The Impacts of Cognitive Style on School-Based Saudi Education Students' Problem Solving Ability in English Language

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Abstract
The purpose of this study is to find out how cognitive style and problem complexity affected the problem-solving abilities of school-based Saudi education students taking a Saudi power and technology class. The method of this research is the analytical method, through which statistical methods used in analyzing the research data of questionnaire study achieve the objectives of the research. Study tool, the research will use the electronic questionnaire form as a tool for the field study by preparing the questionnaire and its axes and phrases by using the theoretical framework of the study, previous studies related to the subject of the study. The five-degree Likert scale was used in answering the questions of the study tool. The sample was in total, 77 students volunteered to take part in the research. Sixty-eight of them finished the entire study and successfully detected the defect in their allocated. The research used the SPSS23 to analyze the data of questionnaire. The result indicated that there is a statistically significant impact of Cognitive Style on School-Based Saudi Education Students' Problem-Solving Ability in English language and the impact is positive.
Keywords: Cognitive Style, Problem Complexity, Problem-Solving Ability, School-Based Education
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1. Introduction
Education, along with other pertinent indicators in the Sustainable Development Goals, is a critical component of long-term development. One of the hurdles to a unified education for sustainable development in a global community with over 6000 languages is a lack of communication across linguistic and cultural boundaries (Sarpong, K.A, 2013). Some language teaching scientists and educationalists believe that universities should incorporate foreign language instruction into their curricula to enable future professionals to deal with concerns of sustainable development in their work and to strengthen students' sustainability competences (Castro, F.E.V.G., 2015).

As a result, if they wish to achieve long-term individual and societal growth, they must prioritize language instruction. Language study is a difficult subject with a practical application. Learners must go through a lengthy and rigorous learning process, particularly when learning spoken English. Language learning is more of a social interaction activity that takes place in real social language circumstances than a cognitive activity that is divorced from context and language use. The linguist researchers believed that the practicality of language reflects the social feature of language in language learning. Language allows people to communicate, construct, and express their thoughts, feelings, behaviors, identities, and other information and states, and language communication and expression must take place in a certain social setting (Arends 2012), emphasized that context can help language learners acquire comprehensible input, influence their language learning, and have a significant impact on language learning effects.

One of the most essential outputs of learning that people employ in their daily and professional life is problem-solving. In fact, the capacity to solve issues has regularly been highlighted as a necessary talent for entry-level Saudi jobs (Robinson, 2009). Employers are looking for people that are innovative, creative, and can solve problems on the spot (Robinson & Garton, 2008). People must be able to "address significant, complicated problems in demanding circumstances" in order to be successful.

The primary purpose of education is to encourage students to learn. Although learning and problem-solving are not synonymous, they are inextricably linked. The ability of students to become self-regulated learners is crucial to effective problem-solving. According to research, children as young as four years old begin to develop the ability to recognize problem space and create mental models for addressing problems (Halford, 1993). Problem space, also known as mental model representation, is an important part of the problem-solving process, particularly when dealing with technical issues (Jonassen, 2000).

Technical issue solving, often known as troubleshooting, is a subset of general problem solving in which the problem is rooted in a real-world scenario and the troubleshooter is tasked with diagnosing a fault. Technology is viewed as a tool for enhancing learning experiences and fostering the development of 21st-century capabilities. Sanabria and ArámburoLizárraga (2017) Computer environments with cognitive aids or scaffolding to enhance students' learning and constructivist principles could be utilized as a medium to learn certain skills (Crockett, Jukes, & Churches, 2011). Working memory is key in the early stages of learning

problem-solving and goal-directed behavior (Serino et al., 2006); hence, obtaining the earliest building blocks of these skills is one of the most important and difficult tasks of early and middle childhood. Working memory, attention, and flexibility considerably rise between the ages of 7 and 9, and middle childhood is a crucial stage in which these skills develop further for healthy development. In addition, fostering flexible and problem-solving abilities is critical in today's school (Kalyuga, 2010) since they help to establish early literacy and numeracy proficiency.

Friedel, Irani, Rhoades, Fuhrman, and Gallo (2008) used Mendelian genetics to investigate the links between critical thinking and problem-solving. Between critical thinking skills and whole cognitive style or critical thinking disposition, no statistically significant associations were discovered. There was no statistically significant association between critical thinking disposition and problem-solving level, nor was cognitive style connected to problem-solving level. Lamm, Rhoades, Irani, Unruh Snyder, and Brendemuhl (2011) looked into the relationships between critical thinking disposition, problem-solving style, and learning styles among undergraduates who took part in a study abroad program. There was no correlation between the pupils' cognitive and learning styles. The association between cognitive style and critical thinking disposition was found to be low but positive.

As a framing, consider the problem-solving model. Lamm et al. (2012) investigated how students' cognitive styles influenced group problem solving during a study abroad program. A homogeneous adaptor group, a homogeneous innovator group, and a heterogeneous group of both adaptors and innovators participated in focus groups.

Purpose of the Study

The goal of this study was to see how cognitive style and problem complexity affected the problem-solving abilities of school-based Saudi education students taking a Saudi power and technology (APT) class.

Questions of the Study

The study was guided by the following research questions:
1. What are the personal and educational characteristics of students in Saudi who are enrolled in Saudi courses?
2. How do issue complexity, hypothesis formation, and students' cognitive styles affect the amount of time it takes to complete problems correctly?

Hypothesis of the Study

There is statistically significant impact of Cognitive Style on School-Based Saudi Education Students' Problem-Solving Ability in English language

Literature review

A cognitive style is a consistent form of behavior that determines how every individual gains and processes information (Hsieh et al., 2020) and affects the path of development and the mind of thought (Baron, 2020). In a simple illustration, a cognitive style means a unique way for an individual to gain and build their knowledge. Cognitive style is classified into two types; cognitive style of field-dependent (FD) and cognitive style of Field Independent (FI) (Atsuwe & Thaddeus, 2019). FD has the following characteristics: (a) a deep curiosity about other people; (b) being physically social with other people. (c) having a strong social sensibility from a psychological standpoint. The cognitive style of FI, on the other hand, has the following characteristics: (a) not particularly interesting to other people; (b) physically keeping a distance from other people; (c) psychologically preferring to be in a non-social context.

The Cognitive Style Questionnaire, which was created from the Attributional Style Questionnaire, is the most frequent tool for determining negative cognitive style (Peterson et al., 1982). The CSQ examines 24 hypothetical occurrences (12 positives and 12 negatives) pertaining to academic attainment, employment, and interpersonal relationships. Participants are instructed to fully visualize themselves in each setting before writing down the single significant reason for the incident. The participants are then asked to rate the extent to which the named cause was caused by (a) internal versus external factors (i.e., caused by themselves or other people/circumstances), (b) specific versus global factors (whether the cause of the event has implications for all areas of life or only that specific situation), and (c) stable versus unstable factors (whether the cause of the event has implication for all areas of life or only that specific situation), and (d) stable versus unstable factors (whether the (whether the cause will persist and always lead to the same outcome in the future). Participants are questioned about the meaning of the event (rather than its cause) in the CSQ's last section, and if the event (d) suggests that they will experience such negative or positive events in the future. (e) means that they are flawed/special in some way, and (f) matters to them.

The term problem solving has a slightly different meaning depending on the discipline. For instance, it is a mental process in psychology and a computerized process in computer science. There are two different types of

problems: ill-defined and well-defined; different approaches are used for each. Well-defined problems have specific end goals and clearly expected solutions, while ill-defined problems do not. Well-defined problems allow for more initial planning than ill-defined problems.[1] Solving problems sometimes involves dealing with pragmatics, the way that context contributes to meaning, and semantics, the interpretation of the problem. The ability to understand what the end goal of the problem is, and what rules could be applied represents the key to solving the problem. Sometimes the problem requires abstract thinking or coming up with a creative solution.

Problem-solving strategies are the steps that one would use to find the problems that are in the way to getting to one's own goal. Some refer to this as the "problem-solving cycle". notice the problem, define the problem, establish a plan to solve the problem, organize the knowledge of the problem cycle, determine the resources available to the user, track progress, and assess the solution for accuracy The term "cycle" refers to the fact that after one problem is solved, another frequently arises.

An Ooh! moment occurs when you have a sudden solution to a long-standing problem, a sudden recognition of a new idea, or a sudden understanding of a complex situation. Insight-based solutions are frequently more accurate than those discovered through step-by-step investigation. In order to solve more problems faster, insight is required for selecting productive steps at various stages of the problem-solving cycle. This problem-solving method is only applicable to problems classified as insight problems.

Blanchard-Fields (2007) considers issue solving from two perspectives. The first step is to look at problems that have just one answer (such as mathematics problems or fact-based inquiries) and are based on psychometric intelligence. The other is socio emotional in nature, with answers that alter on a regular basis.

The following techniques are usually called problem-solving strategies (Wang, Y., & Chiew, V. 2010):

- Abstraction is the process of solving a problem in a system model before applying it to the real system. Using a solution that solves a similar problem is known as analogy.
- Brainstorming: proposing a huge number of solutions or ideas and merging and developing them until an optimal one is identified (particularly among groups of people).
- Breaking down a large, complex problem into smaller, solvable problems is known as divide and conquer.
- Hypothesis testing is making an assumption about a possible solution to a problem and then attempting to prove (or, in certain cases, refute) that assumption.
- Lateral thinking is the process of approaching problems in a novel and indirect way.
- Means-ends analysis: choosing an action to move closer to the objective at each step.
- The method of focus objects is to combine seemingly unrelated properties of various objects to create something new.
- Morphological analysis is the process of evaluating a system's output and interactions.
- Try to demonstrate that the problem is unsolvable.
- The starting point for solving the proof will be where it fails.
- Reduction is the process of reducing an issue into another problem for which there are answers.
- Applying existing ideas or adapting previous solutions to similar challenges is referred to as research.
- Root cause analysis is the process of determining what is causing an issue.
- Trial-and-error: trying out different solutions until you find the one that works.

Research Methodology
After the curriculum had been taught, the researcher performed a second site visit to all of the participating schools. Students were randomly assigned to treatment groups based on their cognitive styles at the time. The current study used the analytical method, through which statistical methods used in analyzing the research data of questionnaire study achieve the objectives of the research. The research used the electronic questionnaire form as a tool for the field study by preparing the questionnaire and its axes and phrases by using the theoretical framework of the study, previous studies related to the subject of the study. The five-degree Likert scale was used in answering the questions of the study tool.

Data Analysis
The research used the SPSS23 to analyse the data of questionnaire using Alpha coefficient, Frequencies, percentages, mean, standard deviation, relative weight, Pearson correlation coefficient and Regression coefficient

Validate the study tool
The first dimension: Cognitive Style

Table (1) Correlation coefficients between each phrase and first dimension

Phrase	Person Correlation coefficient	P-value
I do my best to convince others of my ideas	**0.866	0.000
Take care to explain my thoughts to others	**0.841	0.000
I take care of having flexibility in my dealings with different situations	**0.900	0.000
I try to solve all the problems that come to me rationally	**0.911	0.000
I am interested in getting all the information about the topics that interest me	**0.921	0.000
Take care of asking other people about things I don't know	**0.932	0.000
I seek to know all the unusual things that I meet	**0.786	0.000

**significant ($\alpha = 0.01$)

The second dimension: School-Based Saudi Education Students' Problem-Solving Ability in English language.

Table (2) Correlation coefficients between each phrase and second dimension

Phrase	Person Correlation coefficient	P-value
Students seek to increase their vocabulary in English	**0.824	0.000
Students are interested in implementing teachers' instructions to solve language problems	**0.981	0.000
Students are interested in the connection between learning English and the reality of their lives	**0.916	0.000
Students apply what they have learned from the English language in their lives	**0.918	0.000
Students are interested in taking English language training courses	**0.888	0.000
Students seek practical solutions to the problems they find when learning English	**0.892	0.000
Students are interested in applying all the teachers' ideas when learning English	**0.932	0.000

**significant ($\alpha = 0.01$)

From the previous table, we notice that all correlation coefficients for all questionnaire items were statistically significant at the level of significance $\alpha = (0.01)$, and this means that the tool has structural validity and is valid for the purposes of the study.

The stability of the study tool

Table (3) Stability coefficient of the questionnaire

Dimension	Alpha Cornbach	number of elements
Cognitive Style	0.951	7
School-Based Saudi Education Students' Problem-Solving Ability in English language	0.964	7
Total questionnaire	0.977	14

Source: Study sample data

It turns out that the value of the stability coefficient Alpha is greater than 0.6 for all dimension of the questionnaire, which confirms the validity and correlation of the statements of the questionnaire axes and the stability of the tool used in the study.

Analysis of the questionnaire:
First: Personal data

Table (4) Distribution of the study sample according to Personal data

	Categories	N	%
Gender	Male	39	57.4
	Female	29	42.6
Age	Less than 18 years	11	16.2
	From 18 to 20 years	19	27.9
	From 21 to 23 years	15	22.1
	23 years or more	23	33.8

Second: the dimension of study
The first dimension: Cognitive Style

Table (5) Phrases of the first dimension

N.	Phrase	Mean	S.D	Relative weight	Degree	Arrangement
1	I do my best to convince others of my ideas	4.132	0.827	0.826	High	1
2	Take care to explain my thoughts to others	4.088	0.910	0.818	High	2
3	I take care of having flexibility in my dealings with different situations	3.779	0.861	0.756	High	5
4	I try to solve all the problems that come to me rationally	3.824	0.897	0.765	High	4
5	I am interested in getting all the information about the topics that interest me	3.868	0.976	0.774	High	3
6	Take care of asking other people about things I don't know	3.691	0.885	0.738	High	6
7	I seek to know all the unusual things that I meet	3.647	0.787	0.729	Medium	7

The expressions of the Cognitive style of student's dimension were **6** expressions in the high plane and **1** expression in the medium plane and it shows the high level of the Cognitive style of students in the Kingdom of Saudi Arabia where mean dimension **3.861** and S.D **0.878**.

The second dimension: School-Based Saudi Education Students' Problem-Solving Ability in English language

Table (6) Phrases of the second dimension

N.	Phrase	Mean	S.D	Relative weight	Degree	Arrangement
1	Students seek to increase their vocabulary in English	4.000	0.753	0.800	High	1
2	Students are interested in implementing teachers' instructions to solve language problems	3.824	0.791	0.765	High	3
3	Students are interested in the connection between learning English and the reality of their lives	3.824	0.791	0.765	High	3
4	Students apply what they have learned from the English language in their lives	3.824	0.845	0.765	High	3
5	Students are interested in taking English language training courses	3.735	0.874	0.747	High	4
6	Students seek practical solutions to the problems they find when learning English	3.912	0.859	0.782	High	2
7	Students are interested in applying all the teachers' ideas when learning English	3.912	0.859	0.782	High	2

The expressions of the school-Based Saudi Education Students' Problem-Solving Ability in English language dimension were all expressions in the high plane and it shows the high level of the school-Based Saudi Education Students' Problem-Solving Ability in English language in the Kingdom of Saudi Arabia where mean dimension **3.861** and S.D **0.**825.

Test Research Hypothesis
There is statistically significant impact of Cognitive Style on School-Based Saudi Education Students' Problem-Solving Ability in English language.

Table (7) impact of Cognitive Style on School-Based Saudi Education Students' Problem-Solving Ability in English language

B	T	F	P-VALUE
0.904	**21.292	**453.335	0.000

**significant ($\alpha = 0.01$)

The simple regression equation was significant at the level of 0.01, and the there is a statistically significant impact of Cognitive Style on School-Based Saudi Education Students' Problem-Solving Ability in English language and the impact is positive, it is correct the first hypothesis and the more it increased Cognitive Style 1% is School-Based Saudi Education Students' Problem-Solving Ability has increased 0.799%.

Discussion and findings
In overall, the study's findings show that Cognitive Style has a considerable and good impact on School-Based Saudi Education Students' Problem-Solving Ability in English. The cognitive style of kids has a substantial impact on their problem-solving ability (Meins, E. 2012). Students that learn with Cognitive Style have the most opportunities to develop and use information to solve problems in a collaborative setting (Mustofa, R.F &

Hidayah, 2020). The outcomes of this study confirm the premise that Cognitive Style has a statistically significant impact on School-Based Saudi Education Students' Problem-Solving Ability in English. The findings revealed that questionnaire participants outperformed those who did not embrace cognitive style in learning in terms of problem-solving abilities. This finding supports the use of cognitive style as a powerful tool for improving students' problem-solving abilities (Kadir et al. 2016).

Individual images in learning are reflected in the cognitive style. Cognitive style is a consistent pattern of behaviour that governs how a person collects and processes information (Sellah et al., 2017). Cognitive style is critical since it impacts how information is processed while solving issues or making judgments when interpreting stimuli and reactions. According to the findings of this study, pupils with a field-independent cognitive style had stronger problem-solving ability. This finding is consistent with the findings of (Karaçam& Digilli, 2015) research, which found substantial disparities in students' problem-solving ability between those with Field Independent and Field Dependent cognitive styles.

Table (5) Phrases of the first dimension showed that the cognitive style of students in the Kingdom of Saudi Arabia was highly plane. Table (6- 7) indicate that the expressions of the school-Based Saudi Education Students' Problem-Solving Ability in the English language dimension were all expressions in the high plane and it shows the high level of the school-Based Saudi Education Students' Problem-Solving Ability in the English language in the Kingdom of Saudi Arabia. Then there is a statistically significant impact of Cognitive Style on School-Based Saudi Education Students' Problem-Solving Ability in English language and the impact is positive, it is correct the hypothesis.

Conclusion

Based on the findings of the research analysis and discussion, it is possible to conclude that pupils with Field Independent and Field Dependent cognitive styles have significantly different problem-solving capacities.

The high level of the Cognitive style of students in the Kingdom of Saudi Arabia where mean dimension 3.861 and S.D 0.878. The high level of the school-Based Saudi Education Students' Problem-Solving Ability in English language in the Kingdom of Saudi Arabia where mean dimension 3.861 and S.D 0.825. There is a statistically significant positive impact of Cognitive Style on School-Based Saudi Education Students' Problem-Solving Ability in English language and the more it increased Cognitive Style 1% is School-Based Saudi Education Students' Problem-Solving Ability has increased 0.799%.

Recommendations
- ✓ Working on providing training programs and courses that contribute to increasing students' level of English language
- ✓ Providing all possibilities that work to increase the level of performance of the educational process and increase the efficiency of teaching English
- ✓ Attention to raising the level of teachers, solving all their problems and providing an appropriate work environment.

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