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Correlative Study of Cognitive Style on Problem-Solving Ability among Secondary School Students

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Abstract:

In the course of human life, encountering and resolving problems is inevitable. Each time an individual successfully tackles a problem, they experience a sense of accomplishment, which shapes their unique problem-solving approach. This study aims to explore the relationship between Secondary School Students' (SSS) cognitive styles and their problem-solving skills. Employing a correlational methodology, the research delves into how individual differences in cognitive style preferences may impact students' problem-solving abilities. Jha (1983) designed the Cognitive Style Inventory, a tool used to assess various cognitive styles, including analytical, intuitive, and practical cognitive styles. Additionally, the Problem-Solving Ability (PSA) Test, developed by Dubey (2008), is employed to measure students' problem-solving skills. The study also considers students' academic achievement records to investigate potential links between cognitive style, problem-solving skills, and academic success. This study's outcomes shed light on the interplay between problem-solving approaches and cognitive style proficiency within the context of secondary education. The findings hold the potential to aid educators and policymakers in gaining a deeper understanding of how cognitive style preferences influence students' problem-solving capabilities. Armed with this knowledge, they can devise tailored lesson plans and curricula that cater to diverse learning preferences. The complete square sum with 199 degrees of freedom totals 6110.195, leading to the computation of the F-statistic (2.348) in the ANOVA by dividing the mean square of the regression by the mean square of the residual. Armed with an understanding of cognitive style patterns that enhance problem-solving skills, teachers can effectively support students in honing their problem-solving abilities, ultimately contributing to improved academic achievement. This study bears significant implications for educational practices, emphasizing the importance of factoring in cognitive style when fostering students' problem-solving capabilities and academic success in secondary schools.

Keywords: *Cognitive Style, Problem-Solving Ability, Correlative Study, Secondary School Students, Rural and Urban, Integrated and Split-Style.*

1. Introduction:

Critical thinking expertise is among the significant abilities which are supposed to be acquired during instructive projects [1]. In the improvement of kids' abilities and moulding their ways of behaving, parental mentalities are accepted to be successful [2]. The auxiliary school understudies in the review bunch needed an undeniable level of reasoning abilities, consequently, they experienced issues in taking care of the issues, which required a significant level of reasoning [3]. Focusing on multiple things is necessary to master high-level thinking [4]. It was seen that the understudies couldn't continue by correspondingly considering more than one occasion or probability without a moment's delay. As indicated by discoveries among the significant parts of the critical thinking process is to separate the known from the obscure [5]. The cases will be successful during critical life stages, which typically occur in these two settings. Among the significant elements of critical thinking abilities (CTA) that people ought to have is to pick the suitable technique in the arrangement of the issues, which is significant as far as making progress in taking care of issues [6]. A strong correlation was observed between cognitive style and critical thinking. Consistent practice of problem-solving among students leads to improved social awareness and adaptability to various situations [7]. Additionally, they develop effective time management skills and patience. Problem-solving skills in children foster curiosity, creativity, and perseverance.

Critical thinking can be connected with numerous mental capacities likewise, going from rationale, investigation, arithmetic, and science [8]. Consequently, critical thinking can essentially be characterized as offering an answer, or a plan to a hazardous circumstance [9]. To allude to the comprehension that controls understudies in learning overall and a particular way to deal with managing issues is a mental style. Besides, the term in mental brain research is connected with the dynamic type of mental (thinking, grasping, recollecting) as opposed to a comprehension of mental style [10]. The study found that mental styles distinguish people answer various circumstances. Expertise levels and examples are because of the hereditary arrangement of the individual, yet mental style impacts ability improvement [11]. Mental style is among the elements to impact understudies' language talking [12]. Mental requests support the talking skill of individuals who are not subject to the field to talk all the more effectively or precisely paying little heed to second language capacity Explicitly, the investigation discovered that people with additional adaptable and imaginative mental styles were bound to find success in critical thinking undertakings than those with additional fixed and unbending mental styles [13]. Besides, the investigation likewise discovered that people with more significant levels of critical rational aptitude were bound to have a higher grade point normal than those with lower levels of critical ability to think [14]. According to these findings, cognitive style has a major impact on SSSs' ability to solve problems and achieve academic success [15]. The objective of this study is to compare the critical thinking scores between male and female high school students, examining the differences between those who prefer integrated thinking and those who prefer separate thinking styles. The remainder of the article is as follows. Section 2 provides an overview of relevant studies on cognitive styles and problem-solving abilities among students. In section 3 the research problem is clearly defined, and the reasons for conducting the study are explained. The methodology to be used in the study, including data collection and analysis techniques, is outlined in this section 4. The findings and outcomes of the study, focusing on the relationship between cognitive styles, problem-solving skills, and academic performance depicted in section 5 and section 6 ends with the conclusion.

2. Literature Survey:

Castro *et al* [16] analysed the problem-solving skills of middle school understudies in science learning. Given the exploration that has been finished, it tends to be reasoned that practically the articles dissect the level of understudies' all's critical abilities to think, and the vast majority of the articles examined utilize a trial research configuration in further developing middle school understudies' innate science CTAs. Azizah *et al* [17] intended this exploration to examine the viability of mixed Learning with the Issue Based Learning-Gathering Examination (PBL-GI) model on understudies' decisive reasoning and critical thinking skill in science mastering. The after effect of this study proposes that mixed learning with the PBL-GI model was successful in fostering the understudies' decisive reasoning because the outcome showed the importance worth of 0,012 < 0,05 and understudies' critical thinking skill showed the importance worth of 0.036 < 0,05. Yılmaz *et al* [18] examined the experimental proof of messing around concerning kids' SPS abilities have would in general zero in on the capability of a solitary game. The consequences of this study's exploratory plans were the most used, and more examinations utilizing dynamic benchmark groups are expected to look at the viability of the game playing. Herman *et al* [19] determined the association between mathematical resilience and students' problem-solving abilities. The outcomes showed that these two abilities impact one another and can work on understudies' capacity to tackle numerical issues. Jafri *et al* [20] suggested for this study to configure learning gadgets in light of revelation figuring out to assist with classing X SMA understudies further improve their CTAs. The outcomes, it is gotten arithmetic RPP and LKPD given the disclosure learning model for class X SMA semester 1 are substantial, down to earth and successful.

Windiyani *et al* [21] compared and contrast the critical abilities to think of understudies presented to issue-based education and those presented to Disclosure Getting the hang of, zeroing in on the connection between the two concerning understudies' self-adequacy. The outcomes were tried utilizing two-way ANOVA, showing contrasts in understudies' critical abilities to think with a high, and medium. The consequences of this study can give a reference as a learning elective that could further develop understudies' critical abilities to think. Putri *et al* [22] determined the join between CTA and ecological proficiency at Senior Secondary School Turen. The consequences of this review, it is important to foster learning apparatuses and coordinate natural materials in figuring out to prepare understudies' CTA Chi *et al* [23] assessed the understudies' capacity to handle the setting data implanted in science issues. The discoveries of this study could illuminate science instructors to further develop their educating rehearses. Chen *et al* [24] inspected the chain interceding jobs of advanced education and the critical ability to think about the connections between ICT usage and learning accomplishment. Notwithstanding, discoveries the critical ability to think can't intervene in the connection between them. Göktepe Yıldız *et al* [25] understudies' view of critical thinking ab CTA, which is among their instructive attributes, were demonstrated with the ANFIS approach. In this way, the ANFIS results because of imaginative critical thinking highlight precisely anticipate understudies' PoPS scores.

3. Research Problem Definition And Motivation:

The correlative study attempts to look into SSS problem-solving skills (PSS) and cognitive styles transmit to one alternative. A person's preferred way of interpreting, categorising, and processing information is referred to as cognitive style, and it has a big impact on learning and approaching problems. On the other side, the ability to solve problems effectively refers to the capability to recognise, evaluate, and deal with difficult issues. This study explores the connection between different cognitive styles, such as analytical, intuitive, or holistic, with higher or worse PSA in secondary school pupils. Insights into cognitive style affect students' problem-solving strategies and all-around academic achievement can be learned by researching this correlation. A further benefit of comprehending the link between thinking patterns and PSS is that it can help teachers choose the best interventions and teaching strategies for various cognitive types. This information can be used to help create personalised learning strategies that take into account the various requirements and abilities of students, thereby boosting their capacity for problem-solving and general cognitive growth. The outcomes of this study can also add to the body of knowledge in educational psychology and potentially guide future interventions and educational policies aimed at fostering effective PSS in SSS. This study's findings can also add to the body of exploration on cognitive styles and problem-solving that already exists.

Understanding the elements that lead to effective problem-solving abilities in education is crucial, which is why a correlative study on the connection between cognitive style and PSA among SSS was conducted. Students must master problem-solving techniques to overcome scholastic obstacles and be successful in their future ambitions. The cognitive styles of pupils vary, though, and this may affect approaches and solve problems. Educators and researchers can learn a lot about the separate changes between students and these differences affect their problem-solving tactics by examining cognitive style affects PSA. Understanding these connections can assist educators in classifying children who may have difficulty solving problems and in developing focused interventions to meet those students' needs. Additionally, knowing which cognitive types are linked to better PSS can help teachers better customise their instructional strategies to recover students' problem-solving abilities. The ramifications of this research go far beyond the classroom, too. In many professions and daily life, problem-solving is a crucial talent. Researchers can shed light on potential long-term consequences on people's problem-solving abilities and their success in the future by comprehending the impact of cognitive style on PSA during the secondary school years. In the end, this research may aid in the creation of evidence-based tactics and programmes to foster effective problem-solving abilities in SSS, providing them with the skills necessary to overcome obstacles in the classroom and real life.

Objectives of the Study:

- Researching the possessions of cognitive styles on SSS capacity for problem-solving.
- To investigate the differences in problem-solving test results between integration and split-style male SSS.
- To examine the disparity in problem-solving performance between female SSS using integrated and split learning styles.
- To research whether a student's subject stream affects their capacity for problem-solving in secondary school.

Hypotheses:

- Students in integrated and split-style secondary schools scored similarly on tests of problem-solving skills.
- There is no visible alteration in the problem-solving abilities of male SSSs using the integrated and split styles.
- There is no obvious modification in the problem-solving scores of female SSSs using the integrated and split styles.
- There is no distinct metamorphosis in the problem-solving scores of SSSs from rural and urban areas.

4. Proposed Research Methodology:

The proposed methodology intends to look into the connection between SSSs' PSS and cognitive style. The study will use a correlative research methodology using the Jha (1983) Cognitive Style Inventory to examine several cognitive style characteristics and the Dubey (2008) PSA Test to test problem-solving abilities. To investigate the potential effects of thinking patterns and problem-solving aptitude on students' academic results, academic performance records will also be gathered. By utilising these research methods, the study aims to shed light on preferences for cognitive styles that may affect students' ability to solve problems in the context of secondary education. This information will be helpful for practitioners and educators in improving the academic performance and learning experiences of their students.

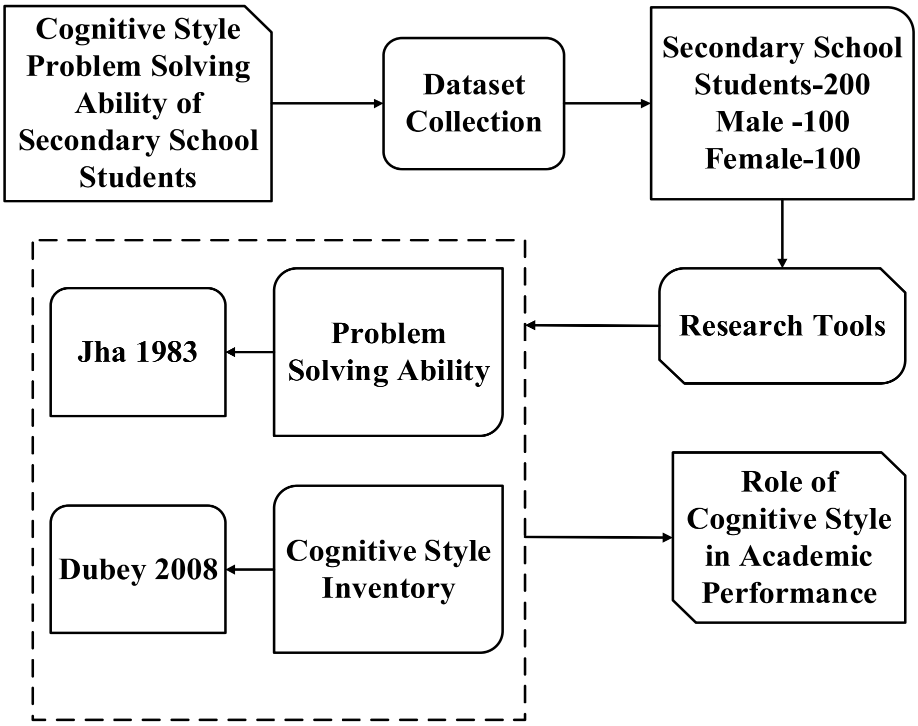

Figure 1: Block Diagram of Proposed Work

The consequence of cognitive styles on students in secondary school's capacity for problem-solving is depicted in figure 1. Using the suggested strategy, data from secondary school pupils was obtained. There are 200 pupils enrolled in secondary schools overall. In the study that was given, there were 100 males and 100 females. The following standardised questionnaire or inventory may be utilised as among the research methods for the correlative investigation of cognitive style on problem-solving abilities among SSS. Its purpose is to evaluate the participants' cognitive styles. A psychological diagnostic tool called the Cognitive Style Inventory, created by Jha in 1983, is used to quantify and comprehend separate alterations in cognitive styles. Dubey created the Problem Solving Ability Test in 2008 to evaluate a person's problem-solving abilities and skills. The outcomes of this correlative study can help us realize cognitive style affects cognitive functioning and academic success.

4.1 Sample Dataset Collection

The sample is made up of 200 SS students 200 males and 200 females from various institutions in the Trichy District. 100 men and 100 women participated in the study that was offered. Trichy District is a great choice for this study's location since it provides a sizable and representative sample for the research thanks to its diverse student body and accessibility to many schools. It is ensured that any potential gender-based disparities in cognitive style and PSA are taken into consideration by including both male and female participants in the study. By including students from several schools within the Trichy District, the study can take into account any school-specific variables that may have an impact on children's problem-solving abilities and cognitive style. The advantage of choosing Trichy District as the study extent is that a variety of socioeconomic conditions, cultural influences, and educational environments may be observed there. This variety improves the findings' generalizability and enables a deeper comprehension of the connection between problem-solving and cognitive style aptitude among SSS in a practical educational setting. To increase the statistical power and dependability of the findings, the study used a sizable sample size of 200 students. Because of the greater sample size, it is possible to perform more thorough analyses and find substantial connections between problem-solving and cognitive style abilities. Researchers can study the association between the mental approach to solving problems abilities in a real-world educational situation thanks to the inclusion of 200 male and female SSS from various schools in Trichy District. This ensures a representative and diverse sample.

4.2 Research Tools

The following standardised questionnaire or inventory may be utilised as among the research methods for the correlative investigation of cognitive style on problem-solving abilities among SSS. Its purpose is to evaluate the participants' cognitive styles. To assess various aspects of cognitive styles, such as field reliance vs. field independence, analytical vs. intuitive thinking, verbal vs. visual processing, etc., the inventory may contain several scales or subscales. Participants would answer the questions, and their scores on each scale would reveal their preferred cognitive style. An exam that measures the secondary school pupils' aptitude and PSA. The exam could include some problem-solving exercises or circumstances that span a variety of topics, including logic, math, and real-world events. Participants would have a set amount of time to complete the tasks, and their performance would be evaluated depending on well they solved the challenges.

4.2.1 Cognitive Style Inventory Jha (1983)

The psychological diagnostic tool used to quantify and comprehend distinct variances in cognitive styles is the Cognitive Style Inventory, established by Jha in 1983. Cognitive styles describe the distinctive ways that people process, organise, and perceive information. The questionnaire is probably made up of some statements or inquiries that participants must respond to reveal their preferences, proclivities, or methods for approaching cognitive tasks. The inventory may evaluate many cognitive style dimensions, including field dependency vs. field independence, visual vs. verbal processing, and analytical vs. intuitive thinking. It enables researchers to group individuals according to their responses into various cognitive style groups.

4.2.2 Problem-Solving Ability Dubey (2008)

An individual's problem-solving abilities and skills can be evaluated using the Dubey Problem Solving Ability exam, which was created in 2008. The process of recognising, evaluating, and coming up with solutions to problems or difficulties is known as problem-solving, and it is an essential component of cognitive functioning. Participants will probably have to answer a series of issues or scenarios on the test within a specific amount of time. The exercises test the participant's capacity for critical thought, inventiveness, and methodical problem-solving across a range of topics, including mathematical, logical, and real-world scenarios. While the Problem-Solving Ability assessment measures students' problem-solving abilities, the Cognitive Style Record assists in classifying pupils into various cognitive style groups. The study intends to obtain insight into discrete variances in cognitive processing that may affect PSS among SSS by studying the link between cognitive styles and problem-solving aptitude. The consequences of this correlative study can help us comprehend cognitive style affects cognitive functioning and academic success.

5. Experimentation And Results Discussion:

Data was collected appropriately and scored following the manuals' instructions to test the hypotheses. All subjects were divided into five categories of cognitive styles, including systematic, intuitive, undifferentiated, integrated, and split, based on the outcomes of the cognitive style inventory. Fewer students were chosen for further study because they exhibit systematic, intuitive, and undifferentiated learning styles. The ratings from subjects of the integrated and split types of cognitive style were subjected to statistical analysis. Following are the grades of the 't-test, which was used to determine the effect of cognitive style on problem-solving abilities.

Table 1: Mean, Standard Deviation and 'T' Value of PSA of Split and Integrated Style

Sl. No.	Groups	N	M	SD	t-value
1	Integrated Style	70	12.8	4.00	1.53
2	Split style	109	11.19	3.62	
df = 177, P >.05, Not significant					

Table 1 demonstrates that at the.05 level of significance, the calculated 't' value for PSA scores of integrated and split-style SSS is less than the table value. It shows that neither the PSS of integrated nor split style SSS differ significantly. The difference that was displayed might not be accurate.

Table 2: Mean, SD and 't' value of PSA of Integrated and Split Style of Male SSS

Sl. No.	Groups	N	M	SD	t-value
1	Integrated Style	34	11.76	4.29	0.133
2	Split style	54	11.61	3.89	
df = 86, P >.05, Not significant					

Table 2 demonstrates that, at the 0.05 level of significance, there is no significant difference between the problem-solving skill scores of integrated and split-style male students, indicating that any mean difference may be the consequence of measurement error.

Table 3: Mean, SD and 't'-value of PSA of Integrated and Split Style of Female SSS

Sl. No.	Groups	N	M	SD	t-value
1	Integrated Style	36	12.38	3.67	2.14
2	Split style	55	10.78	3.28	
df = 89, P >.05, Significant					

Table 3 shows that the obtained 't' value was 2.14, greater than the table value at a.05 level of significance, indicating that the value is significant. This indicates that female SSS with integrated styles has a different capacity for problem-solving than those with split styles. Given that integrated style, female SSS mean value is higher than split-style students' mean value, it can be said that integrated-style female SSS are stronger problem solvers. Therefore, it can be determined that cognitive style significantly influences female SSSs' capacity for problem-solving. Additionally, a woman with an integrated style has good problem-solving and problem-identification skills. When tackling any challenge, imagination and critical analysis are crucial. Women with an integrated approach tend to be very pragmatic and logical. The ability of female SSS learning in integrated and divided styles to solve problems differs significantly as a result.

Table 4: Mean, SD and 't' value of PSA of Urban and Rural Secondary School Students

Sl. No.	Groups	N	M	SD	t-value
1	Rural	57	14.4	4.03	8.07
2	Urban	122	10.2	2.83	
df = 177, P >.01, Significant					

Table 4 demonstrates that the estimated 't' value at the.01 level of significance (df = 177) is higher than the table value. The mean score reveals the disparity between undergraduates from rural and urban areas in terms of problem-solving skills. SSS from rural areas are stronger problem solvers than those from urban areas. The students from rural secondary schools are proficient in mathematical operations, formulas, calculations, logical reasoning, etc.

Table 5: Descriptive Statistics Analysis

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
CS	200	21	9	30	18.98	6.053	-1.257	.342
PSA	200	22	10	32	19.49	5.776	-1.141	.342
MIS	200	21	9	30	18.25	5.524	-.977	.342
FIS	200	44	10	54	19.04	5.951	4.480	.342
MSS	200	25	7	32	19.03	5.914	-1.083	.342
FSS	200	21	9	30	18.76	5.914	-1.147	.342
RPSA	200	21	10	31	19.60	5.541	-1.176	.342
UPSA	200	25	7	32	19.11	6.107	-1.234	.342
Valid N (list wise)	200							

Table 5 of the presented dataset, which has 200 observations, provides descriptive statistics for several variables. CS variable has a 21-value range, with values between 9 and 30. 9 is the minimum value while 30 is the maximum value. With a standard deviation (SD) of 6.053, the mean value is roughly 18.98. Given the kurtosis of -1.257, the distribution appears to be rather flat. The PSA variable has a 22-value range, ranging from 10 to 32. 10 is the minimum and 32 is the maximum value. The SD is 5.776, while the mean value is roughly 19.49. Given that the kurtosis is 1.141, the distribution appears to be quite flat. There are 21 possible values for the MIS variable, ranging from 9 to 30. 9 is the minimum value while 30 is the maximum value. The SD is 5.524 and the mean value is around 18.25. A slightly peaked distribution is indicated by the kurtosis, which is -0.977. FIS variable has a 44-value range, with values between 10 and 54. 10 is the minimum value while 54 is the maximum value. Approximately 19.04 is the mean value, while the SD is 5.951. Descriptive statistics help with additional data analysis and decision-making by offering useful insights into the distribution and properties of each variable.

Table 6: Pearson Correlation Coefficients Analysis

		CS	PSA	MIS	FIS	MSS	FSS	RPSA	UPSA
CS	Pearson Correlation	1	.092	-.168*	-.032	-.096	.044	-.010	.043
	Sig. (2-tailed)		.196	.017	.654	.174	.533	.883	.545
	N	200	200	200	200	200	200	200	200
PSA	Pearson Correlation	.092	1	.081	.005	-.048	-.051	-.089	-.098
	Sig. (2-tailed)	.196		.257	.942	.496	.477	.208	.168
	N	200	200	200	200	200	200	200	200
MIS	Pearson Correlation	-.168*	.081	1	.019	-.100	-.059	-.001	-.027
	Sig. (2-tailed)	.017	.257		.787	.157	.409	.985	.707
	N	200	200	200	200	200	200	200	200
FIS	Pearson Correlation	-.032	.005	.019	1	.126	-.010	-.018	.000
	Sig. (2-tailed)	.654	.942	.787		.076	.892	.797	1.000
	N	200	200	200	200	200	200	200	200
MSS	Pearson Correlation	-.096	-.048	-.100	.126	1	.166*	.047	.037
	Sig. (2-tailed)	.174	.496	.157	.076		.019	.512	.602
	N	200	200	200	200	200	200	200	200
FSS	Pearson Correlation	.044	-.051	-.059	-.010	.166*	1	.136	.057
	Sig. (2-tailed)	.533	.477	.409	.892	.019		.055	.425
	N	200	200	200	200	200	200	200	200
RPSA	Pearson Correlation	-.010	-.089	-.001	-.018	.047	.136	1	.243**
	Sig. (2-tailed)	.883	.208	.985	.797	.512	.055		.001

	N	200	200	200	200	200	200	200	200
UPSA	Pearson Correlation	.043	-.098	-.027	.000	.037	.057	.243**	1
	Sig. (2-tailed)	.545	.168	.707	1.000	.602	.425	.001	
	N	200	200	200	200	200	200	200	200
*. Correlation is significant at the 0.05 level (2-tailed).									
**. Correlation is significant at the 0.01 level (2-tailed).									

The Pearson correlation coefficients between the various variables in the dataset are shown in table 6. For each pair of variables, the table displays both the correlation coefficient (CC) and the matching p-value (significance level). A CC of around 0.092 indicates a somewhat favourable association between CS (Variable 1) and PSA (Variable 2). At the 0.05 level, this association is not statistically significant, nevertheless. CS (Variable 1) and MIS (Variable 3) are negatively correlated, with a CC of roughly -0.168. At the 0.05 level, this negative connection is statistically significant. With a CC of roughly 0.126, FIS (Variable 4) and MSS (Variable 5) show a marginally positive association. At the 0.05 level, this correlation is not statistically significant, nevertheless. With a CC of roughly 0.166, MSS (Variable 5) and FSS (Variable 6) exhibit a light to moderately positive association. At the 0.05 level, this association is statistically significant. With a CC of roughly 0.243, RPSA (Variable 7) and UPSA (Variable 8) have a somewhat favourable association.

Table 7: ANOVA for Regression and Residual Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	481.797	7	68.828	2.348	.025[b]
	Residual	5628.398	192	29.315		
	Total	6110.195	199			
a. Dependent Variable: RPSA						
b. Predictors: (Constant), UPSA, FIS, MIS, FSS, PSA, CS, MSS						

The analysis of variance (ANOVA) table 7 above displays the findings for the regression model with the needy variable RPSA (Recommended Polarity Score A) and seven predictors: UPSA, FIS, MIS, FSS, PSA, CS, and MSS. Regression shows the mean square, degrees of freedom (df), and the sum of squares for the model. The overall disparity in the reliant on variable explained by the predictors is shown as the sum of squares. The regression model has a mean square of 68.828 and a sum of squares of 481.797 with 7 degrees of freedom. Residual errors, or the unexplained difference in the reliant variable after taking into account the predictors, are represented by the degrees of freedom, sum of squares, and mean square for the residual errors. The mean square is 29.315, and the remaining sum of squares is 5628.398 with 192 degrees of autonomy. The sum of squares and degrees of freedom for the entire model, including both the explained and unexplained variation, is shown in the Total row. The complete square sum has 199 degrees of freedom and is 6110.195.

Table 8: Regression Coefficients Analysis

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.650	3.331		4.398	.000
	CS	-.015	.065	-.016	-.229	.819
	PSA	-.057	.067	-.060	-.848	.397
	MIS	.016	.071	.016	.225	.822
	FIS	-.019	.065	-.020	-.286	.775
	MSS	.017	.067	.018	.254	.800
	FSS	.111	.066	.118	1.674	.096
	UPSA	.209	.063	.231	3.307	.001
a. Dependent Variable: RPSA						

The regression model's predictor coefficients for the predictor RPSA (Recommended Polarity Score A), the dependent variable, are shown in table 8. The estimated impacts of each predictor on the reliant variable are shown by the coefficients. The regression model's intercept term is represented by a Constant. The constant's coefficient is 14.650, with an SD of 3.331. The intercept is meaningfully changed from zero, as shown by the t-value of 4.398 ($p < 0.001$). The t-values for CS, PSA, MIS, FIS, MSS, and FSS are all not statistically significant ($p > 0.05$), and their coefficients are all very close to zero. This implies that the RPSA is not significantly impacted by these predictors. The predictor UPSA, on the other hand, has a coefficient of 0.210 and a standard error of 0.063. At $p = 0.001$, the t-value of 3.307 is statistically significant. This suggests that the UPSA significantly benefits the RPSA. In particular, it is predicted that everything else being equal, the Recommended Polarity Score A will rise by 0.209 units for every unit increase in UPSA.

Table 9: Residuals Statistics Analysis

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	16.63	23.15	19.60	1.556	200
Residual	-10.831	11.687	.000	5.318	200
Std. Predicted Value	-1.904	2.288	.000	1.000	200
Std. Residual	-2.000	2.158	.000	.982	200
a. Dependent Variable: RPSA					

The statistics for the residuals in the regression model using the reliant variable RPSA (Recommended Polarity Score A) may be found in table 9 above. The discrepancies between the dependent variable's actual observed values and those predicted by the regression model are known as residuals. They offer insightful information about the model's goodness of fit and forecast precision. The minimum and maximum residual values are -10.831 and 11.687, respectively. The average residual is quite near zero (about 0.000), which shows that the model's predictions are generally fairly accurate. The residuals' SD is 5.318, indicating that the real RPSA values may differ by roughly 5.318 units from the anticipated values. The standardised residuals are displayed via the "Std. Residual" field. Standardised residuals are residuals that have had their SD scaled, and they are a useful tool for identifying outliers and significant data points. The minimum and maximum standardised residuals are -2.000 and 2.158, respectively. The average model predictions are unbiased, as shown by the mean standardised residual being near zero. The usual variation of residuals from their mean value in standardised units is represented by the standardised residuals' standard deviation, which is 0.982. The variable is operating largely successfully.

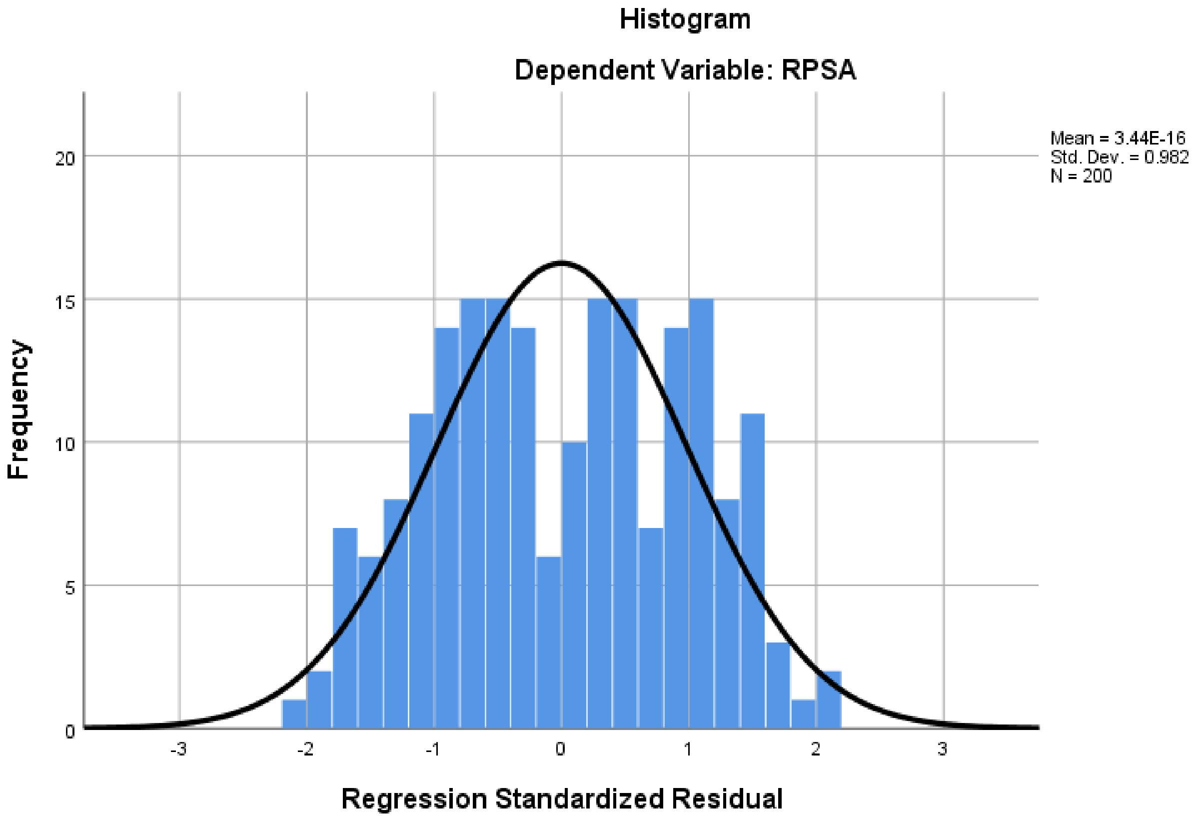

Figure 2: Dependent Variable for Regression Standardized Residuals

The correlation between the needy variable and the standardised residuals resulting from the regression analysis is depicted in figure 2. The alteration among detected values and expected values, as divided by the residuals' standard deviation, is what is known as the standardised residuals. Each data point in this graph represents an observation, and its location on the y-axis represents the value of the reliant variable that corresponds to it. The standardised residuals are shown on the x-axis. The graphic can also be used to verify regression assumptions like normality and constant residual variance. If there is a pattern in the standardised residuals, the model may not be able to capture the underlying association between the dependent and independent variables. In these circumstances, model modifications or data transformations can be required.

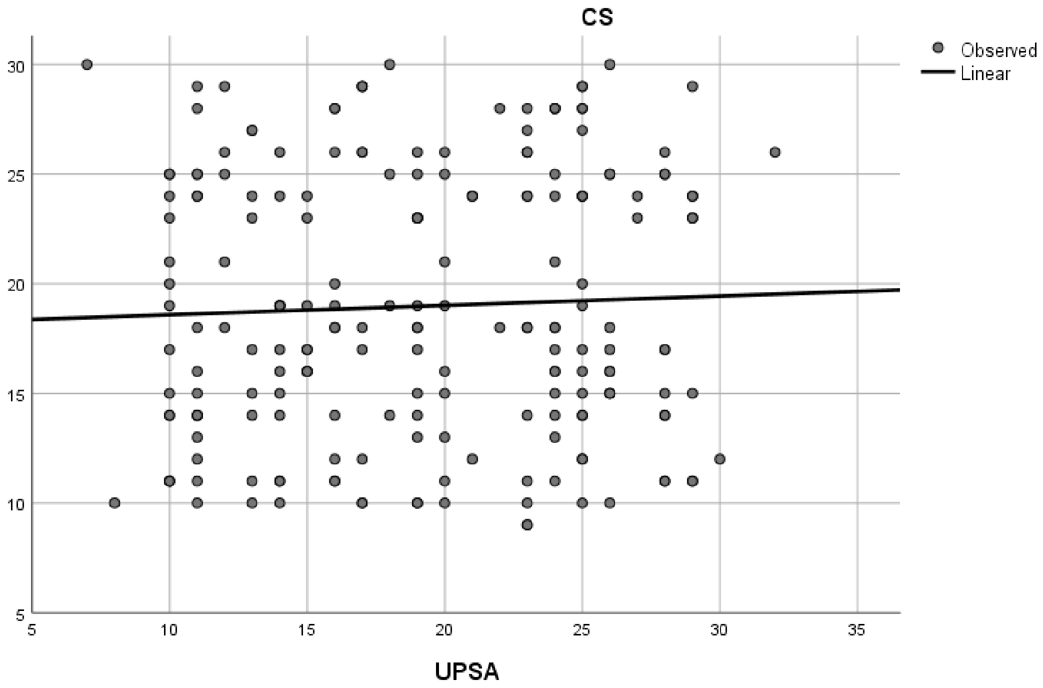

Figure 3: Regression Standardized Plot of Predicted Values

The correlation between the actual values of the needy variable and the standardised predicted values for CS is shown in figure 3. The standardised predicted value for CS is represented by the x-coordinate on the plot, while the actual value of the reliant variable is shown by the y-coordinate. The scatter plot enables us to visually evaluate the regression model's goodness of fit for CS and see any recurring patterns or trends in the data points.

Table 10: Multivariate Test Results

Multivariate Tests[a]						
Effect		**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Intercept	Pillai's Trace	.984	1284.669[b]	3.000	62.000	.000
	Wilks' Lambda	.016	1284.669[b]	3.000	62.000	.000
	Hotelling's Trace	62.161	1284.669[b]	3.000	62.000	.000
	Roy's Largest Root	62.161	1284.669[b]	3.000	62.000	.000
FIS	Pillai's Trace	.701	.929	63.000	192.000	.625
	Wilks' Lambda	.439	.937	63.000	185.911	.611
	Hotelling's Trace	.979	.943	63.000	182.000	.598
	Roy's Largest Root	.540	1.645[c]	21.000	64.000	.066
MSS	Pillai's Trace	.696	.841	69.000	192.000	.796

	Wilks' Lambda	.444	.841	69.000	186.079	.795
	Hotelling's Trace	.957	.842	69.000	182.000	.794
	Roy's Largest Root	.538	1.498[c]	23.000	64.000	.104
FIS * MSS	Pillai's Trace	1.724	.950	273.000	192.000	.653
	Wilks' Lambda	.074	.946	273.000	186.913	.664
	Hotelling's Trace	4.229	.940	273.000	182.000	.680
	Roy's Largest Root	1.741	1.224[c]	91.000	64.000	.196
a. Design: Intercept + FIS + MSS + FIS * MSS						
b. Exact statistic						
c. The statistic offers a lower bound on the significance level and an upper bound on F.						

The multivariate tests in table 10 evaluate the overall importance of the main factors and the effect of the relation in the regression model. All of the multivariate test numbers for the intercept (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root) have incredibly low p-values (about 0.000), demonstrating the intercept's tremendous significance. The reliant variable and the other variables in the model have substantial associations, indicating that the model's overall effect is significant. The multivariate test digits (Pillai's Trace, Wilks' Lambda, and Hotelling's Trace) exhibit p-values higher than 0.05 (range from 0.598 to 0.625) for the foremost result of FIS (Factor 1), indicating that the focal outcome of FIS is not statistically significant. The p-value for Roy's Largest Root test statistic is 0.066, which is just below the threshold of 0.05. There may be some effect of FIS on the dependent variable, as indicated by the marginal significance threshold, which is indicated by this. Similar to the focal influence of MSS (Factor 2), none of the multivariate test measurements for the latter had p-values less than 0.05 (varying from 0.794 to 0.796), showing that the latter's major effect is not statistically significant.

Table 11: Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	CS	4684.625[a]	135	34.701	.852	.781
	PSA	4296.788[b]	135	31.828	.870	.751
	MIS	4358.662[c]	135	32.286	1.205	.203
Intercept	CS	37222.415	1	37222.415	914.047	.000
	PSA	39512.227	1	39512.227	1080.138	.000
	MIS	34010.291	1	34010.291	1269.682	.000
FIS	CS	1110.073	21	52.861	1.298	.211

	PSA	520.469	21	24.784	.678	.839
	MIS	529.999	21	25.238	.942	.542
MSS	CS	610.499	23	26.543	.652	.873
	PSA	610.639	23	26.550	.726	.802
	MIS	717.021	23	31.175	1.164	.309
FIS * MSS	CS	3061.069	91	33.638	.826	.800
	PSA	3109.899	91	34.175	.934	.621
	MIS	2874.907	91	31.592	1.179	.243
Error	CS	2606.250	64	40.723		
	PSA	2341.167	64	36.581		
	MIS	1714.333	64	26.786		
Total	CS	79301.000	200			
	PSA	82571.000	200			
	MIS	72649.000	200			
Corrected Total	CS	7290.875	199			
	PSA	6637.955	199			
	MIS	6072.995	199			
a. R Squared =.643 (Adjusted R Squared = -.112)						
b. R Squared =.647 (Adjusted R Squared = -.097)						
c. R Squared =.718 (Adjusted R Squared =.122)						

The main effects (CS, PSA, MIS, FIS, MSS) and the collaboration effect (FIS * MSS) on the dependent variables (CS, PSA, MIS) are detailed in table 11. An F-value of 0.852 and a p-value of 0.781 indicate that the highest conclusion of CS on the dependent variables (CS, PSA, and MIS) is not statistically significant. The dependent variable's variability is only 64.3% explained by the core effect of CS, according to the R-squared value for this effect of 0.643. A non-significant F-value of 0.870 and a p-value of 0.751 are also present for the foremost effect of PSA on the dependent variables (CS, PSA, and MIS). The focal effect of PSA may only be credited with 64.7% of the inconsistency in the needy variable, according to the R-squared value for this effect, which is 0.647. A non-significant F-value of 1.205 and a p-value of 0.203 are found for the central effect of MIS on the dependent variables (CS, PSA, and MIS). The dependent variable's variability can be explained by the focal effect of MIS by 71.8%, according to the R-squared value of 0.718 for this effect. The interaction impact of FIS and MSS (FIS * MSS) on the dependent variables (CS, PSA, and MIS) is also not statistically significant, with an F-value of 0.826 and a p-value of 0.800. The R-squared value for this interface effect is 0.122, indicating that only 12.2% of the variability in the reliant variable can be attributable to the interaction between FIS and MSS. There are no statistically significant correlations between the dependent variables (CS, PSA, and MIS) and the main effects of CS, PSA, and MIS, as well as the contact effect between FIS and MSS. The comparatively low R-squared values show that these effects do not adequately explain the dissimilarity in the dependent variables.

6. Research Conclusion:

The study's findings support the assertion that cognitive style has little bearing on SSS capacity for problem-solving. Both integrated and split-style SSS are capable of addressing problems on a good to excellent level. Cognitive style does not significantly affect PSS in male SSS. However, it has a major impact on PSS in female SSS. Major differences between integrated and divided learning styles in these students' PSS were discovered. Female respondents with integrated cognitive styles were found to have strong problem-solving skills. Most female participants fall between the range of moderate and excellent problem-solving skills. People with integrated styles can adjust their behaviour fast and easily depending on the circumstance. In comparison to boys who are more stiff and casual, girls tend to be more serious, disciplined, and punctual when it comes to their work. Additionally, girls are renowned for making decisions that are harmonious and appropriate for the situation. With 199 freedom degrees, the sum of the squares is 6110.195. Dividing the regression's mean square by the residual's mean square, the F-statistic (2.348) in the ANOVA is calculated. The ability of rural and urban SSS to solve problems differed significantly as well. The degree of problem-solving skill is significantly influenced by the location of the study. Comparing SSS from rural and urban areas, it is discovered that the former is better at addressing problems. The school environment may encourage logical reasoning, problem-solving imagination, abstract thinking at a reflective level, etc.

The study highlights that there are significant gender differences in problem-solving skills among secondary school students. Educators and school administrators should be aware of these differences and consider tailoring teaching methods and problem-solving approaches to address the varying needs of male and female students. While cognitive style may not have a substantial impact on problem-solving abilities in male students, educators must be aware of cognitive style preferences among female students. Understanding the integrated and split-style cognitive preferences can help teachers adapt their teaching strategies to better support female students in developing their problem-solving skills. For future research, it would be beneficial to explore the specific factors influencing gender differences in problem-solving skills among secondary school students. Additionally, conducting a longitudinal study to track the development of problem-solving skills from primary to secondary school levels could provide valuable insights into the factors that contribute to the varying levels of problem-solving abilities among students. Furthermore, investigating the role of specific teaching methodologies and curricula in promoting problem-solving skills can offer practical guidance to educators in enhancing students' problem-solving capabilities. Additionally, conducting comparative studies across different countries or regions could provide a broader understanding of how cultural and social factors influence problem-solving aptitudes among secondary school students.

References:

[1] Maulani, Nur, Sahril Sahril, and Nur Aeni. "Correlation between Language Learning Strategies and Thinking Styles on Learning Outcomes of Senior High School Students." Journal of Excellence in English Language Education 1.3 (2022).

[2] Rashid, Ali Asghar, Vahid Bakhshalipour, and Siavash Khodaparast. "Correlation between Thinking Styles with Creativity and Self-Efficacy ofNursesin Amir Al-Momenin Hospital." Iranian Journal of Culture and Health Promotion 6.4 (2023): 638-645.

[3] Orhan, Ali. "Critical thinking dispositions and decision making as predictors of high school students' perceived problem-solving skills." The Journal of Educational Research 115.4 (2022): 235-245.

[4] Hulyadi, Hulyadi, *et al*. "Correlation Profile of Cognition Levels and Student Ability to Solve Problems in Biodicell Synthesis." Jurnal Penelitian Pendidikan IPA 9.6 (2023): 4179-4188.

[5] Sheikhani, Amal, and Ali Shojaeifard. "Investigating the relationship between emotional intelligence and metacognition with problem-solving skills in first-grade high school students in Shiraz."

[6] Rashid, Ali Asghar, Vahid Bakhshalipour, and Siavash Khodaparast. "Correlation between Thinking Styles with Creativity and Self-Efficacy ofNursesin Amir Al-Momenin Hospital." Iranian Journal of Culture and Health Promotion 6.4 (2023): 638-645.

[7] Mohamed, Alshimaa. "The Effectiveness of SWOM Strategy on Developing Branching Thinking Skills and Solving Numerical Physics Problems for Language Secondary Stage Students with Different Cognitive Style." 121.4 (2023): 3-24.

[8] Qomariyah, Siti, *et al*. "Indicators and essay problem grids on three-dimensional material: Development of instruments for measuring high school students' mathematical problem-solving ability." JEMS: Jurnal Edukasi Matematika dan Sains 11.1 (2023): 261-274.

[9] Yeung, Monly Man-Yee, *et al*. "The efficacy of team-based learning in developing the generic capability of problem-solving ability and critical thinking skills in nursing education: A systematic review." Nurse Education Today (2023): 105704.

[10] Ramos-Galarza, Carlos, Cristina Aymacaña-Villacreses, and Jorge Cruz-Cárdenas. "The intervention of Brain Gym in the mathematical abilities of high-school students: A pilot study." Frontiers in Psychology 13 (2023): 1045567.

[11] Rahmah, Kamilia, *et al*. "Analysis of Mathematics Problem Solving Ability of Junior High School Students Based on APOS Theory Viewed from the Type of Kolb Learning Style." INdoMATH: Indonesia Mathematics Education 5.2 (2022): 109-122.

[12] Orhan, Ali. "Critical thinking dispositions and decision making as predictors of high school students' perceived problem-solving skills." The Journal of Educational Research 115.4 (2022): 235-245.

[13] Tendrita, Miswandi, Muhammad Fath Azzajjad, and Dewi Satria Ahmar. "Mind mapping with problem-posing: Can it affect student's problem-solving skills in Schoology-based learning?" JPBI (Jurnal Pendidikan Biologi Indonesia) 8.1 (2022): 86-94.

[14] Ichsan, I., Subroto, D.E., Dewi, R.A.P.K., Ulimaz, A. and Arief, I., 2023. The Effect of Student Worksheet with Creative Problem Solving Based On Student's Problem-Solving Ability. Journal on Education, 5(4), pp.11583-11591.

[15] Suherman, A., Komaro, M. and Ana, A., 2023. E-book Multimedia Animation Implementation on Concept Mastery and Problem-Solving Skills of Crystal Structure Subjects in Engineering Materials Course. Indonesian Journal of Science and Technology, 8(2), pp.259-280.

[16] Castro, E.A.M., 2023. Analysis of Problem-Solving Ability of First Middle School Students in Learning Science. Integrated Science Education Journal, 4(2), pp.43-53.

[17] Azizah, Nurul, and Suyitno Aloysius. “The effectiveness of blended learning with problem-based learning-group investigation (PBL-GI) model on students’ critical thinking and problem-solving ability in senior high school.” AIP Conference Proceedings. Vol. 2556. No. 1. AIP Publishing, 2023.

[18] Yılmaz, E. and Griffiths, M.D., 2023. Children’s social problem-solving skills in playing videogames and traditional games: A systematic review. Education and Information Technologies, pp.1-34.

[19] Herman, T. and Fatimah, S., 2023. Considering the Mathematical Resilience in Analyzing Students’ Problem-Solving Ability through Learning Model Experimentation. International Journal of Instruction, 16(1).

[20] Jafri, H., Asmar, A. and Rifandi, R., 2023, February. Development of discovery model-based learning devices to increase the problem-solving skills of grade X high school students. In AIP Conference Proceedings (Vol. 2698, No. 1). AIP Publishing.

[21] Windiyani, T., Sofyan, D., Iasha, V., Siregar, Y.E.Y. and Setiawan, B., 2023. Utilization of Problem-based Learning and Discovery Learning: The Effect of Problem-Solving Ability Based on Self-Efficacy Elementary School Students. AL-ISHLAH: Jurnal Pendidikan, 15(2), pp.1458-1470.

[22] Putri, Melia Dita Silviana, *et al*. “Relationship between problem-solving skills and environmental literacy of students.” AIP Conference Proceedings. Vol. 2569. No. 1. AIP Publishing, 2023.

[23] Chi, S., Wang, Z. and Liu, X., 2023. Assessment of Context-Based Chemistry Problem-Solving Skills: Test Design and Results from Ninth-Grade Students. Research in Science Education, 53(2), pp.295-318.

[24] Chen, D., Zhang, Y., Luo, H., Li, J. and Lin, Y., 2023, July. From ICT Utilization to Student Learning Achievement: Mediation Effects of Digital Literacy and Problem-Solving Ability. In International Conference on Blended Learning (pp. 71-82). Cham: Springer Nature Switzerland.

[25] Göktepe Yıldız, S. and Göktepe Körpeoğlu, S., 2023. Prediction of students’ perceptions of problem-solving skills with a neuro-fuzzy model and hierarchical regression method: A quantitative study. Education and Information Technologies, pp.1-39.

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