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A Comparative Study on the Influencing Factors and Process of Teenagers' Global Competence in Britain and Spain from the Theory of Ecosystem

Danhua Zhou[a], Yingzhuo Hou[b], Jingying Wang[a*]

[a] Faculty of Education, Beijing Normal University, Beijing 100875, P.R. China

[b] School of Physics and Electronic Technology, Liaoning Normal University, Liaoning 116029, P.R. China

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ABSTRACT

Global competence (GC) is an important component of countries' core competencies, which is particularly important for training teenagers with global vision and responsible behavior. Combined with the relevant contents of the GC research, the relevant conclusions are summarized and found that students' individual characteristics level, teacher level, social level, family level and information and communications technology (ICT) level factors will affect the development of students' GC in varying degrees. In order to deeply find the specific influence of different factors on students' GC and the process among them, this study is guided by ecosystems theory and selected the data based on Britain and Spain, and used the method of multi-level linear regression model (HLM) to comprehensively investigate the impact of various factors on GC and the interaction between them. The study found that there is interaction among factors at all levels of adolescents. Moreover, family factors play the greatest role in the global competence ecosystem. On this basis, combined with the interaction of various factors, this paper puts forward some suggestions on how to cultivate and develop students' GC.

1 Introduction

With the acceleration of globalization, effective communication with people in different cultures and values have become skills that contemporary young people need to learn, which are highly valued by governments. Global competence (GC) is regarded as one of the necessary qualities and key abilities that young people in the new era should possess. Therefore, it has become a new topic of contemporary education to cultivate individual's GC, pay attention to the shaping of individual roles that dominate the process of globalization, face the global crisis together, and share the opportunities of the times. In order to gain an in-depth understanding of the level of teenagers' GC and its influencing factors, the Organization for Economic Cooperation and Development (OECD) formally incorporated the assessment of students' GC into the Programme for International Student Assessment (PISA) in 2018, and released the results of the GC report (Volume 6) in 2020(OECD, 2020).

In the previous studies, the researchers explored the relationship or effects between individual factors, social factors, family factors and GC. For instance, learning motivation, second language and social connectedness were included (Meng, et al.,2020; Semeaang, et al.,2015; Meng et al.,2017). The influencing factors of individual, teacher, social, family and ICT on GC have been taken into account, but the nested interaction among these factors and the influencing process on GC have not been deeply explored. Thus, in order to further explore the influencing factors of GC and provide a theoretical basis for the cultivation of GC, this study extracted British and Spanish data from PISA2018 and used hierarchy linear model to analyze and summarize the influence process of individual characteristics level, teacher level, social level, family level and ICT level factors on teenagers' GC.

1.1 The Definition of Global Competence

Global competence (GC), as a multidimensional capacity, empowers individuals to study local, global and intercultural issues, to understand and appreciate different worldviews,to respect different cultures and to interact effectively, and to act responsibly for sustainable development and collective well-being (OECD, 2020). At present, however, there has been no clear definition of GC. Different organizations and individuals have given explanations from different dimensions. As early as in 1983, Hayden put forward the concept of "GC", calling on the US government to establish an education system that can cultivate citizens' GC in order to enhance the ability of American citizens to cope with international affairs. According to Lambert (1993), GC consists of

* Corresponding author: Jingying Wang

Email: wangjingying8018@126.com

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five elements: knowledge, empathy, support, foreign language competence and work performance, which provided a theoretical basis for follow-up research. Hunter, et al. (2006) defined GC as "having an open mind while actively seeking to understand the cultural norms and expectations of others, and using this acquired knowledge to interact, communicate and work effectively outside one's environment", which opens up a link between GC thought and action.

Different researchers also divided the content of GC into different dimensions to achieve a better understanding. Li et al. (2013) divided GC into three dimensions: knowledge, skills/experience and attitude. Knowledge means an understanding of history, geography, economy, politics and other issues related to oneself and foreign culture, which provides a background for a new culture so that people can think critically and creatively about complex international challenges. Skill refers to the extensive personal ability to collect and process information through interpersonal communication or second-hand data research in a cross-cultural environment. Attitude means a person's positive feelings about cultural differences and his willingness to participate in cultural differences. In addition, Asia Society (2011) released "Educating for GC: Preparing Our Youth to Engage the World", and divided GC into four dimensions: observing the world, identifying ideas, communicating ideas and taking action. OECD defined GC as "the ability to analyze global and cross-cultural issues critically from multiple perspectives; the ability to understand how cultural differences affect people's perceptions, judgments and perceptions of themselves and others; and the ability to communicate frankly, appropriately and effectively with others from different backgrounds based on universal respect for human dignity" (OECD, 2020). OECD pushes the definition of GC into the field of teaching practice. In this study, the GC definition of OECD is used to support our further investigation and analysis.

1.2 Influencing Factors of GC

GC of teenagers is affected by many factors. Combing the influencing factors of GC revealed in the relevant literature and reports, it is found that the influencing factors discussed in the existing studies include discipline category, gender, learning motivation, foreign language proficiency, contact style and personality characteristics. It also included family rearing styles and maternal depression, as well as the types of schools, national curriculum and international education. In addition, social factors such as geography, cross-cultural communication, teachers' professional standards, immigration and mass media also have a certain impact on GC.

Personal Factors. Meng et al. (2017) systematically studied the effects of disciplines, gender, learning motivation, foreign language proficiency, the way of contact with foreign cultures, personality types and other variables on college students' GC. By comparison, it is found that the GC of social humanities students is significantly higher than that of Physics, Engineering and Bioscience students. They also believed that the GC of male students is higher than that of female students (Cao et al., 2020). Men are higher than women in global knowledge, and women are higher than men in global attitude, but there is no significant gender difference in global skills (Meng, et al., 2020). It can be seen that more empirical studies are needed to explore the internal relationship between gender and GC in order to provide empirical basis for teachers to teach students in accordance with their aptitude. Meng et al. (2017) believed that foreign language proficiency has a significant positive impact on the cultivation of college students' GC. Besides, Cao et al. (2020) believed that the way of contact with foreign cultures can also have an impact on GC. Direct contact (face-to-face conversation with foreigners) has a positive impact on college students' global attitude and global skills, but has no significant impact on global knowledge. Indirect contact (learning about foreign cultures through foreign TV dramas and movies) has a positive impact on college students' GC. Online contact (online video with foreigners) has no significant impact on college students' GC. When direct contact and online contact are combined, it can promote college students' global attitude, weaken college students' global skills, and have no significant impact on college students' global knowledge (Meng et, al., 2020). The research also showed that personality types affect college students' GC. Extroverted and open personality is conducive to GC development, and easygoing personality type is conducive to global skills development, responsible personality is conducive to global knowledge upgrading, while neurotic personality hinders global attitude and global skills development (Cao et al., 2020).

Family Factors. Family environment and rearing style have a significant impact on all dimensions of teenagers' GC. Moody et al. (2019) studied the effects of rearing styles and maternal depression on GC in adolescents with both developmental and intellectual disabilities. The results showed that negative rearing styles have an inhibitory effect on the GC of adolescents with sound development and intellectual disabilities, and maternal depression has an inhibitory effect on the GC of adolescents with intellectual disabilities. Family assets are also one of the influencing factors of GC. Additionally, Tsang et al. (2020) found that students' high family income has a positive impact on their GC.

Teacher Factors. High-quality universities, international courses and international education have a positive impact on college students' GC. Although teachers are willing to integrate the content of cross-cultural topics into the curriculum to varying degrees, they lack professional development opportunities on related topics, so teachers themselves are willing but powerless. This requires relevant departments to increase the content of teachers' professional development training and broaden the path for the improvement of teachers' GC. There are two ways to understand international courses, one is that courses that come into contact with foreigners in class are called international courses, and the other is to offer international-related learning courses called international courses. Different types of international courses have different effects on students' GC. Kedia et al. (2011) believed that good international education in universities can promote the GC of college students. However, some studies have focused on the group of college students, and have not comprehensively discussed the influence of other factors on students' GC except school quality, international curriculum and international education. Whereas, there is no in-depth analysis of the influence mechanism of school factors on all dimensions of students' GC.

Social Factors. Cross-cultural communication can promote global attitudes and global skills, and cross-cultural communication experience can enhance students' self-confidence in the face of cross-cultural problems and enhance their willingness to contact and learn foreign cultures. Kang et al. (2018) highlighted that students' early exposure to global mass media will have a negative impact on their cross-cultural communication skills and global knowledge. Being in a large-scale immigration environment was conducive to the upgrading of cross-cultural communication skills, but had a negative impact on global attitudes. Simultaneously, students with immigrant background have higher understanding of global problems and acceptance of foreign culture than students without immigrant background. Students with immigrant backgrounds are more open to foreign cultures and people, and improve their cross-cultural communication skills and GC by participating in cross-cultural projects and other activities.

ICT Factors. The effective and responsible use of media platforms by young people is also an important part of GC. Over the past two decades, a radical shift in digital technology has shaped young people's worldview, the way they interact with others, and how they perceive themselves. Online electronic networks, social

media and interactive technologies are creating new types of learning, and teenagers have more control over the content and way they learn. Meanwhile, young people's digital lives may cause them to be out of touch with themselves and the world, and ignore the impact their actions may have on others. However, digital technology and social platforms also hinder students' effective communication, blocking them in the isolated island of information. What's more, due to the lack of media literacy of young people, they are also easy to be guided by false or biased news. Early exposure to global mass media will cause students to realize in advance the differences between themselves and foreign cultures, and reduce the comfort of their communication with foreigners, which will have a negative impact on the GC of college students. In this case, cultivating students' GC can improve students' digital literacy and ICT ability. At the same time, some studies also showed that GC played a moderating role between Chinese students' cross-cultural network communication and social capital (Chun, et al., 2020).

1.3 Theoretical Framework

Ecosystem theory provided a useful framework for studying the interaction between factors affecting GC, which is an individual development model theory put forward by Urie Bronfenbrenner, emphasizing that the developing individual is embedded in a series of environmental systems that influence each other. In these systems, the system interacts with the individual and affects the individual development (Bronfenbrenner, 1989). Bronfenbrenner believed that a person's development is influenced by everything in the surrounding environment and the social interaction in it, and emphasized that children are shaped by their interaction with others and the environment. He divided the human environment into five different systems: Microsystem (Direct interaction), Mesosystem (Connection between two or more microsystems), Exosystem (Does not directly involve individuals but affects the settings of the microsystem), Macrosystem (The broader culture and society that affect other system levels and manifest in personal consciousness), Chronosystem (Times change and the influence of historical events) (Bronfenbrenner, 2002).

From the definition of GC, it can be concluded that GC is an ecological behavior, which pays attention to the complex interactions among individuals, individuals and others, as well as between individuals and living environment and cultural background. Therefore, this paper attempts to explain the interaction among the factors affecting GC with the help of different levels of ecological systems theory, and to explore the internal relationship of teenagers' global competence ecosystem. Although the mesosystem and chronosystem are also a part of the global competence ecosystem framework, there is a lack of research on the practice system. Therefore, the chronosystem is not included in this study.

Microsystem- individual, teacher and family level. Microsystem is the first level of the theory, which is the things that come into direct contact with the child in the child's direct environment, such as parents, siblings, teachers and school peers. We classify the individual, family and teacher-level factors that affect the GC of teenagers into the Microsystem (Hong et al., 2021). Students' individual attitudes, motivation and self-efficacy, teachers' teaching strategies and behaviors, as well as family environment and parents' influence are all environments in which students interact directly.

Exosystem-social level. Exosystem include communities, parents' workplaces, parents' friends and the mass media which children do not participate but affect their environment (Ryan, 2009). We introduce social factors into the external system. Communication language, rules and order, and peer relationships are all external systems for students.

Macrosystem-ICT Level. Macrosystem focuses on the broader culture and society that affect other system levels and are reflected in personal consciousness. ICT factors are an extensive environment for students to study and live. So, we put it into the macrosystem system. ICT has been integrated into and invisibly affects all aspects of education. Learning to learn and cultivate global literacy in the environment of ICT is the core issue of contemporary youth education.

Consequently, there is a certain degree of nesting relationship and interaction among the factors that affect GC. Students' individual characteristics have an essential impact on the development of their GC, and teaching and learning factors also have a direct impact on the development of students' GC. Likewise, students are exposed to a variety of social factors and events, which also invisibly affect the development of their GC. The mode of getting along with the family and the way of rearing are also the background of the environment in which the individual students live. With the development of intelligent technology, information technology factors surround students and permeate all aspects of their study and life. Considering the characteristics of the above factors, this paper constructs the influencing model of students' GC development. As shown in Figure 1.

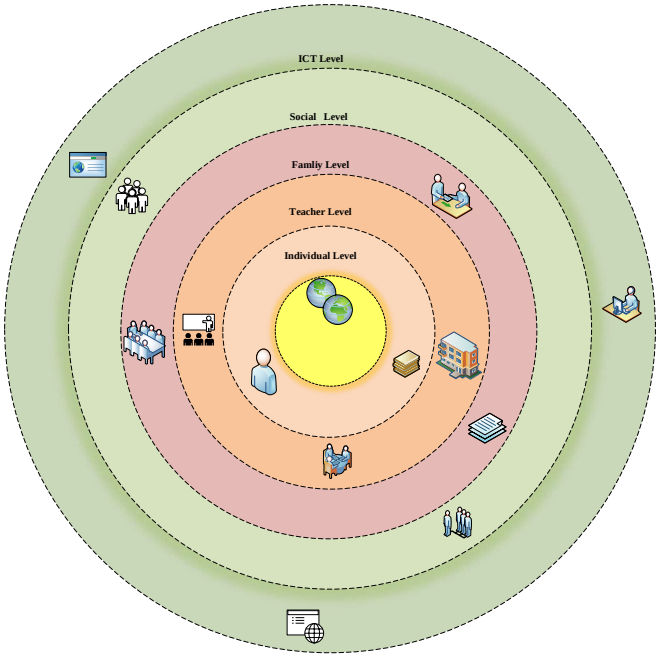

Figure 1. Theoretical frame diagram

In this paper, the following two problems are investigated by using hierarchy linear model (HLM): Which factors have an impact on students' GC at the levels of individual characteristics, teacher, social, family and ICT? What kind of influencing process exists among the influencing factors at different levels?

2 Method

2.1 Data Sources

The data used in this article come from PISA launched by OECD in 2018. 612004 students of 15-year-olds from 79 countries and regions took part in the PISA Reading, Mathematics, Science, Finance and GC Test. The GC Assessment consists of

two components: 1) A cognitive test built specifically for "global understanding", defined as a combination of background knowledge and cognitive skills needed to solve global and cross-culturally related problems. 2) A set of questionnaire projects that collect self-reporting questionnaires on students' knowledge, skills (cognitive and social) and attitudes towards global issues and culture. The data of this study comes from the cognitive test scores of GC students, taking the data of Britain and Spain as examples.

2.2 Variable design

Dependent Variable. Teenagers' GC is the dependent variable that this study focuses on, which is regarded as a multi-dimensional ability. GC is measured and evaluated from the dimensions of knowledge, skills, attitude and values. The first three are external dimensions and the values dimensions are internal dimensions. The knowledge dimension aims to measure whether students have the ability to have a preliminary understanding of different life styles and customs at home and abroad, which is the basis of cultivating students' GC. The skill dimension aims to measure whether students have the ability of rational thinking, the ability to communicate effectively with individuals from different cultures, and the ability to make feasible and innovative suggestions to achieve a collective goal. The attitude dimension aims to measure whether students have the ability to understand, tolerate and appreciate different ideas and values at home and abroad, as well as the ability to think in a globalized way of thinking. The value dimension aims to measure whether students have the ability to respect human dignity and cultural differences. The GC score is calculated by the weighted average score of 10 GC factual values (Plausible Value) in PISA2018.

Independent Variable. GC Assessment in PISA 2018 mainly consists of two parts, one is cognitive test, the other is background questionnaire. This study used the data of the cognitive test of the students' questionnaire, removed the background questions in the questionnaire, and classified the remaining questions into five categories factors: individual characteristics level, teacher level, social level, family level and ICT level. Individual characteristics include gender, the number of communication languages mastered, reading condition (reading interest, type frequency, reading time), reading ability perception (evaluation of reading ability, perception of reading tasks), reading strategies (understanding and memory, generalization), sense of happiness (life satisfaction, perception of the meaning of life, emotional state, learning a sense of belonging), emotional attitude (emotional intelligence, failure perception, competitive consciousness, bullying cognition, difficulty perception, professional status expectation), learning motivation (learning goal, achievement goal), sense of self-efficacy (the sense of efficacy of learning results, sense of efficacy in accomplishing tasks, educational expectation, analytical perspective). Teacher level factors include teaching behavior (behavior support, direct instruction), teaching emotion (emotional support, teaching enthusiasm, teaching fairness) and teaching strategy (adaptive teaching, teaching feedback, teaching motivation, reading quantity, teaching methods). Social level factors include emigration, cultural language (peer language), learning atmosphere (competitive atmosphere, cooperative atmosphere) and Rule and order (disciplinary atmosphere, campus bullying). Family level factors include Parental education capital (mother's highest educational background, father's highest educational background), household capital (educational resources, number of items owned, collection of books), parents' occupation (mother's professional status, father's professional status), language use (mainstream language at home, language used by family, number of parental languages) and emotional support. ICT level factors include network technology and resources (school internet course, Email usage and on-campus electronic resources) and electronic reading (types of reading media and reading activity frequency). See Table 1.

Table 1. Independent variable definition

	Variable name		Variable description (Category variable=1, Continuous variable=2)
Individual level	Gender		1(1=Male, 2=Female)
	The number of communication languages mastered		2
	Reading condition	Reading interest	2
		Species frequency	2
		Reading time	2
	Reading ability perception	Evaluation of reading ability	2
		Perception of reading tasks	2
	Reading strategy	Understanding and memory	2
		Generalization	2
	Sense of happiness	Life satisfaction	2
		Perception of the meaning of life	2
		Emotional state	2
		School sense of belonging	2
	Emotional attitude	Emotional intelligence	2
		Failure perception	2
		Competitive consciousness	2
		Bullying acquaintance	2
		Difficulty perception	2
		Career expectation	2
	Learning motivation	Learning goal	2
		Achievement goal	2

	Self-efficacy	The sense of efficacy of learning results	2
		Sense of efficacy in accomplishing tasks	2
		Educational expectation	2
		Analytical perspective	2
Teacher level	Teaching behavior	Behavior support	2
		Direct instruction	2
	Teaching emotion	Emotional support	2
		Teaching enthusiasm	2
		Teaching fairness	2
	Teaching strategy	Adaptive teaching	2
		Teaching feedback	2
		Teaching motivation	2
		Reading quantity	2
		Teaching methods	2
Social level	Emigration		1（1 = local, 2 = second-generation immigrants, 3 = first-generation immigrants）
	Cultural language	Peer language	2
	Learning atmosphere	Competitive atmosphere	2
		Cooperative atmosphere	2
	Rule and order	Disciplinary atmosphere	2
		Campus bullying	2
Family level	Parental education capital	Mother’s highest educational background	2
		A certificate held by a mother	
		Father’s highest educational background	2
		A certificate held by a father	
	Household capital	Whether there are educational resources	2
		Number of items owned	2
		Collection of books	2
	Parents' occupation	Mother’s professional status	2
		Father’s professional status	2
	Language use	Mainstream language at home	1（1 = test language, 2 = other languages）
		The language used by the family	2
		Number of parental languages	2
	Emotional support		2
ICT level	Network technology and resources	School Internet course	2
		Email usage	2
		On-campus electronic resources	2
	Electronic reading	Types of reading media	2
		Reading activity frequency	2

2.3 Model Construction

This study mainly focused on the influencing factors of teenagers’ GC, taking the score of GC cognitive ability as the dependent variable and the relevant factors affecting teenagers’ GC as independent variables. Therefore, this study mainly used the ordinary linear square (OLS) and linear regression method to incorporate several groups of variables into the model to construct the regression model of adolescent individual, teacher, society, family and ICT, and carried on the regression analysis model. The regression model is designed as follows:

$$Prob(Y_i)=a_0+\beta_1 W+\beta_2 D+\beta_3 H+\beta_n S+\gamma_i^{'} C+\varepsilon_i$$

Dependent variable. The dependent variable Y means the GC of teenagers. W represents the explanatory variable of individual factors, including gender, number of communication languages mastered, reading condition (reading interest, type frequency, reading time), reading ability perception (evaluation of reading ability, perception of reading tasks), reading strategies (understanding and memory, generalization), sense of happiness (life satisfaction, perception of the meaning of life, emotional state, learning a sense of belonging), emotional attitude (emotional intelligence, failure perception, competitive consciousness, bullying cognition, difficulty perception, professional status expectation), learning motivation (learning goal, Achievement goal), sense of self-efficacy (sense of efficacy of learning results, sense of efficacy in accomplishing tasks, educational expectation, analytical per-

spective). D, H, S and C are all independent variables, in which D refers to teachers' level factors, including teaching behavior (behavior support, direct instruction), teaching emotion (emotional support, teaching enthusiasm, teaching fairness) and teaching strategy (adaptive teaching, teaching feedback, teaching motivation, reading quantity, teaching methods). H refers to social level factors, including emigration, cultural language (peer language), learning atmosphere (competitive atmosphere, cooperative atmosphere), rule and order (disciplinary atmosphere, campus bullying). S refers to family factors, including Parental education capital (Mother's highest educational background, Father's highest educational background), Household capital (Educational resources, Number of items owned, Collection of books), Parents' occupation (Mother's professional status, Father's professional status), Language use (Mainstream language at home, The language used by the family, Number of parental languages) and Emotional support. C refers to information technology factors, including Network technology and resources (School Internet course, Email usage and On-campus electronic resources) and Electronic reading (Types of reading media and Reading activity frequency).
The term is a random disturbance.

Independent Variable. Teenagers' GC is affected not only by their individual factors, but also by their families and other factors. The impact of this hierarchical and nested structure on teenagers' GC needs to be paid attention to. Based on the hierarchical and nested structure of the research data, in order to reduce the estimation error of the traditional OLS, this study used the hierarchical linear model method and uses HLM6.0 to process the data. Students' individual factors are the first level variables, while teacher factors, social factors, family factors and information technology factors are the second level variables. In order to accurately find out the influencing factors of students' GC, the stepwise regression principle is adopted, and all levels of variables are added step by step, and the model is constructed as follows:

$$Y_{ij}=\beta_{0j}+\beta_{1j}W_{ij}+\beta_{2j}D_{ij}+\beta_{3j}H_{ij}+\beta_{4j}S_{ij}+\beta_{nj}C_{ij}+r_{ij}$$

In the model, Yij indicates the GC of the teenagers in the j and i families. The model includes individual characteristic variable W, teacher variable D, social variable H, family variable S and information technology variable C.

The intercept estimation of layer-2 model includes teacher, society, family, ICT and other variables. Taking family factors as an example, we included the family variable S in order to explore how family-level factors affect the differences in global literacy of teenagers in different families. The model is as follows:

$$\beta_{nj}=\gamma_{n0}+\sum_{q=1}^{qn}\gamma_{nq}S_{qj}+\varepsilon_{nj}$$

In the model, γn0 represents the intercept of the j family variable to βnj regression, and γ nq represents the slope of the j family variable to βnj regression. Sqj indicates that the predictive variables at the family level mainly include parents' education capital (Mother's highest education, Father's highest education), Family capital (Educational resources, number of Number of items owned, and Collection of books), Parents' occupation (Mother's professional status, Father's professional status), Language use (Mainstream language at home, The language used by the family, Number of parental languages) and Emotional support. Ɛnj represents random errors at the family level and describes the differences between βnj and predictive variables.

2.4. Data Analysis

In this study, the Propensity Score Matching method (PSM) proposed by Leuven and Sianesi was used for estimation. Compared with the ordinary least square method (OLS), it can effectively reduce the data imbalance and the model dependence and control the estimation error (King & Porro, 2018), which is suitable for sample analysis of non-random sampling. Its main advantage is that after adding covariables to match the treatment group and the control group, the results are similar to those of the natural experiment, so that the sample distribution of the treatment group and the control group is close to random distribution. Thus, it ensured that the experimental results and the distribution of processing variables are independent of each other, satisfies the assumption of conditional independence, and made up for the sample selectivity error which cannot be overcome by the ordinary least square method. The study also involved multi-layer linear regression analysis, using IEA_IDB Analyzer_Setup_v4.0.35 to sort out and transform the data, and then using SPSS23.0 to carry out descriptive statistics and linear regression analysis. Before linear regression analysis, all category variables were converted to continuous variables.

3. Results

3.1. Descriptive Statistics

Descriptive statistics of the effects of variables at different levels in Britain and Spain on students' GC: average (M) and standard deviation (SD) are shown in the table below. From the analysis data, it can be seen that among the individual characteristics level, the score of "Career expectation" is the highest (UK: M = 67.19, SD = 18.89; Spain: M = 67.53, SD = 17.702), followed by family level factors of "Mother's professional status" (UK: M = 49.838, SD = 23.236; Spain: M = 40.614, SD = 23.362) and "Father's professional status" (UK: M = 50.58, SD = 22.622). Spain: M = 44.144, SD = 22.342). The scores of other factors were evenly distributed. The results are shown in Table 2.

Table 2. Simple descriptive statistics of Britain and Spain.

	Variable name		Britain		Spain	
			M	SD	M	SD
Individual level	Gender		1.486	0.5	1.506	0.500
	The number of communication languages mastered		1.484	0.688	2.417	0.893
	Reading condition	Reading interest	2.341	0.788	2.561	0.808
		Species frequency	2.092	0.793	2.121	0.799
		Reading time	1.913	1.124	2.107	1.233
	Reading ability perception	Evaluation of reading ability	2.92	0.614	2.867	0.548
		Perception of reading tasks	1.842	0.698	1.801	0.642

	Reading strategy	Understanding and memory	3.654	0.909	3.695	0.921
		Generalization	3.681	1.006	3.847	0.992
	Sense of happiness	Life satisfaction	6.164	2.663	7.347	2.302
		Perception of the meaning of life	2.568	0.783	2.829	0.725
		Emotional state	2.774	0.482	2.999	0.418
	Emotional attitude	School sense of belonging	2.917	0.575	3.268	0.594
		Emotional intelligence	2.096	0.892	2.255	0.905
		Failure perception	2.809	0.813	2.476	0.793
		Competitive consciousness	2.885	0.701	2.793	0.716
		Bullying acquaintance	3.389	0.565	3.398	0.662
		Difficulty perception	-0.01	1.034	-0.062	0.965
	Learning motivation	Career expectation	67.19	18.89	67.530	17.702
		Learning goal	3.346	0.947	3.309	1.028
		Achievement goal	2.821	0.567	3.138	0.565
	Self-efficacy	The sense of efficacy of learning results	1.544	0.668	1.590	0.700
		Sense of efficacy in accomplishing tasks	2.894	0.51	3.074	0.512
		Educational expectation	4.556	1.825	4.891	1.688
		Analytical perspective	2.474	0.814	2.218	0.787
	Teaching behavior	Behavior support	1.712	0.761	1.890	0.816
		Direct instruction	2.086	0.728	2.250	0.718
	Teaching emotion	Emotional support	2.9	0.742	2.750	0.798
		Teaching enthusiasm	2.99	0.696	2.843	0.758
Teacher level	Teaching strategy	Teaching fairness	1.505	0.596	1.616	0.653
		Adaptive teaching	2.712	0.789	2.455	0.804
		Teaching feedback	2.754	0.809	2.137	0.836
		Teaching motivation	2.655	0.724	2.294	0.765
		Reading quantity	4.64	0.87	3.717	1.551
		Teaching methods	5.87	2.156	4.169	2.307
	Emigration		1.282	0.609	1.195	0.550
	Cultural language	Peer language	2.984	0.907	2.794	1.190
Social level	Learning atmosphere	Competitive atmosphere	0.011	0.662	2.490	0.721
		Cooperative atmosphere	2.569	0.645	2.581	0.728
	Rule and order	Disciplinary atmosphere	2.989	0.761	2.778	0.744
		Campus bullying	1.421	0.57	1.290	0.515
Family level	Parental education capital	Mother's highest educational background	4.577	1.388	4.227	1.852
		A certificate held by a mother				
		A certificate held by a father	4.432	1.49	4.001	1.926
	Household capital	Educational resources	0.14	1.006	0.128	0.914
		Number of items owned	2.894	0.466	2.760	0.424
		Collection of books	3.168	1.482	3.289	1.379
	Parents' occupation	Mother's professional status	49.838	23.236	40.614	23.362

		Father's professional status	50.58	22.622	44.144	22.342
	Language use	Mainstream language at home	1.119	0.324	1.206	0.404
		The language used by the family	2.646	1.224	2.104	1.097
		Number of parental languages	1.422	0.644	1.826	0.781
	Emotional support		3.347	0.715	3.316	0.744
ICT level	Network technology and resources	School Internet course	4.528	2.107	3.633	2.029
		Email usage	3.953	0.877	3.814	0.894
		On-campus electronic resources	7.121	1.756	6.050	2.188
	Electronic reading	Types of reading media	2.046	1.055	2.015	1.028
		Reading activity frequency	3.644	0.627	3.505	0.622

3.2. Multilevel Linear Regression

First of all, we take the score of British students' GC as an example to investigate the effects of different models. When individual characteristics level factors were included in model 1, it is found that "Reading interest" and "Reading frequency" have a significant positive impact on British students' GC. "Reading ability perception" also has a positive effect. That is, the stronger the students' self-perceived reading ability, the better their GC. In terms of happiness, "Life satisfaction" has a significant positive impact on students' GC, while the impact of "Perception of the meaning of life" is negative. In terms of emotional attitude, "Emotional intelligence" had a significant negative impact on students' cognitive performance of GC, while the influence of "Career expectation" is positive. Students' "Educational expectation" has a significant positive impact on their cognitive performance of GC.

By incorporating teachers' factors into regression model 2, it is found that teachers' "Direct instruction" teaching behavior has a significant negative impact on the development of students' GC. The degree of "Teaching fairness" perceived by students had a significant positive impact on their cognitive performance of GC. Then the social factors were included in the regression model, and it is found that the use of test language for peer communication is conducive to the cognitive development of students' GC. Further incorporating family factors into the regression model, it is found that "Collection of books" and "Mother's professional status" had a significant positive impact on the development of students' cognitive ability of GC. Finally, the factors of ICT level were included in the regression model, and it is found that "Email usage" has a significant positive impact on students' cognitive performance of GC.

The original results of Britain are shown in Table 3.

Table 3. Results of multilayer linear regression analysis of Britain.

Category	Variable name		Britain				
			D1	D2	D3	D4	D5
Individual level	Gender		0.002	0.026	0.042	0.029	0.016
	The number of communication languages mastered		0.018	0.025	0.047	0.048	0.048
	Reading condition	Reading interest	0.137**	0.136**	0.12*	0.074	0.086
		Species frequency	0.069*	0.074*	0.077*	0.058	0.046
		Reading time	0.027	0.023	0.017	0.025	0.009
	Reading ability perception	Evaluation of reading ability	0.104*	0.105*	0.095	0.089	0.091
		Perception of reading tasks	0.1	0.165	0.108	0.185	0.136
	Reading strategy	Understanding and memory	-0.005	0.001	-0.007	-0.017	-0.039
		Generalization	-0.021	-0.016	-0.008	0.011	0.004
	Sense of happiness	Life satisfaction	0.108**	0.082*	0.058	0.063	0.06
		Perception of the meaning of life	-0.096*	-0.078*	-0.069	-0.072	-0.073
		Emotional state	-0.031	-0.02	-0.017	-0.014	-0.004
	Emotional attitude	School sense of belonging	-0.018	-0.021	-0.051	-0.087*	-0.081
		Emotional intelligence	-0.048*	-0.045	-0.047	-0.023	-0.026
		Failure perception	0.012	0.023	0.018	0	0.001
		Competitive consciousness	0.016	0.013	0.02	0.017	0.014
		Bullying acquaintance	0.014	-0.009	-0.008	-0.002	-0.02
		Difficulty perception	-0.312	-0.364	-0.298	-0.34	-0.273

	Learning motivation	Career expectation	0.088***	0.071**	0.056*	0.043	0.035
		Learning goal	-0.039	-0.03	-0.01	0.008	0.009
		Achievement goal	0.009	0.019	0.01	-0.009	0.001
	Self-efficacy	The sense of efficacy of learning results	0.021	0.028	0.031	0.014	0.016
		Sense of efficacy in accomplishing tasks	0	0.001	-0.004	-0.006	-0.007
		Educational expectation	0.214***	0.185***	0.17***	0.117**	0.117**
		Analytical perspective	0.036	0.03	0.019	0.005	0.003
Teacher level	Teaching behavior	Behavior support		-0.035	-0.041	-0.027	-0.011
		Direct instruction		0.103**	0.1**	0.065	0.051
	Teaching emotion	Emotional support		0.025	0.02	0.008	0.023
		Teaching enthusiasm		0.016	0.006	0.011	0.008
		Teaching fairness		-0.115**	-0.084	-0.091*	-0.075
	Teaching strategy	Adaptive teaching		0.016	0.002	-0.008	-0.008
		Teaching feedback		-0.067	-0.06	-0.062	-0.063
		Teaching motivation		0.045	0.053	0.062	0.068
		Reading quantity		0.002	-0.002	-0.021	-0.017
		Teaching methods		-0.029	-0.021	-0.012	-0.01
Social level	Emigration				-0.02	-0.024	-0.024
					-0.029	-0.016	-0.014
	Cultural language	Peer language			0.176***	0.168***	0.156
	Learning atmosphere	Competitive atmosphere			0.034	0.026	0.026
		Cooperative atmosphere			0	-0.01	-0.001
	Rule and order	Disciplinary atmosphere			0.01	0.009	0.007
		Campus bullying			-0.087	-0.111**	-0.111*
Family level	Parental education capital	Mother's highest educational background				0.02	0.027
		A certificate held by a mother					
		Father's highest educational background				0.021	0.014
		A certificate held by a father					
	Household capital	Educational resources				-0.03	-0.026
		Number of items owned				-0.014	-0.01
		Collection of books				0.123**	0.115**
	Parents' occupation	Mother's professional status				0.076*	0.062
		Father's professional status				0.053	0.054
	Language usage	Mainstream language at home				0.004	0.002
		The language used by the family				-0.075	-0.076
		Number of parental languages				0.038	0.031
	Emotional support					-0.019	-0.018
ICT level	Network technology and resources	School Internet course					-0.03
		Email usage					0.13***
		On-campus electronic resources					-0.026
	Electronic reading	Types of reading media					-0.002
		Reading activity frequency					0.012

Then, we examined the effects of different models on Spanish students' GC. After introducing variables at the individual characteristics level, model 1 showed that "The number of communication languages mastered, "Reading interest, Evaluation of reading ability, Life satisfaction, School sense of belonging, Competitive consciousness, Bullying cognition, Career expectation, Sense of efficacy in accomplishing tasks and Educational expectation" have a significant positive effect on students' reading literacy. "Reading time, Perception of reading tasks, Perception of the meaning of life, Emotional state and Emotional intelligence" have significant negative effects on reading literacy.

Then the variables at the teacher level were introduced to get model 2. "Direct instruction, Teaching enthusiasm and Reading quantity" have a significant positive effect on students' GC. "Teaching fairness, Teaching feedback and Teaching methods" have a significant negative effect on students' GC. Social level variables were added to model 3. "Peer language, Competitive atmosphere, Cooperative atmosphere and Disciplinary atmosphere" have significant positive effects on students' GC. "Campus bullying" has a significant negative effect on students' GC. At the same time, "Emigration" has a significant negative effect on students' GC.

Family level variables were added to model 4. "Collection of books, Mother's professional status and Father's professional status" have a significant positive effect on students' GC. "The language used by the family" and "Number of parental languages" have a significant negative effect on students' GC.

Finally, model 5 was obtained by introducing variables at the level of ICT level. "Email usage" has a significant positive effect on students' GC. "School Internet course" and "On-campus electronic resources" have a significant negative effect on students' GC. The results are shown in Table 4.

Table 4. Results of multilayer linear regression analysis of Spain.

Category	Variable name		Spain				
			D1	D2	D3	D4	D5
Individual level	Gender		0.027*	0.047***	0.057***	0.052***	0.042**
	The number of communication languages mastered		0.035*	0.040*	0.057*	0.068***	0.061***
	Reading condition	Reading interest	0.152***	0.129***	0.121***	0.110***	0.109***
		Species frequency	-0.006	0.012	0.010	-0.004	-0.015
		Reading time	-0.053**	-0.049**	-0.036*	-0.036	-0.036
	Reading ability perception	Evaluation of reading ability	0.137***	0.133***	0.126***	0.131***	0.120***
		Perception of reading tasks	-0.250**	-0.185*	-0.109	-0.124	-0.115
	Reading strategy	Understanding and memory	0.021	0.032	0.034	0.030	0.011
		Generalization	0.026	0.021	0.015	0.023	-0.001
	Sense of happiness	Life satisfaction	0.040**	0.032*	0.026	0.026	0.023
		Perception of the meaning of life	-0.140***	-0.123***	-0.117***	-0.106***	-0.100***
		Emotional state	-0.083***	-0.077***	-0.089***	-0.089***	-0.082***
		School sense of belonging	0.043**	0.023	-0.013	-0.017	-0.019
		Emotional intelligence	-0.033**	-0.030*	-0.033**	-0.034**	-0.030*
	Emotional attitude	Failure perception	-0.009	0.003	0.004	0.003	-0.002
		Competitive consciousness	0.029*	0.033**	0.034**	0.033*	0.030*
		Bullying acquaintance	0.092***	0.070***	0.061***	0.041*	0.026
		Difficulty perception	0.056	0.020	-0.048	-0.015	-0.013
		Career expectation	0.135***	0.107***	0.099***	0.080***	0.077***
	Learning motivation	Learning goal	0.004	0.010	0.023	0.019*	0.023
		Achievement goal	0.006	-0.010	-0.017	-0.011	-0.009
	Self-efficacy	The sense of efficacy of learning results	0.011	0.017	0.021	0.024*	0.020
		Sense of efficacy in accomplishing tasks	0.047**	0.052***	0.056***	0.042**	0.036*
		Educational expectation	0.191***	0.164***	0.151***	0.126***	0.117***
		Analytical perspective	-0.008	-0.009	-0.005	-0.007	-0.009
Teacher level	Teaching behavior	Behavior support		-0.008	-0.004	-0.011	-0.013
		Direct instruction		0.060***	0.052**	0.057***	0.046**
	Teaching emotion	Emotional support		0.028	0.018	0.021	0.020
		Teaching enthusiasm		0.073***	0.061**	0.057**	0.056**
	Teaching strategy	Teaching fairness		-0.150***	-0.123*	-0.114***	-0.112***
		Adaptive teaching		0.028	0.027	0.036*	0.033
		Teaching feedback		-0.086***	-0.077***	-0.073***	-0.069***
		Teaching motivation		0.001	-0.003*	-0.006	-0.014
		Reading quantity		0.079***	0.071***	0.062***	0.059***
		Teaching methods		-0.081***	-0.074***	-0.067***	-0.055**
Social level	Emigration				-0.023	0.006	0.006
	Cultural language	Peer language			-0.052***	-0.023	-0.023
					0.111***	0.086***	0.077***

	Learning atmosphere	Competitive atmosphere	0.001*	0.004	0.002
		Cooperative atmosphere	0.005*	0.000	0.005
	Rule and order	Disciplinary atmosphere	0.035*	0.032	0.032
		Campus bullying	-0.102***	-0.103***	-0.098***
Family level	Parental education capital	Mother's highest educational background		0.000	-0.005
		A certificate held by a mother			
		Father's highest educational background		-0.002	0.002
		A certificate held by a father			
	Household capital	Educational resources		-0.023	-0.020
		Number of items owned		-0.028	-0.030
		Collection of books		0.092***	0.089***
	Parents' occupation	Mother's professional status		0.066***	0.060***
		Father's professional status		0.064***	0.062***
	Language use	Mainstream language at home		0.002	0.001
		The language used by the family		-0.060***	-0.057***
		Number of parental languages		-0.044**	-0.036*
	Emotional support			0.013	0.008
ICT level	Network technology and resources	School Internet course			-0.032*
		Email usage			0.139***
		On-campus electronic resources			-0.034*
	Electronic reading	Types of reading media			0.003
		Reading activity frequency			0.019

Through the analysis of Britain and Spain, it is found that factors at all levels not only have a direct impact on students' GC, but also have indirect interaction among factors at all levels. Meanwhile, the influencing factors of GC at the individual level decrease as the regression level increases. In particular, the inclusion of family-level factors made the impact of factors at all levels on their GC is no longer significant, or not significantly reached a significant level, indicating that in the global competence ecosystem of teenagers, family factors play the greatest role in the system. The subsequent inclusion of ICT factors has almost no impact on the GC ecosystem, but only has an impact on individual factors of the individual level, indicating that the addition of ICT technology factors may have a certain regulatory effect on the basic level of teenagers' GC. Therefore, on the other hand, this not only confirms the transformative role of technology in some educational levels, but also shows that family-level factors play an important role in the global literacy system of teenagers.

According to the data from Britain, it is found that after the Teacher level factors was included, the effect of individual characteristics level remained basically unchanged, and only the negative impact of "Emotional intelligence" on GC disappeared. With the inclusion of social variables, the effects of students' "Reading ability perception", "Life satisfaction" and "Perception of the meaning of life" at the individual characteristics level are no longer significant. The "Teaching fairness" perceived by students at the teacher level was no longer significant. With the inclusion of family variables, only the influence of students' "Educational expectation" at the individual characteristics level continued to be significant, and the other significant effects disappeared, but the negative impact of "School sense of belonging" was not significant. At the teacher level, teachers' "Direct instruction" teaching behavior no longer has a significant impact, while students' perceived "Teaching fairness" has reached a significant level again. At the social level, students' perceived "Campus bullying" showed a significant negative impact. With the introduction of ICT level variables, the negative impact of "School sense of belonging" at individual characteristics level was no longer significant, while at the individual level, only the influence of students' "Educational expectation" continued to be significant. At the teacher level, the influence of students' perceived "Teaching fairness" was no longer significant. At the social level, "Peer language" was no longer significant. At the family level, the positive impact of "Mother's professional status" was no longer significant.

According to the data from Spain, it is worth noting that after including the variables at the teacher level, "School sense of belonging" no longer has a significant impact on their reading literacy, which means that teachers' factors weaken the impact of "School sense of belonging" on GC. With the inclusion of social level variables, the influence of students' individual characteristics level, "Life satisfaction" and "Perception of reading tasks" on GC is no longer significant, which means that social level factors weaken the influence of individual characteristics level. On the other hand, the negative impact of teachers' "Teaching motivation" on GC has become significant, which means that social level factors enhance the negative effects of teachers' factors. With the inclusion of family level factors, the effects of "Learning goal, The sense of efficacy of learning results and Teachers' adaptive teaching on students' GC become significant. On the other hand, "Reading time, Teaching motivation, Competitive atmosphere, Cooperative atmosphere and Disciplinary atmosphere" no longer have a significant effect on students' GC. With the inclusion of variables at the level of ICT, "Bullying cognition, Learning goal, The sense of efficacy of learning results and Adaptive teaching" no longer have a significant impact on students' GC.

Through the summary and analysis of the analysis results of the two countries, it can be found that the inclusion of the factors

of each layer of the model has an interactive impact on the factors in the previous level of the model, and the influence mechanism can be shown in the following figure.

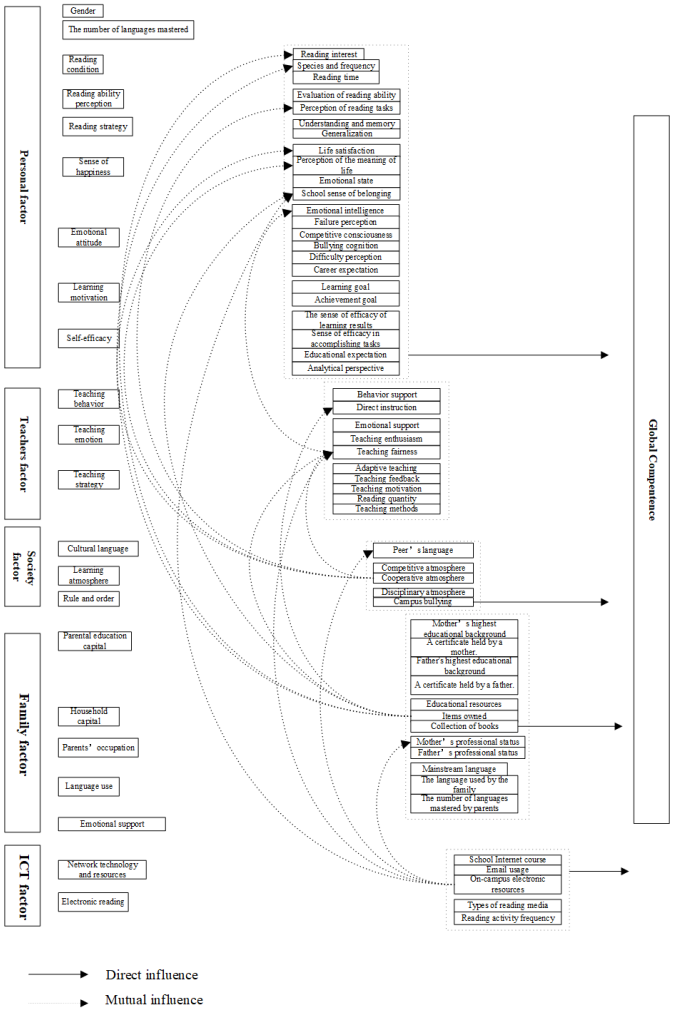

Figure 2. The effect of multiple factors on Global Literacy in Britain

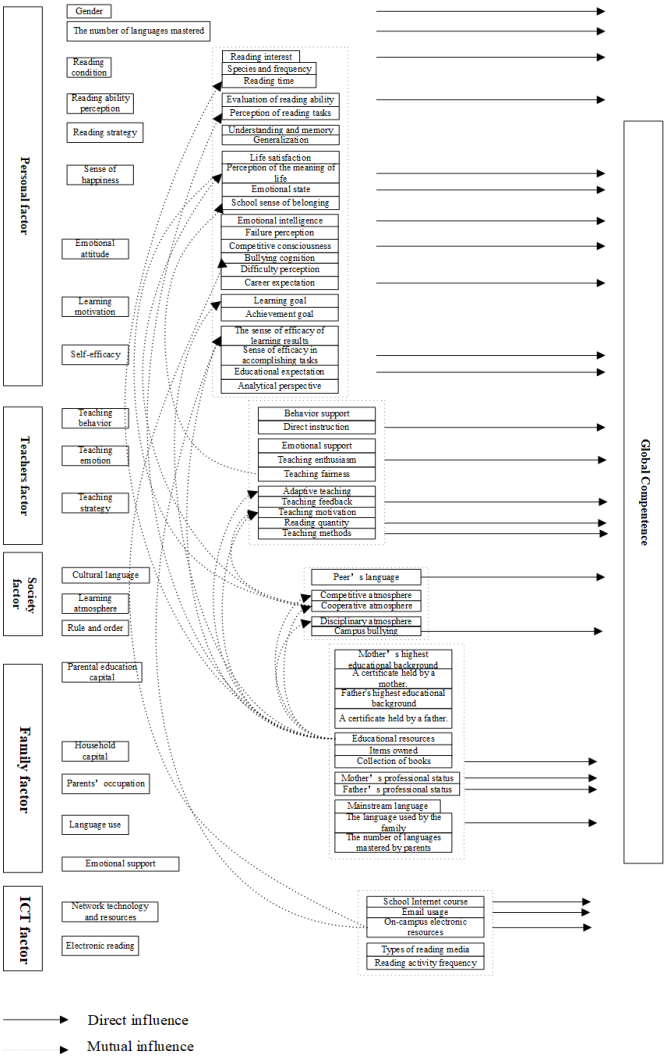

Figure 3. The effect of multiple factors on Global Literacy in Spain

4. Discussion

In this study, we used PISA2018 conducted by OECD as a data source to extract data from the Britain and Spain. The influencing factors in the survey are divided into five levels: personal characteristics, teachers, society, family and ICT. In order to better explain the interaction among factors, we construct a global competence ecosystem framework with the help of Bronfenbrenner's ecosystem theory, and explored the effects of different levels of factors on students' GC and the interaction between them through multi-level linear regression model.

In the global competence ecosystem, the significant influence of all levels of factors on global literacy decreases with the increase of regression levels. Especially with the introduction of family-level factors, the significant impact of previous factors on global literacy has almost disappeared, indicating that family factors play the greatest role in the system. At present, there is a lack of research on the role of family factors in other factors on students' GC. A report by Tsang, et al. (2020) explored the impact of school-based global learning education (GLE), knowledge, and family income on global competence, indicating that when family income is taken into consideration, school-based GLE has no impact on the knowledge of students from low-income families, and their knowledge has no effect on their intercultural literacy. On the contrary, family income has a negative impact on the knowledge of students from high-income families, and their knowledge has a positive effect on their intercultural literacy. Hallina (1988) believed that educational diversion makes students from dominant families more likely to obtain high-quality educational resources, so as to achieve a higher level of education and professional status. This may be because the elite will take the initiative to match high-quality resources, such as school choice, extracurricular tutoring, and so on. In addition, the study also found that foreign language extracurricular tutoring can significantly improve children's global competence, which is mainly reflected in the improvement of students' foreign language communication ability and cultural comprehension ability. The gap between different classes and individual family backgrounds cannot be avoided. How to narrow the differences in students' global competence under different family backgrounds is a topic that we need to continue to discuss in depth.

In the microsystem of GC, individual characteristics level of GC showed a decreasing trend with the increase of the regression level, indicating that the more complex the environmental system is, the weaker the influence effect at the individual level is. On the individual characteristics level, students' "The number of commu-

nication languages mastered, Reading condition, Career expectation, Educational expectation" have a positive impact on students' GC. Foreign language proficiency is the basis of international communication, which is also supported by other related studies. Semaan et al. (2015) found that there is a significant positive correlation between second language learning motivation and GC, that is, students with strong second language learning motivation tend to have higher GC. GC puts forward higher requirements for students' reading ability.

As for family level, factors such as "Book collection" and "Collection of books" will have an impact on students' global competence. Some studies have shown that the father's education level and occupation have a significant positive impact on children's ability and status acquisition. For teachers, "Teaching enthusiasm, Education fairness and Teaching methods" all have an impact on students' GC. While students' GC has attracted much attention, teachers' GC has also become the focus of attention. Kirkwood (1990) pointed out that as the main source of information for students' global education, teachers are more influential than textbooks. However, in the school curriculum, most teachers lack the knowledge, skills and evaluation ability to fully cultivate students' GC. Kerkhoff et al. (2020) surveyed teachers' views on GC teaching and proposed a way to cultivate the GC of pre-service teachers, which provided evidence for the global teaching model as a forward-looking framework, and highlighted the key dimensions of the internationalization of teacher education. The training programs based on learning content (Asia Society,2018), learning style (World Savvy,2018) and learning field (Urban et al.,2018) are effective for the development of teachers' GC. Therefore, we can consider further exploring the development path of teachers' GC and developing pre-service and post-service teachers' GC training programs.

Therefore, we can consider further exploring the development path of teachers' GC and developing pre-service and post-service teachers' GC training programs. The language environment of students' communication and dialogue is of great significance to the cultivation of GC. Based on an online survey of Belgian Chinese students, Qian et al. (2018) showed that English and local language proficiency are important predictors of global literacy, which in turn significantly affect participants' social connections and academic adaptation. We speculate that students will get more stimulation in the process of getting along with their peers and their surroundings, which may help them develop their GC.

In the Exosystem, "Emigration", "Peer language" and "Campus bullying" all has a significant positive impact on teenagers' GC. The views of Doerrand, et al. (2018) also support this view, saying that increasing the opportunities for minority students to study abroad may be the only way to improve their GC. Bi/multicultural and bi/multilingual minority immigrant students studying abroad already had global competence have become globally competitive, indicating that immigration and language environment have improved the GC of minority students and used this ability to enrich their experience. Make good use of the exosystem of students' study and life to improve the GC of teenagers in a rich learning and competitive environment.

In terms of the level of information and communication technology in macrosystem, "Email usage", "On-campus electronic resources" and "School Internet course" will significantly affect students' GC. With the development of intelligent technology, people have reached a consensus that the ability to use digital information technology in education is no longer a choice, but a must. (Cabezas-Gonzalez, 2021). Information technology equipment can provide technical support and environment for the cultivation of students' GC. Dzhurylo et al. (2019) stressed that we should start to build digital ability by embedding and learning ICT as soon as possible. In other words, utilizing ICT tools critically and creatively is an important competence to cope with the trend of globalization in the future.Therefore, teachers can create a rich information environment and stimulation with the help of multimedia equipment in the classroom. At the same time, students should also learn to master the ability of multi-channel communication and communication through ICT.

The integration of various factors layer by layer will have an interactive impact on the factors of the previous level. This mechanism gives inspiration to the development and training mode of students' GC. For example, in the GC training system of basic education in the United States, schools (including teachers), society (including families and communities), and the government (state and federal level) cooperate to promote the cultivation of GC in American basic education. The government devolved power to schools. Since then, schools have made clear educational objectives and allocated educational resources and attached great importance to teachers' professional development, as well as the improvement of teachers' GC; at the same time, family background and social environment play a decisive and complementary role in the cultivation of students' GC (Ji, 2019). Therefore, considering the impact of various factors on students' GC, we can build a professional collaborative community, realize the interaction between school, family and society, and strive to create a global collaborative environment, so as to establish partnerships with schools in other regions and countries, so that students can participate in national and international intercultural learning exchanges more comprehensively. (ASCD et al.,2019).

4.1. Implications for Policy and Practice

As a multi-dimensional and comprehensive ability, the development and cultivation of GC should also consider the influence of many factors. First, at the school level, the implementation of GC school teaching reform is the key to promote the development of students' GC. Educators can integrate the cultivation of GC into the teaching of various disciplines, create real teaching situations, and achieve teaching goals by developing independent-themed courses, curriculum disciplines and comprehensive practical activities. Second, at the teacher level, only teachers with GC can better train students. Therefore, we need to train qualified and powerful teachers with GC teaching, identify the difficulties for teachers to carry out GC teaching, and carry out targeted guidance. Third, at the individual level of students, the cultivation of students' GC needs to comprehensively consider the impact of students' environment, integrate teachers, society, family and technological environment, and implement the collaborative training mechanism of GC.

4.2. Limitations and Future Research Directions

This study also has some limitations. First of all, we mainly took the data of the Britain and Spain as examples to illustrate a mechanism of influence among factors at all levels of GC, which did not cover all countries, and any generalization of other social and cultural backgrounds should be treated with caution. Secondly, this paper only analyzed and studied the data of PISA2018 GC survey, and did not make a more in-depth assessment of students' influence on the development of GC in the context of teaching practice and intervention, which still needs to be further explored. Finally, because there are many factors in each level, there is no in-depth exploration and detailed explanation of the relationship between specific factors. Future research can further explore the regulation or intermediary mechanism between specific factors.

5. Conclusion

In this work, taking the PISA of GC in Britain and Spain as the data representative, we divided the independent variables involved in the questionnaire into five levels: individual students, teacher factors, social factors, family factors and ICT factors. In order to explore the specific impact of different factors on student' GC and its impact mechanism, this research is guided by ecological systems theory. The method model of multi-level linear regression (HLM) is used to comprehensively study the influence of various factors on GC and the interaction between them. The study found that there are interactions among factors at all levels of teenagers. Simultaneously, the influencing factors of GC at the individual level decreased with the increase of the regression level, indicating that the more complex the environmental system is, the weaker the influence at the individual level is. In addition, family factors have the greatest impact on the global competence ecosystem. The addition of family factors affects the significant effect of other factors on GC. And the subsequent inclusion of ICT factors has almost no impact on the global competence ecosystem, but has an impact on individual level, indicating that the addition of ICT technical factors may have a certain regulatory effect on the basic level of teenagers' GC. On this basis, combined with the interaction of various factors, this paper puts forward some suggestions on how to cultivate and develop students' GC.

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