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نقش واسطه‌ای هوش شناختی در رابطه بین فناوری فاوا و اشتیاق تحصیلی

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چکیده

هدف از پژوهش نقش واسطه‌ای هوش شناختی در رابطه بین فناوری فاوا و اشتیاق تحصیلی بود. پژوهش توصیفی- همبستگی بود. جامعه آماری از کلیه دانش آموزان پایه ششم مشغول به تحصیل در سال ۱۴۰۲-۱۴۰۳ ابتدایی شهر کرمان به تعداد ۲۵۰ نفر که به روش نمونه گیری کل شماری ۲۵۰ نفر به عنوان حجم نمونه انتخاب شدند. داده‌ها از طریق پرسشنامه‌های محقق ساخته (فاوا) توسط اسلامی (۱۳۹۷)، پرسشنامه استاندارد اشتیاق تحصیلی توسط فردریکز و همکاران (۲۰۰۴) مقیاس کودکان کتل آزمون فرم B مقیاس ۲، جمع‌آوری شد. و فرضیه‌ها از طریق ضریب همبستگی پیرسون و مدل یابی معادلات ساختاری تحلیل شدند. یافته‌ها نشان داد رابطه بین تجربه کار با اینترنت، استفاده از اینترنت با هوش شناختی و اشتیاق تحصیلی معنادار نیست. رابطه بین هوش شناختی با اشتیاق تحصیلی معنادار نیست. همچنین رابطه بین استفاده از نرم افزارهای آموزشی، استفاده از کامپیوتر و سرویس‌ها اینترنتی، سهولت و سودمندی کار با کامپیوتر و سرویس‌های اینترنتی و توانمندی کار با کامپیوتر و سرویس‌های اینترنتی با اشتیاق تحصیلی، مثبت و معنادار است. اثر مستقیم مولفه‌های فناوری فاوا (استفاده از کامپیوتر و سرویس‌های اینترنتی، سهولت و سودمندی کار با کامپیوتر و سرویس‌های اینترنتی، براشتیاق تحصیلی مثبت و معنادار است. یافته‌ها نشان داد اثر مستقیم مولفه‌های فناوری فاوا همچون (توانمندی کار با کامپیوتر و سرویس‌های اینترنتی) بر هوش شناختی مثبت و معنادار است. اثرمستقیم هوش شناختی بر اشتیاق تحصیلی دانش آموزان معنادار نیست. هوش شناختی نقش واسطه‌ای معناداری در رابطه بین مولفه‌های فناوری فاوا با اشتیاق تحصیلی ندارد. در نتیجه می توان گفت توجه به فناوری فاوا در اشتیاق تحصیلی و هوش شناختی موثر می باشد.

واژه‌های کلیدی

اشتیاق تحصیلی، فناوری فاوا، هوش شناختی.

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ORIGINAL ARTICLE

The mediating role of cognitive intelligence in the relationship between ICT technology and academic motivation

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ABSTRACT

The purpose of the study was to examine the mediating role of cognitive intelligence in the relationship between ICT and academic enthusiasm. This was a descriptive-correlational study. The statistical population consisted of all sixth-grade students studying in the 2023-2024 primary school year in Kerman City. 250 people were selected as the sample size using the total number sampling method. Data were collected through questionnaires made (ICT) by Islami (2018), a standard questionnaire of academic aspiration by Fredericks et al. (2004) Cattell Child Studies Form B 2 test. Hypotheses were analyzed using the correlation coefficient and modeling of old structural equations. The findings showed that the relationship between experience working with the Internet, Internet use, cognitive intelligence, and academic enthusiasm was insignificant. The relationship between cognitive intelligence and academic motivation is not significant. Also, the relationship between the use of educational software, the use of computers and Internet services, the ease and usefulness of working with computers and Internet services, and the ability to work with computers and Internet services with academic enthusiasm is positive and significant. The direct effect of ICT components (use of computers and Internet services, ease and usefulness of working with computers and Internet services) on academic motivation is positive and significant. The findings showed that the direct effect of ICT components such as (the ability to work with computers and Internet services) on cognitive intelligence is positive and significant. The direct effect of cognitive intelligence on students' academic enthusiasm is not significant. Cognitive intelligence does not have a significant mediating role in the relationship between ICT components and academic enthusiasm. As a result, it can be said that paying attention to ICT is effective in academic enthusiasm and cognitive intelligence.

KEYWORDS

Academic enthusiasm, Cognitive intelligence, ICT technology.

Introduction

The expansion of AI technology and its application have had profound effects on various aspects of human life. So in the present era, access to information technology and the ability to use it has increasingly become a necessary tool for participating in an information-based society (Jadidi Mohammadabadi et al, 2020). One area that has undergone a fundamental transformation with the arrival of information technology is the field of education, such that educational centers in the new millennium are faced with the question of how to overcome the changes and opportunities that information and communication technology has created (Bigdely et al, 2017). Therefore, experts consider one of the most important indicators of educational development to be the quality of using new information and communication technologies in the educational process (Jadidi Mohammadabadi et al, 2021). Therefore, in recent years, educational systems have spent significant amounts of money on integrating and applying information and communication technology in educational and research activities. In modern education, technology has led to a change in the pace of progress. One of the results of these rapid changes, which has received little attention is, Exploring new forms of teaching and learning using ICT (Mukel abai Chainda, 2011). The use of this technology in the field of education in general and academic progress, in particular, creates important changes in student learning, and optimal use of the capacities of these technologies adds a special breadth and richness to learning (Afzal nia, 2008). Using technology in learning is a basic necessity (Daizadeh et al, 2010). ICT, with its systemic vision in education, utilizes all factors that play the best role in the learning and teaching process. Also, by careful engineering and designing the elements, it tries to create optimal educational conditions by the goals and objectives (Mansouri & Zolghadari, 2015). By utilizing ICT, learners will be able to absorb more information in a shorter period (Aghapour et al. 2022). Also, research projects on the impact of ICT on learning indicate that since its introduction into the field of education, it has led to increased motivation among learners (Jadidi Mohammadabadi et al, 2021). In some contexts, and for people who have previously experienced continuous failure in learning, this technology can provide a new opportunity. Research shows that with the introduction of ICT, learners can be more active, more challenged, and more confident than before (Legris et al, 2007). Many factors contribute to the use of ICT in learning and the development of virtual learning environments, the most important of which is better and faster learning (Farajihorani, 2013). The use of information technology in education has created a new type of learning, in which learning is not done only in the old ways and through lectures. Rather, utilizing new tools enables students to learn at their own pace, collaboratively, and in a way that connects subject matter, and the content of the course is not limited to printed books. Therefore, learners will have greater social power (Dalir Naser & Hosseini Nasab. 2015).

Learners become more enthusiastic about pursuing their studies, as academic enthusiasm is considered an important factor in learning (Azizinejad & Allah Karami, 2018). The effectiveness of using ICT on many influential variables in education has been investigated and confirmed in numerous studies (Maslach et al, 2001).

Researchers consider intelligence to be a set of characteristics or talents that are not directly observable (Wechsler, 1958). Some consider it a

general and single talent, and some believe in different types of intelligence. It is certain that since the beginning of the study of intelligence, the emphasis has often been on its cognitive aspects, such as memory and problem-solving (Farajihorani, 2013). According to the ability approach, cognition and emotions interact with each other, and emotional intelligence is a type of abstract reasoning about emotions and feelings (Yousefi & Safari, 2009).

One of the cognitive abilities is cognitive intelligence. Cognitive intelligence is a construct that positive psychology has focused on over the past three decades. Since its introduction to the scientific community in 1990, schools around the world are currently faced with a wide range of students with different abilities and motivations for learning. Students who are academically committed and successful are eager to attend the classroom, and given that scientists now believe that the best state of intelligence and talent can only contribute as much as 20 percent to a person's success and the other 80 percent is related to other factors such as cognitive intelligence (Farajihorani, 2013). Therefore, it is necessary to develop intelligent and thoughtful policies, taking advantage of the highest and deepest form of human intelligence and senses, so that this technology remains at the service of education and upbringing and the new generation (Salmani Kaleh et al, 2024). On the other hand, the use of information technology lays the groundwork for training individuals who will later become specialists and experts in this technology (Sheikhi et al, 2014). Given the importance of using information and communication technology in classrooms, and also considering that academic enthusiasm is a multidimensional construct, creating and strengthening it in our schools can contribute more than anything to students' academic growth (Marsh, O'Mara, 2008). Learners' enthusiasm for pursuing the course material increases. Depending on the individual, their reactions to school and classroom activities vary (Pehlivan, 2012). This is a reaction that some learners respond with enthusiasm, others with refusal, and in a group with reluctance. There are also differences in the amount of energy students put into each area of work. These differences are related to the concept of passion and motivation (Khojasteh Mehr et al, 2012). Therefore, academic enthusiasm is of great importance as a factor in motivating, sustaining, and guiding inclusive behavior during education (Fredricks et al, 2004). Academic enthusiasm refers to the amount of energy a student expends on academic tasks, as well as the level of effectiveness and efficiency achieved. Academic enthusiasm plays a major role in academic progress, improving students' academic performance in schools, and reducing risky behaviors in schools (Jennifer, 2015). The main objective of this study was to investigate the mediating role of cognitive intelligence in the relationship between ICT and academic enthusiasm in sixth-grade students in Kerman City.

Research method

The purpose of this study was to investigate the relationship between variables. The correlational research method was used for this purpose. The present study consisted of all 250 sixth-grade elementary school students in Kerman City. Due to the limited sample size of the statistical population, the total number of students studying in the years 2023-2024 was selected as the sample size using the total number of census methods. In this study, the sampling method was used by the total count method. The reason for using the total count method was the limited number of people in the statistical population.

Measuring tools

1. Questionnaire (ICT)

The researcher-made questionnaire (ICT) was designed by Eslami et al (2016) to conduct a study to assess the level of readiness required to implement some training programs through e-learning. This test consists of 46 questions, including personal characteristics and computer skills with four questions, and familiarity with the program with eleven questions, in three sections (A with 10 questions, B with 11 questions, and C with 10 questions). The validity and reliability of the questionnaire were confirmed by experienced professors. The reliability of the questionnaire in a study by Eslami et al (2016) to assess the level of readiness required to implement some training programs through e-learning in ICT technology was reported as 96/ based on Cronbach's alpha. In this study, the reliability of the questionnaires using Cronbach's alpha method is shown in the table below.

Table 1. Reliability of each ICT component

Variable	Component	Reliability
ICT technology	Total	0.91
	Experience working with the Internet	0.77
	Use of educational software	0.5
	Internet use	0.67
	Using computers and Internet services	0.9
	Ease and usefulness of working with computers and Internet services	0.73
	Ability to work with computers and internet services	0.65

2. Academic Enthusiasm Questionnaire

The standard academic engagement questionnaire was designed and developed by Fredricks et al. (2004). This questionnaire has 15 items. The validity of a data collection instrument, or validity, deals with the extent to which a measurement instrument measures what we think it does. In the study (Abbasi Asl et al, 2011), the reliability of the questionnaire using Cronbach's alpha method was found to be above 0.70. In this study, the reliability of the questionnaires was 0.78 using Cronbach's alpha method.

3. Kettle Children's Scale

Regarding the study of the cognitive dimension of intelligence, this study used the Form B test, Scale 2 of the Cattell Culture-Free Test, which was developed by R.B. Cattell in 1971 and is a group intelligence test and a type of pencil-paper test. This test has 3 scales, of which scale 2 is used to measure the intelligence of normal students and adults with average mental ability and education below a diploma (Reyhani et al, 2021). To examine the reliability of the test, test-retest, peer-reviewed, split-half, and Cronbach's alpha methods were used. The resulting coefficients were 0.78, 0.84, 0.77, and 0.70, respectively.

Data analysis method

In the statistical analysis stage, considering the nature of the measurement scale, which is an interval type, and the research hypotheses, Pearson's correlation coefficient and structural equation modeling were used to analyze the data, as appropriate. The detailed results of these calculations are presented in this chapter in two descriptive sections and a test of the research hypothesis.

Descriptive indicators of research variables

Table 2 shows the descriptive indicators of the mean, standard deviation, minimum, and maximum scores of the study participants in the variables under study. The mean and standard deviation of ICT components such as experience working with the Internet (SD=0.59, M=2.39), Use of educational software (SD=0.69, M=2.03), use of the Internet (SD=0.35, M=1.36), use of computers and Internet services (SD=0.54, M=2.56), Ease and usefulness of

working with computers and Internet services (SD=0.89, M=2.79), ability to work with computers and Internet services (SD=0.57, M=2.46). Also, the mean and standard deviation of cognitive intelligence are (SD=0.06, M=0.81) and academic enthusiasm (SD=0.58, M=2.46).

Table 2. Descriptive indices of participants' scores on research variables

Variable	Component	Number	Average	SD	Minimum score	Maximum score
ICT technology	Experience working with the Internet	250	2.39	0.59	1.25	3.5
	Use of educational software	250	2.03	0.69	1	4
	Internet use	250	1.36	0.35	0.4	2
	Using computers and Internet services	250	2.56	0.54	1	3.9
	Ease and usefulness of working with computers and Internet services	250	2.79	0.89	1.33	4.55
	Ability to work with computers and internet services	250	2.46	0.57	1.2	4.2
Cognitive intelligence	-	250	0.81	0.06	0.52	0.98
Academic enthusiasm	-	250	2.46	0.58	1.33	3.73

Distribution of study variables

Table 3 shows the distribution of the studied variables in terms of normality. The findings showed that all variables are not normal according to the Kolmogorov-Smirnov index, but since this index is significant in large samples, if the two indices of skewness and kurtosis are ±2, the normality of the variables is confirmed. In examining multivariate normality, the findings showed that the ratio of the multivariate elongation index (3.66) to the critical value (2.28) was 1.6, since the ratio is less than 2, normality was confirmed.

Table 3. Indicators of the distribution status of research variables

Variable	Component	Skewness	Kurtosis	Kolmogorov-Smirnoff	DF	P-value
ICT technology	Experience working with the Internet	0.003	-0.86	0.12	250	0.000
	Use of educational software	0.38	-0.37	0.08	250	0.000
	Internet use	0.11-	-0.8	0.12	250	0.000
	Using computers and Internet services	0.12	-0.52	0.08	250	0.000
	Ease and usefulness of working with computers and Internet services	0.18	-1.47	0.16	250	0.000
	Ability to work with computers and internet services	0.37	-0.45	0.13	250	0.000
Cognitive intelligence	-	-0.55	1.83	0.09	250	0.000
Academic enthusiasm	-	0.18	-0.88	0.1	250	0.000
Multivariate elongation (critical value(		3.66(2.28)				

Multilinear hypothesis

The data in Table 4 show the examination of the hypothesis of non-collinearity of the predictor variables. The findings showed that the tolerance index was all values less than 1 and greater than 0.4, and the tolerance coefficients ranged from 0.4 to 0.95. The Variance Inflation Index (VIF) also showed that all values were below 10 and the variance inflation values were in the range of 1.04 to 2.67. Also, the coefficient of the Durbin-Watson statistic was 2.03, which means that coefficients close to 2 for this statistic indicate the independence of errors.

Table 4. Multilinearity assumption of the relationship between variables

Variable	Dependent variable	Experience	Educational software	Internet	Computer	Ease and usefulness	Ability	Cognitive intelligence
Tolerance coefficient index	Academic enthusiasm	0.74	0.59	0.79	0.5	0.4	0.47	0.95
(VIF)		1.33	1.67	1.25	1.96	2.46	2.67	1.04
(WDF)		2.03						

Linear correlation between variables

Table 5 shows the correlation information between the research variables. The findings showed that the relationship between experience working with the Internet with cognitive intelligence (P>0.05, r=0.09) and academic enthusiasm (P>0.05, r=0.07) was not significant.

The findings showed that the relationship between the use of educational software and cognitive intelligence (r=-0.06, P>0.05) was not significant, but it was positive and significant with academic enthusiasm (r=0.31, P<0.01).

The findings showed that the relationship between Internet use and cognitive intelligence (P>0.05, r=0.03) and academic enthusiasm (P>0.05, r=0.002) was not significant.

The findings showed that the relationship between the use of computers and Internet services with cognitive intelligence (r=-0.09, P>0.05) was not significant, but with academic enthusiasm (r=0.57, P<0.01) was positive and significant.

The findings showed that the relationship between the ease and usefulness of working with computers and Internet services with cognitive intelligence (r=-0.1, P>0.05) was not significant, but with academic enthusiasm (r=0.79, P<0.01).

The findings showed that the relationship between computer and Internet service proficiency and cognitive intelligence (r=0.008, P>0.05) was not significant, but it was positive and significant with academic enthusiasm (r=0.63, P<0.01).

The findings showed that the relationship between cognitive intelligence and academic enthusiasm (P>0.05, r=-0.07) was insignificant.

Table 5. Correlation results between research variables

Variable	Component	Correlation							
		1	2	3	4	5	6	7	8
ICT technology	Experience working with the Internet	1							
	Use of educational software	0.42**	1						
	Internet use	0.22**	0.37**	1					
	Using computers and Internet services	0.27**	0.41**	-0.04	1				
	Ease and usefulness of working with computers and Internet services	0.12	0.36**	-0.04	0.61**	1			
	Ability to work with computers and internet services	0.3**	0.39**	-0.05	0.64**	0.73**	1		
Cognitive intelligence		0.09	-0.06	0.03	-0.09	-0.1	0.008	1	
Academic enthusiasm		0.07	0.31**	0.002	0.57**	0.79	0.63**	-0.07	1

Model test

The information in Table 6 shows the fit indices of the analyzed model. The findings showed that the value of (RSMEA=0.000, p=0.99, 1df=0.00), which indicates a very good fit of the model in the population, Also, fit indices were used to determine the appropriateness of the model fit to the data. The findings showed that the smoothed fit index (1NFI) = 1 and the comparative fit index (2CFI) = 1, which indicates an acceptable fit of the model to the data. In particular, the CFI value, which according to Muller (1999) should be above 0.9 and according to Weston and Gore-Jer (2006) should be above 0.95, is required for the model to have a good fit with the data because it is not affected by the sample size. Also, if the root mean square error of approximation (RMSEA □ 0.05) is very good, between 0.05 and 0.08, the fit is acceptable, and if it is higher than 0.08, the fit is poor. In this study, RMSEA was below 0.05, indicating a very good fit.

Table 6. Model fitness indices

Fitness indicators	(χ^2)	df)	(χ^2/df)	Sig	(RMSEA)	(NFI)	(NNFI)	(CFI)	(GFI)	(AGFI)
Index value	0.000	1	0.000	0.99	0.000	1.03	1	1	1	1

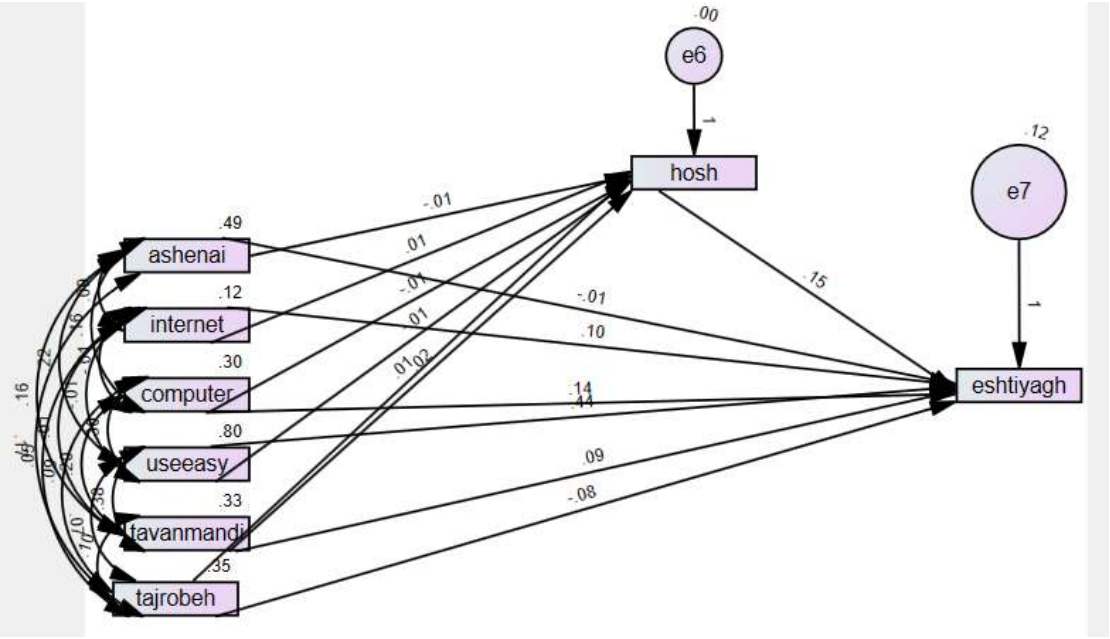

Figure 1: Prediction path diagram based on standardized path coefficients

Hypothesis testing

First hypothesis: ICT components have a significant direct effect on students' academic enthusiasm.

The data in Table 7 showed that the direct effect of ICT components such as the use of

1. Normed Fit Index(NFI)

2. Comparative Fit Index(CFI)

computers and Internet services ($p<0.01$, $t=2.58$, $\gamma=0.135$), the ease and usefulness of working with computers and Internet services ($p<0.01$, $t=11.47$, $\gamma=0.668$) on academic enthusiasm is positive and significant However, the effects of the components of experience working with the Internet ($p<0.05$, $t=1.88$, $\gamma=0.081$), use of educational software ($p<0.05$, $t=0.14$, $\gamma=0.007$), use of the Internet ($p<0.05$, $t=1.37$, $\gamma=0.057$), and ability to work with computers and Internet services ($p<0.05$, $t=1.39$, $\gamma=0.06$) are not significant.

Second hypothesis: ICT components have a significant direct effect on students' cognitive intelligence.

The data in Table 7 showed that the direct effect of ICT components, such as computer and internet service capabilities ($p<0.05$, $t=2.03$, $\gamma=0.204$), on cognitive intelligence is positive and significant However, the effects of the components of experience working with the Internet ($p<0.05$, $t=1.51$, $\gamma=0.108$), use of educational software ($p<0.05$, $t=1.29$, $\gamma=0.103$), use of the Internet ($p<0.05$, $t=0.66$, $\gamma=0.046$), use of computers and Internet services ($p<0.05$, $t=1.16$, $\gamma=0.1$), ease and usefulness of working with computers and Internet services ($p<0.05$, $t=1.73$, $\gamma=0.167$) on cognitive intelligence are not significant.

Third hypothesis: Cognitive intelligence has a significant direct effect on academic enthusiasm.

The data in Table 7 showed that the direct effect of cognitive intelligence on students' academic enthusiasm was not significant ($p<0.05$, $t=0.43$, $\beta=0.017$).

Table 7. Summary of the direct effect of research variables on each other

Endogenous/Exogenous Variables	Unstandardized coefficients γ	Standardized Coefficients β	Standard error	T-value	R^2
On academic enthusiasm					
From experience working with the Internet					
Using educational software	-0.08	-0.081	0.04	-1.88	
From using the Internet	-0.006	-0.007	0.04	-0.14	
Using computers and	0.096	0.057	0.07	1.37	
Internet services	0.144	0.135	0.05	**2.58	0.653
The ease and usefulness of working with computers and	0.438	0.668	0.03	**11.47	
Internet services	0.087	0.085	0.06	1.39	
Ability to work with computers and internet services	0.148	0.017	0.33	0.43	
From cognitive intelligence					
On cognitive intelligence					
From experience working with the Internet					
Using educational software	0.012	0.108	0.008	1.51	
From using the Internet	-0.01	-0.103	0.008	-1.29	
Using computers and	0.009	0.046	0.013	0.66	0.046
Internet services	-0.012	-0.1	0.01	-1.16	
The ease and usefulness of working with computers and	-0.012	-0.167	0.007	-1.73	
Internet services	0.023	0.204	0.012	*2.03	
Ability to work with computers and internet services					

Discussion and Conclusion

The main hypothesis of the present study was to investigate the mediating role of cognitive intelligence in the relationship between ICT and academic enthusiasm. The findings showed that the relationship between the use of educational software, the use of computers and Internet services, the ease and usefulness of working with computers and Internet services, and the ability to work with computers and Internet services with academic enthusiasm is positive and significant. The findings of Saba et al. (2022) on The effectiveness of emotional intelligence skills in improving academic emotions and self-regulated learning processes, Ghasemi & Mahmoudi (2020) Information and communication technology lead to a move towards teaching in new ways of learning, Charusaei & Manouchehri (2019) Educational technology increases critical thinking and diversity of curricula are consistent with this part of the main hypothesis.

In explaining the findings, it can be said that the experience of working with a computer and using the Internet in itself provides conditions that make it easy for students to access, transfer, process, store, and exchange information, and to have easy access to it The lack of relationship between these ICT components and cognitive intelligence could be due to the lack of necessary experience and the possibility of not being able to utilize the Internet, which will not be able to expand the cognitive abilities of the mind and provide the need for reasoning and thinking skills in the student. Also, the lack of access to and utilization of information and communication technology facilities has not provided them with the conditions to increase the attractiveness and cheerfulness of students by utilizing this new technology and creating a basis for their academic enthusiasm.

While the use of educational software, the use of computers and Internet services, the ease and usefulness of working with computers and Internet services, and the ability to work with computers and Internet services with academic enthusiasm are positive and significant therefore, when students can easily access new technology, recognize its benefits and usefulness, and can make optimal use of this tool, the necessary groundwork is created for a promising solution to promote better progress and learning in their homework and increase academic enthusiasm. As Finn (1992) states in this context, inclusive enthusiasm is often considered a promising solution to academic problems because, theoretically, enthusiasm involves the process of working to promote learning and academic achievement. Also, when students are weak in reasoning and analysis skills related to the mind, they will not be able to find any solutions to their academic problems, which leads to a lack of relationship between cognitive intelligence and the ability of the mind to think and academic enthusiasm as a process and solution for improving homework and progress.

First hypothesis: ICT components have a significant direct effect on students' academic enthusiasm. The findings showed that the direct effect of the components of ICT (use of computers and Internet services, ease and usefulness of working with computers and Internet services) on academic enthusiasm is positive and significant, but the effect of the components of (experience with working with the Internet, use of educational software, use of, ability to work with computers and Internet services) on academic enthusiasm is not significant.

Findings of Azizinejad & Allah Karami (2018), The effectiveness of ICT-based education on students' academic enthusiasm, Charusaei &

Manouchehri (2019), The impact of ICT on increasing attractiveness and motivation, willingness to attend class and completing homework, Sheikhi et al (2014), Information and communication technology is a powerful tool for improving the quality and efficiency of teaching and learning, Sattari et al (2012), The impact of information technology and increasing creative thinking, willingness to do homework, Abbasi Asl et al (2011), welcoming ICT and its applications as a basis and facilitator for its use in the learning process, Lee et al (2019), Increasing academic enthusiasm through technology, the effect of technological facilities on academic enthusiasm, Adeyemi (2012), Computer use had a significant effect on academic achievement, a positive and significant relationship between the variables with the aforementioned findings.

In explaining the findings, it can be said that in the sample group, the possibility of using computers and Internet services, the ease and usefulness of working with computers and Internet services existed, and it provided conditions for students to make sufficient use of technology in the process of completing assignments. These conditions provided the basis for promoting academic enthusiasm in them. While lack of experience working with the Internet, lack of the necessary ability to use educational software, and lack of the necessary ability to work with computers and Internet services have prevented them from creating conditions to benefit from it as a problem-solving process, this in itself could be a decisive reason for the lack of relationship between the stated components and academic enthusiasm.

Second hypothesis: ICT components have a significant direct effect on students' cognitive intelligence. The findings showed that the direct effect of ICT components such as (the ability to work with computers and Internet services) on cognitive intelligence is positive and significant. The findings of Bakhtiari & Bakhtiari (2016) on solving verbal mathematical problems with the ICT method are moderate, and Rastegar & Dashab (2015) on the use of ICT in students' skills and reasoning is effective in mathematics lessons, are consistent with the present study. While considering the effect of the components of experience working with the Internet, use of educational software, use of the Internet, use of computers and Internet services, ease and usefulness of working with computers and Internet services with cognitive intelligence are not significant. The findings are inconsistent with this part of the hypothesis.

In explaining the findings, it can be said that Sternberg (2000) in his definition of intelligence considered an individual's cognitive ability to learn from experience, reason well, remember important information, and adapt to the requirements of everyday life. Therefore, having cognitive intelligence provides students with the opportunity to analyze information and adapt better. This ability allows them to acquire and improve the necessary skills by utilizing the mind's ability to use information technology, especially in the ability to work with computers and Internet services.

When the school system is not equipped with technology, it is not possible to experience working with the Internet, using educational software, using the Internet, using computers and Internet services, the ease and usefulness of working with computers and Internet services, and even if you have the skills of thinking and analyzing information, using practical mental abilities is not fruitful. Therefore, the prerequisite for utilizing cognitive intelligence is familiarity, accessibility, and competence with IT. Otherwise, expecting a relationship between cognitive intelligence and IT is far from reality.

Hypothesis 3: Cognitive intelligence has a significant direct effect on academic enthusiasm.

The findings showed that the direct effect of cognitive intelligence on students' academic enthusiasm is insignificant. Findings of Reyhani et al (2021) Social cognition is a significant mediator between intelligence beliefs and academic enthusiasm, Jalili & Ashori (2015) Positive relationship between emotional intelligence and cognitive intelligence with academic achievement, Farajihorani (2013) The contribution of low cognitive intelligence to students' academic progress, Salmela et al (2017) The positive effects of academic enthusiasm on students' engagement in academic activities, Wang and Holcomb The indirect effect of facilities, equipment, and technological technologies on enthusiasm, Cadima et al (2015) Information and communication technology intensification or reduction of teacher-student relationships are inconsistent with the present research.

In explaining the findings, it can be said that according to Gardner's theory (1993), intelligence is the biological-psychological ability to process information that can lead to problem-solving or the creation of valuable products in a given situation. When students are biologically and psychologically unable to process information to solve a problem or create a new product, it cannot lead to enthusiasm and excitement for them because they have difficulty completing the task or processing it. For this reason, a relationship between cognitive intelligence and academic enthusiasm in students cannot be expected.

The overall results showed that being able to use and facilitate the use of AI technology can lead to interest and strengthening skills related to thinking and analyzing information. Therefore, one of the reasons for using information and communication technology in education is to help improve the quality of education, which is achieved by increasing learners' motivation to learn. These software programs can create authentic content and, by involving the student in the learning process, facilitate the acquisition of basic skills and concepts that underlie higher-level intellectual skills. Information and communication technology is a paradigm that has been able to bring about numerous changes in human lifestyles, and one of the fields that have contributed a major share of these changes is learning. Learning based on information and communication technology, by creating fundamental changes in traditional concepts, can eliminate the inefficiencies of the educational environment and bring about fundamental changes in learning: strengthening memory, interest in learning, speed of transfer and sustainability, and deepening learning, creating the power of reasoning and creativity, and finally changing students' attitudes, creating interest and enthusiasm, and improving thinking and information analysis. Therefore, it is recommended that in national-level macro-planning, programs be prepared and formulated to develop technology and new technological facilities in education that have a practical aspect.

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