

Relationships between Computer Literacy and Analytical Literacy with Creativity in Students: The Role of Gender Moderator

Rozita Deravipour¹, Alireza Assareh^{2*}, Sadegh Nasri³, Mohammad Armand⁴

1. PhD student, Department of Curriculum Planning, Research Sciences Unit, Islamic Azad University, Tehran, Iran.
2. Professor, Department of Educational Sciences and Psychology, Shahid Rajaei Teacher University, Tehran, Iran.
3. Associate Professor, Department of Psychology, Shahid Rajaei Teacher Training University, Tehran, Iran.
4. Associate Professor, Department of Curriculum Planning, Organization for Studying and Compiling Books of Islamic Sciences and Humanities, Tehran, Iran.

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Purpose: The aim of this study was to determine the relationship between analytical literacy and computer literacy with creativity and with the role of moderating gender in high school students in secondary period in Guilan province.

Methodology: The method of descriptive research of correlational type and the statistical society included the high school students in secondary period of Guilan province in the first semester of the academic year 2020-2021. The statistical sample consisted of 384 people (191 females and 193 males) who were randomly selected by paper and electronic methods. The tools for measuring variables included Abedi creativity test, researcher-made questionnaire of computer literacy and analytical literacy. Data were analyzed using hierarchical regression analysis, multivariate regression and Z test.

Findings: The results showed that the effect of computer literacy and analytical literacy on students' creativity is positive and significant. The effect of computer literacy by gender on creativity was also significant.

Conclusion: The effect of computer literacy on analytical literacy has been positive and significant, too. The results can be used to predict creativity in male and female students.

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* Corresponding Author Email: alireza_assareh@yahoo.com

1. Introduction

Creativity is the most basic and fundamental human ability and is one of the topics that have been considered during all different eras. All human progress has been the product of the creativity of thinkers who have come to their present form by processing thoughts, theories and innovations. Creativity is an invisible nature (it is a concept or structure) but its product is observable (objective) in the form of new solutions, innovative thoughts and new products (Mostafa Sarbaz, Abolghasemi and Rostamoghli, 2014). Vernon (1989; quoted by Dollinger, 2004) defines creativity as "the ability of an individual to produce new and innovative ideas and theories, insights, or objects, and to reconstruct in science and other fields which is considered valuable by experts as original and scientifically, aesthetically, technologically and socially. According to Dipreti (1993; quoted by Fasko, 2001), creativity is a process that begins with an indefinite, questionable, complex, and with psychologically difficult situation, and conducts research, search, and hunting information to find cases that resolve the dubious, uncertain and complex situation and turn it into a clear, coherent and harmonious situation. Creativity, according to most thinkers, is present in all individuals and can be brought to the fore by encouragement and persuasion, but the lack of innovations in educational environments, according to several experts, and the consistency of existing procedures and methods, it reinforces the suspicion that either members of society have low creative thinking or are factors that hinder the flourishing of creative thinking. The serious vacuum of our society in the current fast-paced era is especially from an educational point of view. Creativity is one of the most complex and excellent manifestations of human thought that plays an effective role in the growth, development of the individual and human civilization and is the basis of inventions, artistic and scientific achievements (Soh, 2017). Creativity plays a vital role in the improvement and development of humans life; for this reason, creativity is an important factor in the survival of societies in the current competitive environment and full of problems (Cheng, 2017). Creativity is highlighted by educational policies, the goals of 21st century educational policy are growing, and there is a consensus that creativity must be nurtured in formal and informal education. Creativity in the classroom enhances the growth of knowledge and fosters growth and innovation (Davis et al., 2012) and supports problem-based learning (Myers, 2012). Discourse around the world as an important element in education demanding curricula that promote creativity (Lin, 2011; cited in Soh, 2017).

Although the ability to think creatively has been potentially and instinctively endowed in human beings, but its emergence requires its cultivation. Torrance (1986) believes that in order to survive, human beings need to develop the power of creative thinking in children. Human creativity is his most important weapon and with it he can eliminate the stresses of daily life and extraordinary things. Shellcross (1976) states that many factors play a role in the emergence of creative thinking, including environmental, physiological (intelligence, heredity, etc.), economic, personality and physical variables, there are also factors that play a deterrent role in the flourishing of this talent.

In the research literature, the role of variables such as teaching skills and methods (Darestani Farahani, 1997; Oghlidos, 2004; Jahanian, 2016; Larraz-Rábanos, 2021), school organizational atmosphere (Haghighat, 2003), educational environment (Mirkamali and Khorshidi, 2009; TepPutyrom et al., 2018), classroom leadership style (Azimi, 2003), teacher creativity (Saeedi, 2002), teaching creativity strategies (Wisdom, 2007; McCluskey, 2013), parenting methods (Haghighat, 2003, TepPutyrom et al., 2018), self-efficacy (Saleh, 2006), self-concept (Gohari, 1997), intelligence (Peirakhaefi, 1994), source of control (Rashidi, 1985), learning strategies (Goli Dizej, 2005; Mollaghasemi, 2002; Hosseini Lor, 2005) and emotional intelligence and mental health (Peirakhaefi and Rafieian, 2012) are mentioned in creativity. Also Seif Derakhshandeh and Narimani (2019) in a meta-analysis study concluded that the variables of learning, education factor, school factor, teacher factor, family factor, participation in school activities, self-esteem, motivation, dialect, epistemological beliefs, play, self-concept, source of control, self-efficacy and thinking style are associated with creativity in students and can be effective in increasing creativity. Also, there was no difference between male and female students in terms of creativity.

One of the variables proposed by UNESCO in recent years is literacy and its types. The first definition of literacy in the early twentieth century focused solely on the ability to read and write in one's mother tongue. According to this definition, a literate person was considered to be able to read and write in own mother tongue. In the late twentieth century, a second definition of literacy was introduced. In this new definition, in addition to the ability to read and write in the mother tongue, the ability to use a computer and learn a foreign language was added. Thus, people who were able to read and write, use a computer, and speak and comprehend a foreign language were called literate. In the second decade of the 21st century, the concept of literacy changed again. In this third definition, the nature of literacy changed completely. Skills were declared that having these abilities and skills became an example of being literate. Thus, a person who succeeds in obtaining a doctorate in a university field is about 5% literate. In this regard, 12 types of abilities and skills were proposed, including computer literacy and analytical literacy. Computer literacy is the knowledge of computer leadership skills and analytical literacy is the ability to recognize, evaluate and analyze various theories and create logical arguments without prejudice and default (UNESCO, 2017).

Today, students entering education from an early age, in addition to learning to read and write and learning different subject areas, also need to acquire computer literacy skills to form the basis of the original goal of education, which is to learn "learning" and students act as independent and lifelong learners in society (Kinen, 2011). Learning computer literacy skills in the information and communication age is especially important today along with learning to read and write literacy, and education should teach computer skills along with other areas of training, especially in the childhood of students. Of course, the continuation of this type of trainings is necessary for all courses and all fields. Computer technology is evolving widely and rapidly, and this advancement has brought a new meaning to the word "literacy". Such as: computer literacy, electronic literacy and information literacy, and with this situation, the idea of computer literacy has inevitably increased (Talebi et al., 2011).

Computer literacy is the knowledge of computational capabilities and the ability to recognize and express the method of problems that can be solved with the help of computer technology. Computer literacy is the science and ability of a person to use computers and information technology. Computer literacy also preferably refers to the level at which individuals can use computer programs and other computer-related capabilities (Wiliam, 2016).

To teach computer skills in the curricula of the country's educational courses, contents have been designed and included for this purpose. This has been implemented in recent years with the change of the educational system and the preparation and compilation of new compiled textbooks for the sixth grade of elementary school. A book entitled work and technology that the first part of which is about 60 pages and addressed preliminarily computer literacy training. The book actually consists of two main parts. The first part is the work with computer, which is one of the media that can be used in the field of technology education in two ways and interactively, and the second part of the book is activities that involve students in practical work in the technical, agricultural or service field. Therefore, according to the matters and content compiled in the book chapters, schools need to be smart, equipped with a computer site and connected to at least the internet, and have workshops to increase skills (ministry of education, 2021).

Other cognitive skills is the ability to solve problem. Problem solving is a form of thinking or the use of mental abilities that is driven to solve a particular problem. Problem solving involves shaping a variety of answers and choosing the appropriate answer from multiple answers. Analytical skills are the ability to visualize, articulate, understand, or solve simple or complex problems by making sensible decisions based on available information. These skills include using logical thinking to break down complex problems into their smaller components (Torvi, 2018).

In analytical thinking and analytical literacy, the individual has data and information and distances from the outside world in his mind to process what he has. For example, the discussion of knowing how to cook is a discussion of a skill. But that the person can be well separated and segmented and staged what he is doing and to transfer it to others requires analytical thinking and analytical literacy. Perhaps the success of Steve Jobs

should be sought in his analytical and synthetic thinking, and this is the missing link of Iranian startups and entrepreneurs around the world.

Regarding the relationship between the types of literacy with creativity, limited research has been done and in this regard, it can point the role of information literacy (Tatari and Mokhtari Deinani, 2018; Faghih Aram and Ebrahimi, 2017; Nemati et al., 2015), media literacy (Faghih Aram and Mokhtari Dinani, 2018), digital literacy (Knobel, 2017; Martin- Bravo et al., 2020), technology and communication literacy (Yousefnejad, 2020) and computer literacy (Kasjin and Kasjin, 2019; Wu, 2018). The research results of Seifouri (2019) showed that gender has no role in information literacy. The research findings of Ashrafi Rizi (2013) showed that the average media and information literacy of students of Isfahan University of medical Sciences using the Iranian questionnaire of media and information literacy is above average and relatively desirable level. Comparison between gender and age and the level of media and information literacy showed that there is no significant difference between information literacy in terms of mentioned variables, but there is a significant difference in terms of educational grade, college and family income level.

According to the background, no scientific research has been done on the role of computer literacy and analytical literacy on creativity in students. There is also ambiguity about the effect of gender as a moderating variable in the relationship between mentioned literacies with creativity and requires scientific study.

2. Methodology

The present study has been practical in terms of purpose and descriptive-correlational in terms of data collection method, and meanwhile examining the relationships between computer literacy and analytical literacy with creativity in students, it has studied the moderating role of gender in the relationships of variables. The variables of computer literacy and analytical literacy were independent variables (predictor), gender was the moderator variable and creativity was the dependent variable (criterion).

Statistical society, sample and sampling method

The statistical society of the study includes high school students in secondary period in Guilan province in the first semester of the academic year 2020-2021, whose number was 82520. According to Klein criteria, 400 people (200 male students and 200 female students) were considered as the statistical sample size. The cluster sampling method was random. Based on the geographical location of the cities, Anzali from the north, Roudbar from the south, Lahijan from the east, Fouman from the west and Rasht region 2 from the center were randomly selected. Then, four schools of secondary period of high school (two girls' schools and two boys' schools) were selected from each city, and then a cluster of 20 people was selected from each school. Due to defect in the questionnaires of 16 students, the sample was eventually reduced to 384 people (191 female and 193 male). The method of execution was in person and electronically.

Measurement tools

Jamal Abedi creativity test: In this research, Abedi test has been used to measure students' creativity and has 60 three-choice questions. Questions 1 to 22 measure fluidity factor, 23 to 33 expansion factors, 34 to 49 initiative factors, and 50 to 60 flexibility factors. The options show the degree of creativity from low to high. The minimum score is 60 and the maximum score is 180. Abedi (1993) has shown that in terms of validity there are significant results of correlation between the four fold factors of both tests. Since these questionnaires have already been used in researches in Iran and have been norm referenced and their validity has been determined, there is no need to check the content validity and face validity again. This test was norm referenced in 1984 in Tehran and then in 1992 at the university of California and finally in 2002 in the Basque country of Spain, and the reliability coefficient of the test in Tehran has been 0.85 in the fluidity section, 0.82 in initiative section, 0.84 in flexibility section and 0.80 in expansion section.

Computer literacy questionnaire: This questionnaire consists of 24 questions. Which examines the familiarity and skills levels of people in the basics of computers and the internet, windows and Microsoft Office software. The answers to the questions are scored in 2 degrees, yes and no. The validity of this questionnaire was investigated by 4 experts in the field of computer and information technology and was approved after modification and review. The validity of the structure was confirmed using factor analysis. To assess the reliability, 20 students completed a questionnaire. In the preliminary study, the reliability of the questionnaire was 0.86 using Cronbach's alpha test.

Analytical literacy questionnaire: This questionnaire consists of 9 questions and examines students' analytical literacy. The answers to the questions are scored on a 5-point scale very low, low, medium, high and very high. The validity of the questionnaire was assessed by 4 experts in the field of psychology and educational sciences and was confirmed after correction and review. Also, the validity of the structure was checked and confirmed using factor analysis method. To assess the reliability, 20 students completed a questionnaire, too. The reliability of the questionnaire was confirmed using Cronbach's alpha test with a coefficient of 0.88.

Data analysis method

To describe the research data from descriptive statistics including mean, standard deviation, skewness and elongation indices and to check the normality of data from Kolmogorov-Smirnov test and to test research hypotheses from multivariate regression, hierarchical regression and Z test to compare two correlation coefficient was used. Data were analyzed using SPSS-25 software.

3. Findings

Table 1 shows the mean, standard deviation and skewness and elongation indices of the research variables.

Table 1. Mean, standard deviation, skewness and elongation of research variables

| Variables | Mean | Standard deviation | skewness | Elongation |
|-----------------------|---------|--------------------|----------|------------|
| Creativity | 129.162 | 33.39 | -0.092 | -0.981 |
| Fluid component | 47.789 | 12.607 | -0.466 | -0.967 |
| Expansion component | 22.859 | 7.335 | -0.131 | -0.990 |
| Initiative component | 33.922 | 9.149 | -0.181 | -0.987 |
| Flexibility component | 24.591 | 6.535 | -0.066 | -0.988 |
| Analytical literacy | 26.847 | 7.81 | 0.096 | -0.620 |
| Computer literacy | 11.098 | 7.429 | 0.111 | -0.975 |

According to the information in Table 1, students' critical thinking had mean and standard deviations of 101.287 and 27.35, respectively, and creativity scores had averages of 129.162 and 33.39, respectively. Also, the mean and standard deviation of students' analytical literacy were 26.847 and 7.81, respectively, and their computer literacy was 11.098 and 7.429, respectively. Also, the degree of skewness and elongation of all research variables were between +1 to -1, which indicates that their data distribution is relatively appropriate. Table 2 shows the mean and standard deviation of the research variables by gender segregation.

Table 2. Mean and standard deviation of research variables by gender segregation

| Male | | Female | | Variables |
|--------------------|--------|--------------------|--------|-----------------------|
| Standard deviation | Mean | Standard deviation | Mean | |
| 33.76 | 129.06 | 33.1 | 129.26 | Creativity |
| 12.72 | 47.53 | 12.52 | 48.05 | Fluid component |
| 7.45 | 22.87 | 7.24 | 22.85 | Expansion component |
| 9.22 | 33.99 | 9.1 | 33.85 | Initiative component |
| 6.59 | 24.67 | 6.49 | 24.51 | Flexibility component |
| 7.87 | 27.14 | 7.76 | 26.56 | Analytical literacy |
| 7.49 | 11.87 | 7.3 | 10.32 | Computer literacy |

According to Table 2, there are differences between male and female students in the field of research variables. Males had higher scores in the variables of analytical literacy and computer literacy. Table 3 shows the correlation matrix of the variables.

Table 3. Correlation matrix of the studied variables

| Variables | 1 | 2 | 3 |
|-----------------------|---------|---------|---|
| 1- Creativity | 1 | | |
| 2-Analytical literacy | 0.670** | 1 | |
| 3-Computer literacy | 0.631** | 0.607** | 1 |

**P<0.01

According to the information in Table 3, there is a positive relationship between creativity with analytical literacy ($r = 0.670$) and computer literacy ($r = 0.631$). The relationship between analytical literacy and computer literacy ($r = 0.607$) was also positive. The correlation coefficients observed at the error level of 0.01 were significant.

Kolmogorov Smirnov test was used for data distribution test and Z values calculated at the level of 0.05 were not significant and indicated a relatively normal distribution of data. To determine the role of gender moderation in the relationship between analytical literacy and computer literacy with creativity, first, hierarchical regression analysis and then Z test to compare the multiple coefficients of the two sexes were used. Table 4 shows the results of hierarchical regression analysis for the creativity variable.

Table 4. Results of hierarchical regression analysis of predictor variables on creativity

| p | t | P | F | R^2 | R | Variables | Model |
|--------|--------|--------|---------|-------|-------|------------------------------|-------|
| 0.0001 | 9.547 | 0.0001 | 201.987 | 0.515 | 0.717 | Analytical literacy | 1 |
| 0.0001 | 7.162 | | | | | Computer literacy | |
| 0.0001 | 7.930 | 0.0001 | 103.718 | 0.531 | 0.729 | Analytical literacy | 2 |
| 0.588 | 0.542 | | | | | Computer literacy | |
| 0.140 | -2.479 | | | | | Gender * Analytical literacy | |
| 0.039 | 2.071 | | | | | Gender*Computer literacy | |

According to the results of Table 4, in the first model, the multiple correlation coefficient of the variables of analytical literacy and computer literacy with creativity was equal to 0.717 and its square value was 0.515. This means that these two mentioned variables have been able to explain about 52% of the changes in creativity. In the second model, with the introduction of the variables of gender interaction with analytical literacy and gender interaction with computer literacy, the value of multiple correlation increased to 0.729 and its square to 0.531, and the intended variables were able to predict the same 53% of creativity changes.

Also, both in the first and in the second order, the multiple correlation coefficients obtained are statistically significant ($P < 0.0001$). In addition, in the first order, due to the significance of t -values ($P < 0.0001$), both predictor variables, namely analytical literacy and computer literacy, were able to positively predict creativity. In the second order, analytical literacy and the interaction of gender * analytical literacy and gender * computer literacy were able to predict creativity and computer literacy in the second model had no role in predicting creativity.

According to the results, the variables of analytical literacy and computer literacy with gender moderation were involved in predicting creativity. Then, to determine the multiple correlation coefficient of analytical literacy and computer literacy variables with creativity, multivariate regression analysis was performed by gender separation and then the multiple correlation coefficient was compared using Z test. Table 5 shows the results of multivariate regression analysis of predictor variables on creativity in female students.

Table 5. Results of multivariate regression analysis of predictor variables on creativity in female students

| p | t | P | F | R^2 | R | Variables | Model |
|--------|-------|--------|--------|-------|-------|---------------------|-------|
| 0.0001 | 7.378 | 0.0001 | 72.840 | 0.437 | 0.661 | Analytical literacy | 1 |
| 0.0001 | 4.146 | | | | | Computer literacy | |

According to the results of Table 5, the multiple correlation coefficient of the variables of analytical literacy and computer literacy with creativity in female students was equal to 0.661 and its square value was 0.437. This means that these two variables have been able to explain about 44% of the changes in creativity in female students. The value of multiple correlation coefficient obtained in females is also statistically significant ($P < 0.0001$). Also, the beta values of analytical literacy and computer literacy are significant in the equation of predicting creativity in female students. Table 6 shows the results of multivariate regression analysis of predictor variables on creativity in male students.

Table 6. Results of multivariate regression analysis of predictor variables on creativity in male students

| p | t | P | F | R^2 | R | Variables | Model |
|--------|-------|--------|---------|-------|-------|---------------------|-------|
| 0.0001 | 5.135 | 0.0001 | 145.157 | 0.604 | 0.777 | Analytical literacy | 1 |
| 0.0001 | 6.482 | | | | | Computer literacy | |

According to the results of Table 6, the multiple correlation coefficient of the variables of analytical literacy and computer literacy with creativity was equal to 0.777 and its square value was 0.604. This means that these two variables have been able to explain about 60% of the changes in creativity in male students. Also, the multiple correlation coefficient obtained in males is statistically significant ($P < 0.0001$). The beta values of analytical literacy and computer literacy are also significant in the creativity prediction equation in male students. Table 7 shows the comparison of multiple correlation coefficients of analytical literacy and computer literacy variables on creativity in male and female students using Z test.

Table 7. Comparison of multiple correlation coefficients of variables on creativity in the two sexes

| Error level | Z value | Zr | multiple correlation of R^2 | Variables |
|-------------|---------|-------|-------------------------------|-----------|
| 0.01 | 3.52 | 0.693 | 0.661 | Females |
| | | 1.045 | 0.777 | Males |

Based on the results of Table 7, considering that the value of Z obtained (3.52) is greater than the Z of Table (2.58) at the error level of 0.01, it can be said that a significant difference was observed between the two multiple correlation coefficients in both sexes. This means that the multiple relationships of analytical literacy and computer literacy variables with creativity are greater in males.

4. Conclusion

The aim of this study was to investigate the relationships between analytical literacy and computer literacy with creativity and with the role of gender moderation in high school students in secondary period in Guilan province. Findings of this research showed that there is a positive correlation between computer literacy and analytical literacy with creativity. The variables of analytical literacy and computer literacy have been able to explain about 52% of the changes in creativity. With the introduction of gender interaction variables with analytical literacy and gender interaction with computer literacy, the value of multiple correlation increased and the intended variables were able to predict 53% of creativity changes. In other words, gender interaction with the variables of analytical literacy and media literacy play a role in the equation of predicting creativity. Also, comparing the multiple correlation coefficients of analytical literacy and media literacy relationships with creativity showed that these relationships are stronger in male students than female students and their role in predicting creativity was greater in the male group. Overall, the results showed that the gender variable had a moderating role in the relationships of the studied variables.

The results of the present study on the relationship between computer literacy and creativity were consistent with Wu (2018) and inconsistent with the study of Kasjin and Kasjin (2019). The relationship between digital literacy and creativity has also been similar to the studies of Nobel (2017), Martin-Bravo et al. (2020) and Yousefnejad (2020). In connection with the role of other literacies (media literacy, information literacy, technology and communication literacy) in predicting creativity with the researches of Tatri and Mokhtari Deinani (2018), Faghih Aram and Ebrahimi (2017), Nemati et al. (2015), Faghih Aram and Mokhtari Deinani (2018) and Yousefnejad (2020) have been in the same direction. Regarding the role of gender in the relationships between literacy and creativity, it was inconsistent with the results of Seifouri (2019) and Ashrafi Rizi (2013).

In the study of Kasjin and Kasjin (2019), it was not observed that people with computer literacy are creative at the same time. They observed that these two properties are not related to each other and do not affect each other. At the same time, Chalkiadaki (2018) emphasizes the skills and competencies related to the information and communication conditions of technology development with regard to the issue of globalization for innovation.

Salma Jan (2017) points out that digital literacy, using tablet and smartphone, previous training in the use of computer and the frequency of computer use in the age of information and communication technology have a significant impact on students' attitudes. Computer literacy is the knowledge and ability of a person to use computers and information technology. Computer literacy also preferably refers to the level at which individuals can use computer programs and other computer-related capabilities (Morrison & Wells, 2009). With the rapid development of information and communication technology and the increasing expansion of electronic information resources, skills in the field of information literacy need to be familiar with information technology (Cullen, Clark, and Esson, 2001). The ability to use computer and the internet network is the foundation of skill in information technology (Bawden, 2011). Another application of computer and information technology is their use in education. In fact, one of the most promising and the most developed achievements of the progress of information and communication technology is the electronic teaching / learning and based on the internet, that issues as the lack of educational space, the large amount of information available and the time constraints of teachers and scholars make its necessity obvious more than ever (Taghiareh and Siadati, 2007). In fact, e-learning refers to trainings that is provided through electronic means of communication such as the internet, intranet, extranet and hypertext. E-learning is one of the most proposed learning environments in the information age. Therefore, the efforts and experiences related to this type of learning have received a lot of attention around the world. In Iran, also most universities are widely using this technology (Jokar and Khaseh, 2007). Wu (2018) showed that in the digital age, computer literacy is defined as the ability to effectively identify information needs, access the information needed, and evaluate and use information, a vital skill for both the individual and the organization. Findings show that creativity

can be affected by technology literacy. The ability to access a mass of new information is one of the key factors in the flourishing of students' creativity.

Another finding has been the role of analytical literacy in predicting creativity. Argument is an important form of discourse that is at the heart of intellectual culture and public. Groups and individuals are constantly competing for our adherence to how they look and to accept their view of what is right, important, and worth doing. In each case, the researcher or advocate uses the tool of argument, that is, they say they provide evidence or reasons to justify the claims they want us to believe. It is because of the centrality of argumentative discourse in popular and intellectual communication that people must be able to read and analyze reasoning. This type of competency is called "analytical literacy". People with analytical literacy show three abilities in reading and writing: the ability to read and respond to reasoning with intelligence and insight (analytical reading), the ability to construct reasoning that is logically convincing (analytical writing), and the ability to recognize that when argumentative analysis is needed and when it is not necessary. Typically, schools can take responsibility the duty of training for reading and writing analytically to students and hold courses in critical thinking or reasoning skills. These courses provide opportunities for students to participate and practice in analyzing and constructing reasoning (Crooks, 2008). Researches by Kuhn, Shaw and Felton (1997) show that students who take critical thinking courses are better able to evaluate argumentative content in oral and written matters. And to facilitate the presentation and evaluation of evidence in their writings. Analytical literacy is a process that necessarily takes place over time. This means that students (including those who have received the necessary training) must continually practice and develop their analytical reading and writing skills. This can, and certainly should, take place beyond the critical thinking classroom in the diverse curriculum environments offered. Instructors should ask their students to do analytical reading and writing according to common patterns. Patterns should be designed in such a way as to force students to engage in analytical reflection that is appropriate to their reading and writing tasks, respectively (Crooks, 2008).

Ranjdoost et al. (2021) addressed the importance of teaching analytical literacy in students and identified the topics of the curriculum in a qualitative study. According to the research results, the main category includes teaching general topics, education (comprehension, educational tools and techniques), study management (book budgeting, study time management) which can be used to design, codify and implement analytical literacy training program in Iran. In the field of causal factors (planning and cultural management of the family, reaching the desired level of literacy, using the internet of things, the emergence of distance education, taking advantage of life opportunities, avoiding from confronted with the consequences of unipolar education), in the field of structural factors (subculture of country- province- city, education system of country, family culture), were identified in the field of intervening factors (complexity of analytical components, hereditary characteristics such as intelligence, household economic conditions).

The role of gender in the relationship between computer literacy and analytical literacy has not been studied in the research literature. The present study, meanwhile confirming the role of gender moderation in predicting creativity, discovered that these effects are more observed in male students. In explaining these results, it can be said that firstly, the level of computer literacy of males was significantly higher than females and secondly, considering the role of reasoning in analytical literacy, it seems that due to gender differences, males have been better performance in the field of this cognitive skill.

In conclusion, we can say that creativity is defined as the ability to research of a new idea or thought and the process of finding new ways to do better works and present new mind and plans for new products and services and its continuation after the absence of those phenomena (Hisrich and Peters, 2002). A study of the vast developments of the last two decades showed that creativity is the essential essence of all social, economic and technological processes that have changed the foundations of educational systems. The change in the direction of educational systems from the presentation of educational programs to creative thinking training programs has been accompanied by a change in the content and methods of education. In order to institutionalize this type of education in the country is very important and necessary the existence of many studies in the field of creativity and methods of implementing this method, the experiences of other countries

in this field and not repeating their costly experiences. On the other hand, with the development of new knowledge and technologies, the need for existence of computer and analytical literacy to use these technologies and the increasing development of new knowledge is very important. Therefore, it is impossible to enter all the changing information in the training programs. For this reason, it is necessary for people to cultivate creativity so that they can personally obtain the information they need and acquire the basic methods of understanding this information. Therefore, the effectiveness of creativity is of special importance in educational programs to prevent the loss of financial and human resources in various fields and to cultivate creativity in the proportional sector.

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