The Correlation between EFL Learners' Academic Intelligence and the Level of Productive Skills

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Abstract
Communicating effectively by gaining productive skills in a classroom setting is one of the critical goals of learning the English language. The current study was conducted to explore the correlation of EFL learners' level of academic intelligence with their productive skills. The study tries to find an answer to what is the correlation between EFL learners’ academic intelligence and level of production skills. The study population represents EFL students at the departments of English language of the Iraqi Colleges of Education for the academic year (2022-2023). The sample includes 310 EFL students selected from the 3rd year of the Department of English of the College of Education, Ibn-Rushd for Human Sciences/University of Baghdad, College of Education/University of Diyala, and College of Education/University of Tikrit. The current study has two instruments, the academic intelligence test consists of two dimensions (the operational and the content), while the second instrument used is the test of productive skills, which is composed of two skills; speaking skill consists of six standards (grammar, vocabulary, comprehension, fluency, pronunciation, interaction), and writing skill consists of five criteria (content, organization, grammar, vocabulary, writing technique). The results obtained reveal that there are positive significant correlations between EFL learners' and productive skills. Concerning the productive skills tested in this study, EFL learners succeed in using speaking and writing skills, which constitute a large amount of human communication. Moreover, academic intelligence abilities can help EFL learners develop the skills and strategies necessary for academic success and professional development.

Keywords: Academic intelligence, EFL learners, productive skills, Iraqi students, crystallized intelligence

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Introduction

The main objective of language acquisition is communication. Mastering a language is all about communicating successfully with those who speak that language. Language study is a way to enhance communication abilities, whether it is for a conversation, presentation, or email. Developing speaking and writing abilities is a part of learning a new language (Ozorio, 2014).

However, learning English as a Foreign Language (EFL) can help develop cognitive abilities such as critical thinking, problem-solving, and analytical skills, which are crucial for academic success. These skills are required in language learning and academic tasks such as research, analysis, and writing (Steinberger et al., 2001). That is, students who use their Academic Intelligence (henceforth AI) for engagement in conversation, whether they seek better performance or mastery of the skills, will consequently adjust themselves to achieve their goals, cope with difficulties and challenges, and ultimately be successful communicators.

The present study aims at first finding the correlation between EFL students’ AI and productive skills. The second is finding out the EFL students' level of AI and productive skills, and the third one is determining the extent to which AI contributes to interpreting the variation in productive skills for Iraqi EFL university students. It hoped that the findings of the study will be helpful for students to be aware of how their AI may aid in improving of their productive abilities. Also, EFL instructors should emphasize the significance of AI in assisting students to regulate their studies and academic activities, specifically in productive skills.

The study tries to find an answer to the following question: What is the correlation between EFL Learners’ academic intelligence and the level of production skills? To answer this question, it hypothesized that there is no statistically significant correlation between the AI and productive skills of EFL university students. To the best knowledge of the researcher, there is no study conducted in the field of education in Iraq concerned with the correlation between AI and productive skills, the current study is trying to shed light on the relationship between these two variables of EFL Iraqi college students and the extent that show their managing of these variables in FL learning.

Literature Review

Academic Intelligence: Definition & Theory

The concept of AI is limited to human cognitive and mental capabilities. It is defined as intellectual performance, within a closed system, on academic tasks or academic problems with fixed objectives, fixed structure, and known elements, distinguished from social, successful, or practical intelligence (Tabatabaee, 2023). On the other hand, AI defined as "a collection of mental abilities, processes, and aptitudes, such as abstract, logical, and consistent reasoning; detecting relations; (complex) problem solving; detecting rules in seemingly unordered materials; solving new tasks by utilizing existing knowledge; adapting to new situations flexibly; and learning without direct and complete instruction. The intellectual thinking and problem-solving processes involved in academic tasks or problems with a fixed and confined structure (Krebts, 2017).
There are several theories of AI, like Two-Factor Theory of Spearman or the g-Factor Hypothesis, which postulates that intelligence, consists of two factors: a general component (g) and particular skills (s). The general factor (g), according to Xu et al. (2023), is a broad ability that underpins success on all cognitive tasks. In contrast, the specific ability (s), on the other hand, is a more focused ability that is unique to a given type of task. The second theory is related to Sternberg's Triarchic, which consists of three types of intelligence: analytical, artistic, and practical intelligence. The capacity to think critically and solve issues falls under analytical intelligence. Strong analytical thinkers excel at logical thinking, information application, and novel circumstances. The other theory is related to Gardner's Multiple Intelligences, which stresses the significance of identifying and encouraging various forms of intelligence in people and contends that conventional IQ tests may not fully represent the range of cognitive skills. According to Gardner's (1983) multiple Intelligences theory, intelligence is a collection of unique skills largely independent of one another rather than a singular, all-encompassing talent. According to Gardner's hypothesis, AI is just one form of intelligence, mainly linguistic and logical-mathematical intelligence. Finally, the Fluid and Crystallized Intelligence of Cattell, Horn, and Carroll (CHC) (1987) this theory is made up of three categories of skills (Rozov, 2023).

A. General Intelligence (g) in Stratum III: The highest degree of intelligence, which underpins performance in all intellectual activities, shows a wide range of knowledgeable abilities.
B. Stratum II: Broad Abilities: These mid-range skills represent a more focused part of the intellect, such as recollection, fluid intelligence, and crystallized intelligence.
C. The narrow skills in Stratum I lead to the success of particular cognitive activities, such as word comprehension, perceptual speed, and spatial thinking.

There are two models of AI, Guilford’s Structure of Intellect Model (SOI) (1967) and Berlin Intelligence Structure Model (BIS) (1982, 1984) (Beauducel & Kersting, 2002). According to Anvarovna (2023), students' cognitive requirements for completing a task can be described by the aspect operations, including the following: cognition, memory, divergent production, convergent production, and assessment. The task's figural, symbolic, semantic, and behavioral aspects comprise the content dimension. Units, classes, relations, systems, transformations, and implications, these six components include the product aspect, which describes the results of a mental operation. On the other hand, Beauducel and Kersting (2002) suggest seven second-order features:

On the SMCR facet:
- Speed (BIS-S): The ability to rapidly and accurately do routine tasks,
- Memory (BIS-M): Ability to recall sets of items and their arrangements,
- Creativity (BIS-C): Ability to generate a wide variety of original ideas quickly and easily,
- Reasoning (BIS-R): the capacity to construct and plan sophisticated knowledge using inductive and deductive reasoning and other forms of reasoning.
On the VFB facet:
- Verbal (BIS-V): employing all four modalities of cognition to process text.
- Figural-Spatial (BIS-F): Ability to process figural-spatial information utilizing all four cognitive processes,
- Numeric (BIS-N): The capacity to process numerical information via the four distinct cognitive processes.

Productive Skills

According to Nunan (2003), productive skills, including speaking and writing, are essential for several reasons (Rico, 2014):
- Conversation: Effective conversation requires productive abilities. It's crucial to communicate successfully in both personal and business settings.
- Academic success: Since many tasks and examinations require written responses, strong writing abilities are crucial for academic success. Speaking correctly can be essential in speeches and conversations.
- Professional success: Effective communication with coworkers and customers, report writing, and delivering speeches are all examples of professional settings where productive skills are crucial.
- Personal growth: Strong functional skills can also help students advance because they can better arrange their ideas, communicate their views, and show their ingenuity.

Speaking and writing abilities are essential because they allow students to practice real-world activities in the classroom. These two skills can be used as a 'barometer' to determine how much the students have learned. Unless a person is learning English solely for academic purposes and has no intention of communicating in English, which is relatively uncommon, learning to speak is essential. A strong command of speaking skills fosters a genuine sense of advancement and enhances students’ confidence. Learning how to write is vital because written communication is a fundamental life skill. Students may be required to take notes, complete forms, and compose letters, reports, and stories (Al-Jamal & Al-Jamal, 2014).

Academic Intelligence and Language Skills

Academic success is regarded as highly dependent on the cognitive capacity of students. Students from numerous academic disciplines can engage in abstract thought. AI is the capacity to comprehend academic accomplishments. AI is the ability to recognize academic problems from a variety of disciplines. It is defined as the ability to solve problems across multiple academic disciplines and the capacity of a branch of knowledge considered and investigated as part of higher education (Mur Salim, 2021).

Fielder et al. (2002) find that “the correlation is moderated by factors such as the stress experienced by the leader, which apparently can even change the correlation's direction”. The
variety of cognitive skills and abilities required for success in educational contexts can be included in the capacity of AI. These skills consist of:

A. A rational and systematic approach to information analysis, pattern recognition, and reasoning evaluation is known as critical thinking.
B. Problem-solving skills include the capacity to recognize issues, create potential remedies, and choose the best course of action.
C. Analytical thinking is the capacity to dissect complicated information into simpler parts and comprehend how those parts relate.
D. Learning and memory: the capacity to gather, retain, and retrieve knowledge.
E. Information application is the capacity to apply information and skills to novel circumstances and settings.
F. Social and emotional intelligence is the capacity to successfully interact, collaborate with others, and control one's feelings and stress.
G. Perseverance is the capacity to carry on despite obstacles and failures.
H. The capacity to control one's conduct and feelings is known as self-discipline (Arvey et al. 2006).

Method

The type of research design conducted in the present study is correlational design. The study is referred to as correlational when it examines a relationship between two variables without the researcher controlling either of them. A correlational study seeks to determine relationships between two or more variables (Thompson, 2014).

Participants

The study population represents EFL students at the departments of English of the Iraqi colleges of education, except for the Kurdistan region for the academic year (2022-2023). The sample, on the other hand, includes (310) EFL students purposively selected from the 3rd-year students of the Departments of English of the College of Education, Ibn Rushd for Human Sciences/ University of Baghdad 101 (115 students), College of Education/ University of Diyala (110 students), College of Education/University of Tikrit (85 students). The total number of 3rd-year students in the departments included is 995 students; a percentage of 30% is relied on in selecting the sample, which is highly reliable in correlational studies (Duran et al. 2006).

Research Instruments

The Academic Intelligence Test

The academic intelligence test is prepared by constructing items from two dimensions. The first dimension (the operational) consists of four abilities, each one consisting of five items. The second dimension relates to the content, which contains three capabilities, each comprising five items. The total number of the AI test is 35, and the test is one point for the correct answer and zero for the wrong answer. Moreover, the test examines two domains or orientations, operational...
and content, with five, five items, respectively, for each direction. Participants' responses are supposed to reflect their functional exposures in their academic setting, like speed and creative ability. On the other hand, the content items indicate participants' disposition towards better learning numerical, verbal, and master figures. That is, they measure content ability. It is worth mentioning that the higher score to be obtained by the participant is (35) while the lower score is zero with a theoretical mean of (17.5).

**Productive Skills Test**

The second instrument used in this study is the test of productive skills which is composed of two skills: speaking skill consists of six standards (grammar, vocabulary, comprehension, fluency, pronunciation, interaction), and writing skill consists of five criteria (content, organization, grammar, vocabulary, writing technique). Accordingly, the highest score obtained by the participant in speaking skills is (30). The lower score is six with a theoretical mean of (18), whereas, the highest score that can be obtained by the participant in writing skills is (20), and the lower score is five with a theoretical mean of (12.5).

**Research Procedures**

*Face Validity*

The measures of the current study exposed to a jury of (15) experts in the field of methods of teaching English and the field of linguistics to provide their viewpoints concerning the adequacy and appropriateness of the items of each measure. The experts show their approval of the suitability of the items for the topic and sample concerned.

*Test Reliability*

The researcher relied on the internal consistency method to find test stability, which is a method that depends on the correlation between the test items with each other within the test. To extract the stability in this way, the equation (Queder Richardson 20) was applied to the scores of the sample (310) male and female students. Hence, the value of the test stability coefficient was (0.91). Thus, it is considered a reasonable and appropriate value, so the test is considered stable since the tests are not standardized. It is suitable as its stability coefficient is (0.67) or above(Cumming, 2013). To extract stability, the scale was re-applied to a sample of stability consisting of (40) male and female students, with a time interval of (14) days. It indicated that re-application of the scale to identify its stability should not exceed two weeks. Pearson correlation coefficient was calculated between the scores of the first and second applications, and the correlation coefficient was (0.91) for the scale. 0.70) or more, as this is a good indicator of the stability of tests in educational and psychological sciences (Mari & Maul, 2023).

This method is used because obtaining a high stability value indicates that the scores (the stability value) are less likely to be affected by random daily variables in the conditions of the subject or in the environment in which the test is conducted (Hanson et al. 2023). In general, internal consistency approaches allow each item to consider a single measurement and the test to
be viewed as a sequence of repeated measures (Ravid, 2020). Cronbach Alpha coefficient can range from 0.00 to 1.00 to indicate from very low to very high internal consistency. In addition, an Alpha of (0.65-0.80) is often considered adequate for a measure used in human dimension research (Mohan, 2023). Accordingly, the steps of the study (AI test and Productive skills) found high internal consistency with R-values of (0.67, and 0.89) respectively.

Final Application

The instruments in this study applied in different ways. The AI test and the productive skills test are administered to the sample of the survey in person and distributed in the classrooms. The participants have enough time to consider the things and submit their responses. Thus, these tests are applied by eliciting natural conversations from participants by talking about different topics. Because the application is time-consuming, the time allotted for each participant they were ranged from (15-20) minutes for answering each one of the instruments. Before applying tests, students informed that there will be such tests. They gave proper instructions and guidelines on the purpose of the test and the criteria according to which they will rate, like speaking rate, fluency, vocal confidence, prosody, facial expressions, etc. Moreover, the application of the tests takes about four successive weeks to complete, and the participant's performance is taped so that it can be listened repeatedly and accurately scored.

Results

The researcher took the answers of the research sample on the AI test and the productive skills test. The researcher used the Pearson correlation coefficient; the following are the findings of two tests (See Table One):

1. The value of the correlation coefficient between AI and speaking skills was (0.507), and to find out the significance of the relationship, the researcher used the t-test for the importance of the correlation coefficient. The calculated t-value reached (10,347), which is greater than the tabular value of (1.96) at significance level (0.05) and a degree of freedom (308), and this means that the relationship between AI and speaking skill is direct and statistically significant, that is, the higher the AI level of the research sample, the better their speaking skill.

2. The value of the correlation coefficient between AI and writing skills was (0.548), and to find out the importance of the relationship, the researcher used the t-test for 161 the importance of the correlation coefficient. The calculated t-value reached (11,417), which is greater than the tabular value of (1.96) at significance level (0.05) and a degree of freedom (308), and this means that the relationship between AI and writing skill is direct and statistically significant, that is, the higher the AI level of the research sample, the better their writing skill.

3. The value of the correlation coefficient between AI and productive skills was (0.554), and to find out the importance of the relationship, the researcher used the t-test for the importance of the correlation coefficient. The calculated t-value reached (11,542), which is greater than the tabular value of (1.96) at a significance level (0.05) and a degree of freedom (308), and this means that the relationship between AI and productive skills is direct and statistically significant.
significant, that is, the higher the AI level of the research sample, the better their productive skills.

Table 1. *The correlation between AI and productive skills*

<table>
<thead>
<tr>
<th>Productive Skills</th>
<th>Sample Size</th>
<th>r- Value</th>
<th>t- Value</th>
<th>Significance 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking Skill</td>
<td>310</td>
<td>0.507</td>
<td>10.347</td>
<td>1.96 Significant</td>
</tr>
<tr>
<td>Writing Skill</td>
<td>310</td>
<td>0.548</td>
<td>11.417</td>
<td>1.96 Significant</td>
</tr>
<tr>
<td>The Total Skills</td>
<td>310</td>
<td>0.554</td>
<td>11.542</td>
<td>1.96 Significant</td>
</tr>
</tbody>
</table>

**Results Related to the EFL Students' Level of AI & Productive Skills**

As far as EFL students' level of AI is concerned, the results calculated show that the mean score is (17.626) with a standard deviation of (4.681). To identify the significance of the variance between the mean score and the theoretical mean, which is (17.5) at the level of importance (0.05), as the calculated t-value was (0.474), which is smaller than the tabular t-value of (1.96), with a degree of freedom (309), and the table two and figure one explain this.

Table 2.*The mean score, standard deviation, and t-value of the AI test*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample Size</th>
<th>M</th>
<th>S.D</th>
<th>Theoretical Mean</th>
<th>t- Value</th>
<th>Significance (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Intelligence</td>
<td>310</td>
<td>17.6</td>
<td>4.681</td>
<td>17.5</td>
<td>0.474</td>
<td>1.96 significant</td>
</tr>
</tbody>
</table>

Figure 1. *The mean score and theoretical mean of the AI test*

To this goal, the researcher applied the productive skills test to the research sample consisting of (310) male and female students. The results showed that the arithmetic mean of the scores on the test amounted to (31.906) degrees, with a standard deviation of (7.462) degrees. It found that the difference was statistically significant at the level of significance (0.05), as the calculated t-value reached (3.319), which is smaller than the tabular t-value of (1.96), with a degree of freedom (309), Table and Figure two make this clear.
Table 3. **Mean score, standard deviation, t-value of the productive skills test**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample Size</th>
<th>Mean Score</th>
<th>S.D</th>
<th>Theoretical Mean</th>
<th>t-Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productive Skills</td>
<td>310</td>
<td>31.906</td>
<td>7.462</td>
<td>30.5</td>
<td>3.319</td>
<td>1.96</td>
</tr>
</tbody>
</table>

*Figure 2. Mean score and theoretical mean of the productive skills test*

After that, the researcher carried out another procedure, which was to identify the skills (speaking and writing), each skill separately, and the results were shown in table four:

Table 4. **Mean score and theoretical mean of the speaking and writing skills test**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample Size</th>
<th>Mean Score</th>
<th>S.D</th>
<th>Theoretical Mean</th>
<th>t-Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking Skill</td>
<td>310</td>
<td>18.464</td>
<td>5.156</td>
<td>18</td>
<td>1.586</td>
<td>Significant</td>
</tr>
<tr>
<td>Writing Skill</td>
<td>310</td>
<td>13.442</td>
<td>2.781</td>
<td>12.5</td>
<td>5.963</td>
<td>Significant</td>
</tr>
</tbody>
</table>

The following appears from Table Four:

1. For the speaking skill, the arithmetic mean of the sample's answers was (18.464) with a standard deviation of (5.156) and a hypothetical mean of (18). The calculated T-value was (1.586), which is not statistically significant as it was smaller than the tabular value of (1.96), with a level significance of (0.05) and a degree of freedom (309), which means that the average is the degree of this skill.
2. For the writing skill, the arithmetic mean of the sample's responses was (13.442) with a standard deviation of (2.781) and a hypothetical mean of (12.5). The calculated T-value was (5.963), which is statistically significant as it was greater than the tabular value of (1.96), with...
a level significance of (0.05) and a degree of freedom (309), which means that the reasonable is the degree of this skill.

Discussion
To answer the research question of what is the correlation between EFL Learners' academic intelligence and the level of production skills? It was found correlations between variables; results show positive significant correlations between variables. First, results indicate a positive correlation between EFL students' level of AI and their use of productive skills. This positive correlation may be attributed to the fact that learning a language including all its skills is motivated by a variety of factors and goals that learners set for them to achieve better behavior and academic outcomes. Whenever the level of AI is high in the research sample, their speaking and writing skills improve. Thus, the null hypothesis, which ensures the absence of a relationship, is rejected, and the alternative one, which confirms the existence of a connection between the two variables, is accepted. In relation to the findings of the contribution of AI in interpreting the variation in productive skills for Iraqi EFL university students, results show that independent variables contribute to the variance. Therefore, a student's potential to study and acquire knowledge can be affected by the classroom environment, which includes the instructor, classmates, resources, and teaching strategies. AI can influence a student's interaction with the topic, participation in class discussions, and assignment completion. AI can be fostered in a positive and supportive environment.

Conclusion
This study investigated the correlation between EFL students’ AI and productive skills, the analysis of AI demonstrates that EFL learners are aware of their goals and reasons for engaging in tasks in the English language. Also, AI abilities can help EFL learners develop the skills and strategies necessary for academic success and professional development. Yet, it showed that studying critical thinking and analytical reasoning can help EFL learners understand complex literary texts and identify key concepts and arguments. By investigating EFL learners' level of productive skills, data analysis provides evidence that they can communicate satisfactorily, employing a variety of skills in communication. Concerning the productive skills tested in this study, EFL learners succeed in using speaking and writing skills which constitute a large amount of human communication. The use of productive skills can improve EFL's ability to convey their thoughts and ideas clearly and effectively in various settings, such as in academic, professional, and social contexts.

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