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Cognitive Flexibility of Students with Learning Disabilities in English Language and its Relationship to Some Variables

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***Abstract*—** *This study aimed at exploring the level of cognitive flexibility of students with learning disabilities in English language in Irbid Governorate and its relationship with the variables of gender and school grade. The study sample consisted of (380) male and female students in the elementary stage. The study used the descriptive approach and developed the cognitive flexibility scale as an instrument to collect data. The content validity and reliability of the instrument were ensured using the Cronbach Alpha and repetition methods. The results revealed the existence of statistically significant differences in the level of cognitive flexibility among those with learning disabilities due to the gender variable in favor of males, and to the school grade variable in favor of the second primary grade.*

***Keywords*—** *Cognitive flexibility, learning difficulties, English language, elementary stage.*

I. INTRODUCTION

Students with learning disabilities need to learn thinking skills to adapt to new circumstances around them, and to think in new innovative ways to deal effectively with their surroundings. This requires them to learn the skill of cognitive flexibility in thinking, as cognitive flexibility is the equivalent of adapting to new educational circumstances and situations by reducing them, comparing them with old experiences, simplifying the complex ones, and looking at the familiar in it as familiar and ordinary. Students adapt to these conditions in a routine way, while their reality requires them to deal with the complex ones without simplification and to look at them in an unfamiliar and ordinary way (Sweid, 2013).

As a result of the increase in options required by the skill of cognitive flexibility, opinions differed in their view of cognitive flexibility according to the different theoretical backgrounds. Al-Atoum (2017) indicated that cognitive flexibility is an important component of creative thinking and indicates the automatic cognitive state by changing the situation or its characteristics. This means the ability to produce a variety of ideas about a specific problem or situation and the shift from a certain type of thinking to another when responding to a stimulus that challenges the individual's thinking. Cognitive flexibility has two forms: adaptive flexibility, which refers to the ability of the individual in changing the state of mind through which a solution to a specific problem is seen, and automatic flexibility that indicates the speed of an individual to produce the largest possible number of different types of ideas that are related to a specific situation (Amani, Fadaei, Tavakoli, M., Shiri, & Shiri, 2018)).

Accordingly, self-regulation refers to the individual's ability to organize the use of skills to achieve goals through understanding the individual's viewpoint and identifying his qualities that help achieve goals. This is done by clearly defining the individual's goals through self-monitoring, evaluation, and promotion (Youssef & Wahba, 2021).

Therefore, we conclude that the existence of cognitive flexibility is necessary for students with LDs because the student at this stage needs cognitive flexibility in thinking and self-organization. The purpose of this study is to identify the level of cognitive flexibility among students with LDs in the English language and its relationship to some variables.

Research Questions

This study attempts to answer the following research questions:

1. What is the level of cognitive flexibility among students with learning disabilities in Irbid Governorate?
2. Does the level of cognitive flexibility differ among students with LDs in English language in Irbid Governorate according to gender and school grade?

Significance of the Study

The theoretical significance of this study appears in identifying the relationship between cognitive flexibility and self-organization among students with learning disabilities. The cognitive flexibility skill would contribute to increasing students' awareness of what is going on around them and increasing the adequacy of their mental ability in dealing with situations, as well as helping them to develop positive trends towards classroom experiences and about the school. This will also help them solve their problems, which increases the vitality and activity of students in organizing situations and planning them. In light of the theoretical significance, the current study will be useful to those in charge of the educational process to realize the cognitive flexibility that students with learning disabilities enjoy and the ability to organize themselves (Cartwright, Marshall, Huemer, & Payne, 2019).

The practical significance of this study appears in helping those in charge of the educational process in planning for curriculum development and developing advanced teaching methods by introducing a measure of cognitive flexibility.

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Delimitations of the Study

The results of this study are limited to the sample, as it was applied to students with learning disabilities in English language in schools within the Directorate of Education in Irbid Governorate in the first semester of the academic year 2020/2021. The generalization of the results of this study limits the extent to which the study sample represents its community, the procedures for applying the study tools, and the availability of acceptable standards of validity and reliability. The results are also limited to the accuracy of the response of the study sample members and their seriousness in responding to the scale used in the study.

Definition of Operational Terms

The present study included many terms, which can be defined as follows.

Cognitive Flexibility: Rose (2019) defines it as "the ability to build knowledge in various ways in a way that enhances adaptation to the different requirements of the learning situation." In this study, cognitive flexibility is the level students with LDs score on the scale of cognitive flexibility developed for this study.

Students with learning disabilities: This category of students include those who have disorders in one or more of the basic psychological processes, which include understanding of written or spoken language and their use.

II. Literature Review

Cognitive flexibility is one of the important variables that help the individual lead a high-quality life. Students who possess high levels of cognitive flexibility are more able to succeed and find effective solutions to the social, academic, and behavioral problems they face inside and outside the classroom (Periáñez, Lubrini, García-Gutiérrez, & Ríos-Lago, 2021). Cognitive flexibility positively affects the individual's ability to adapt to internal and external sources of psychological stress, in addition to its positive impact on the mental and physical health of individuals, and has an important role in social interaction with others (Koesten, Schrodt & Ford, 2009).

Moreover, cognitive flexibility helps students to provide automatic responses to new problems and situations, and to deal with the presented academic situations and tasks, since it helps them in the production of new and multiple ideas and alternatives (Miconi, Moscardino, Altoè, & Salcuni, 2019.).

The importance of cognitive flexibility lies in its being necessary to apply knowledge in new situations. It is important in its relative appropriateness with the level of stress experienced by the individual, meaning that the greater the flexibility of the individual, the less stress he suffers from (Carvalho & Amorim, 2000).

Previous Studies

Tawfiq, Al- Mallahhah, and Abou Shoqqa (2021) tested the training effectiveness of using self-organized learning strategies to improve the Cognitive Flexibility of pupils with learning disabilities in the elementary stage. The sample of this study consisted of 50 students with learning disabilities aged on average 11.3 years old from primary education schools in the administration of Sidi Salem Center - Kafr El Sheikh Governorate. They were divided into two groups, control and experimental of 25 students each. This study followed the Quasi-experimental method. The results of this study revealed differences between the scores of two groups of the study in self-organized learning strategies in the post-application. The study showed clear differences in the scores of the experimental group and the control group in the Cognitive Flexibility score in favor of the experimental group.

Al-Najjar (2020) revealed the relationship of quality of life and cognitive flexibility of verbal mathematical solving problems skill among learning disability pupils and predict verbal mathematical problem-solving skills through the quality of life and cognitive flexibility. The sample of the study consisted of 62 female and male students with an average age of (122.3) months in the second semester of 2018/ 2019. A Diagnostic test for students with a learning disability in mathematics prepared by the researcher, Scale of skill for solving verbal mathematical problems, Rafin follow-up matrices test, Quality of Life scale also prepared by the researcher, and a diagnostic assessment scale for learning disability in mathematics were used as tools for this study. The results of this study showed a statistically significant relationship at the level of 0.01 between the skills of solving the verbal mathematical problem and the quality of life of fifth-grade primary school students with a learning disability, and a statistically significant relationship at the level of 0.01 between the skills of solving the verbal mathematical problem and cognitive flexibility of the fifth-grade students' Primary school with a learning disability.

Al-Najjar, Hamman, and Al-Najjar (2020) identified the relationship between Cognitive flexibility, Visual-motor coordination, and Emotional adjustment among students with nonverbal learning disabilities. The sample of this study consisted of 21 4^{th} and 5^{th}-grade students with nonverbal learning disabilities from the new Islah Primary School in the East Tanta Educational Administration. An emotional adjustment scale prepared by Thorlacius & Gudmundsson (2015), a visual-motor coordination test prepared by Mariana Frostig & others (2009), and a cognitive flexibility test prepared by Magdy Habib (2011) were used in this study. The result of the study showed a positive correlation at (0.01) between Cognitive flexibility, Visual-motor coordination, and Emotional adjustment, among primary stage students with nonverbal learning disabilities.

Toraman, Özdemir, Kosan, and Orakci (2020 explored how cognitive flexibility has an impact on the quality of faculty life, learning methods and academic achievement. The study was applied to a sample of 1573 undergraduate students from 16 faculties from Ankara University. “Cognitive Flexibility Scale”, “Quality of Faculty Life Scale” and “Approaches to Learning Questionnaire” were used to collect the data. This study followed the correlational comparison method. The findings revealed that three subscales of the scale to have a significant positive relationship with cognitive flexibility.

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Schommer-Aikins and Easter (2018) explored the attitudes of student's propensities toward cognitive flexibility, procrastination, and the need for closure. The study was applied to 119 college students from two universities, and 60% were females. The findings revealed that students who have higher cognitive flexibility scored better that other students. These students were also better in engaging with peers and instructors online, and monitoring the success of their learning. On the other hand, students who procrastinate very much scored lower proficiency in time management for online courses. Students with a strong need for closure were less proficient in managing their stress in online courses.

Gleish (2017) discovered the relationship between innovative thinking and cognitive flexibility of students with learning difficulties. The sample of the study consisted of 30 5th grade students from a primary school in Qaleen educational administration during the 2nd Semester of 2016-2017 who were selected based on their economical and social level and a cognitive Flexibility, Wisconsin Card Sorting Test. The study followed the comparative relational descriptive method and used SPSS to analyze data. The results of this study showed a positive relationship between innovative thinking and the cognitive flexibility of students with learning difficulties.

III. Research Methodology

Population and Sample

The study population consisted of all students with learning disabilities in English language in schools within the Education Directorate in Irbid Governorate, and their number was (800) students, for the academic year 2020/2021. The study sample consisted of (400) students, who were chosen randomly, and they were distributed according to gender and school grade as shown in Table (1).

TABLE 1: Distribution of study sample according to gender and grade

Grade	Gender		Total
	Number	percentage	
Second grade	65	65	130
Third grade	65	65	130
Fourth grade	60	60	120
Total	190	190	380

Research Instrument

The cognitive flexibility scale

The researcher developed the cognitive flexibility scale by reviewing the available measures in the previous studies and reformulating them in line with the objectives of the current study and its new environment.

Validity of the instrument

The indications of the apparent validity of the content of the cognitive flexibility scale were verified by presenting it in its initial form to a group of experienced and competent judges to identify indications of the judges' validity of the instrument to suit the purposes of the study. The judging was carried out according to the following criteria: appropriateness of the items of the scale, the integrity of the formulation of items, and the clarity of the meaning from a linguistic point of view. The proposed amendments, which were agreed upon by (80%) of the judges, were taken into account.

To extract indicators of the construct validity indications for the scale, the score correlation coefficients were extracted on the scale's items with the total score. The instrument was applied to an exploratory sample from outside the study sample consisting of (50) male and female students. The scale's items were analyzed and the correlation coefficient between the score on each item was calculated and between the total score. The correlation coefficients of the instrument were (0.30-0.65) as shown in the following table.

TABLE 2. Correlation coefficients between scores of the items and the overall score on the scale of cognitive flexibility

Item No.	Correlation coefficient	Item No.	Correlation coefficient	Item No.	Correlation coefficient
1	.46*	12	.45*	23	.55*
2	.39*	13	.34*	24	.38*
3	.32*	14	.43*	25	.40*
4	.41*	15	.41*	26	.42*
5	.55*	16	.38*	27	.38*
6	.56*	17	.33*	28	.33*
7	.38*	18	.37*	29	.56*
8	.32*	19	.36*	30	.67*
9	.39*	20	.57*	31	.59*
10	.47*	21	.49*	32	.56*
11	.44*	22	.66*		

*Statistically significant at.(0.05)

It should be noted that all correlation coefficients were of acceptable scores, and therefore none of these items was omitted.

Reliability of the instrument

To check the reliability of the cognitive flexibility scale, the researcher used the test-retest method by applying the instrument to an exploratory sample from outside the study sample consisting of (50) male and female students, with an interval of two weeks between the first and second applications. The Pearson correlation between the scores of the two applications was calculated to find the reliability, and the overall coefficient of the scale according to this method was (0.81), which is an acceptable reliability coefficient to apply the scale to the study sample. The overall reliability of the scale according to this method was (0.83), which is an acceptable reliability factor to apply the scale to the study sample.

IV. Findings and Discussion

First: The results of the first question.

To answer this question, the mean scores and standard deviations of the level of cognitive flexibility of students with LDs in Irbid Governorate were extracted as shown in the following table.

TABLE 3. The mean scores and standard deviations of the level of cognitive flexibility for students with LDs arranged in descending order according to the mean scores

Rank	No.	Item	Mean score	Standard deviation	Level
1	8	I can achieve my goals.	4.37	.901	High
2	1	I am proud of the achievements I have made in my life.	4.18	1.035	High
3	11	I like challenges.	4.18	.907	High
4	2	I like change in my life.	4.03	1.177	High

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Rank	No.	Item	Mean score	Standard deviation	Level
5	3	I feel I can make decisions	3.99	.948	High
6	5	I can act appropriately in every situation in which I find myself	3.86	1.111	High
7	9	I can convey an idea in more than one way	3.83	.942	High
8	10	I have a sufficient level of self-confidence to display different behaviors	3.69	.915	High
9	7	My behaviors are the result of the conscious decisions I make	3.66	1.057	Medium
10	16	I control all things in my life	3.66	.943	Medium
11	15	I see change as a challenge for me.	3.60	1.026	Medium
12	6	I can find successful solutions to difficult problems	3.59	.987	Medium
13	13	I have a lot of friends that I can rely on.	3.57	1.249	Medium
14	20	I can see the good side of things, not just the bad side.	3.48	1.218	Medium
15	12	My life carries a lot of meaning.	3.44	1.107	Medium
16	17	I adapt easily to psychological stress.	3.43	1.126	Medium
17	19	I can turn to my family members in times of adversity.	3.41	1.070	Medium
18	4	I can quickly return to my normal state when I have a psychological problem.	3.39	1.213	Medium
19	18	I find people to help me overcome my psychological problems.	3.34	1.159	Medium
20	14	I avoid new situations.	2.69	1.219	Medium
		Total	**3.60**	**.402**	Medium

Table (3) shows that the mean scores were (2.69-4.37). The item "I can achieve my goals" came first with a mean score of (4.37) and a high level. The item "I avoid new situations" came in the last order, with a mean score of (2.69) and an average rating level. The mean score of the cognitive flexibility scale as a whole was (3.60) and with a medium level. When looking at this mean score, it becomes clear that it is closer to the high level than to the low level of cognitive flexibility. The reason for this result is that some students possess the skill of cognitive flexibility more than others. This is due to many reasons, including the difference in students' mental abilities, and their differences in the methods of family upbringing, which leads to varying levels of cognitive flexibility among students. The researcher attributes this result to the stressful social and academic conditions that students with learning disabilities are exposed to, which has increased their ability to adapt to those conditions that would affect their academic and social future, and thus increase the level of cognitive flexibility that enables them to continue and succeed in their academic and social lives and overcome all the difficulties they face.

Second: results of the second question.

To answer this question, the mean scores and standard deviations of the cognitive flexibility level of elementary school students in Irbid Governorate were extracted according to the gender and grade variables, as shown in the following table.

TABLE 4. The mean scores and standard deviations of the level of cognitive flexibility of secondary school students in Irbid according to the variables of gender and school grade

Gender	Grade	Mean score	Standard deviation	No.
Males	Second grade	3.45	.346	64
	Third grade	3.76	.378	59
	Fourth grade	3.78	.387	61
	Total	3.66	.399	184
Females	Second grade	3.55	.400	65
	Third grade	3.46	.339	63
	Fourth grade	3.67	.436	68
	Total	3.55	.399	196
Total	Second grade	3.48	.378	129
	Third grade	3.58	.385	122
	Fourth grade	3.73	.415	129
	Total	3.62	.403	380

Table (4) shows apparent differences in the mean scores and standard deviations of the level of cognitive flexibility among elementary school students in Irbid governorate according to the variables of gender and school grade. To identify the statistical differences, the Two-Way ANOVA analysis was carried out as shown in Table (5).

TABLE 5. The Two-Way ANOVA analysis of the effect of gender and school grade on students' cognitive flexibility

Source of variance	Sum of squares	Freedom value	Mean square	F value	Sig.
Gender	.957	1	.947	6.241	.014
Grade	3.220	2	1.615	10.569	.000
Error	60.196	396	.152		
Total	64.371	399			

Table 5 shows the existence of statistically significant differences in the level of cognitive flexibility due to the effect of gender, where the F-value was 6.241, with a statistical significance of 0.014, and the differences came in favor of males.

Table 5 also reveals the existence of statistically significant differences in the level of cognitive flexibility due to the impact of the grade variable. The F value was 10.569, with a statistical significance of 0.000. To explain the statistically significant differences between the mean scores, the post-comparisons method was used orally as shown in table (6).

TABLE 6. Post-comparisons using the oral method of the effect of the grade on the level of cognitive flexibility

School grade	Mean score	Second	Third	Fourth
Second grade	3.49			
Third grade	3.59	.10		
Fourth grade	3.71	.22*	.12*	

*significant at (= 0.05)

Table (6) shows the presence of significant differences in the level of cognitive flexibility due to the school grade,

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between the second grade on the one hand and each of the third and fourth grades on the other hand, and the differences came in favor of the second grade. This result indicates the existence of varying levels of cognitive flexibility among students with learning disabilities, as the results showed that males have higher levels of cognitive flexibility compared to females.

This result can be attributed to the fact that males have a relatively greater margin of freedom than females in our Arab societies, and that this freedom of thinking and openness to sources of knowledge is the appropriate ground for the growth of the skill of cognitive flexibility, as males can open up to their external surroundings more than females. This ability is one of the means of experience and knowledge, while it is on a limited scale among females due to customs and traditions that lead many fathers to fear for their daughters from using these sources and means under the pretext that they are morally and ethically unsafe. Therefore, it prevents and limits the use of these sources of knowledge, which are an important source to feeding the skill of cognitive flexibility, its growth, and development.

Recommendations

Based on the results of the current study, the following was recommended:

- Paying more attention to setting up various programs to develop the skills of cognitive flexibility and self-regulation among students by educational officials.
- Counselors and teachers should pay attention to educational activities that develop cognitive flexibility skills for students with learning disabilities.

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