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The Relationship between Critical Thinking and Cognitive Learning Styles with General English Proficiency and Success in Examinations

Background: Critical thinking and learning styles are important in students' learning processes. The study examined the relationship between critical thinking and cognitive learning styles with general English proficiency and success in examinations.

Method: In this descriptive cross-sectional study, 138 students at Gonabad University of Medical Sciences in 2019-2020 were selected through convenience sampling. To collect data, a critical thinking scale, a learning cognitive style questionnaire, a general English proficiency test, and a general English final exam were used. The obtained data were analyzed using descriptive and inferential statistics through SPSS V.22.

Results: Descriptive statistics showed that among critical thinking components, 35.4% of participants had deductive and inductive reasoning components. Out of cognitive learning styles, most had divergent styles, claiming 47.1% of the cases. ANOVA results showed a significant relationship between critical thinking and general English proficiency as well as success in the English final exam ($p=0.045$ and $p=0.037$, respectively). However, ANOVA results revealed no significant relationship between cognitive learning styles and general English proficiency as well as success in the English final exam among students ($p=0.41$ and $p=0.06$, respectively).

Conclusion: It is concluded that the higher the critical thinking skills in deductive and inductive components among students are, the greater their proficiency in the English language and their success in English final exams will be. Regarding cognitive learning styles, the students would integrate concrete experimental methods and reflective observational methods and have the greatest ability to observe concrete situations.

Keywords: Cognitive Learning Style, Critical Thinking, Final Examination, General English Proficiency

العلاقة بين التفكير الناقد وأساليب التعلم المعرفية مع إتقان اللغة الإنجليزية العامة والنجاح في الامتحانات

الخلفية: التفكير النقدي وأساليب التعلم مهمة في عمليات تعلم الطلاب. تناولت الدراسة العلاقة بين التفكير الناقد وأساليب التعلم المعرفي مع إتقان اللغة الإنجليزية بشكل عام والنجاح في الامتحانات.

الطريقة: في هذه الدراسة الوصفية المقطعية، تم اختيار 138 طالباً من جامعة جون أباد للعلوم الطبية في 2019-2020 من خلال أخذ العينات الملائمة. ولجمع البيانات، تم استخدام مقياس التفكير الناقد، واستبيان الأسلوب المعرفي للتعلم، واختبار الكفاءة العامة في اللغة الإنجليزية، والاختبار النهائي للغة الإنجليزية العامة. وقد تم تحليل البيانات التي تم الحصول عليها باستخدام الإحصاء الوصفي والاستنتاجي من خلال برنامج SPSS V.22.

النتائج: أظهرت الإحصائيات الوصفية أنه من بين مكونات التفكير الناقد، كان لدى 35.4% من المشاركين مكونات التفكير الاستنباطي والاستقرائي. ومن بين أساليب التعلم المعرفية، كان لدى معظمهم أساليب متباينة، بنسبة 47.1% من الحالات. أظهرت نتائج تحليل التباين (ANOVA) وجود علاقة ذات دلالة إحصائية بين التفكير النقدي وإتقان اللغة الإنجليزية العامة وكذلك النجاح في الامتحان النهائي للغة الإنجليزية ($P=0.037$ و $P=0.045$ على التوالي). ومع ذلك، كشفت نتائج تحليل التباين (ANOVA) عن عدم وجود علاقة ذات دلالة إحصائية بين أساليب التعلم المعرفي وإتقان اللغة الإنجليزية العامة وكذلك النجاح في الاختبار النهائي للغة الإنجليزية بين الطلاب ($P=0.41$ و $P=0.06$ على التوالي).

الاستنتاج: يستنتج أنه كلما ارتفعت مهارات التفكير الناقد في المكونات الاستنباطية والاستقرائية لدى الطلاب، كلما زادت كفاءتهم في اللغة الإنجليزية ونجاحهم في الامتحانات النهائية للغة الإنجليزية. فيما يتعلق بأساليب التعلم المعرفية، سيدمج الطلاب الأساليب التجريبية الملموسة وأساليب الملاحظة التأملية ويكون لديهم القدرة الأكبر على ملاحظة المواقف الملموسة.

الكلمات المفتاحية: أسلوب التعلم المعرفي، التفكير الناقد، الامتحان النهائي، الكفاءة العامة في اللغة الإنجليزية

ارتباط بين تفكير انتقادی و سبک های شناختی یادگیری با توانایی کلی زبان انگلیسی و موفقیت در امتحان

زمینه و هدف: تفکر انتقادی و سبک های یادگیری در فرآیند یادگیری دانشجویان از اهمیت خاصی برخوردار می باشد. هدف این پژوهش بررسی ارتباط بین تفکر انتقادی و سبک های شناختی یادگیری با توانایی کلی زبان انگلیسی و موفقیت در امتحان پایان ترم می باشد.

روش: در این مطالعه توصیفی-مقطعی، 138 دانشجوی دانشگاه علوم پزشکی گناباد در سال تحصیلی 1399-1398 بصورت نمونه گیری در دسترس انتخاب شدند. برای جمع آوری داده ها، از پرسشنامه تفکر انتقادی، پرسشنامه سبک های شناختی یادگیری، آزمون توانایی کلی زبان انگلیسی و آزمون پایان ترم زبان عمومی استفاده شد. داده ها با آمار توصیفی و استنباطی با نرم افزار SPSS نسخه 22 تجزیه و تحلیل شدند.

یافته ها: از میان مؤلفه های تفکر انتقادی، 35/4 درصد شرکت کنندگان دارای مؤلفه های استدلال قیاسی و استدلال استقرایی بودند. از بین سبک های یادگیری شناختی، 47/1 درصد شرکت کنندگان دارای سبک واگرا بودند. بین تفکر انتقادی با توانایی کلی زبان انگلیسی و موفقیت در امتحان پایان ترم زبان انگلیسی ارتباط آماری معنی داری وجود داشت ($p=0.037$, $p=0.045$). بین سبک های شناختی یادگیری با توانایی کلی زبان انگلیسی و موفقیت در امتحان پایان ترم زبان انگلیسی در دانشجویان ارتباط آماری معنی داری وجود نداشت ($p=0.41$, $p=0.06$).

نتیجه گیری: هر چه مهارت های تفکر انتقادی در مؤلفه های استدلال قیاسی و استقرایی بیشتر باشد، توانایی دانشجویان در زبان انگلیسی و موفقیت در امتحانات پایان ترم بیشتر می شود. با توجه به عدم وجود ارتباط بین سبک های یادگیری و موفقیت در امتحان، در سبک شناختی یادگیری واگرا، دانشجویان شیوه های تجربی عینی و مشاهده ای تأملی را با هم ادغام می نمایند و از بیشترین توانایی در مشاهده موقعیت های عینی برخوردارند.

واژه های کلیدی: سبک شناختی یادگیری، تفکر انتقادی، امتحان پایان ترم، توانایی کلی زبان انگلیسی

عمومی انگریزی کی مهارت اور امتحانات میں کامیابی کے ساتھ تنقیدی سوچ اور علمی سیکھنے کے انداز کے درمیان تعلق

پس منظر: تنقیدی سوچ اور سیکھنے کے انداز طلباء کے سیکھنے کے عمل میں ہے۔ اس مطالعے میں انگریزی کی عمومی مهارت اور امتحانات میں کامیابی کے ساتھ تنقیدی سوچ اور علمی سیکھنے کے انداز کے درمیان تعلق کا جائزہ لیا گیا۔

طریقہ: اس وضاحتی کراس سیکشنل اسٹڈی میں، گون آباد یونیورسٹی آف میڈیکل سائنسز میں 2019-2020 میں 138 طلباء کو سہولت کے نمونے لینے کے ذریعے منتخب کیا گیا۔ ڈیٹا اکٹھا کرنے کے لیے، ایک تنقیدی سوچ کا پیمانہ، ایک سیکھنے کے علمی انداز کا سوالنامہ، ایک عمومی انگریزی کی مهارت کا امتحان، اور ایک عمومی انگریزی فائنل امتحان استعمال کیا گیا۔ حاصل کردہ ڈیٹا کا تجزیہ SPSS V. 22 کے ذریعے وضاحتی اور تخمینی اعدادوشمار کا استعمال کرتے ہوئے کیا گیا۔

نتائج: وضاحتی اعدادوشمار سے پتہ چلتا ہے کہ تنقیدی سوچ کے اجزاء میں سے، 35.4% شرکاء میں تخصیصی اور دلکش استدلال کے اجزاء تھے۔ علمی سیکھنے کے انداز میں سے، زیادہ تر کے مختلف انداز تھے، جو 47.1 فیصد کیسز کا دعویٰ کرتے ہیں۔ ANOVA کے نتائج نے تنقیدی سوچ اور انگریزی کی عمومی مهارت کے ساتھ ساتھ انگریزی فائنل امتحان میں کامیابی کے درمیان ایک ہم تعلق ظاہر کیا (بالترتیب $p=0.045$ اور $p=0.037$)۔ تاہم، ANOVA کے نتائج نے علمی سیکھنے کے انداز اور انگریزی کی عمومی مهارت کے ساتھ ساتھ طلباء کے درمیان انگریزی فائنل امتحان میں کامیابی کے درمیان کوئی خاص تعلق ظاہر نہیں کیا (بالترتیب $p=0.41$ اور $p=0.06$)۔

نتیجہ: یہ نتیجہ اخذ کیا گیا ہے کہ طلباء میں جتنی زیادہ تنقیدی سوچ کی مهارت ہوگی اور نتیجہ خیز اجزاء میں انگریزی زبان میں ان کی مهارت اتنی ہی زیادہ ہوگی اور انگریزی فائنل امتحانات میں ان کی کامیابی ہوگی۔ علمی سیکھنے کے انداز کے بارے میں، طلباء ٹھوس تجرباتی طریقوں اور عکاس مشاہداتی طریقوں کو مربوط کریں گے اور ٹھوس حالات کا مشاہدہ کرنے کی بہترین صلاحیت رکھتے ہیں۔

مطلوبہ الفاظ: علمی سیکھنے کا انداز، تنقیدی سوچ، حتمی امتحان، عام انگریزی کی مهارت

INTRODUCTION

Iran's educational system has long been founded upon the passive transfer of knowledge to learners. However, the authorities have begun to renovate and improve the previous educational system and convert it into a new flexible educational one. Despite such transformations in the educational system, the issue of critical thinking seems to be alien for students and professors, especially regarding learning English (1). It may emanate from the unwillingness of many English lecturers to change the traditional approaches and use novel methods of teaching based on critical thinking (1). Critical thinking is conceived as the person's ability to scrutinize a problem, issue, or situation to integrate all available information about the issue at hand and achieve a solution or hypothesis to justify the person's orientation (2). Critical thinking is considered a positive activity and an essential process for the development of any society and organization. Not only is critical thinking merely linked to learning in higher education, but it also encompasses all life activities including interpersonal relationships and work (3). The dimensions of critical thinking include cognitive skills and emotional tendencies. Researchers have stated that enjoying cognitive critical thinking abilities is essential for a person with critical thinking. Also, the concept of critical thinking is employed with a set of personal attitudes or tendencies that can be used to describe the tendencies of those with critical thinking (4). However, another area of high importance which is investigated as the other variable of the current study is the cognitive learning style.

Learning styles are categorized into three groups as follows: a) emotional styles are the styles referring to the emotional and personality traits, the traits include the learner's perseverance, independent study, or cooperation with others, as well as accepting or refusing external reinforcements, b) physiological styles in which the biological aspects of the learner are of interest, and c) cognitive styles which specify how the learner understands the points, memorizes them, and thinks. All in all, the cognitive learning styles refer to the person's method of emphasizing some learning abilities concerning some other abilities (5).

Kolb's learning style is generally considered as one of the different manifestations of learning styles. Kolb noted that the person's perception of the outcome of their learning styles will have advantages in acquiring other learning methods. According to Kolb, learning is a process consisting of four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation (6). The main key in this style is involving and sustaining the participation of students in the learning process. The more materials they include in perceiving preferences and learning and cognitive styles, the more they can affect their performance positively or negatively (7), whose usage depends on a learner's general ability in using the language properly which is termed as general language proficiency in this study.

General English proficiency refers to the person's general

ability in reading comprehension, listening, speaking, and writing as well as vocabulary, grammar, and pronunciation (8). The English final exam employed in the study refers to a test measuring the linguistic knowledge and ability of the person in reading comprehension, vocabulary, and grammar (9).

To investigate the role of critical thinking, learning strategies, and success in examinations at the academic levels, some studies have been carried out by the educationists. Vahedi et al. (2017) conducted a study to determine the extent of effectiveness of training critical thinking skills on reading comprehension and the type of learning strategies used by students (1). They reported that following the intervention, the participants would use more metacognitive, social, and compensatory strategies during text reading compared with pre-training. However, Ghasemi and Bilyad (2017) observed that learning styles did not have a significant effect on the critical thinking ability of students and their progress in learning vocabulary (10).

Kuhpayehzadeh et al. (2016) also investigated the effect of team-based learning on the critical thinking of nursing students and found that the team-based training method had a significantly enhancing effect on the critical thinking of students compared to the traditional/lecturing method (11). Valavi et al. (2016), conducting a study to determine the critical thinking among postgraduate students, found that the mean pretest and posttest values of critical thinking and higher-order reading of the group that had passed the higher-level reading course improved significantly compared to the group passing only the English course, too (12). Moreover, Noohi et al. (2014), performing a study on the relationship between critical thinking and learning styles among postgraduate students of nursing and utilizing the California critical thinking scale and Kolb learning styles questionnaire, observed that there was a significant relationship between learning styles and critical thinking (13).

Further, Nasrabadi and Mousavi (2012) performed a study to determine the role of critical thinking attitude and learning cognitive styles in predicting the academic progress of students. They found that the role of critical thinking attitude and cognitive learning styles is undeniable in the extent of academic progress (5). In addition, Homauni and Abdollahi (2003) conducted a study to determine the relationship between learning styles and cognitive styles and their role in the academic success of students. The findings indicated that learning styles, abstract conceptualization learning styles, and academic success in mathematics and English had a positive and significant relationship (7).

Overall, learning styles as well as critical thinking skills have a special importance in the teaching-learning process of students, which have also gained much attention by researchers in recent years. Accordingly, this research examines the relationship between critical thinking and cognitive learning styles with general English proficiency and success in the English final exam among students at Gonabad University of Medical Sciences. To this end, the following questions were posed:

1. What is the status of critical thinking and cognitive learning styles of students?

2. Is there any relationship between general English proficiency and success in the English final exam among students?
3. Is there any relationship between critical thinking as well as cognitive learning styles and general English proficiency in students?
4. Is there any relationship between critical as well as cognitive learning styles and success in the final English exam among students?

METHODS

The sample consisted of 138 students from among the students entering Gonabad University of Medical Sciences in 2019-2020 who had chosen the general English course (which is a three-credit course). The students were selected based on convenience sampling. The inclusion criteria were: having chosen general English course, being freshmen in 2019-2020, and willing to participate in the study. The exclusion criteria were as follows: not having completed either of the three instruments, discontinuing the course, and not participating in the English final examination at the end of the term.

To collect data, the following instruments were used:

1. Cognitive Learning Styles Questionnaire

The Kolb questionnaire includes 12 items, for each of which 1 response has been proposed. In this questionnaire, each option represents one of the four learning styles: concrete experience, reflective observation, abstract conceptualization, and active experimentation. The research participants rank their proposed options based on the preference of their learning style from a score of 4 to 1. If the proposed options match the participant's learning style completely, to some extent, slightly, and barely, scores 4 to 1 are assigned, respectively. The sum of the scores of these options consists of four scores, representing the four learning styles. The proposed time for filling out this questionnaire is 10 minutes.

The validity of this questionnaire has been examined by Royin and Asimian in 2015, Rahmani Shams in 2018, and Hosseini Lorgani and Saif in 2019 (14-16). Kolb (1985) performed a research on 1446 women and men with at least two years of academic studies, with the questionnaire's reliability coefficient obtained as follows (8): concrete experience (CE) 82%, reflective observation (RO) 73%, abstract conceptualization (AC) 83%, active experimentation (AE) 87%, AC-CE 88%, AE-RO 81%.

2. Critical Thinking Questionnaire

This questionnaire, which is a modified version of the Form B California critical thinking questionnaire, includes 20 yes/no items and was adapted from Shahidi, 1999 (17). Validity and reliability coefficients of 0.88 and 0.90 have been reported for it, respectively. The questionnaire encompasses five components (analysis, evaluation, inference, deductive reasoning, and inductive reasoning). The students are required to answer the items within 10 minutes. Khalili and Hosseinzadeh, 2003, found a reliability coefficient of 0.62 with KR-20, and reliability coefficients of 0.62-0.67 for its components (18).

3. General English Proficiency Test

English proficiency test was the Nelson proficiency test (300D), evaluating the general ability of the participants in

English reading comprehension, vocabulary, grammar, and pronunciation. This test consists of 50 multiple-choice items, starting with a cloze passage with eight items in multiple-choice format. Items 9 to 45 deal with testing the knowledge and usage of grammar, vocabulary, and conversation, with the items 46 to 50 being related to pronunciation. Each item has 1 point and the student's score is calculated from a total of 50. The validity and reliability indices of this test have been calculated by Amiri et al. (2018) as 0.90 and 0.92, respectively. The duration of the test is 45 minutes, and there are no penalties for the incorrect answers (19).

4. The English Final Exam

The success in the English final exam test is based on the score of a 40-item teacher-made test including sections of translation of words into Persian, synonyms in matching format, proper use of vocabulary in blanks, grammar, sentence translation from English to Persian, and finally a reading comprehension passage including true/false, multiple choice, and open-ended questions. It has been designed for the general English course based on the book, entitled "Mind and Body", written by Shomoossi et al. (2019) and assigned to the students taking the general English course (20). The allotted time to answer the exam is 55 minutes.

Data collection method

To collect data, the above-mentioned questionnaires were confirmed by the respective professors. The students at Gonabad University of Medical Sciences were selected through convenience sampling. Upon briefing the students about the significance of the research, the researchers administered the questionnaires. Next, the data were put into SPSS V.22, whereby they were analyzed through descriptive and inferential statistics. At the descriptive level, statistical indices of frequency, mean, as well as standard deviation were calculated. For inferential statistical analysis, correlation through the Spearman-Brown prophecy formula, a one-way analysis of variance (one-way ANOVA) test, and the Fisher's least significant difference (LSD) were used. The p-value was considered statistically significant at 0.05 level.

RESULTS

The findings regarding major and gender are as follows: 41 students (29.7%) were in midwifery, 20 (14.5%) in laboratory sciences, 19 (13.8%) in environmental health, 17 (12.3%) in nutrition sciences, 16 (11.6%) in radiology technology, 14 (10.1%) in anesthesia, and 11 (8.0%) in medicine. Also, 35 (25.4%) students were male, and 103 (76.6%) students were female.

Considering descriptive statistics and with regard to the first research question regarding the critical thinking status in students, the components of the critical thinking questionnaire enjoyed the following frequencies and percentages: evaluation (n=7, 5.3%), analysis (n=8, 5.7%), inference (n=31, 22.4%), deductive reasoning (n=46, 33.3%), and inductive reasoning (n=46, 33.3%).

Again, considering the very first question, the results related to the responses to the Kolb learning cognitive styles questionnaire were as follows: most participants showed the majority of learning styles as divergent learning, claiming

47.1% (n=65) of learning styles, followed by accommodator style with 27.5% (n=38). Also, 5.8% (n=8) had a convergent style, 27.5% (n=38) accommodator, 47.1% (n=65) divergent, 6.5% (n=9) assimilator, and 13.0% (n=18) balanced learning style. Thus, the cognitive learning style of most students (47.1%) has been divergent learning.

Table 1 reports the mean and SD of the final English exam and general English proficiency scores of the participants. The mean scores of the final exam and the general English proficiency tests were 15.51 and 33.69, respectively (Table 1).

Regarding question No. 2, statistical analysis via the Spearman-brown prophecy formula indicated that there is a significant and direct relationship between the general English proficiency of participants and their success in the final English exam ($p=0.000$, $r=0.31$). This means that as the general English proficiency test score of the participants increased, so did their English final success exam score.

About the third question, one-way ANOVA results indicated that there was a significant relationship between critical thinking and general English proficiency ($p=0.045$, $p=0.05$). The highest English final exam score belonged to the students with deductive and inductive reasoning components of critical thinking. The lowest final exam score was found for students with the evaluation component of critical thinking. Thus, it should be stated that there is a

significant relationship between the critical thinking of students and their general English proficiency (Table 2). Also, Fisher's least significant difference (LSD) indicated that the difference was related to the mean difference between the abstract with active components of critical thinking ($p=0.008$). Concerning the third question of whether there is any relationship between cognitive learning style and general English proficiency, the results of one-way ANOVA revealed that there was no significant relationship between cognitive learning styles and general English proficiency ($p=0.41$), (Table 3).

About the fourth question, one-way ANOVA test results showed that there was a significant relationship between critical thinking and success in the final exam of participants ($p=0.037$). The highest final exam score was found for the students with deductive and inductive reasoning components of the critical thinking. The lowest score was observed among students with the evaluation component of the critical thinking (Table 4). The follow-up analysis through Fisher's least significant difference (LSD) showed that the difference was related to the mean difference between the components of inductive reasoning with inference ($p=0.015$) and deductive ($p=0.013$) reasoning.

In response to the fourth question, however, one-way ANOVA showed that there was no significant relationship between cognitive learning styles and the final English exam

Table 1. Mean and SD of final exam score and general English proficiency of the participants

Variable	N	Mean±SD	Min	Max
Final Exam	138	15.51±3.13	7.5	20
General English Proficiency	138	33.69±6.69	8	40

Table 2. Relationship between critical thinking components and general English proficiency of the participants

Critical Thinking Components	N	Mean±SD	One-way ANOVA
Analysis	8	20.42±4.55	F=2.76 df=4
Evaluation	7	20.57±4.57	
Inference	31	22.54±6.63	
Deductive Reasoning	46	24.94±6.63	P=0.045
Inductive Reasoning	46	21.19±6.96	

Table 3. Relationship between cognitive learning styles and general English proficiency of the participants

Learning styles	N	Mean±SD	One-way ANOVA
Divergent	65	22.60±7.24	F=0.99 df=4
Convergent	8	19.50±6.56	
Assimilator	9	20.44±4.66	P=0.41
Accommodator	38	23.42±6.46	
Balanced	18	24.00±5.81	

Table 4. Relationship between critical thinking components and success in the final exam of participants

Critical Thinking Components	N	Mean±SD	One-way ANOVA
Analysis	8	15.72±3.41	F=2.91 df=4 P=0.037
Evaluation	7	15.83±3.61	
Inference	31	16.19±2.88	
Deductive Reasoning	46	16.04±3.12	
Inductive Reasoning	46	14.41±3.12	

Table 5. Relationship between cognitive learning styles and success in the final exam of participants

Learning styles	N	Mean±SD	One-way ANOVA
Divergent	65	15.50±3.10	F=2.31 df=4 P=0.06
Convergent	8	16.06±3.16	
Assimilator	9	13.83±3.45	
Accommodator	38	16.40±3.01	
Balanced	18	14.26±3.64	

of students ($p=0.06$) (Table 5).

DISCUSSION

While the English language is known as the standard scientific and international language, the educational system, in Iran, has to some extent been inefficient, preventing learning and advancement in this regard. Over the past recent years, with greater changes and modifications, we are somehow observing the improvement of the educational system. In the past years, great emphasis was put on the grammatical points of English, which was followed by learning vocabulary as demanded by our educational system. However, what both high school and university students need is learning effectively and proficiency in all areas of English language learning (2).

Nevertheless, it should be noted that the model and type of learning as well as the abilities of any person cause them to have different learning styles. Training university and high school students, with critical thinking together with the cognitive learning styles of learners, as the best descriptor of individual differences, plays an essential role in decision-making and problem-solving processes. Accordingly, the present research was performed to determine the relationship between students' critical thinking and cognitive learning styles with and general English proficiency as well as their success in the final English exam (4).

Based on the findings, it can be concluded that there is a positive and significant relationship between critical thinking among students and their academic progress and achievement. Also, a review of previous studies mostly confirmed this positive and significant relationship. Researchers in many studies have shown that critical thinking is a good predictor of academic performance of students (21-23). Those with high critical thinking can have better academic performance because of good information

reception and processing power as well as its organization, which are empowered via the faculty of reasoning and inference, curiosity, open-mindedness, as well as avoidance from prejudice and bias plus greater distinction power (2, 5). In the present research, the mean critical thinking score of students in response to the Kolb cognitive styles test was 35.4, which seemed to be hardly acceptable. Studies performed by other researchers show a positive relationship between critical thinking and academic progress. For example, Vahedi et al. (2017) found this significant relationship in learning success (1). In addition, Ghasemi and Bilyad (2017) reported the positive effect of this style on learning and success in exams (10). Furthermore, Nasrabadi and Mousavi (2012) conducted a study whose results also confirmed the positive effect of critical thinking on learning (7). Notwithstanding, Ghasemi and Bilyad (2017) found that learning styles did not have a statistically significant effect on the critical thinking ability of students and their vocabulary learning progress in the control group. However, a significant effect was found in the intervention group (10). Moreover, Noohi et al. (2014) explored a statistically significant relationship between critical thinking and learning styles among postgraduate students of nursing (13). Also, Nasrabadi and Mousavi (2012) found that the role of critical thinking attitude and cognitive learning styles is undeniable in academic progress (5). Additionally, Homauni and Abdollahi (2003) observed that cognitive styles, learning styles of abstract conceptualization, and academic success in mathematics and the English language had a positive and significant relationship (7). Therefore, the findings of the above-mentioned studies concur with the present research findings regarding the low level of critical thinking. In most of the studies in Iran, the researchers have reported low mean values of critical thinking scores. However, the results of this research showed a significant negative relationship

between general English proficiency and success in academic exams with the evaluation component of critical thinking a finding which is in line with those of Scott JN, and Markert RJ. (1994), Chang C. (2021) and Ross D. et al. (2013) (21-23). This is because the participants in the present research acquired a lower score on the English final exam, while deductive and inductive reasoning components of critical thinking showed a positive significant relationship.

Considering the cognitive learning styles, the divergent learning styles which covered around half of the participants constituted the largest percentage; the students with divergent learning styles are more creative and innovative, with special abilities in humanities and art sciences. As such, if the type of teaching of English books was in such a way that these students could relate more to the English language, where materials and methods requiring greater ideation were used, the probability of success in the final exam test would also be enhanced (24). Also, as it is suggested by Shirazi and Heidari (2019), the dominant learning style of students should be taken into account, and, accordingly, proper teaching methods should be planned and used (24). In case of the critical thinking, it was found that two-thirds of the participants had deductive and inductive reasoning of critical thinking. This type of critical thinking alongside divergent learning styles suggests that for the majority of these individuals, the traditional educational system and the manner of administering these tests can be influential on the scores acquired. Teaching the English language in the current educational system has an excessive emphasis on concrete realities and tends to be taught in the same way as experimental sciences and mathematics are taught. Based on the results obtained from the participants' performance, it can be observed that this type of educational system has functioned somehow inefficiently. In the table of the final exam and general English proficiency, it was observed that both tests were directly correlated, leading to the conclusion that the greater the English proficiency of the person, the higher the probability of their success in the final exam.

LIMITATIONS

Overall, based on the findings, the number of female participants was three times as large as that of the male counterparts, which of course has been due to convenience

sampling, thereby we did not have an equal gender distribution among the participants. Moreover, most of the participants have come from midwifery students, and the fewest from medicine and other majors. Indeed, since midwifery students only consist of females, this large volume of the females in the sample may have caused considerable changes and discrepancies in the results between the male and female participants.

CONCLUSION

Ultimately, it can be concluded that deductive and inductive components of critical thinking skills, specially the inference component, are associated with a higher probability of success in English final exam. Moreover, the abstract and active components of critical thinking are of utmost importance in achieving a higher level of English language proficiency. Nevertheless, it should be noted that since the statistical population has been very small and limited, this research should be performed across larger populations and in other universities to identify the extent of accepting or refusing the findings.

Ethical Considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors. The research has been approved by the ethics committee of Gonabad University of Medical Sciences, the ethics code: IR.GMU.REC.1398.131.

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REFERENCES

- Vahedi VS, Ebrahimi MA. The effectiveness of critical thinking skill training on Iranian EFL learners' reading comprehension and reading strategy use. *Tech Edu J (TEJ)*. 2017;11(2):171-80.
- Hasanpour M, Bagheri M, Heidari FG. The relationship between emotional intelligence and critical thinking skills in Iranian nursing students. *Med J Islamic Rep Iran*. 2018;32-40.
- Hasanpour M, Hasanzadeh A, Ghaedi Heidari F, Bagheri M. Critical thinking skills of nursing students. *Iran J Nurs*. 2015;28(93):22-31
- Rambod M, Raieskarimian F, Moattari M. Critical thinking in the students teaching and learning. *Sadra Med J*. 2013;1(2):113-28.
- Nasrabadi HA, Mousavi S. The contribution of critical thinking attitude and cognitive learning styles in predicting academic achievement of medical university's students. *Iran J Med Educ*. 2012;12(4):285-96.
- Kolb DA. Experience as the source of learning and development. Upper Saddle River: Prentice Hall; 1984.
- Homauni A, Abdollahi MH. Investigating the relationship between learning styles and cognitive styles and its role in students' academic success. *J Psychol*. 2003;7(2):179-97.
- Farhady H, Jafarpoor A, Birjandi P. Language skills testing: From theory to practice. Tehran, Iran: SAMT Publishers; 1994.
- Richards JC, Schmidt RW. Longman dictionary of language teaching and applied linguistics. Routledge; 2013.
- Ghasemi M, Belyad M. The impact of learning styles and applying semantic-mapping on the high school students' critical thinking ability and English vocabulary learning improvement. *Educ Psychol*. 2017;13(43):171-206.
- Kuhpayehzadeh Isfahani J, Karami

- Aghqhalleg H. The effect of team-based learning on critical thinking of nursing students at Iran University of Medical Sciences in 2014. *J Med Educ Dev* 2017;11(3):186-200.
12. Valavi P, Bagherpour S, Shahsavari J. Examining critical thinking in university graduate students. *Res Curric Plan*. 2016;13(49):184-92.
13. Noohi E, Salahi S, Sabzevari S. Association of critical thinking with learning styles in nursing students of the school of nursing and midwifery, Iran. *Stride Dev Med Educ*. 2014;11(2):179-86.
14. Royin H, Asimian F. Investigating the relationship between cognitive styles and self-regulated learning components and academic progress of secondary school students (10th grade). 2015. Persian.
15. Rahmani Shams H. Comparison of personality and learning styles of men and women in four educational fields of medicine, technical-engineering, arts and sciences humanity of the university, Master's thesis, Allame Tabatabai University, Tehran, 2018. Persian.
16. Hosseini Lorgani M, Saif AA. Comparison of students' learning styles according to gender, academic levels, and fields of study, *Res Plan Quarterly High Educ*. 2019;19. Persian.
17. Shahidi, L. The critical thinking skills in students at Gonabad University of Medical Sciences. The unpublished research project: Education Development Center, 1999. Persian.
18. Khalili H, Hosseinzadeh M. Investigation of reliability, validity, and normality Persian version of the California Critical Thinking Skills Test; Form B (CCTST). *J Med Educ*. 2003;3(1):29-33.
19. Amiri M, Ghonsooly B, Ghapanchi Z. Iranian EFL learners' performance in the reading subsection of TOEFL: The role of two strategies. *Lang Trans Studies (LTS)*. 2018;20(2):51-74.
20. Shomoossi N, Khazaei AR, Amiri M, Kowsari MA, Rostamian M. Mind and body: Pre-intermediate English course for university students. Mashhad: Taak Ketab; 2019.
21. Scott JN, Markert RJ. Relationship between critical thinking skills and success in preclinical courses. *Acad Med*. 1994, 1;69(11):920-4.
22. Chang C, Colón-Berlinger M, Mavis B, Laird-Fick HS, Parker C, Solomon D. Medical student progress examination performance and its relationship with metacognition, critical thinking, and self-regulated learning strategies. *Acad Med*. 2021, 1;96(2):278-84.
23. Ross D, Loeffler K, Schipper S, Vandermeer B, Allan GM. Do scores on three commonly used measures of critical thinking correlate with academic success of health professions trainees? A systematic review and meta-analysis. *Acad Med*. 2013, 1;88(5):724-34.
24. Shirazi F, Heidari S. The relationship between critical thinking skills and learning styles and academic achievement of nursing students. *J Nurs Res*. 2019, 1;27(4):1-7.