Differential Impacts of Digital Learning Resources on Adolescents' Educational Expectations: A Family Socioeconomic Status Perspective

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Abstract: Digital learning resources exert profound influences on adolescents' educational expectations. Existing studies mainly focus on objective academic outcomes, while few explore their stratified effects on educational expectations. Based on the 2022 CFPS data, this paper investigates the relationship between digital learning resources and adolescents' educational expectations, as well as the heterogeneity of family socioeconomic status (SES). The results indicate that digital learning resources cannot raise educational expectations directly and only exert indirect effects through academic performance; family socioeconomic status positively predicts educational expectations. The linear moderation effect is insignificant, yet subgroup regression verifies a class threshold: digital learning resources significantly promote educational expectations only among adolescents with high SES, confirming the digital Matthew effect. Simply popularizing digital resources tends to widen educational stratification. To advance educational equity, supporting services for disadvantaged families should be enhanced.

Keywords: Digital Learning Resources; Adolescents' Educational Expectations; Family Socioeconomic Status; Educational Equity

1. Research Background

Educational digitalization constitutes a vital strategic orientation for building China into a powerful nation in education. The widespread popularity of "Internet+Education" has broken the boundaries of traditional campus education and become an important support for teenagers' after-school learning. Teenagers are in an important stage of educational choice and lifelong growth. Digital learning resources can expand teenagers' access to knowledge, improve learning experience and enhance learning confidence, thus greatly changing everyone's expectation for education. As a core psychological factor to predict academic achievement and help social mobility, teenagers' expectation for education is not only influenced by personal learning experience, but also greatly influenced by structural factors related to family socioeconomic status.

The current research is mainly to investigate how digital learning resources affect the academic performance and cognitive ability of teenagers. On the other hand, the mechanism of their influence on subjective education expectation has not been fully studied. In addition, the common ideas among scholars about the educational effect of digital resources are still not unified. Some scholars argue that digital education is equal to everyone. It breaks down the barrier of resources, gives disadvantaged teenagers the power to improve their educational hopes and can narrow the class gap. However, according to the digital divide theory, even if the differences in visits are reduced, the differences in family economic status, parents' digital literacy and educational assistance will produce invisible differences in use and results, further widening the gap between teenagers' expectations for education.

In this case, the paper mainly studies how digital learning resources affect teenagers' expectations for education, so as to understand the role of family socioeconomic status adjustment and the differences at different levels. Theoretically, this study will expand the scope of research that has paid attention to visible achievement indicators so far. Pay attention to subjective education expectation, combine digital divide theory and status attainment theory, reveal the mechanism of digital education effect generation level, and enrich the empirical research on digital education inequality in China. In fact, it provides

a small level of empirical evidence for better allocating digital education resources, coping with the digital divide and ensuring equal access to high-quality education.

2. Literature Review

The influence of digital learning on teenagers' learning expectation is not linear, but depends on the structural factors of family socioeconomic status (ses). Digital technology is not only conducive to everyone's fair learning opportunities, but also conducive to expanding the class gap. The final learning result depends on the quality of access resources, the way of use and family support. Family SES affects the effect of digital learning through the preparation of goods, parents' learning guidance and the cultivation of digital literacy, and the results obtained in digital education will have obvious level differences.

2.1 Stratified Disparities in Access to Digital Resources

The research of digital divide has shifted from the gap of "whether you can buy hardware" to the gap of using methods and knowledge. Family SMS is the most important thing that determines the quality of digital learning for young people [1]. Families with high SES can prepare digital equipment and learning, and can carry out high-quality digital learning [6]. On the contrary, families with low SES often have insufficient hardware and learning environment. Therefore, it is difficult for disadvantaged people to have hope for learning through digital resources [7]. At the same time, the class gap will also increase the gap of digital ability. Young people from families with high SES will seriously study numbers, so their knowledge and learning ability of numbers will continue to improve [8]. They want to learn more from their good digital learning experience, and finally, there are differences in the hope of learning among young people of different classes in society [9].

2.2 The Moderating Role of Parental Digital Mediation

Parents' expectation of education and adjustment in figures are important ways for family class to realize children's educational achievements, and also important conditions for digital resources to produce educational value [2]. Digital tools can improve the family's expectation of education, but its effect varies greatly in different social classes [10]. High-quality SES families can rely on high-quality home-school interaction and family education support to turn digital resources into their own learning ability improvement and education plans [3]. In addition, the class difference of parents' digital literacy and educational ability will increase the education gap. Parents with high SES can scientifically guide their children to use digital resources reasonably, avoid network dangers and give full play to the value of digital learning [11]. Most parents with low SES are limited by their own strength and realistic pressure, and adopt passive management methods, which cannot stimulate their children's digital learning [12]. In addition, parents with high SES know more about the value of digital education, and further improve the educational effect of digital resources by actively encouraging inquiry digital learning [4].

2.3 Heterogeneity in Individual Digital Usage Behaviors

Adolescents not only accept the existence of digital resources. The mood and psychological characteristics they want to use, together with the family class, will produce differences in the learning results. Adolescents of the high SES family tend to give priority to learning and growth, and use digital resources as a tool to improve their performance. In contrast, children with low SES are often used for enjoyment, and it is difficult to expand their educational dreams in digital learning [5]. Subjective class feelings are helpful. Some Adolescents, who have low objective social skills but strong and indomitable hearts, can make good use of digital resources with a positive development concept and continue to have good educational expectations [13]. At the same time, the influence of friends in digital places will strengthen the education class. The learning atmosphere and behavior choice of groups will enlarge the dream difference of their respective education and further aggravate the inequality of digital education [14][15].

This means that the influence of digital learning on Adolescents educational expectations is obviously different at different levels. Family socioeconomic status helps to widen the educational gap in the digital age by transmitting resources, mediating parents, and personal behaviors. This paper goes beyond the limits of ordinary research that only investigates

interviews. Pay attention to the quality difference, family support and individual subjectivity of using digital, and carefully investigate the complex structure of digital learning when making educational expectations. The purpose of this study is to fill the gap in the existing literature, and to provide local practical data for eliminating digital divide, improving the provision of digital education and promoting educational equity.

3. Research Design

3.1 Data Source and Sample Selection

This study uses data from the 2022 China Family Panel Studies (cfps). This dataset is aimed at many province in the country, which contains detailed information such as everyone's educational behavior, the use of digital, and the economic and social situation at home. The representativeness of sample and the quality of data are very good. Adolescent, who is 10 to 30 years old at school, is selected as the research sample. This year's group is an important period for educational choice, so their expectation for education is worth studying. After excluding invalid observations such as insufficient data of important variables, mismatched information and mismatched house background records, 761 effective observations were finally obtained.

3.2 Variable Definition and Measurement

This paper specifies a dependent variable, core explanatory variable, moderating variable, and a set of control variables, and conducts heterogeneity analysis based on family SES.

The dependent variable refers to adolescents' educational expectations. Following common academic practices, ordered educational aspiration responses in the questionnaire are converted into continuous years of schooling to quantify individuals' educational aspirations.

The core explanatory variable is the usage of digital learning resources, operationalized as a binary dummy variable constructed from adolescents' after-school online learning behaviors.

The moderating variable is the composite index of family socioeconomic status (SES). It integrates seven indicators including parental education, occupational prestige, household income, and regional stratification. The index is generated by computing the mean value after Z-score standardization; higher values indicate superior family socioeconomic standing.

To mitigate omitted variable bias, this study controls for individual gender, age, education stage, academic performance, learning duration, physical and mental health, household size and other covariates. Provincial fixed effects are incorporated to isolate disturbances arising from regional disparities in educational policies and resource endowments.

3.3 Econometric Model Specification

Baseline OLS regression is adopted to test the main effects. An interaction term is introduced to construct a moderation model, and subgroup regression is applied for heterogeneity testing.

(1) Baseline Regression Model

A baseline model is established to examine the overall impact of digital learning resource usage on adolescents' educational expectations:

$$Expectation_i=\alpha_0+\alpha_1 Digital_i+\sum \alpha_k Controls_{ki}+\delta_p+\varepsilon_i \quad (1)$$

Where $Expectation_i$ denotes adolescent i 's educational expectations; $Digital_i$ represents digital learning resource usage; $Controls_{ki}$ stands for a series of control variables;$\delta_p$indicates provincial fixed effects;$\alpha_0$is the intercept, and α_1 is the regression coefficient of the core explanatory variable. A significantly positive α_1 implies that digital learning resource usage substantially raises adolescents' educational expectations; ε_i is the random disturbance term.

(2) Heterogeneous Moderation Model

Building on the baseline model, an interaction term between digital learning resource usage and family SES is incorporated to identify the stratified moderating effect:

$$Expectation_i=\beta_0+\beta_1 Digital_i+\beta_2 SES_i+\beta_3 Digital_i\times SES_i+\sum \beta_k Controls_{ki}+\delta_p+\mu_i \quad (2)$$

Where SES_i refers to the composite family socioeconomic status index; $Digital_i\times SES_i$is the interaction term between the core explanatory variable and the moderating variable; β_3 is the moderation coefficient. All remaining variables carry the same definitions as in the baseline model. To address limitations of the linear interaction model and precisely capture nonlinear stratified disparities, the full sample is divided into three subsamples by SES level for separate regression. Seemingly Unrelated Regressions (Sur) method is used to investigate the differences of coeficient in each group, which can accurately confirm the hierarchical

deviation of digital learning effect.

4. Empirical Results and Analysis

4.1 Descriptive Statistics and Correlation Analysis

The analysis is based on 761 valid observations. According to the statistics, the average educational expectation of adolescents is 15.67 years, which is between junior college and bachelor's degree. This shows that the surveyed adolescents generally have high hopes for education. The variable range is 0 to 22 years, and the standard deviation is 1.89. This means that individuals are very different and meet the deviation conditions of empirical analysis. The average value of the core descriptive variable digital learning resource usage is 0.49, which means that about half of adolescents study online after class. Digital learning tools are very popular at first, but in fact, different groups have different ways of using them. The average value of composite family SES index is 0.13, which is slightly higher than the national average. Because the range of values is large enough, the deviation of each layer shown in Table 1 can be investigated.

The distribution characteristics of all control variables are consistent with the general state of teenager in school. The ratio of male to female in sample is just right, with an average age of 17.69. There are more high school students and junior college students. Teenager usually study very hard, and the average study time on weekdays can reach 9.05 hours. Academic achievement ranking and academic satisfaction are above average, and the people who answered me are healthy both physically and mentally. There is a missing value in the variable of class achievement order, which is because the answers of questionnaire are inconsistent. The average family size of sample is 4.44, which is consistent with the family structure characteristics of Chinese. As a whole, sample is effective and fully representative.

Table 1. Descriptive Statistics of Main Variables

Variable	Mean	Sd	Min	Max	Count
Educational Expectation (Years of Schooling)	15.67	1.89	0.00	22.00	761.00
Online Learning Usage Dummy	0.49	0.50	0.00	1.00	761.00
Composite Family Socioeconomic Status Index	0.13	0.49	-1.06	1.69	761.00
Gender (1=Male)	0.54	0.50	0.00	1.00	761.00
Age	17.69	1.91	16.00	24.00	761.00
Class Rank (Percentile Scale)	2.49	1.17	1.00	5.00	531.00
Average Daily Study Hours on Weekdays	9.05	3.55	0.00	24.00	761.00
Academic Satisfaction	3.25	0.82	1.00	5.00	761.00
Household Size	4.44	1.88	1.00	12.00	761.00
Self-rated Health	2.08	0.88	1.00	5.00	761.00
Observations	761				

To preliminarily examine the correlation patterns among core variables and test for multicollinearity, this study conducted Pearson product-moment correlation analysis on all included variables, with detailed results presented in Table 2.

The results show a significantly positive association between digital learning behavior and adolescents' educational expectations. There is a positive relationship between the time spent doing online learning and digital learning every day and editing learning. The coefficients are 0.143 and 0.167 respectively, both of which are at the level of 1%, which is statistically significant. This first shows that the more you take part in digital learning, the higher the educational expectations of children. At the same time, family socioeconomic status (SES) is also positively correlated with educational expectations ($r=0.133$, $p<0.001$), and positively correlated with daily digital learning time. From this result, we can see that there are social and economic differences in digital learning, so as to prepare for the analysis of the adjustment effect in the future.

In other items surveyed, age is positively correlated with educational expectations ($r=0.210$, $p<0.001$), but the ranking and gender of school performance are negatively correlated with educational expectations. The relationship between educational expectations and school learning satisfaction, the number of books at home, and self-perceived health status cannot be said to be statistically significant. Generally

speaking, the absolute value of the correlation coefficient of most projects is less than 0.2, so the numerical problem is not big, which meets the conditions of regression analysis and adjustment effect analysis in the future.

Table 2. Correlation-Coefficient Matrix of Digital Learning, Family Socioeconomic Status and Adolescents' Educational Expectations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Educational expectations (years of schooling)	1.000									
(2) Online-learning participation	0.143* (0.000)	1.000								
(3) Composite index of family socioeconomic status	0.133* (0.000)	0.028 (0.436)	1.000							
(4) Respondent's gender	-0.108* (0.003)	-0.036 (0.319)	-0.010 (0.787)	1.000						
(5) Age	0.210* (0.000)	0.121* (0.001)	-0.155* (0.000)	0.010 (0.777)	1.000					
(6) Class ranking (percentile)	-0.154* (0.000)	-0.055 (0.207)	0.049 (0.256)	0.081 (0.063)	0.024 (0.587)	1.000				
(7) Daily non-weekend digital-learning duration (hours)	0.167* (0.000)	-0.012 (0.735)	0.191* (0.000)	-0.129* (0.000)	-0.322* (0.000)	-0.045 (0.300)	1.000			
(8) Academic satisfaction	0.048 (0.300)	0.015 (0.680)	0.022 (0.551)	0.060 (0.098)	0.081* (0.025)	-0.154* (0.000)	-0.042 (0.253)	1.000		
(9) Number of family members	-0.069 (0.058)	-0.045 (0.213)	0.024 (0.510)	-0.050 (0.169)	-0.252* (0.000)	0.040 (0.362)	0.083* (0.022)	0.031 (0.389)	1.000	
(10) Self-rated health	-0.028 (0.448)	0.016 (0.660)	0.002 (0.952)	-0.167* (0.000)	0.053 (0.142)	0.022 (0.610)	-0.013 (0.722)	-0.136* (0.000)	-0.026 (0.469)	1.000

Notes: significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.2 Analysis of Baseline Regression Results

This study adopts hierarchical stepwise regression to incorporate multi-dimensional variables and track dynamic changes in the core effect. Robust standard errors are applied across all models, and regression outputs are reported in Table 3. Model (1) only includes the variable of digital learning resource usage. Its coefficient is significantly positive at the 1%level, which preliminarily confirms a positive correlation between digital learning resource usage and adolescents' educational expectations. After adding the family SES index in Model (2), the coefficient of the core variable declines slightly yet remains statistically significant. Family socioeconomic status exerts a significant positive effect on educational expectations. Moreover, the promotional effect of digital learning exists independently of family stratification and cannot be absorbed by the SES variable. Model (3) further controls for individual demographic and educational stage characteristics. The positive effect of digital learning resources weakens moderately but stays significant at the 1%level. Meanwhile, obvious individual heterogeneity emerges: female and older adolescents hold higher educational expectations. Compared with primary school students, adolescents in junior high school exhibit markedly lower educational expectations, reflecting rational constraints on educational aspirations brought by academic pressure and realistic perceptions. Model (4) incorporates all control variables and provincial fixed effects and achieves the best model fit(R^2 =0.202). At this stage, the coefficient on digital learning resources turns insignificant, indicating that its initial positive correlation is primarily driven by confounding factors such as individual academic performance, household background and regional characteristics. Across all specifications, the coefficient of family SES remains stably and significantly positive, which strongly validates status attainment theory. It demonstrates that family stratification constitutes a core stable

determinant of adolescents' educational expectations and continues to exert powerful constraints even within digital contexts.

Table 3. Baseline Regressions: Impacts of Digital Learning Resource Usage on Adolescents' Educational Expectations

	(1)	(2)	(3)	(4)
	No Controls	+SES	+Individual Characteristics	+Full Set of Controls
Online Learning Usage Dummy	0.539*** (0.136)	0.526*** (0.136)	0.367*** (0.135)	0.197 (0.165)
Composite Family Socioeconomic Status Index		0.493*** (0.137)	0.623*** (0.133)	0.479*** (0.167)
Female			0.000 (.)	0.000 (.)
Male			-0.385*** (0.128)	-0.351** (0.151)
Age			0.110* (0.064)	0.064 (0.090)
Junior High Stage			-0.870** (0.363)	-0.223 (0.249)
Senior High Stage			-0.502* (0.270)	0.000 (.)
Tertiary Education Stage			0.000 (.)	0.000 (.)
Class Rank (Percentile Scale)				-0.224*** (0.075)
Average Daily Study Hours on Weekdays				0.146*** (0.034)
Academic Satisfaction				0.044 (0.117)
Household Size				0.022 (0.040)
Self-rated Health				-0.157 (0.105)
province=11				0.000 (.)
province=12				-1.360*** (0.374)
province=13				-2.173*** (0.301)
province=14				-2.116*** (0.547)
province=21				-2.755*** (0.481)
province=22				-2.660*** (0.498)
province=23				-3.431*** (0.837)
province=31				-2.731*** (0.485)
province=32				-2.555*** (0.627)
province=33				-1.104 (0.860)
province=34				-1.813*** (0.472)
province=35				-2.950*** (0.530)
province=36				-4.429*** (1.239)
province=37				-2.567*** (0.334)
province=41				-2.201*** (0.278)
province=42				-1.826** (0.779)
province=43				-2.159*** (0.291)
province=44				-2.528*** (0.263)
province=45				-2.690*** (0.401)
province=50				-2.087*** (0.599)
province=51				-2.346*** (0.359)
province=52				-2.677*** (0.534)
province=53				-2.319*** (0.445)
province=61				-2.292*** (0.450)
province=62				-2.470*** (0.333)
province=64				-2.103*** (0.285)
Constant	15.407*** (0.087)	15.352*** (0.085)	14.101*** (1.322)	16.101*** (1.697)
N	761.000	761.000	761.000	531.000
r2	0.020	0.037	0.103	0.202

Notes: Standard errors are reported in parentheses; significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

4.3 Heterogeneity Analysis by Family Socioeconomic Status

This study first constructs an interaction model to test the linear moderating effect of family SES. The results show that the coefficient for the interaction term between digital learning resource use and family SES is 0.355 (SE = 0.311), which fails to pass the significance test. This suggests that family socioeconomic status exerts no significant moderating effect on the relationship between digital learning and educational expectations within the linear - model framework, as presented in Table 4.

Table 4. Moderating Effect of SES

	(1)
Variables	Educational Expectation (Years of Schooling)
Online Digital Learning Usage Dummy	0.177 (0.167)
Composite Family SES Index	0.481*** (0.167)
Interaction Term	0.355 (0.311)
Female	0.000 (.)
Male	-0.357** (0.152)
Age	0.058 (0.091)
Junior High Stage	-0.229 (0.250)
Senior High Stage	0.000 (.)
Tertiary Education Stage	0.000 (.)
Class Rank (Percentile Scale)	-0.221*** (0.074)
Average Daily Study Hours on Weekdays	0.147*** (0.034)
Academic Satisfaction	0.044 (0.117)
Household Size	0.021 (0.040)
Self-rated Health	-0.153 (0.105)
province=11	0.000 (.)
province=12	-1.254*** (0.403)
province=13	-2.026*** (0.339)
province=14	-1.966*** (0.557)
province=21	-2.604*** (0.486)
province=22	-2.531*** (0.512)
province=23	-3.241*** (0.874)
province=31	-2.548*** (0.524)
province=32	-2.426*** (0.638)
province=33	-0.936 (0.860)
province=34	-1.683*** (0.472)
province=35	-2.802*** (0.548)
province=36	-4.263*** (1.194)
province=37	-2.392*** (0.361)
province=41	-2.059*** (0.312)
province=42	-1.620* (0.848)
province=43	-2.030*** (0.317)
province=44	-2.402*** (0.294)
province=45	-2.530*** (0.441)
province=50	-1.923*** (0.619)
province=51	-2.235*** (0.369)
province=52	-2.547*** (0.541)
province=53	-2.193*** (0.465)
province=61	-2.154*** (0.481)
province=62	-2.318*** (0.357)
province=64	-1.972*** (0.357)
Constant	16.200*** (1.681)
N	531.000
r2	0.204

Notes: Standard errors are reported in parentheses; significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Given that the linear interaction model assumes uniform effect variation and may conceal stratified disparities across social groups, this study further divides the sample into low, medium and high SES subgroups based on SES tertiles and conducts subsample regressions.

As shown in Table 5, the regression results of each group have obvious hierarchical differences. The coefficient of digital learning is 0.215 in low-SES group and 0.393 in medium-SES group, both of which have no statistical significance. In the high-SES group, the coefficient rose to 0.653, which became a meaningful positive value at the level of 5%. It can be seen that the materials of digital learning can effectively improve the expectation of high-level family youth for education, but have little effect on middle-level or low-level family youth. The effect gap between high-status and low-status samples reached 0.87 years, which is of great significance to practical education. In addition, in the test of the difference between groups of SUR, it is found that there is a little significant difference between the two coefficients ($\chi = 2.86$, p=0.091).

This result is consistent with the digital Matthew effect. The materials of digital learning can't bring the good effect of education to everyone, but have a clear class barrier. High-SES families can make use of the advantages of material, culture and social forces to transform digital materials into good results of education. On the other hand, the family of low-SES lacks

professional guidance and supporting power of digital learning. environment, so it is difficult to exert the good

Table 5. Effects of Digital Learning Resource Usage on Educational Expectations across Different SES Levels.

	(1)	(2)	(3)
	Low SES	Medium SES	High SES
Online Learning Usage Dummy	-0.215 (0.263)	0.393 (0.297)	0.653** (0.276)
Female	0.000 (.)	0.000 (.)	0.000 (.)
Male	-0.319 (0.248)	-0.374 (0.262)	-0.173 (0.264)
Age	-0.192 (0.130)	0.241 (0.173)	0.217 (0.174)
Junior High Stage	-0.544 (0.463)	0.010 (0.413)	-0.138 (0.414)
Senior High Stage	0.000 (.)	0.000 (.)	0.000 (.)
Tertiary Education Stage	0.000 (.)	0.000 (.)	0.000 (.)
Class Rank (Percentile Scale)	-0.576*** (0.184)	-0.116 (0.112)	-0.223* (0.122)
Average Daily Study Hours on Weekdays	0.200*** (0.061)	0.097** (0.040)	0.191*** (0.057)
Academic Satisfaction	-0.012 (0.157)	0.389** (0.190)	-0.483** (0.235)
Household Size	0.055 (0.070)	0.047 (0.085)	0.017 (0.064)
Self-rated Health	-0.125 (0.158)	0.069 (0.173)	-0.179 (0.161)

Table 5. (Continued) Effects of Digital Learning Resource Usage on Educational Expectations across Different SES Levels.

	(1)	(2)	(3)
	Low SES	Medium SES	High SES
province=13	0.000 (.)	0.000 (.)	-2.673*** (0.506)
province=14	0.212 (0.574)	-0.294 (0.700)	-1.832 (1.363)
province=21	-0.473 (0.651)	1.427 (1.384)	-3.543*** (0.581)
province=22	-0.408 (0.930)	-2.158*** (0.711)	-2.759*** (0.739)
province=35	0.042 (0.643)	-0.262 (0.520)	-3.422*** (0.733)
province=36	-5.219** (2.121)	0.023 (0.473)	
province=37	0.413 (0.758)	-0.307 (0.426)	-3.027*** (0.564)
province=41	-0.639 (0.585)	0.314 (0.481)	-2.611*** (0.425)
province=43	0.061 (0.584)	0.008 (0.448)	-2.633*** (0.385)
province=44	-1.148 (0.887)	-0.369 (0.399)	-2.995*** (0.396)
province=45	-0.707 (0.623)	-0.215 (0.492)	-3.406*** (0.927)
province=50	-0.958 (0.588)	-1.576 (1.626)	-1.728** (0.837)
province=51	-0.420 (0.532)	0.207 (0.618)	-2.766*** (0.756)
province=52	-0.621 (0.733)	-1.110 (1.004)	-1.386 (1.572)
province=53	-0.650 (0.676)	0.653 (0.468)	-4.452*** (0.512)
province=61	-0.738 (0.724)	0.406 (0.561)	-2.907*** (0.483)
province=62	0.224 (0.487)	-0.395 (0.568)	-3.259*** (0.523)
province=23		-2.018 (1.462)	-2.002*** (0.639)
province=32		-0.888 (0.919)	-2.101** (0.846)
province=33		-0.171 (0.455)	-0.753 (1.206)
province=34		0.152 (0.400)	-1.544* (0.879)
province=42		-0.678 (0.442)	0.498 (0.309)
province=64		0.434 (0.438)	-2.701*** (0.538)
province=11			0.000 (.)
province=12			-1.488** (0.661)
province=31			-2.557*** (0.522)
Constant	18.874*** (2.403)	9.432*** (3.107)	14.972*** (3.540)
N	145.000	193.000	193.000
r2	0.481	0.234	0.306

Notes: Standard errors are reported in parentheses; significance levels: * p < 0.1, ** p

< 0.05, *** p < 0.01.

5. Conclusion and Discussion

In this study, CFPS 2022 dataset is used to analyze the influence of the use of digital learning resource on the emotional experience of teenagers, taking 761 school teenagers aged 10 to 30 as samples. The results of family socioeconomic status show that digital learning resources do not directly promote the learning efficiency of teenagers, but mainly indirectly empower them through academic performance. Regardless of academic variables, the effect of digital learning is very good, but if academic indicators such as class ranking and study time are added, the direct effect will become smaller. It can be seen that digital learning can indirectly improve the learning efficiency of teenagers by improving their academic performance and learning experience. On the other hand, family socioeconomic status will always have a good influence on educational expectations even if it adjusts a lot of covariates. This confirms the status attainment theory, that is, the digital environment has not weakened the long-term influence of family class on individual educational aspirations.

Through the further verification of Heterogeneity tests, we find that the effect of digital learning has a clear class threshold, which is consistent with the digital Matthew effect. The ordinary linear interaction model did not find much adjustment effect, but there were obvious differences among the three SES groups. Digital learning resources only have a good and significant effect on family teenagers with high SES, but have little effect on middle and low SES groups. The difference in educational returns between people with high social class and people with low social class is 0.87 years, and the numerical difference between each group is slightly larger. That is to say, the idea of "everyone has the same effect" in the linear interaction model is limited and easy to cover up the real class differences. Families with high SES have strong abilities in material, cultural and family education, so they can turn digital resources into educational benefits well. On the contrary, families with low SES can't give full play to the value of digital learning education even if they use numbers.

In other words, digital educational resources are not available to anyone. Only spreading digital device and internet resources cannot achieve educational equity, and sometimes it will widen the educational gap. In order to reduce the gap in digital education, policy makers should not only increase the amount of digital educational resources, but also solve the problem of insufficient support and guidance for family education with difficulties in life.

This study has several limits. Because cross-sectional data is used, it is impossible to distinguish causality, only the correlation is known. The central variable is made according to the information you answered, so there may be subjective measurement distortion. In addition, the research measures digital learning behavior through two choices, and does not distinguish between the type of resources and the way of use. In the future, study will use panel tracking data and quasi-experimental design to clarify the causal relationship, correct the measurement distortion with objective usage records, refine the diversity of digital educational resources, and make digital learning an education for teenagers.

References

[1] Sun, J., Zhang, H. H., & Zhang, Q. (2025). Research on the relationships among family socioeconomic status, digital literacy and adolescents' academic achievement. Educational Research, 46(6), 149-159.

[2] Hou, J. Y., Zhang, J. P., Ge, Y., et al. (2023). Research on the influence of family capital and educational investment on children's educational attainment. Journal of Higher Education Management, 17(5), 110-124. https://doi.org/10.13316/j.cnki.jhem.20230906.010

[3] Zhu, X. W., Han, H., & Cheng, Y. X. (2019). Class disparities in adolescents' educational expectations: A micro-mechanism analysis based on family capital investment. Journal of Xi'an Jiaotong University (Social Sciences), 39(4), 102-113. https://doi.org/10.15896/j.xjtuskxb.201904013

[4] Zhang, X. M., & Zhao, G. D. (2022). An analysis of class disparities in children's non-cognitive ability development: A micro-investigation based on family capital investment. Education & Economy, 38(4), 40-47, 59.

[5] Han, H., Liu, D. X., & Wan, L. L. (2023). Heterogeneous effects of family socioeconomic status on children's internet

use. Journal of Central South University (Social Sciences), 29(5), 175-187.

[6] Njeri, M., & Taym, A. (2024). Analysing the power of socioeconomic status on access to technology-enhanced learning in secondary schools. Research Studies in English Language Teaching and Learning, 2(4), 223–250. https://doi.org/10.62583/rseltl.v2i4.55

[7] Qaribilla, R., Indrajaya, K., & Mayawati, C. I. (2024). Digital Learning Inquality: The Role of Socioeconomic Status in Access to Online Education Resources. International Journal of Social and Human, 1(2), 51–58. https://doi.org/10.59613/55gdmt96

[8] Liu, J., & Chen, Y. (2026). Socioeconomic status and educational inequality: digital competency pathways to creative problem-solving and academic performance. Frontiers in Psychology, 16. https://doi.org/10.3389/fpsyg.2025.1690989

[9] Zheng, J., Cheung, K., Sit, P., & Lam, C. (2024). Unraveling the relationship between ESCS and digital reading performance: A multilevel mediation analysis of ICT-related psychological needs. Education and Information Technologies. https://doi.org/10.1007/s10639-024-12458-9

[10] Chen, C., Zhang, Y., & Lu, M. (2025). How internet use has transformed educational expectations in Chinese families. PLOS One, 20(4), e0321185. https://doi.org/10.1371/journal.pone.0321185

[11] Cao, S., Zhang, J., Dong, C., & Li, H. (2024). Digital resources and parental mediation parallelly mediate the impact of SES on early digital literacy among Chinese preschoolers. European Early Childhood Education Research Journal, 33(1), 110–124. https://doi.org/10.1080/1350293x.2024.2334319

[12] Pan, Q., Lan, M., Tan, C. Y., Tao, S., Liang, Q., & Law, N. (2024). Protective factors contributing to adolescents' multifaceted digital resilience for their wellbeing: A socio-ecological perspective. Computers in Human Behavior, 155, 108164. https://doi.org/10.1016/j.chb.2024.108164

[13] Ren, Y., Zhang, F., Jiang, Y., & Huang, S. (2020). Family Socioeconomic Status, Educational Expectations,and Academic Achievement Among Chinese Rural-to-Urban Migrant Adolescents: The Protective Role of Subjective Socioeconomic Status. The Journal of Early Adolescence, 41(8), 1129–1150. https://doi.org/10.1177/0272431620983459

[14]Lorenz, G., Boda, Z., Salikutluk, Z., & Jansen, M. (2020). Social influence or selection? Peer effects on the development of adolescents' educational expectations in Germany. British Journal of Sociology of Education, 41(5), 643–669. https://doi.org/10.1080/01425692.2020.1763163

[15]Sharp, E. H., Seaman, J., Tucker, C. J., Van Gundy, K. T., & Rebellon, C. J. (2019). Adolescents' Future Aspirations and Expectations in the Context of a Shifting Rural Economy. Journal of Youth and Adolescence, 49(2), 534–548. https://doi.org/10.1007/s10964-019-01152-6