encounter problems.

Among the 66 students who chose to believe that studying hard from an early age is necessary for their aspirations (i.e., students with intrinsic motivation), 40 of them, or about 60%, chose to think about it over and over again on their own (i.e., the thinking strategy of cognitive strategies) before asking others. In contrast, there were 45 students who were not intrinsically motivated, and only 9 of them chose the cognitive strategy, i.e., only 20% of them chose the cognitive strategy to solve the problem ($x2=22.716$, $p<0.001$). Students with intrinsic motivation are indeed more inclined to use effective cognitive strategies, which is widely supported in educational psychology research.

Intrinsic motivation means that an individual is motivated to derive satisfaction and enjoyment from the activity itself, rather than for some extrinsic reward or other pressure. Students with higher levels of intrinsic motivation typically show better learning outcomes and deeper approaches to learning. Wolters, C. A. in 1999 explored the relationship between high school students' motivational regulation and their use of learning strategies, engagement of effort, and classroom performance and found that intrinsic motivation was significantly and positively correlated with use of positive learning strategies and high classroom performance. Pintrich, P. R. in 2003 also suggested that the role of intrinsic motivation in students' motivation is more important than that of intrinsic motivation. It also presented a motivational science perspective on the role of student motivation in learning and teaching contexts, emphasizing the importance of core self-regulation strategies with intrinsic motivation. That is, students who are intrinsically motivated will be more motivated to use effective learning strategies to learn than those who rely on extrinsic motivation.

Table 3.

7. When do you always do your homework after you get home? * 9. When you have a problem, you tend to: 交叉表

计数

		9. When you have a problem, you tend to:				
		Put it aside and wait for the teacher	Ask the teacher first, then do it yourself	Ask your classmates first, then do it yourself	Think it over and over before you ask others	总计
7. When do you always do your homework after you get home?	I still don't want to do it when my parents push me	1	4	6	4	15
	Play first and then write	3	4	10	5	22
	When my parents or tutors push me	5	6	5	4	20
	I do my homework on my own initiative	3	5	10	36	54
总计		12	19	31	49	111

卡方检验

	值	自由度	渐进显著性（双侧）	精确显著性（双侧）	精确显著性（单侧）	点概率
皮尔逊卡方	27.352[a]	9	.001	.001		
似然比	26.838	9	.001	.003		
Fisher-Freeman-Halton 精确检验	26.593			<.001		
线性关联	8.034[b]	1	.005	.005	.003	.001
有效个案数	111					

a. 7 个单元格 (43.8%) 的期望计数小于 5。最小期望计数为 1.62。

b. 标准化统计为 2.834。

Table 3 explores the relationship between when learners do their homework at home (motivation to learn) and what they prefer to do when they have a problem (learning strategy). The question option Think carefully before asking others belongs to the cognitive strategy of thinking, while asking classmates or teachers first belongs to the resource management strategy. There were 54 students with intrinsic motivation (i.e., those who took the initiative to do their homework when they went home), and 36 of them chose the cognitive strategy of thinking about themselves, which is about 67%.

Resource management strategy was chosen by 28% of them. In contrast, there were 20 students who relied on external motivation, only 20% of them chose the cognitive strategy and 55% of them chose the resource management strategy ($x2=27.352$, $p<0.001$). Self-reflective learning strategies are often considered effective in educational psychology and cognitive science because they promote deep learning and better information retention. Self-reflection (e.g., self-questioning, critical thinking) requires learners to go beyond simple memorization to analyze, evaluate, and create knowledge. Self-explanation is a form of self-reflection, and Chi et al. (1989) showed that learners who self-explain when learning tasks can better understand and remember new information. Bransford, Brown, & Cocking (2000) emphasized the importance of understanding the meaning behind concepts and principles for knowledge transfer.

Self-reflection helps learners to grasp the underlying concepts that can be used across different contexts and problems. Therefore, students with intrinsic motivation to learn are more inclined to choose more effective learning strategies such as self-reflection strategies among cognitive strategies.

Result of Q3: What type of motivation is more helpful for students? And what type of motivation is more helpful for students to use effective learning strategies?

Table 4.

5. Your reaction to a question from your teacher in class is: * 6. Your status in class is: 交叉表

计数

		6. Your status in class is:				
		Depend on your mood	Listen only to what you think is important	Listen with questions you don't understand	Listen carefully and take proper notes	总计
5. Your reaction to a question from your teacher in class is:	Apathetic	4	4	3	3	14
	Participate in thinking, but don't want to raise your hand	4	6	18	17	45
	Think positively and raise your hand to speak	1	4	30	17	52
总计		9	14	51	37	111

卡方检验

	值	自由度	渐进显著性（双侧）	精确显著性（双侧）	精确显著性（单侧）	点概率
皮尔逊卡方	18.169[a]	6	.006	.006		
似然比	16.225	6	.013	.018		
Fisher-Freeman-Halton 精确检验	15.952			.009		
线性关联	8.001[b]	1	.005	.005	.003	.001
有效个案数	111					

a. 5 个单元格 (41.7%) 的期望计数小于 5。最小期望计数为 1.14。

b. 标准化统计为 2.829。

In Table 4, the relationship between learners' responses to questions taught by the teacher in the classroom (learning motivation) and students' status in class (learning strategies) is explored, and students' active response to questions belongs to a manifestation of intrinsic learning motivation. Intrinsic learning motivation is the motivation of an individual because of interest in the content of learning, curiosity, or satisfaction in accomplishing a task itself. Actively answering questions maybe due to an individual's interest in the topic being studied or enjoyment of the problem-solving process, which is self-motivated without external rewards (Ryan, R. M., & Deci, E. L., 2000). And there are two options in the question about students' status in the classroom: listening attentively and taking notes or listening with unclear questions. Listening attentively and taking notes belongs to the cognitive strategy of learning strategies. By taking notes, learners can organize and reconstruct the information they hear or read so that they can better understand and remember it. Listening to lectures with unanswered questions, on the other hand, belongs to the receptive strategy of learning strategies, which mainly refers to the students' ability to understand and accept the learning content, including paying attention, listening, memorizing and comprehending. Cognitive strategies usually involve active processing of learning materials, including processes such as organizing, summarizing, remembering, and summarizing. In the table there are 52 students with high motivation to learn and 47 of these students with high motivation to learn which is about 90% of them choose to use cognitive or receptive strategies in learning strategies, while there are 14 students with low motivation to learn and only 6 of them which is about 42% of them will choose to use the right learning strategies to learn (x^2= 18.169, $p<0.05$). This shows that students with higher motivation to learn are more inclined to use correct learning strategies.

Table 5.

7. When do you always do your homework after you get home? * 6. Your status in class is: 交叉表

计数

		6. Your status in class is:				
		Depend on your mood	Listen only to what you think is important	Listen with questions you don't understand	Listen carefully and take proper notes	总计
7. When do you always do your homework after you get home?	I still don't want to do it when my parents push me	1	2	6	6	15
	Play first and then write	0	4	9	9	22
	When my parents or tutors push me	6	3	5	6	20
	I do my homework on my own initiative	2	5	31	16	54
总计		9	14	51	37	111

卡方检验

	值	自由度	渐进显著性（双侧）	精确显著性（双侧）	精确显著性（单侧）	点概率
皮尔逊卡方	20.613[a]	9	.014	.014		
似然比	18.082	9	.034	.055		
Fisher-Freeman-Halton 精确检验	16.391			.036		
线性关联	.041[b]	1	.840	.848	.443	.038
有效个案数	111					

a. 7 个单元格 (43.8%) 的期望计数小于 5。最小期望计数为 1.22。

b. 标准化统计为 -.202。

In Table 5 the relationship between when students go to do their homework after school (motivation to learn) and students' status in the classroom (learning strategies) is explored. In the above analysis the author explains that there are two options in the options for the question of students' status in the classroom: listening attentively and taking notes or going to the lectures with unclear questions. Listening carefully and taking notes belongs to the cognitive strategy of learning strategies. Listening with unclear questions is a receptive strategy. As for the option of when to do homework at home, only students' self-initiative to do homework belongs to intrinsic motivation. The number of students who are intrinsically motivated in this group of analysis is 54, and 47 of them choose the right learning strategy to study, which means that about 87% of them will use the learning strategy that will help them to improve their learning efficiency to study. The number of students who were forced by their parents or teachers to do their homework was 20, which is part of the group of students who rely on extrinsic motivation to study, and only 55% of them would choose the right learning strategies to study ($x2=20.613$, $p<0.05$). Thus, it also shows that students with intrinsic motivation are more inclined to go for the correct learning strategies to learn.

Table 6.

7. When do you always do your homework after you get home? * 9. When you have a problem, you tend to: 交叉表

计数

		9. When you have a problem, you tend to:				
		Put it aside and wait for the teacher	Ask the teacher first, then do it yourself	Ask your classmates first, then do it yourself	Think it over and over before you ask others	总计
7. When do you always do your homework after you get home?	I still don't want to do it when my parents push me	1	4	6	4	15
	Play first and then write	3	4	10	5	22
	When my parents or tutors push me	5	6	5	4	20
	I do my homework on my own initiative	3	5	10	36	54
总计		12	19	31	49	111

卡方检验

	值	自由度	渐进显著性（双侧）	精确显著性（双侧）	精确显著性（单侧）	点概率
皮尔逊卡方	27.352[a]	9	.001	.001		
似然比	26.838	9	.001	.003		
Fisher-Freeman-Halton 精确检验	26.593			<.001		
线性关联	8.034[b]	1	.005	.005	.003	.001
有效个案数	111					

a. 7 个单元格 (43.8%) 的期望计数小于 5。最小期望计数为 1.62。

b. 标准化统计为 2.834。

Table 6 explores the relationship between when learners do their homework at home (motivation to learn) and what they prefer to do when they have a problem (learning strategy). The question option Think carefully before asking others belongs to the cognitive strategy of thinking, while asking classmates or teachers first belongs to the resource management strategy. There were 54 students with intrinsic motivation (i.e., those who took the initiative to do their homework when they went home), and 36 of them chose the cognitive strategy of thinking about themselves, which is about 67%.

Resource management strategy was chosen by 28% of them. In contrast, there were 20 students who relied on external motivation, only 20% of them chose the cognitive strategy and 55% of them chose the resource management strategy (x^2=27.352, p<0.001). Self-reflective learning strategies are often considered effective in educational psychology and cognitive science because they promote deep learning and better information retention. Self-reflection (e.g., self-questioning, critical thinking) requires learners to go beyond simple memorization to analyze, evaluate, and create knowledge. Self-explanation is a form of self-reflection, and Chi et al. (1989) showed that learners who self-explain when learning tasks can better understand and remember new information. Bransford, Brown, & Cocking (2000) emphasized the importance of understanding the meaning behind concepts and principles for knowledge transfer.

Self-reflection helps learners to grasp the underlying concepts that can be used across different contexts and problems. Therefore, students with intrinsic motivation to learn are more inclined to choose more effective learning strategies such as self-reflection strategies among cognitive strategies.

Table 7.

10. What do you think learning is for? * 6. Your status in class is: 交叉表

计数

		6. Your status in class is:				
		Depend on your mood	Listen only to what you think is important	Listen with questions you don't understand	Listen carefully and take proper notes	总计
10. What do you think learning is for?	external motivation	8	10	25	26	69
	internal motivation	1	4	26	11	42
总计		9	14	51	37	111

卡方检验

	值	自由度	渐进显著性（双侧）
皮尔逊卡方	8.024[a]	3	.046
似然比	8.500	3	.037
线性关联	.469	1	.493
有效个案数	111		

a. 1 个单元格 (12.5%) 的期望计数小于 5。最小期望计数为 3.41。

In Table 7 the author directly categorized the options as intrinsic motivation (studying because one wants to study itself) and extrinsic motivation (studying well to make others jealous because of strict parents and to compare with others). Whereas the learning state was explained in the above analysis that listening attentively and taking notes belongs to the cognitive strategy, listening with unanswered questions belongs to the receptive strategy in the learning strategy. In this chart, the number of students who relied on intrinsic motivation to learn was 42, and about 88% of them chose appropriate learning strategies to learn. In contrast, the number of students who rely on extrinsic motivation is 69, and about 73% of them choose appropriate learning strategies to learn (x^2=8.024, $p<0.05$). This means that students with intrinsic motivation are more willing to use proper learning strategies to learn.

Table 8.

10. What do you think learning is for? * 9. When you have a problem, you tend to: 交叉表

计数

		9. When you have a problem, you tend to:				
		Put it aside and wait for the teacher	Ask the teacher first, then do it yourself	Ask your classmates first, then do it yourself	Think it over and over before you ask others	总计
10. What do you think learning is for?	external motivation	11	16	21	21	69
	internal motivation	1	3	10	28	42
总计		12	19	31	49	111

卡方检验

	值	自由度	渐进显著性（双侧）
皮尔逊卡方	16.543[a]	3	<.001
似然比	17.876	3	<.001
线性关联	15.652	1	<.001
有效个案数	111		

a. 1 个单元格 (12.5%) 的期望计数小于 5。最小期望计数为 4.54。

In Table 7, the relationship between what learners think learning is for (learning motivation) and how learners go about solving problems when they encounter them (learning strategies) is explored. There were 42 students with intrinsic motivation and 28 of them, or 67% of them, adopted cognitive strategies, while there were 69 students with extrinsic motivation and only 21 of them, or only 30% of them, adopted cognitive strategies (x^2=16.543, $p<0.001$). This shows that students with intrinsic motivation are more inclined to adopt effective learning strategies to learn.

Table 8

11. If you don't have any homework, will you take the initiative to learn? * 6. Your status in class is: 交叉表

计数

		6. Your status in class is:				
		Depend on your mood	Listen only to what you think is important	Listen with questions you don't understand	Listen carefully and take proper notes	总计
11. If you don't have any homework, will you take the initiative to learn?	Not	1	9	10	13	33
	Occasionally	5	3	27	13	48
	Definitely	3	2	14	11	30
总计		9	14	51	37	111

卡方检验

	值	自由度	渐进显著性（双侧）	精确显著性（双侧）	精确显著性（单侧）	点概率
皮尔逊卡方	13.398[a]	6	.037	.035		
似然比	12.993	6	.043	.062		
Fisher-Freeman-Halton 精确检验	12.189			.048		
线性关联	.026[b]	1	.872	.888	.465	.056
有效个案数	111					

a. 5 个单元格 (41.7%) 的期望计数小于 5。最小期望计数为 2.43。

b. 标准化统计为 .161。

Table 8 examines the relationship between whether students will be active in learning without homework (motivation to learn) and their status in the classroom (learning strategies), students who choose to be active in learning have strong intrinsic motivation, there are 30 of them, and a total of 25 of them will use cognitive and receptive strategies, which is 83%. While the students who do not want to study extra at all, i.e., those who do not have intrinsic motivation to learn, are 33 in number, and 23 of them will use learning strategies, with a percentage of 69% (x^2=13.398, $p<0.05$). This shows that students with intrinsic motivation are more inclined to adopt appropriate learning strategies to learn.

Result of Q4: Are there any relationships between students' purpose of studying and gender? Are there any relationships between students' learning strategies and gender?

Table 9.

Gender * 10. What do you think learning is for? 交叉表

计数

		10. What do you think learning is for?		
		external motivation	internal motivation	总计
Gender	Female	40	15	55
	Male	29	27	56
总计		69	42	111

卡方检验

	值	自由度	渐进显著性（双侧）	精确显著性（双侧）	精确显著性（单侧）
皮尔逊卡方	5.174[a]	1	.023		
连续性修正[b]	4.322	1	.038		
似然比	5.229	1	.022		
费希尔精确检验				.031	.018
线性关联	5.127	1	.024		
有效个案数	111				

a. 0 个单元格 (0.0%) 的期望计数小于 5。最小期望计数为 20.81。

b. 仅针对 2x2 表进行计算

By analyzing all the questions in this questionnaire in terms of gender as a grouping, basically there is no significant difference. However, there was a significant difference between boys' and girls' responses to the question on the purpose of studying (p=0.023). 40 (72.73%) girls and 29 (51.79%) boys scored 1, while 15 (27.27%) girls and 27 (48.21%) boys scored 2. In addition, there is no statistically significant difference in the responses of students of different genders in the three questions directed at the direction of serious study in elementary school, approach when dealing with hard study with little reward, and reasons for reluctance to study. In contrast, boys and girls differed in their perceptions of the learning strategies usually used in the learning process, with the main difference being whether or not they took notes or extracted important information during the learning process. A percentage of 70.91% of female students preferred to take notes or extract important information during the study process, while only 51.79% of male students were accustomed to taking notes or extracting important information during the study process (p=0.039). The specific perceptions of male and female students' responses to each question are shown in the Table 9. This finding coincides with the discussion that boys typically favor laziness and fear of trouble, while girls are diligent and hardworking (Voyer, D., & Voyer, S. D., 2014).

5. Conclusion

The purpose of this study is to further explore the close relationship between motivation and learning strategies among primary school students. The findings of a study conducted by Meece et al. in 1988 indicated that students with higher intrinsic motivation were more likely to select and utilize effective learning strategies to further enhance their learning outcomes. Students who are interested and motivated to learn are usually more active in finding learning methods and techniques that suit them. They are more likely to take the initiative in communicating and discussing with their teachers and classmates, actively participate in classroom interactions, and cooperate with the teacher's guidance in formulating study plans. They are also more likely to actively seek additional learning resources to broaden their knowledge, such as reading relevant books and learning online through Internet platforms. However, for students who lack intrinsic motivation, they may face more learning difficulties and frustrations. They may tend to use more traditional learning methods such as mechanical memorization or rote learning. Such methods maybe able to bring short-term results in some cases, but they often fail to help them truly understand knowledge and improve their learning ability.

Therefore, in order to develop students' intrinsic motivation to learn, educators and parents can use a range of strategies. For example, teachers, parents and schools should provide students with a variety of learning resources and environments to stimulate their interest in learning. Encourage students to actively participate in classroom interactions to develop cooperative learning and independent learning skills. Through these efforts, students can be helped to acquire better learning skills and strategies and improve their learning effectiveness, thus achieving better academic results. Intrinsic learning motivation is recognized as the main driver of active participation and efficient learning in the learning process (Deci & Ryan, 2000; Pintrich & Schunk, 2002). Intrinsic learning motivation stimulates the learner's desire for knowledge and spirit of exploration, keeping him or her continuously interested and engaged in learning. When a student is curious about a certain topic and generates spontaneous learning motivation, he or she will take the initiative to read related books, search for related Internet resources, and actively participate in related discussions and practical activities, so as to gain a deeper understanding of the topic and form a solid knowledge base. Intrinsic motivation can also motivate

learners to actively set goals, and self-monitor and adjust learning strategies to achieve better learning results. When a student develops intrinsic interest and motivation in a course, he or she will set specific learning goals and make corresponding learning plans. During the learning process, he or she will constantly reflect on and evaluate his or her own learning progress, discover deficiencies and adjust learning strategies in time to improve learning effectiveness. In addition, intrinsic learning motivation can enhance learners' self-efficacy and autonomy. When students intrinsically see the significance and value of learning and enjoy the sense of fulfillment it brings, they will feel confident and satisfied. This sense of self-efficacy and autonomy will further motivate learners and enable them to demonstrate greater self-discipline and persistence in their learning. When a student experiences that he or she is able to complete a task independently and get good grades, he or she will feel proud of his or her abilities and competence and be confident in future learning. To summarize, intrinsic learning motivation plays an important role in the learning process, which not only stimulates learners' interest and engagement in learning, but also motivates learners to set goals and adjust strategies effectively, and enhances their self-efficacy and autonomy. Therefore, in educational practice, we should emphasize and cultivate students' intrinsic motivation to provide them with exciting and meaningful learning experiences so as to enhance their learning effectiveness and achievement. On the one hand, intrinsic motivation inspires learners to seek challenges and deeper understanding of learning materials, which in turn leads to the pursuit of more complex and sophisticated learning strategies, such as self-monitoring and deep information processing (Wolters, 1999). For intrinsically motivated learners, they do not just learn to complete tasks or get good grades. They seek a genuine learning experience where they can acquire more knowledge and skills through deeper understanding of the learning material and further develop their learning and problem-solving abilities.

Intrinsically motivated learners are more willing to improve their learning by pursuing challenges and deeper understanding of the learning materials, utilizing learning strategies of self-monitoring and deep information processing. Their desire and pursuit of knowledge is not just about meeting tests or completing tasks, but about personal growth and a more holistic learning experience.

The author's further research also found that gender differences had a significant effect on learning strategy selection, with girls tending to choose more effective learning strategies, which is consistent with previous findings found by Heyder and Kessels in 2017. Girls' choice of learning strategies is more detailed and thoughtful, and they are good at utilizing various resources and tools to help them learn. For example, girls often mark keywords and important content when reading textbooks, make detailed review plans before reviewing, and divide the review content into different parts to attack them one by one. They also actively participate in discussions and team learning to gain more knowledge and ideas through cooperation and communication with their classmates. In contrast, boys maybe more inclined to direct knowledge instillation or mechanical memorization in their learning strategies, and they maybe more inclined to surprise revision before the examination without paying attention to regular knowledge consolidation and feedback. This makes them tend to perform less well than girls in long-term memorization and comprehension and application. This is not to say that boys' learning strategies are bad, but rather gender differences lead to differences in inclination towards learning strategies.

Therefore, it is very important for educators and parents to understand the effect of gender differences on learning strategies. They should notice the differences between students of different genders in the process of education and provide different learning support and guidance according to their characteristics. Respecting and encouraging girls to adopt the learning strategies they are adept at, while also guiding boys to gradually develop more systematic and in-depth learning styles in order to enhance overall learning outcomes. By recognizing and applying gender differences, we can better meet the learning needs of our students and help them reach their full potential. Duckworth and Seligman in 2006 found that self-discipline was a key predictor of achievement and that girls in their sample generally did better than boys in this area, and that girls were generally better at academic performance, a phenomenon that can be attributed to their ability to organize, plan, and self-manage their studies more effectively. Voyer, D. et al. in 2014 examined studies related to gender differences globally through a meta-analysis and found that females generally outperform males in educational achievement, although the extent of the difference varies by subject and age level. Specifically, girls are better at breaking down complex learning tasks into smaller subtasks and developing detailed study plans to accomplish them. When faced with a large assignment, girls set aside enough time in advance to rationalize their schedules, complete each part in stages, and plan to ensure quality completion and on-time submission. In addition, girls pay more attention to time management and are good at utilizing fragmented time for revision.

They may review their class notes on public transportation or use their lunch break to read some relevant study materials, thus maximizing the use of every minute to enhance their learning efficiency. All in all, girls' organization, planning and self-management strategies contribute positively to their learning, enabling them to better manage their academic tasks and achieve outstanding results. In addition, female students demonstrate greater self-regulation during the learning process, which further motivates them to use more effective learning

strategies (Zimmerman & Martinez-Pons, 1990).

To summarize the above, when designing instructional activities, educators should consider a combination of methods to stimulate and support students' intrinsic motivation to learn and use gender-sensitive strategies to promote the selection and use of more effective learning strategies for all students.

There are a range of methods and strategies that educators can use to better motivate and support students' intrinsic motivation to learn. They can design engaging content that is relevant to students' real lives, and use case studies, discussions, and hands-on activities to stimulate students' interest and motivation. In addition, educators can provide challenging learning tasks so that students can feel a sense of accomplishment and satisfaction in the process of solving problems, which in turn will promote their learning motivation. And the use of gender-sensitive strategies is also very important. In teaching, educators need to recognize the possible differences in learning strategies, learning styles and interests of students of different genders. By understanding students' gender characteristics and incorporating these characteristics into instructional design, educators can better meet students' needs and promote learning outcomes for all students. Taking the teaching about elementary school studied in this paper as an example, educators can flexibly utilize different forms of learning resources, such as text, pictures, audio and video, in order to create a rich and diverse learning environment. For boys, some competition-oriented learning activities can be provided to stimulate their sense of competition and winning mentality, while for girls, some cooperation-oriented learning tasks can be designed to encourage them to cooperate with others and cultivate their teamwork skills. Through targeted strategies and instructional design, educators can enable each student to choose and use more effective learning strategies to enhance their motivation and learning effectiveness. By recognizing the impact of intrinsic motivation on learning strategy choices, teachers can be more intentional in designing learning environments and activities that encourage self-driven learning. At the same time, understanding how gender affects the utilization of learning strategies can help teachers provide customized strategy training for both boys and girls to ensure that each student engages in learning in an optimal way.

Halpern, D. F et al. in 2007 presented research on gender differences in science and math, mentioning gender differences in areas such as spatial skills, intuition and problem solving strategies. Boys are more inclined to use intuition and spatial thinking when solving math problems, while girls are more detail-oriented and logical reasoning. Therefore, learning strategy training for boys and girls should be differentiated to address these differences. For boys, they can be helped to better understand and apply knowledge by focusing on guided examples and providing concrete situations. For example, when teaching mathematical concepts, teachers may choose to give some real-life examples, such as shopping and sports competitions, to help boys grasp mathematical concepts more intuitively. In addition, by using visualization tools such as charts and images, it also helps boys to better understand abstract concepts and apply them to solve practical problems. As for girls, they can be helped to grasp knowledge more effectively by emphasizing logical reasoning and providing detailed steps. For example, when teaching language writing, teachers can guide girls to follow a certain sequence of steps from making points to providing arguments to summarizing them. By emphasizing logical thinking and clarity of expression, girls will be able to express their ideas more fluently and improve the accuracy and coherence of their writing.

Therefore, by understanding the impact of gender on learning strategies, teachers can provide boys and girls with customized strategy training based on their characteristics.

Such a differentiated approach will help each student realize their potential and enhance learning outcomes so that each student can achieve optimal results in their learning.

By gaining a deeper understanding of students' motivation and learning strategies, educators can more effectively contribute to the academic growth and overall development of elementary students. This is an idea that has been mentioned in academic discussions. By understanding students' motivation, educators can target teaching methods and materials to stimulate students' interest and initiative in learning. At the same time, understanding students' learning strategies helps educators to provide them with suitable learning environments and resources to maximize and optimize learning outcomes. This in-depth understanding of students in education is important for their academic growth and overall development. Therefore, researchers in the academic field have emphasized educators' in-depth inquiry into students' motivation and learning strategies and provided a series of guiding principles and best practices to promote the academic growth and overall development of elementary school students.

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References

Abeysekera, L., & Dawson, P., (2015). Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *Higher Education Research & Development*.

Azinga, F., Ainley, M., & Sawyer, R. K. (Eds.)., (2020). *Learning Strategies. In Handbook of Learning Strategies*. Springer.

Babbie, E., (2016). *The practice of social research* (14thed.). Cengage Learning.

Bandura, A., (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191-215.

Boekaerts, M., (1999). Self-regulated learning: Where we are today. *International Journal of Educational Research*, *31*(6), 445e457. https://doi.org/10.1016/S0883-0355(99)00014-2.

Bransford, J. D., & Stein, B. S., (1993). *The ideal problem solver: A guide for improving thinking, learning, and creativity*. WH Freeman/Times Books/ Henry Holt & Co.

Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D., (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological Bulletin*, *132*(3), 354-380.

Chularut, P., & DeBacker, T. K., (2004). The influence of concept mapping on achievement, self-regulation, and self-efficacy in students of English as a second language. *Contemporary Educational Psychology*, *29*, 248-263.

Claessens, B. J. C., Van Eerde, W., Rutte, C. G., & Roe, R. A., (2007). A review of the time management literature. *Personnel Review*, *36*(2), 255-276.

Cohen, A. D., (2014). *Strategies in learning and using a second language* (2nded.). Routledge. https://doi.org/10.1016/j.cedpsych.2003.09.001

Dansereau, D. F., (1985). Learning strategy research. In J. Segal, S. Chipman, & R. Glaser (Eds.), *Thinking and learning skills*. Volume 1: Relating instruction to research (pp. 209e240). Hilsdale, NJ: Lawrence Erlbaum Associates Publishers.

Deci, E. L., (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, *18*(1), 105-115.

Deci, E. L., & Ryan, R. M., (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227-268.

Deci, E. L., & Ryan, R. M., (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Dignath, C., Buettner, G., & Langfeldt, H. P., (2008). How can primary school students learn self-regulated learning strategies most effectively?. *Educational Research Review*, *3*(2), 101-129.

Dunlosky, J., & Bjork, R. A., (2014). The integrated nature of metamemory and memory. In J. Dunlosky, & R. A. Bjork (Eds.), *Handbook of metamemory and memory*. London: Routledge. https://doi.org/10.4324/9780203805503.ch2.

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T., (2013). Improving students' learning with effective learning techniques. *Psychological Science in the Public Interest*, *14*, 4-58. https://doi.org/10.1177/1529100612453266

Dweck C.S. & Leggett E.L., (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*, 256-273.

Fang, Yuan, & Zhu, Beili., (2000). Relationships between middle school students' perceptions of the

motivational climate in the physical education classroom and internal motivation, self-efficacy, and athletic performance. *Psychological Science*, *23*(2), 236-237.

Field, A., (2013). *Discovering statistics using IBM SPSS statistics: and sex and drugs and rock 'n' roll*. Sage Publications.

Fiorella, L., & Mayer, R. E., (2016). Eight ways to promote generative learning. *Educational Psychology Review*, *28*, 717-741. https://doi.org/10.1007/s10648-015-9348-9.

Flavell, J. H., (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist*, *34*(10), 906-911.

Fowler, F. J., (2013). *Survey research methods*. SAGE.

Fuchs, L.S., Fuchs, D., Hosp, M.K. & Jenkins, J.R., (2001). "Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis." *Scientific Studies of Reading*, *5*(3), 239-256.

Gardner, R.C., (1985). *Social psychology and second language learning: The role of attitudes and motivation*. London: Edward Arnold.

Glogger-Frey, I., Ampatziadis, Y., Ohst, A., & Renkl, A., (2018). Future teachers' knowledge about learning strategies: Mis concepts and knowledge-in-pieces. *Thinking Skills and Creativity*. https://doi.org/10.1016/j.tsc.2018.02.001.

Gottfried, A.E., Fleming, J.S. & Gottfried, A.W., (2001). "Continuity of academic intrinsic motivation from childhood through late adolescence: A longitudinal study". *Journal of Educational Psychology*.

Gurlitt, J., & Renkl, A., (2008). Are high-coherent concept maps better for prior knowledge activation? Differential effects of concept mapping tasks on high school vs. university students. *Journal of Computer Assisted Learning*, *24*, 407-419. https://doi.org/10.1111/j.1365-2729. 2008.00277.x

Han, R.-S., (1998). An experimental study of attribution training for elementary and middle school students. *Journal of Psychology*, *30*(4), 10.

Herzberg, F., Mausner, B., & Snyderman, B.B., (1959). *The motivation to work*. John Wiley & Sons.

Houle, C. O., (1981). Continuing learning in the professions. *Journal of Continuing Education in the Health Professions*, *1*(1), 76-80.

Karpicke, J. D., & Roediger, H. L., (2008). The critical importance of retrieval for learning. *Science*, *319*, 966-968. https://doi.org/10.1126/science.1152408969

Kumar, R., (2011). *Research methodology: A step-by-step guide for beginners*. Sage.

Liu, W.C., & Huang, W.J., (2011). The effect of a role model project upon the academic self-concept of low achieving elementary students in Taiwan. *School Psychology International*, *32*(3), 297-310.

Li, Guancang, (2003). *Ten lectures on Confucius: Interpretation of traditional Chinese culture*. Beijing: People's University of China Press.

Lohse-Bossenz, H., Kunina-Habenicht, O., & Kunter, M., (2013). The role of educational psychology in teacher education: Expert opinions on what teachers should know about learning, development, and assessment. *European Journal of Psychology of Education*, *28*(4), 1543e1565. https://doi.org/10.1007/s10212-013-0181-6

Muelas, A., & Navarro, E., (2015). Learning strategies and academic achievement. *Procedia — Social and Behavioral Sciences*, *165*, 217e221. https://doi.org/10.1016/j.sbspro.2014.12.625.

O'Malley, J. M., & Chamot, A. U., (1990). *Learning strategies in second language acquisition*. Cambridge: Cambridge University Press.

Oxford, R. L., (1990). *Language learning strategies: What every teacher should know*. Newbury House Harper & Row.

Pena-Mora, F., & Vadhavkar, S., (1995). Resource management using strategic analysis of project interaction. *Journal of Computing in Civil Engineering*, *9*(4), 282-296.

Piaget, J., (1926). *The language and thought of the child*. London, UK: Rutledge and Kegan Paul.

Pintrich, P. R., (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, *95*(4), 667-686.

Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, W. J., (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ).

Pintrich, P. R., & De Groot, E. V., (1990). Motivational and self-regulated learning components of classroom

academic performance. *Journal of Educational Psychology*, *82*(1), 33.

Roediger, H. L., & Karpicke, J. D., (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, *17*(3), 249-255.

Rohrer, D., & Taylor, K., (2007). The shuffling of mathematics problems improves learning. *Instructional Science*, *35*(6), 481-498.

Ryan, R. M., & Deci, E. L., (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary educational psychology*, *25*(1), 54-67.

Schmeck, R. (Ed.)., (2013). Learning Strategies. In *Handbook of Learning Styles*. New York: Springer.

Schraw G., Moshman D., (1995). Metacognitive Theories. *Educational Psychology Review*, *7*(4), 351-371.

Tollefson, N., (2000). Classroom Applications of Cognitive Theories of Motivation. *Educational Psychology Review*, *12*(1), 63-83. https://doi.org/10.1023/a:1009085017100

Vygotsky, L. S., (1978). Mind in society: The development of higher psychological processes. In M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). Cambridge, MA: Harvard University Press.

Wang, Z. H., & Liu, P., (2000). Motivational factors, the influence of learning motivation on students' academic achievement. *Journal of Psychology*, *32*(1), 65-69.

Weinstein, C. E., & Mayer, R. E., (1986). The teaching of learning strategies. In M. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed.) (pp. 315-327). Macmillan.

Weiner, B., (1985). An attributional theory of achievement motivation and emotion. *Psychological review*, *92*(4), 548.

Winne, P. H., & Perry, N. E., (2000). Measuring self-regulated learning. *Handbook of self-regulation*, 531-566.

Weinstein, C. E., & Mayer, R. E., (2002). The teaching of learning strategies. *Handbook of Research on Teaching* 3rd edn. New York: Macmillan.

Wigfield, A., & Eccles, J. S., (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, *25*(1), 68-81.

Wittrock, M. C., (2010). Learning as a generative process. *Educational Psychologist*, *45*, 40-45. https://doi.org/10. 1080/00461520903433554

Wigfield, A., & Eccles, J. S., (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, *25*(1), 68-81.

Wolfgang, V. Niedermeyer, U.H., (2010). *Learning Strategies and Academic Success in University Continuing Academic Development.* Frankfurt am Main: Peter Lang Publishing.

Wolters, C. A., (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist*, *38*(4), 189-205.

Zhang, Yan, & Huang, Xiting, (1999). Characteristics of achievement motivation in people with low self-worth. *Journal of Southwest University: Social Science Edition*, (4), 82-86.

Zhou Zongkui, Zhang Zhidong, Wei Min, Zhao Qinghe, (2006). The development of metacognitive level in primary and secondary school students and its influencing factors. *Psychological Science*, *29*(5), 1305-1310.

Zimmerman, B. J., & Schunk, D. H. (Eds.)., (2001). *Self-regulated learning and academic achievement: Theoretical perspectives*. Routledge.

Zimmerman, B. J., (2002). Becoming a self-regulated learner: An overview. *Theory into practice*, *41*(2), 64-70.

Zimmerman B.J., (1990). Metacognitive Self-Regulation and Academic Achievement. *Methods in Educational Research*, *202*(25), 1542-1569.

Zinkevich, M., Weimer, M., Li, L., & Smola, A. J., (2010, December). Parallelized stochastic gradient descent. In *Advances in Neural Information Processing Systems*.