

A LITERATURE REVIEW ON THE ACADEMIC ACHIEVEMENT OF COLLEGE STUDENTS

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ABSTRACT

The development of higher education in the world has experienced the era of elitism, the era of popularization and the era of universalization. China is moving towards universal access to higher education, a strategic choice in line with international trends. The study of academic achievement of college students is an effective way to promote the quality of higher education process. Through a literature review related to academic achievement of college students, it is revealed that the measurement indexes of academic achievement tend to be diversified and the measurement tools are more perfect. Based on this, this study aims to present the shortcomings of existing studies in order to provide a reference for the future research direction of college students' academic achievement.

Keywords: college students, academic achievement, literature review.

INTRODUCTION

Academic achievement of college students is an important factor affecting the achievement of higher education goals (Zhu, 2016). Academic achievement is a direct manifestation of learning effectiveness and a valid indicator to evaluate the effectiveness of teaching and education in higher education as well as the overall development of students. Academic achievement of college students is influenced by various factors, and researchers have done a lot of research. In this paper, we review the relevant studies at home and abroad and comment on them accordingly.

The analysis of academic achievement has gradually become the focus of research by scholars and experts, but the definition of the concept is still controversial. In this paper, academic achievement is used as an outcome variable to investigate how to motivate higher vocational college students to learn while promoting academic achievement. Therefore, a literature review of the concept of academic achievement and its influencing factors is conducted to provide theoretical support for this study.

Academic is explained as "academic work, school work" (Pandey et al., 1996). The term "academic work" refers to the results achieved by students as a result of the accumulation of learning, while "school work" refers to the learning tasks set by the school and is characterized by stages. Achievement refers to the completion and attainment of a certain level that a student can achieve after a series of education or training, while performance refers to the result of an examination in a subject or a whole course (Lamas, 2015). However, some scholars consider achievement to be equivalent to grades, and it is on the basis of the different understandings of achievement and grades that scholars have differed in their definitions of academic achievement (Brookhart et al., 2016).

In general, academic achievement can be divided into two broad and narrow definitions, in which academic achievement in a broad sense refers to the improvement of students' overall quality during their school years. Astin (1984) believes that academic achievement includes cognitive and non-cognitive outcomes, as well as psychological and behavioral outcomes. Bloom (1956) argues that academic achievement includes: knowledge, values and attitudes, and skills or appropriate behaviors. The National Leadership Council on Liberal Education and America's Promise believes that student academic achievement cannot simply mean admission rates and the percentage of degrees earned, as it once did, but that the more important question is whether students have acquired the knowledge and competencies that are essential to their future life, work, and civic activities. Cai and Cao (2019) argue that academic achievement is not only about students' academic performance in school, but should also include all aspects of their knowledge, competence and literacy development. Academic achievement in a narrow sense refers to the measured performance of students through examinations at a certain study stage. In empirical studies of academic achievement, a considerable number of researchers adopt such definitions of academic achievement, especially in empirical studies of primary and secondary school students, researchers often define academic achievement as students' examination results, for example, Bao (2008), Ye (2013), Chen (2015), Li (2016), Li and Chai (2018) all define academic achievement as a definition of a learner's the performance of teaching and learning assessments, such as final examination results, achieved by the person in school.

CONNOTATION OF ACADEMIC ACHIEVEMENT

The term "academic" can be expressed as the result of school work, such as academic achievement. "Achievement" is explained as: (1) victory, establishment; (2) cultivation; (3) the result of a career. Academic achievement is defined as: (1) learned effort; (2) schoolwork. Achievement is defined as: the result obtained through study. The English translations of academic achievement are related to "academic learning", "educational attainment", etc. Academic simply refers to the performance of learning that is ultimately achieved through teaching, development and learning, which is obtained through achievement tests.

The desire of the country and society for excellent talents not only requires higher education with higher quality of talent cultivation, but also puts forward higher requirements on the academic performance of college students. The purpose of academic achievement survey is to improve the quality of education, promote social equity and improve the overall quality of students.

Through the relevant survey, the society can understand the current situation of education more clearly, which is conducive to timely monitoring and promoting the development of education (Quality Assurance & School-based Support Division Education Bureau, 2016). Taylor (2019)'s concept of "educational assessment" and the "goal-oriented" assessment theory have laid an important theoretical and technical foundation for educational assessment. Since the 1980s, organizations and countries around the world have been committed to developing and improving academic achievement survey systems and actively expanding the scale of academic achievement surveys in order to better achieve large-scale academic achievement evaluation (Kuh et al., 2006).

The development of the concept of college student academic achievement can be traced back to 1966, when the Cooperative Institution Research Program (CIRP) was created by the American Council on Education. After the 1960s, the emphasis on the academic achievement of college students led to the expansion of the CIRP beyond the academic outcomes of students to the learning process of students (Jury et al., 2018).

In the early 1980s, the National Survey of Student Engagement (NSSE) emerged in the United States. This survey, created by Indiana University, focused on the process and outcomes of college students' learning engagement and academic achievement. Until the 1990s, surveys on academic achievement gained focus worldwide, and academic achievement became a key element in measuring the growth of the amount of value in colleges and universities (OECD, 2016).

The definition of academic achievement of college students has the following representative views:

Firstly, academic achievement is considered to be equal to academic performance, and the common measure of academic achievement of college students is GPA (credit point average), which can be accurately calculated from the marks of each course to measure students' academic achievement. "Academic" means the result of school work. For example, test scores. When "achievement" is used as a noun, it refers to the results obtained in a career. Wang (2021) believed that academic achievement can be equated with academic performance. In a study of personality traits and academic achievement of secondary school students, Zhao and Guo (2012) measured academic achievement using students' midterm and final grades in language, mathematics, and foreign language subjects. Through an empirical study, Tang (2016) found that preschool education can improve students' future academic achievement (in the case of mathematical literacy) and can also promote educational equity.

Secondly, academic achievement contains cognitive, behavioral, and psychological connotations, and Astin (1974) argued that academic achievement can be divided into two aspects: namely, cognitive and non-cognitive outcomes; and psychological and behavioral outcomes. Pascarella (1991) and other scholars argued that in addition to cognitive ability, academic achievement also includes psychological factors such as intelligence, psychological change, perseverance. Bloom (1956) believes that it can be divided into the following areas: knowledge, attitudes, values, skills, or appropriate behavior.

Thirdly, emphasizing the manifestation of competencies, Minkowski (2015) believes that it contains values, analytical problem solving and social skills, among others, and Bowie (2015) believes that academic achievement value added is divided into three dimensions: core competencies, citizenship, and professionalism possessed. The study by Cheng (2015) explored the factors influencing the academic achievement of college students using cross-year data on variables such as academic achievement and social engagement, and found that "the higher the level of the student's institution, the more academic achievement is influenced by the student's personal input (including factors such as academic engagement, social engagement, and learning goals).

Wu and Li (2019) found that there were inter-school differences in academic achievement among graduating seniors in the "Top of the Class" program, but the differences were not more pronounced with better schools, and factors such as motivation and creativity had a significant positive effect on academic achievement. Fan and Wang (2018) predicted academic achievement and academic risk based on the field of learning analytics, which lies in constructing meaning from data. Li (2016) and other scholars conducted an empirical analysis of academic achievement of students in general higher education institutions through a survey of a sample of 939 college students, and the results showed that the academic achievement of students in general higher education institutions in general is to be improved, and in terms of gender, the academic achievement of female university students is higher than that of male university students.

Fourthly, the category of responsibility consciousness was added. Academic achievement is considered to include not only intelligence and practical ability, but also the mastery of knowledge of human society and nature, in addition to the examination of comprehensive learning ability, and responsibility consciousness (McKeown & Rosalyn, 2009). Academic achievement includes the emotional development of students in addition to their own cognitive and practical abilities.

It is easy to see that there is a wealth of research on the concept of academic achievement in China and abroad, but the most commonly accepted one is that proposed by the National Leadership Council for Liberal Education and America's Promise, which states that academic achievement of college students is not equal to the admission rate and the percentage of those who can earn a degree, but more important: whether students have acquired the essential knowledge and ability to face work and life (Bok et al., 2007).

FACTORS RELATED TO ACADEMIC ACHIEVEMENT

Intellectual factors used to be the focus of research on factors influencing academic achievement, and then with the development of related research, more non-intellectual factors, environmental factors, have received the attention of scholars.

In terms of intelligence, the study by Shao and Pi (1998) showed that intelligence factors were moderately positively related to students' academic achievement. Wang (2000) came to the same conclusion, finding a positive correlation between students' intelligence and academic achievement. Xing (1999) made a statement about the non-intellectual influences in foreign countries: motivational factors, emotional factors, and personality factors.

Alexander (1935) believes that non-intellectual factors should be valued and have the same effect on learners' academic achievement as intellectual factors. In contrast to this view, Wechsle (1950) argued that non-intellectual factors include both temperament and personality, and focused more on personality factors in between; Li (1997) developed the Non-Intellectual Factors Questionnaire for Primary and Secondary School Students, which the content includes 11 diagnostic measures of non-intellectual factors, such as achievement motivation, interaction motivation, cognitive interest, and motivation to win. The factors of achievement motivation and motivation to win have more influence on students' learning activities than other non-intellectual factors.

A review of the relevant literature reveals that scholars' research on the factors influencing academic achievement can generally be divided into two main areas: individual student characteristics and external environmental factors. Studies on students' individual characteristics such as Wang (2000), Zhang (2005) and Wang (2013) argue that students' internal motivation has a significant impact on students' academic achievement.

Zeng (2009) explored the influence of self-efficacy on students' academic achievement based on self-efficacy theory. Wu and Li (2010) found that students' intrinsic motivation, gender and creative tendencies have significant positive effects on academic achievement, and a few scholars have explored the influence of personality on students' academic achievement.

Research on the external environment can be divided into two main aspects: the family environment and the school environment. For example, Zhang and Zhao (2012), Wang Nyan (2017) and Yu and Yu (2020) explored the influence of parents' investment in their children's education, parent-child interaction and family economic status on students' academic achievement from the perspective of family environment and cultural capital, and Chen (2015) argued that teachers are always an important factor influencing students' academic achievement, specifically, teacher expectations, teacher efficacy, some teaching behaviours, teacher professional development practices, some personal characteristics of teachers, teacher styles, and teacher-student relationships all have significant effects on students' academic achievement. In another study on teacher-student relationships, it was found that both positive and negative teacher-student relationships affected students' engagement and academic achievement, and that negative teacher-student relationships even had a significant positive predictive effect when students struggled with learning. In contrast, studies on the influencing factors of postgraduate academic achievement focus on mentorship, financial support policies, study motivation, and family background. For example, Wang (2015) analysed the influence of mentoring style, frequency and content of mentoring on graduate students' academic performance from the perspective of mentoring, while some other researchers explored its relationship with graduate students' academic achievement based on the perspective of financial aid policy. For example, Liu (2016) used the structural-functional model as the theoretical basis to explore the influence paths of grant-based funding, self-help funding and deferred payment funding on graduate students' academic achievement, Li (2017) studied the influence mechanism of graduate student funding policies on graduate students' academic achievement by constructing a relationship model between graduate students' academic achievement and funding policies, in addition, Ling and Wang (2018), based on a qualitative study verified that graduate student motivation, mentor guidance, peer effects and family background jointly act on graduate students' academic achievement. A small number of scholars have also explored the impact of mode of entry on postgraduate academic achievement.

Individual external influences:

(1) Social network factors, including peer, interpersonal, and social interaction factors. Wang (2020) found that there is a significant difference in academic achievement among small groups of university students, that is, there is some degree of consistency in academic achievement within small groups of university students.

In other words, there is a certain degree of consistency in academic achievement within small groups of university students, and students with good academic performance will interact closely with their peers who also have good academic performance, forming a small group within the class with higher academic achievement; and vice versa. Zhang (2020) found that peers influence each other's learning attitudes, motivation and engagement behaviour, and that similarity in intrinsic motivation and behaviour for learning also leads to similarity in academic achievement between peers, with close friends are important influences on an individual's academic development.

(2) Family factors, including parental involvement, family interaction styles, family cultural capital, and the environment of the community in which they live. According to Liu (2018), parenting practices of families are inextricably linked to students' academic achievement. Liu (2018) found that the community environment in which students' families live affects students' academic achievement, that children in rural communities have lower language application skills than those in urban communities, and that the nature of the community significantly and positively influences parental involvement in education and parents' educational expectations.

(3) School factors, including teacher delivery style, teacher-student relationship, school support, and school information technology level. Gong (2019) found that the level of information technology in schools was not fully linearly related to students' academic achievement, i.e. low to medium levels of information technology could promote students' academic achievement, and while high levels of information technology had a hindering effect on students' academic achievement.

STUDIES ON ACADEMIC ACHIEVEMENT

Broadly speaking, academic achievement is a result of the subjective and objective assessment of learners through school teaching or self-study, which is a more permanent behavioural outcome, but which can also accumulate over time. In a narrower sense, academic achievement is defined as a record of learning in school subjects or the average academic performance in each subject studied (Zhang, 2010). It is a reflection of the learning outcomes achieved during the schooling period, and it is also a goal to be achieved by the student in learning education. For teachers, academic achievement enables them to identify their own shortcomings in the teaching process, to improve the quality of their teaching, to improve their teaching methods, and to make appropriate adjustments to their teaching methods (Stabback & Philip, 2016).

They can also make appropriate adjustments to their teaching style. The assessment of student achievement is therefore an essential part of the teaching and learning process in schools (Fisher & Bandy, 2019). It measures the specific results of teachers' teaching as well as the learning outcomes of students. Therefore, for many disciplines such as psychology, society and education, the study of academic achievement and the factors that influence it has always been an important proposition in their research (Leicht et al., 2018).

A review of previous literature on topics such as factors influencing differences in academic achievement has been identified:

In terms of subjects, the main subjects of research on the influences of academic achievement include low achievers and all students with different levels of academic achievement; in addition, there are many different types of research on high achievers, and the types of research on the influences of academic achievement can be divided into correlational, causal, descriptive and exploratory studies. The studies focus on analysing and aggregating survey data, and then carefully describing a phenomenon or theme that causes an impact on academic achievement, further attempting to identify the causal and correlational relationships that exist between variables and variables, using research methods that include both non-empirical and empirical studies (Loeb et al., 2017). As far as research methods are concerned, they can be divided into two types: quantitative research and qualitative research. The discursive approach also falls under the category of qualitative research. In terms of research content, there are many different starting points for studying the factors influencing academic achievement, including intervention studies and surveys of current conditions. In terms of the detailed classification of influencing factors, they can also be divided into social and individual factors. Individual factors include, firstly, cognitive factors, such as the use of learning strategies and methods, the accumulation of knowledge and individual intelligence, and secondly, non-cognitive factors, such as learning efficacy, self-concept, motivation and individual traits. Social factors include, firstly, family factors such as parental expectations, parental involvement and educational style, but also parental literacy, economic status and family structure; secondly, school factors such as peer relationships, classroom climate, teaching style and teacher expectations; and finally, regional factors such as community resources, religious beliefs and ethnicity.

STUDIES ON ACADEMIC ACHIEVEMENT OUTSIDE CHINA

The concept of "academic achievement of students in higher education" first emerged in the United States in the evaluation of students' abilities at Stanford University, dating back to around 1930, and then began to be widely used in higher education institutions around the world ((Kuh et al., 2006)). The I-E-O model was developed by Astin after 1960, which considered the relationship between the "environment", "inputs" and "outputs" of higher education to be interactive (Astin, 1993). Since then, Astin has developed the concept of student engagement, in which students are expected to actively participate in school activities in order to achieve better learning outcomes, and student learning is the total process of student engagement. The more energy students put into meaningful activities, the more knowledge they will gain. The effectiveness of student engagement is an important indicator of the quality of university education (Coates, 2005). The American scholar J. Coleman, in 1966, surveyed and studied nearly 4,000 colleges and universities and noted that student academic achievement was up to 70 per cent of the total quality of education. This report, known in educational history as the Coleman Report, caused a public outcry, leading the public to question the quality of higher education and to rethink the important role that student achievement plays in the assessment of higher education activities (Coleman, 1966). In terms of the actual factors influencing the academic achievement of university students, it is still common for scholars abroad to study this area, with institutional influence theory being a typical representative. Early on, institutional influence theory suggested that two of the more important factors influencing individual students were student behavior and institutional characteristics (Jabeen & Rafiuddin, 2015). McLean and Saunders' (1983) work emphasized that academic achievement should be defined in strict legal terms and that it should be integrated into the effectiveness of higher education. Pace (1982) argues that universities have an important responsibility for student development, such as providing adequate resources and facilities for student learning and development, as well as more incentives for students.

Smart and Toutkoushian (2001) show that the effect on student achievement varies according to the type of school, with schools own doctoral programmers having a greater impact on student achievement than schools with ordinary programs. Pike et al. (2003), based on a model of the relationship between academic achievement, individual student characteristics and the creation of a school level, showed that individual student characteristics had a more significant effect on academic achievement than the school level, such as evaluation, classroom behavior and academic achievement. In her doctoral dissertation, Flynt (2008) scrutinizes the relationship between teacher evaluation, classroom behavior and academic achievement.

In terms of academic achievement assessment mechanisms, in recent years, international instruments for assessing the academic achievement of university students have been diversified, with more than twenty-seven instruments developed by researchers in various countries, depending on the target population and the content of the assessment. The National Survey of Student Engagement (NSSE) is now the most commonly used questionnaire in the United States to assess the specific effects of students'

college experiences on different skills (Tendhar et al., 2013). The results of the survey show that there is a correlation between individual student learning gains indicators and student academic achievement, and that this is process-based, so there are some interventions that are important for institutional improvement (NSSE, 2013). The study of the factors influencing academic achievement shows that the individual student has a greater influence on his or her development than the school, and that the institutional factors are usually more influential than the student's own characteristics (Rugutt, 2005).

STUDIES ON ACADEMIC IN CHINA

From the perspective of conducting research on factors that influence students' academic achievement, Chinese scholars have conducted multifaceted research in this area, drawing on relevant measures from abroad. Zhu and Arnold (2014) de examined the direct and indirect effects of various types of student engagement such as after-school activities, social-emotional, learning emotions and learning behaviors on students' growth and development. From Ma and Wang (2002) research, it is known that maintaining a positive interpersonal relationship between teachers and students can help students to improve their academic achievement. In general, students with high academic achievement are more likely to receive encouragement and praise from their teachers and to gain the admiration of their peers, which helps them in their studies. Conversely, students with low academic achievement are often belittled by their peers and teachers do not have high expectations of them, and are harsher or more indifferent to them, which seriously undermines their motivation to learn. The results of Sun and Ding (2011) show that there is a moderate range of extra-curricular engagement in terms of self-learning and extra-curricular activity participation, and that the impact on students' overall development is marginal, with extra-curricular activity participation, active classroom participation and extra-curricular self-learning having different impacts on all aspects of students' development, mainly in terms of direction and degree of impact. Moreover, the impact of extracurricular self-learning and extracurricular participation on students' development varies by school type.

According to Zhou and Zhang (2006), whether it is the neurological type, the general ability complex, or the specific ability-reasoning, which tends to be physiological, the general ability complex tends to be more efficient, these all have a direct impact on the academic achievement of junior high school students. In terms of the overall academic performance of junior secondary students in the three main subjects, whether in terms of individual subject scores or total scores, students in the higher grouping have significantly higher academic performance than those in the lower grouping. They also scored significantly higher than students in the lower subgroups at the beginning and at the end of their junior year. Wang (2008) summarized the research findings on the academic achievement of primary and secondary school students in China, dividing them into different types of studies, namely descriptive studies, exploratory studies and causal or correlational studies.

The studies are classified according to the type of research: descriptive, exploratory and causal or correlational, and according to the method of research: quantitative research, qualitative research and "discursive" research, which is classified by the authors. The study population includes all pupils, including those with special needs, such as academically gifted children, intellectually disadvantaged children, children with learning difficulties and underachievers.

Special groups of students, such as academically gifted children, mentally retarded children, children with learning difficulties and academically underachieving children, have received much attention (Ford, 1994).

Most of the research has been conducted on individual factors, with non-cognitive factors accounting for the majority of the research. Zhang and Zhu (2009) study the financial situation of university students, showing that students who spend more on daily living expenses are less successful in school. Students from well-off families are always optimistic about employment and survival after graduation, so they do not spend much time on their studies, and therefore their academic achievement is lower.

Liu (2010) conducted a study on university students and found that students' self-efficacy is closely related to academic achievement and that parenting styles have a corresponding impact on students' self-efficacy, which in turn affects their academic achievement. Feng and Xu (2015) conducted a study on left-behind junior high school students and found that school environment can significantly affect students' academic achievement, and at the same time, school environment also affects students' psychological state, thus indirectly affecting students' academic achievement. Bao (2010) found that the academic qualifications, learning commitment, learning behavior and family economic background of university students are diverse and heterogeneous; the academic achievement of university students is not only determined by the organizational attributes of the university they live in, but also influenced by their own learning commitment, communication and interaction with teachers and peers, the quality of teaching and learning in the university, and the basic characteristics of students.

Pan and Gao (2017) conducted a survey on college students in a university in Henan Province by random sampling, and the survey results showed that college students' learning adaptation and dormitory interpersonal relationship could positively predict academic achievement, while the learning adaptation factor played a mediating role in the interaction between dormitory interpersonal relationship and academic achievement. Zhang (2013) conducted a questionnaire survey on 531 university students in Wuhan University, and found that academic goals and autonomy were closely related to academic achievement, and that clear academic goals could effectively improve academic achievement. Bowie (2010) used SEM structural equation modelling to model the influence of student engagement in Chinese universities. The results demonstrated that students' active participation in academic engagement can effectively improve academic achievement.

Most of the existing research has looked at family reasons and aspects of student development, but there is little research on the school environment and there is a lack of comprehensive research on the school environment in general.

To sum up, as far as the current research situation is concerned, the evaluation standards of students' academic achievement in Chinese universities are too simple, lacking a diversified and comprehensive evaluation system, and some universities even directly copy and adopt foreign academic achievement evaluation methods, lacking academic achievement evaluation standards. The current studies are mainly in the following aspects: in terms of research content, most of the studies are focused on the factors influencing the academic achievement of university students, and there are few studies that consider in depth the factors influencing the academic achievement of postgraduates and provide reference for the development of higher education and higher vocational education in China.

MEASUREMENT OF ACADEMIC ACHIEVEMENT

Academic achievement is an enduringly popular area of research worldwide, which has led to a rich body of structural constructs and research findings (Tremblay et al., 2012). PISA (Program for International Student Assessment), run by the Organization for International Economic Co-operation and Development, and TIMSS (Trends in International Measurement in Mathematics and Science) and PIRLS (Progress in International Reading Literacy Study), run by the International Association for the Evaluation of Educational Achievement, are some of the better known large-scale academic achievement assessment programmers (Eivers, 2010). TIMSS and PIRLS focus on students' understanding, application and reasoning skills, with TIMSS measuring academic achievement in mathematics, initially in three dimensions: content, performance expectations and opinion (Mullis & Martin, 2012). The TIMSS measures students' academic achievement in mathematics, initially in three dimensions: content, performance expectations and opinions, but later in two dimensions: content and cognition; and the PIRLS measures students' reading literacy in three dimensions: purpose, process and behavior and attitudes (Mullis & Martin, 2019). In addition to international organizations, countries around the world have developed systems to measure academic achievement in order to better promote the development of students' abilities and literacy, such as the National Assessment of Educational Progress (NAEP) in the USA and the Compulsory Education Quality Analysis and Evaluation Feedback System project in China (Alexander, 2018).

However, most of these systems focus on students at primary and secondary school levels, and very few specifically investigate the academic achievement of higher vocational college students. In practice, some studies have directly measured the academic achievement of college students using academic performance as an indicator. However, more studies have constructed multi-dimensional and multi-level structural models to investigate students' academic achievement. Based on the three dimensions of academic achievement, competence development and self-concept, Jia (2019) further subdivides academic achievement into major grades, study attitudes, general studies grades, overall grade ranking, professional skills, study methods, study habits and academic future planning; while competence development refers to various qualities beyond academic achievement and is divided into five dimensions, including problem solving, communication and coordination, information technology use, organizational leadership and Self-concept refers to the experience and perception of one's own existence, including the correct understanding of oneself, satisfaction with the current situation of life, satisfaction with family happiness and attribution of achievement, etc. From these aspects, the academic achievement level of university students is measured comprehensively. Li et al., (2019) measured the academic achievement level of university students through four dimensions: interpersonal facilitation, cognitive ability to learn, self-management ability and communication ability.

College and graduate students are assessed differently from elementary and junior high schools because of the diversity of content and assessment methods. For example, in the United States, standardized tests such as the CLA (Collegiate Learning Assessment) are mainly used to measure the critical thinking skills, problem-solving skills and analytical reasoning skills of university students, and the SERU-S self-assessment report of the University of California is able to obtain a broader range of academic achievement measures by using a method that allows students to self-assess (Douglass, 2012). Chinese scholars Li and Yang (2016) developed a college student academic achievement measurement scale with high reliability and validity from five components: college students' learning cognitive ability, communication ability, interpersonal facilitation, problem-solving ability and self-management ability. Cai and Cao (2019) measured "students' academic experience before enrollment, university-level coursework, university after-school activities, evaluation of institutional courses and teaching services, student development and basic information" to study the performance and variance analysis of college students' academic value-added, and Wu and Li (2019) measured "knowledge and ability" from two dimensions. This scale consists of four subscales measuring four dimensions: academic contribution, task performance, interpersonal facilitation and social comparison.

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