

2023

## Educational Practices Within High Schools and their Relationship to Developing Students Innovation Skills in Saudi Arabia

A. A. Al-Harthy

*Assistance Subject Department, College of Sciences and Humanities Studies, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia, aalharthy@iau.edu.sa*

Follow this and additional works at: <https://digitalcommons.aaru.edu.jo/isl>

---

### Recommended Citation

A. Al-Harthy, A. (2023) "Educational Practices Within High Schools and their Relationship to Developing Students Innovation Skills in Saudi Arabia," *Information Sciences Letters*: Vol. 12 : Iss. 8 , PP -. Available at: <https://digitalcommons.aaru.edu.jo/isl/vol12/iss8/29>

This Article is brought to you for free and open access by Arab Journals Platform. It has been accepted for inclusion in Information Sciences Letters by an authorized editor. The journal is hosted on [Digital Commons](#), an Elsevier platform. For more information, please contact [rakan@aarj.edu.jo](mailto:rakan@aarj.edu.jo), [marah@aarj.edu.jo](mailto:marah@aarj.edu.jo), [u.murad@aarj.edu.jo](mailto:u.murad@aarj.edu.jo).

# Educational Practices Within High Schools and their Relationship to Developing Students' Innovation Skills in Saudi Arabia

A. A. Al-Harthy\*

Assistance Subject Department, College of Sciences and Humanities Studies, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

Received: 21 Jun. 2023, Revised: 22 Jul. 2023, Accepted: 24 Jul. 2023.

Published online: 1 Aug. 2023.

**Abstract:** The current study focused on the Relationship between educational practices and the development of students' innovative thinking skills within high schools in Saudi Arabia. One of the most important contributions added by current research in the field of science is to enrich theoretical frameworks in the field of development of innovation among high school students and to learn about the most important practices applied by secondary teachers to develop innovative thinking skills and to learn about the relationship between educational practices within secondary schools and the development of innovative thinking skills of students. (62) Another teacher and questionnaire to measure innovative thinking for high school students applied to me (113) Secondary students in Saudi Arabia in the academic year 2022/2023, The sample was randomly selected. The results of the study found that computational averages ranged from (3.51-3.61), with teachers applying practices that stimulate innovative thinking to a moderate degree. The results also indicated a statistically positive correlation between the dimensions of innovative thinking skills and innovative thinking-inducing educational practices among secondary students with a correlation factor of (0.897).

**Keywords:** Educational Practices, High School Students, Innovative Thinking Skills, Skills Development.

## 1 Introduction

Innovation is one of the important and necessary educational objectives that advanced societies are striving to achieve. Innovators have an active and positive role to play in the development and progress of their societies. Thus, societies are moving toward the investment of their children [1] Creativity and innovation don't necessarily mean just bringing a new one but reintroducing the old in a new or strange way, which is dealing with familiar things in an unfamiliar way. is also the ability to form and create something new, incorporate old or new opinions into a new image, or use imagination to develop and adapt opinions to satisfy needs in a new way or to do something new, tangible, or intangible in one way or another. The school climate has an enormous role to play in developing innovative thinking skills, especially in the classroom, as a teacher who can use innovative thinking skills can motivate students to understand it and then use it, So the pedagogical literature took care of teachers because they had a great deal to give students thinking skills by accepting and encouraging divergent thinking. and to promote areas for finding solutions that are unusual for oblique even if the result is not ideal, they bear opinions that are contrary to the teacher's opinion and encourage confidence in the judgment of the student himself, creating experiences that ensure the success of all students, showcase unfamiliar ideas, provide well-planned activities, and accept individual differences [2].

Many effective teaching methods have a major impact on the development of innovative thinking. The most prominent of these methods are brainstorming, multiple intelligence, and mental maps, which greatly affect the development of creative thinking skills and the achievement of many educational benefits [3]. (Martin Martine confirms, 2015) However, education in our schools continues to focus on injecting information into the minds of students at an age where they need programs to develop innovative thinking to help them learn about their mental abilities and thus develop and invest in creative cognitive development [4].

An enhanced teacher of creative skills must understand students' abilities and talents and he must have skills, methods, and strategies that allow him to guide and excite all the creative power of students, to the extent that the teacher is competent to distinguish the individual differences between students' characteristics, methods, and different learning skills education strategies with students that help them to understand and develop innovative abilities are becoming more effective.

An enhanced teacher of creative skills must understand students' abilities and talents and he must have skills, methods, and strategies that allow him to guide and excite all the creative power of students, so to the extent that the teacher is

\*Corresponding author e-mail: [aaalharthy@iau.edu.sa](mailto:aaalharthy@iau.edu.sa)

competent to distinguish the individual differences between students' characteristics, methods and different learning skills education strategies with students that help them to understand and develop innovative abilities are becoming more effective. Teaching students how to think will be the most important building and foundation for the progress of the world and society. and good preparation of for meetings in the future requires a lot of reflection on the appropriate means of thinking about the solution of problems and their relevance to the time era and the value, social and geographical environment, based on the objectives of modern education, which focuses on thinking skills, it is important to focus on innovative thinking among high school students. Based on calls for the development of innovative thinking skills among high school students, it is recognized that there are schools in the Kingdom of Saudi Arabia that provide some modern educational means and programs that are concerned with the development of innovative thinking the curricula used are not linked to students' daily lives. They do not consider students' interests and needs, and teachers do not raise the spirit of innovation and creativity. and the perpetuation of the traditional teaching method, as secondary teachers are dominated by the traditional teaching method This creates a sense of the problem of schooling and a desire to identify the reality of the educational practices used by teachers and whether they are related to the development of innovation among secondary students. Secondary school is chosen because it is considered a stage of preparation for cadres who are supposed to enjoy creative and innovative thinking that helps their society's progress.

### **The theories about creative thinking**

Most researchers and scholars in the field of creativity and creative thinking agree that innovative thinking includes three key skills: fluency, flexibility and authenticity included in Torrance's scale of creative thinking [5].

Innovative thinking skills: Guilford considers that the capacity for innovative thinking is not a single capacity, but a capacity embedded in a range of capabilities (in Startups, 1998). Torrance has identified a number of basic skills for innovative thinking: fluency, flexibility, authenticity, and detail .

#### **a-Fluency**

Torrance defines fluency as the ability to summon as many responses as possible to a particular problem in a given period of time. The ability to generate a large number of alternatives, synonyms, ideas, problems or uses means when responding to a particular trigger and the speed and ease of its generation, which is in essence a process of recalling and optional recall of previously learned information, experience or concepts [6]. They include the multiplicity of ideas that can be called upon or the speed at which uses, synonyms, and benefits are called for specific objects, the fluidity and flow of ideas, and the ease with which they are generated [7]. Fluency is divided into four types: verbal fluency, intellectual fluency, expression, and diligence. Verbal fluency is the ability to quickly produce as many words as possible with certain conditions. Intellectual fluency is the ability to quickly produce as many ideas as possible that belong to a particular type of idea at a given time. Expressionism is the ability to express speedy thinking and wording of words in useful terms. The fluency of the fallout is the ability to produce as many primary units as possible with specific characteristics [8]. Thus, fluency means an individual's ability to produce a large number of ideas at a given time, where the importance here lies of the number of responses rather than their diversity .

#### **b-Flexibility**

It is meant to be able to change the state of mind by changing attitude, which is to reverse the process of mental inertia. The most creative child is thus more flexible, having a high degree of ability to change his or her state of mind, in order to match the complexity of the innovative situation. This pattern requires a large amount of information, which gives the child instructions. This appearance of innovative thinking also indicates the child's ability to generate a range of responses showing unfamiliar uses of something familiar. It is noted here that attention is focused on the diversity of ideas or responses, while fluency focuses on quantum without adaptation and is also the number of entrances used to make improvements or solutions to a particular problem [9].

Guilford identifies several forms of flexibility:

- Adaptive flexibility, meaning adaptability to changing circumstances
- Freedom from stalemate, in the sense of shifting the direction of thinking- Reinterpretation of information, i.e., revision of data or information items
- Automatic flexibility. Spontaneity in changing an individual's state of mind to do something differently [10] means that a human being who stands at an idea or hardens in a way is less able to create than a flexible human being who is capable of changing and adaptive flexibility. Flexibility is therefore the individual's ability to come up with different

responses to the same problem. A flexible person, if he fails to solve, will soon come up with another new solution.

### **c- Originality**

The ability to quickly produce ideas that meet certain conditions in a particular situation such as grandmother or statistically scarce, or indirect and out-of-pocket ideas [11]. In Torrance's view, the statistically authentic idea is the least frequent .

[12] defines it as being capable of bringing new, rare, useful, and unrelated ideas to the repetition of previous ideas, which are unusual and far-reaching. The idea is considered authentic if it does not repeat the ideas of the people around it, and it is new if it is judged in the light of ideas that emerge from other people, ideas that are not subject to common ideas, characterized by excellence and the person with authentic thinking. It is tended to use repetitive ideas, traditional solutions to problems, and authenticity focuses on ideas of value in terms of type and grandmother: uniqueness of ide.

### **d- Elaboration**

[13] defines it as increasing or building on the main idea to become more attractive. This is to arrive at complementary assumptions that in turn lead to a new increase, namely the space of experience and access to new developments than the learner has. is a detail skill that complements innovative work and needs a long effort and focus 'The authenticity of thinking may fail to complete their work because of their inability to continuity, improve their ideas and add everything needed to the idea. It is clear that details mean that an individual can add improvements to a particular idea so that the individual addresses the simple idea and then adds other ideas .

Innovative thinking in the light of theories: many theories explain innovative thinking, and the researcher will present some of these theories: psychoanalytic theory, behavioral theory, immobilization, and cognitive theory.

### **Psychoanalytic Theory**

The proponents of this theory interpret innovation through Freud's views that it is not different in its basis and dynamics from the psychiatric disorder that begins in an individual from the early days of his life. Innovation from Freud's point of view is only an expression of a defensive ploy called superiority, and through this defensive ploy the individual expresses his sexual and aggressive energies in a socially acceptable manner [14].

Although Young agrees with Freud, he disagrees with him in determining non-feeling, while Freud considers that most the non-feeling is acquired and personal, Young distinguishes between two types of non-feeling, one of which is personal, which Freud speaks of, and the other is a collector who transmits inheritance to the individual bearing with him the effects of ancestral experiences and their heritage [15].

"Freud" differentiated between innovation and psychiatric disorder, when he explained that psychiatric disorder arose when defensive tricks used to confront the subconscious contents of an individual failed, while innovation was the result of successful publicity, the defensive trick used to express subconscious contents [16].

It is clear from the foregoing that this theory does not differ in its interpretation of innovative thinking from its interpretation of personality. It considers that innovative thinking is a defensive ploy by which an individual expresses his or her physical and psychological energies in a manner acceptable to society .

### **Behavioral Theory**

Mednick provided a theoretical conception of the innovative process, a conception based on the temporal pairing between exciting and responsive, He considers that whenever the relationship or correlation between sexy and responsive is a distant one that individuals have not realized and has never existed before, this is evidence of a high level of innovative thinking. and innovation becomes a kind of search for linkages that have never been associated with the agitator and the organization of such linkages in a new formation [17]

This theory thus interprets innovative thinking as the access to and usefulness of new components of its association that meet certain conditions, as well as the proponents of this theory that correlative elements may arise in conjunction with each other because of another exciting occurrence, often by accident. Mednick also concluded that the greater the number of associations an individual has with the underlying elements of the problem, the greater his access to an innovative solution [18].

So, this theory interprets innovative thinking as connections between sexy and new responses.

## Jashtalit Theory

In the view of the proponents of this theory, knowing the solutions to any problem is in view of its overall scope, i.e., the circumstances and circumstances surrounding it. And they see that it is an innovation that tends to undertake to reorganize the realm of cognition rather than as ideas of past experience, and perception plays an important role in shaping innovation [19].

The study and the search for solutions to any problem depend on dealing with all innovative solutions that are not the product of a structured and sequenced process but appear abruptly while attempting to rearrange and examine their components in their overall context, we cannot anticipate this moment, and the thought of intuition or the sudden emergence of innovative ideas cannot, of course, be fully acknowledged. Thus, in our view, this theory interprets innovation as the process of reaching new solutions by recognizing a holistic attitude.

## Cognitive Theory

Cognitive theory is an important theory based in its background on mental aspects, and best put forward by cognitive theory is "Piaget", where it considers that there are interrelated processes that shape understanding and assimilation represented in the process of representation and harmonization that shape the adaptation process, thus shaping the general cognitive balance of the human being [20].

Piaget's theory is that when individuals deal with something new or alien to their cognitive construction, there is an imbalance. And the process of rebalancing requires that an individual absorb this new thing, adjusting their own cognitive structure to deal with new ideas. and the study found that innovative children are more balanced than their ordinary peers, this difference was also found to be due to the rapid reconstruction of their knowledge [21].

Innovation is thus interpreted to depend on an individual's ability to rapidly rebuild knowledge to achieve adaptation. From the previous presentation of explanatory theories of innovative thinking, it is clear that these theories are varied in vision and interpretation of this process, While Freud believes that innovative thinking is a defensive ploy that reveals internal conflicts in a socially acceptable way, we see behaviorists interpreting innovative thinking as links between excitement and new responses, as well as the Jishdalit as dependent on perception of the problematic situation, and Piaget as the speed of an individual's cognitive reconstruction to adapt to new situations. We note that these theories in their entirety draw attention to production, although their interpretations vary

While Freud believes that innovative thinking is a defensive ploy that reveals internal conflicts in a socially acceptable way, we see behaviorists interpreting innovative thinking as links between excitement and new responses, as well as the Jishdalit as dependent on the perception of the problematic situation, and Piaget as the speed of an individual's cognitive reconstruction to adapt to new situations. We note that these theories in their entirety draw attention to production, although their interpretations vary.

## Characteristics of innovative children

Knowledge of the characteristics of the creative child is of benefit to the educator/teacher in order to identify and discover creative children, develop their creative abilities, and prevent their disability, as Torrance says: "Teachers do not tend to deal with the creative child", owing to the extraordinary characteristics of the child, which require special planning and activities, which must be taken into account, which means a special effort, otherwise this child will be turned into a feisty child, aimed at occupying the nanny or teacher .

The creative child is resilient, independent, persistent, self-reliant, introverted and isolationist, adventurous and adventurous thinking, diverse interests, diverse ways of expressing emotions, impulsiveness, competition, aesthetic taste, artistic taste, humor, useful play and playing with ideas [22] .

The innovative child's features as a child with clear construction and installation preparations, new solutions, and genuine ideas for the problems presented to him, even if they are not new. [23] presents a number of characteristics that characterize the innovative child, including the fact that he excels in his peers in the ability to talk, seeks more knowledge, loves writing, the capacity for access, the speed of intuition and intuition, and has the ability to focus and keep attention.

He also has the skills to solve the problem. [24] consider that one of the most important features of an innovative child is open-mindedness, humor, fun, a tendency to express feelings, and problems with school discipline and order. [25] presents the most important qualities of the innovative child: flexibility of thinking, and personal autonomy so that the child is free from social constraints.

He also leans towards the complexity of things, feels happy when challenging difficult things, endures mistakes, and has a low level of anxiety [26]. A child is considered innovative if he or she has the ability to identify problems and propose many ideas to solve them. He or she must have some knowledge that he or she researches in different ways and means, analyses the results he or she reaches, and reaches multiple ideas [27].

## 2 Purpose of the Study

In the present study, we examined the reality of teaching practices carried out by teachers at the secondary level and their relationship to the development of innovation among students. Through previous literature, the researcher found that the curricula used were not linked to students' daily lives. They do not take into account students' interests and needs, and teachers do not raise the spirit of innovation and creativity. and the perpetuation of the traditional teaching method, as secondary teachers are dominated by the traditional teaching method This creates a sense of the problem of schooling and a desire to identify the reality of the educational practices used by teachers and whether they are related to the development of innovation among secondary students. Secondary school is chosen because it is considered a stage of preparation for cadres who are supposed to enjoy creative and innovative thinking that helps their society's progress. In our current research, we have tried to answer the following questions:

Question I: What is the reality of using educational practices that stimulate innovative thinking among high school students from the point of view of teachers in Saudi Arabia?

Question II: Is there a statistically significant relationship between innovative thinking-inducing educational practices and the development of high school students' innovative thinking skills?

## 3 Method

### Sample

Response rates and evaluation ratings were retrieved from archived course evaluation data. The archive of SET data did not include information about the personal characteristics of the instructor (gender, age, or years of teaching experience), and students were not provided with any systematic incentive to complete the paper or online versions of the SET. We extracted data on response rates and evaluation ratings for 364 courses that had been taught by the same instructor during three consecutive fall terms (2012, 2013, and 2014).

The sample included 62 secondary teachers in the Eastern Region of Saudi Arabia and 113 secondary students in the academic year 2022/2023 divided into 10 schools. The sample was selected randomly and distributed as follows:

First School 5 Teachers (8.1%) and 10 Students (8.8%), second school 6 teachers by (9.7%), 18 students by (15.9%), Third school 5 teachers by (8.1%) and 12 students by (10.6%), and the fourth school had 7 teachers (11.3%) The number of students 11 by (9.7%), the fifth school was the number of teachers 5 by (8.1%) 12 students (10.6%), then sixth school 8 teachers (12.9%) and 13 students (11.5%), The seventh school had 4 teachers (6.5%), 16 students (14.2%), the eighth school, 7 teachers (11.3%), 15 students (13.3%), the ninth school had 8 teachers (12.9%), 3 students (2.7%), the tenth school had 7 teachers (11.3%) and 3 students (2.7%).

### Instrument

**The first tool:** Female researchers prepared a questionnaire to measure "innovative thinking-inducing educational practices from the perspective of secondary teachers. The identification consisted of (28) a paragraph distributed in four areas: The first is the focus on classroom questions, the second is the focus on the classroom environment, the third is the focus on innovative teaching methods, the fourth is the focus on supportive and stimulating activities, and the Lickert Triple Ladder has been adopted (always on occasion never). If the examiner answers (always), his grade is (3), and if he answers sometimes (2).

**Believe the study tool:** To ascertain the authenticity of the study tool, it was presented to a group of experts and specialists in the curricula and teaching methods at Saudi universities, which number (10) arbitrators asked them to express an opinion on the suitability of the tool and its linguistic integrity and any other suggestions they deem appropriate from deleting and amending, and in light of the opinions of the arbitrators, the researcher made the necessary adjustments from deleting, modifying or adding.

**Persistence of study tool:** To ensure the stability of the study tool, the test-retest method was verified by applying the scale and reapplying after two weeks on a group of out-of-sample studies made up of 15, and the Pearson correlation coefficient was calculated between their estimates both times. The persistence factor has also been calculated in an internal consistency manner according to the Cronbach alpha equation. Table (1) shows the internal consistency factor according to the Cronbach alpha equation and the reinstatement constant of the fields and

total degree and considers these values to be appropriate for this study.

**Table 1:** Internal Coherence Coefficient Cronbach Alpha and Repetition Constant for Fields and Total Degree

Internal consistency	Return stabilization	Field
0.81	0.86	Class Questions
0.79	0.84	The centerpiece of the classroom environment
0.82	0.87	Pivot to innovative teaching methods
0.75	0.90	activities supporting and stimulating innovation
0.87	0.89	Total Degree

**The Second Tool:** Innovative Thinking Skills Measurement Questionnaire for High School Students. Through the literature and previous studies on innovative thinking for high school students. The researcher prepared an innovative thinking questionnaire with the aim of:

-Getting the level of innovative thinking (authenticity-fluency-flexibility-detail perception) for secondary students. The second research tool consisted of 31 paragraphs spread over four dimensions: authenticity, fluency, flexibility, and understanding of details distributed to secondary students as shown in Table (2).

**Table 2:** Breakdown of identification paragraphs by dimension and paragraph numbers for each dimension

N	Number of paragraphs	Organs or interlocutors	Number of paragraphs or phrases
1	7	Fluency	Q8, Q9, Q10, Q11, Q12, Q13, Q14
2	7	Flexibility	Q15, Q16, Q17, Q18, Q19, Q20, Q21
3	7	Authenticity	Q1, Q2, Q3, Q4, Q5, Q6, Q7
4	7	Perception of Details	Q22, Q23, Q24, Q25, Q26, Q27, Q28
Total		28	

#### How to correct an innovative thinking skills measurement questionnaire for high school students:

Correction is done according to the Likert Three Scale (always on occasion at all). If the examiner answers (always), it is his grade (3). If he answers sometimes, it is his degree (2). If he answers (never), it is his degree (1). Seko metric properties of the second instrument.

#### First: Believe the tool: validity

To know the degree of validity for which the questionnaire measures what it has been prepared, the researcher ensures the veracity of the questionnaire by:

##### a. Apparent honesty (the honesty of arbitrators):

To ascertain the honesty of the apparent performance and to ensure that the tool measures what it is designed to measure; The questionnaire was presented to (6) arbitrators with competence and experience in the curricula and teaching methods in Saudi universities to ensure the comprehensiveness of the research tool in terms of linguistic wording and appropriate phrases for the subject of the study, with modification, deletion or addition of what they deem appropriate. The preliminary identification consisted of 37 phrases. In the light of the arbitrators' observations, 6 phrases had been deleted, with the final identification made up of 28 phrases divided into four dimensions:

##### b. Constructive honesty of the instrument:

The researcher used the correlation coefficient (Spearman-Brown Formula) to determine the extent to which each dimension of the resolution relates to the overall degree of the resolution vertebrae as shown in Table (3). In the paragraphs of the innovative thinking skills questionnaire for high school students.

**Table 3:** Spearman's correlation factor between each paragraph of each axis and the overall degree of its axis

Fluency	0.876**	Very strong moral expulsion link at an indicative level (0.01) * *
Flexibility	0.852**	Very strong moral expulsion link at an indicative level (0.01) * *
Authenticity	**0.845.	Very strong moral expulsion link at an indicative level (0.01) * *
Perception of Details	0.856**	Very strong moral expulsion link at an indicative level (0.01) * *
*. Correlation is significant at the (0.05) level.		
**. Correlation is significant at the (0.01) level.		

#### Tool Stability Reliability

The overall stability of the sample resolution was estimated using the Alpha Cronbach's Alpha and retail coefficient,

**Table 4:** Fastness coefficient (alpha-Cronbach and half-part) on (Innovative Thinking Skills Measurement Questionnaire for Secondary Students).

Split-Half Coefficient	Cronbach's Alpha	Number of phrases	Sample Resolution Stability
0.977	0.981	31	All paragraphs of the questionnaire

**Note.** The high correlation rate and internal consistency of the second scale paragraphs on the Cronbach scale and internal consistency using the halfway segmentation confirm the consistency of the innovative thinking skills scale paragraphs of secondary students.

## 4 Results

### Response Rates

Question 1: What is the reality of using educational practices that stimulate innovation among high school students from the point of view of teachers in Saudi Arabia?

In response to this question, the computational averages, and standard deviations of the extent to which teachers exercise the means to develop innovative thinking skills in teaching at the secondary level have been extracted from the perspective of their teachers.

**Table 5:** Computational averages and standard deviations of secondary teachers' educational practices to develop innovative thinking skills downward according to computational averages.

Level	Standard Deviation	Arithmetic Average	Field	Number	Grade
medium	0.817	3.61	Class Questions	2	1
medium	0.679	3.56	The centerpiece of the classroom environment	1	2
medium	0.825	3.54	Pivot to innovative teaching methods	3	3
medium	0.875	3.51	activities supporting and stimulating innovation	4	4
medium	0.727	3.56	Total Degree	Total	

Table 5 shows that computational averages ranged from (3.51-3.61) The classroom environment was ranked first with the highest average calculation (3.61), The focus on activities supporting and stimulating creativity came last with an average calculation of 3.51. In the average calculation of the tool as a whole (3.56), the researcher explains the lack of interest in teacher training courses in Saudi Arabia for these skills and the lack of teacher training in the use of thinking development methods in students through ongoing training courses on innovative thinking development methods and strategies in students. Despite Saudi Arabia's interest in promoting thinking and integrating all skills into different courses at the secondary level, the majority of teachers do not practice methods that develop innovative thinking skills. education ", the researcher explains this finding that teachers have become accustomed to the practice of traditional methods. The result of the current study was ed with the outcome of the study [28], which concluded that the estimates of first-grade secondary students to the degree of eloquence teachers practicing methods of developing creative thinking were moderate, as was the result of the current study with the result of the study [29], which concluded that the estimates of students practicing methods of thinking by teachers were medium, and the estimates of teachers were medium.

The result of the current study differed from that of the study [30], which found that the use of effective teaching methods encourages students to use creative thinking skills to a relatively high degree. The design of calendar techniques provides opportunities to apply creative thinking skills and promotes creative students. The calculation averages and standard deviations of the study sample individuals' estimates were calculated in the paragraphs of each area separately, as follows:

**Table 6:** Arithmetic averages and standard deviations of paragraphs on the axis of pure questions are arranged downward according to arithmetic averages.

Level	Standard deviation	Arithmetic Average	Paragraphs	Number	Grade
medium	0.893	3.66	Questions vary depending on students' tendencies and	6	1



Level	Standard deviation	Arithmetic Average	Paragraphs	Number	Grade
			interests		
medium	0.932	3.57	Teachers Ask Questions Open Ends	2	2
medium	0.924	3.56	Teachers ask questions that challenge students' thinking to generate different alternatives.	1	3
medium	0.907	3.54	It asks questions that require fluency such as: How can., what can.	3	4
medium	1.122	3.53	Ask various questions to evaluate authenticity skills such as: extracting? Suggested?	4	5
medium	1.159	3.52	Teachers ask questions that inspire students' imagination.	5	6
medium	0.679	3.56	Class Questions	Total	

### Area I: Focus of Class Questions

Table 6 shows that computational averages ranged from (3.52-3.66), with paragraph (6) stating that "Questions vary according to students' tendencies and interests" in the first place with average arithmetic of (3.66), while paragraph (5) reads "Teachers ask questions that give rise to the imagination in students" in the last grade with average arithmetic of (3.52). The computational average of the class question axis was 3.56. This result shows that secondary teachers in Saudi Arabia are less aware of the importance of classroom questions and employ them in a way that promotes innovative thinking such as diverse and unspecified open-ended questions that provide students with the opportunity to have different responses, thereby developing their innovative thinking.

### Area II: Focus of the Classroom Environment

**Table 7:** Arithmetic averages and standard deviations of paragraphs on the axis of the classroom environment are ranked downward according to arithmetic averages.

Level	Standard deviation	Arithmetic Average	Paragraphs	Number	Grade
medium	.967	3.65	Students are urged to register their ideas in their register	9	1
medium	1.136	3.64	Students are urged to exchange ideas for discussion	8	2
medium	1.109	3.62	It is concerned with giving positive expectations of students' performance and notifying them of this	7	3
medium	1.078	3.62	Students are rewarded when they express their new ideas in a non-traditional manner	10	3
medium	1.050	3.58	Urges students to apply innovative ideas and experience them whenever possible	11	5
medium	.951	3.55	Encourages students to take the initiative to ask ideas and questions automatically and freely	12	6
medium	.817	3.61	The centerpiece of the classroom environment	Total	

Table (7) shows that the calculation averages ranged from (3.55-3.65). Paragraph 9 states that "Students are urged to register their ideas in their register" in first place with average arithmetic of (3.65), while paragraph 12 states that "Students are encouraged to take the initiative to automatically and freely ask ideas and questions" in last place. The average computational level of the classroom environment is 3.61. The researcher explains this result to the lack of training programs that prepare secondary teachers based on the composition of the active interactive environment. The researcher explains this result to the lack of training of Arabic language teachers on practices that stimulate creativity within the classroom.

**Area III: The Focus of Innovative Teaching Methods**

**Table 8:** Arithmetic averages and standard deviations of paragraphs on the axis of innovative teaching methods are ranked downward according to arithmetic averages.

Level	Standard deviation	Arithmetic Average	Paragraphs	Number	Grade
medium	0.913	3.65	Design teaching methods that allow students to generate diverse ideas	14	1
medium	0.980	3.62	Teacher raises students' attention to problems and attitudes that require renewed and diverse responses	15	2
medium	1.193	3.57	The teacher encourages students to imagine understanding lessons in different courses.	13	3
medium	1.243	3.47	Encourages students to give non-traditional interpretations of different attitudes	16	4
medium	1.184	3.40	Interested in revealing the news in the decisions	17	5
medium	0.825	3.54	The hub of innovative teaching methods	<i>Total</i>	

Table (8) shows that computational averages ranged from (3.40-3.65), with paragraph (14) stating that "teaching methods that allow students to generate divergent ideas" are designed in the first place with average arithmetic of (3.65), while paragraph (17) reads "Attention to the disclosure of new courses" in the last grade with average arithmetic of (3.45). The calculation of the axis of creative teaching methods averaged 3.54, because of secondary teachers' use of strategies that enhance innovative thinking skills.

**Area IV: Focus on activities supporting and stimulating innovation.**

**Table 9:** Computational averages and standard deviations of paragraphs on the axis of activities supporting and stimulating innovation are downward ranked.

Level	Standard deviation	Arithmetic Average	Paragraphs	Number	Grade
medium	1.058	3.58	Students are asked to write reports of activities and projects in an innovative form	19	1
medium	1.159	3.53	Students are asked to produce representational scenarios that reflect the subjects they study	20	2
medium	1.152	3.51	The teacher requests students to cartoons related to the subject of the lesson.	18	3
medium	1.045	3.51	Give students homework to develop creativity and relate to their interests and realities	21	3
medium	1.114	3.44	Students are asked to write a summary or idea in an innovative way about the lesson	22	5

Level	Standard deviation	Arithmetic Average	Paragraphs	Number	Grade
medium	0.875	3.51	The focus of activities supporting and stimulating innovation	Total	

Table (9) shows that the calculation averages ranged from (3.44-3.58), with paragraph (19) stating that "students are required to write reports of activities and projects in an innovative form" in the first place with an average calculation of (3.58), while paragraph (22) reads "Students are required to write a summary or idea in an innovative manner of the lesson" in the last grade and with an average calculation. The computational average of the axis of activities supporting and stimulating innovation was 3.51. The researcher explains that although the nature of the courses requires teachers to activate non-classroom and classroom activities to achieve the desired goals, teachers neglect this and focus on the teaching of the subject and neglect all these activities.

### Question II: Is there a statistically significant relationship between innovative thinking-inducing educational practices and the development of high school students' innovative thinking skills?

To answer this question, the computational averages, and standard deviations of the extent to which teachers exercise the means to develop innovative thinking skills in teaching at the secondary level have been extracted from the perspective of their teachers.

**Table 10:** Pearson correlation transactions between hubs of practice Educational Motivating Innovative Thinking and Innovative Thinking Skills Axes

Perception of Details	Authenticity	Flexibility	Fluency	Innovative Thinking Methods Practices Educational Stimulating Innovative Thinking
** .778	** .774	** .842	** .897	Class Questions
** .875	** .798	** .767	** .786	The centerpiece of the classroom environment
** .788	** .703	** .809	** .876	Pivot to innovative teaching methods
** .931	** .782	** .754	** .709	activities supporting and stimulating innovation
.*Correlation is significant at the (0.05) level.				
.**Correlation is significant at the (0.01) level.				

Table No. 10 shows that there is a statistically positive relationship between the dimensions of innovative thinking skills and educational practices that stimulate innovative thinking among secondary students, where the coefficient of association reached (0.897). Between the classroom environment, centerpiece style, and fluency skill is a positive relationship, as evidenced by a positive relationship between the classroom question axis and students' flexibility skill where he reached the coefficient of association (0.842). and a positive correlation between the centerpiece of innovative teaching methods and authenticity skills, where the coefficient of association has reached (0.774), as well as a positive correlation between the axis of supportive and innovative activities and the skill of understanding the details, where he reached the coefficient of association (0.778) It is a DAL link at the level of (0.01) and so we find that whenever there is a good classroom environment and open-ended classroom questions and appropriate teaching methods and supportive activity to practice innovation whenever it helps to have a generation with innovative thinking skills.

## 5 Discussion

The results of the current study indicated that educational practices for secondary school teachers that help students to think creatively are carried out at a medium level, indicating the need for attention to prepare and qualify teachers in Saudi Arabia and their mastery of educational skills that stimulate students' innovative thinking through ongoing training courses based on methods and strategies to develop innovative thinking in students. Despite Saudi Arabia's interest in promoting thinking and integrating all skills into different courses at the secondary level, the majority of teachers do not practice methods that develop innovative thinking skills., Also, the lack of awareness of samongondary teachers in Saudi Arabia about the importance of class questions and their employment in a way that promotes innovative thinking such as diverse and unspecified open-ended questions that provide students with the opportunity to

differentiate responses, thereby developing their innovative thinking, the researcher explains this finding that teachers have become accustomed to the practice of traditional methods. The result of the current study agreed with the outcome of the study [31], which concluded that the estimates of first students to the degree of eloquence teachers practicing methods of developing creative thinking were moderate, as was the result of the current study with the result of the study [32], which concluded that the estimates of students practicing methods of thinking by teachers were medium, and the estimates of teachers were medium. On the other hand, some results differ from the current study as [33], which found that the use of effective teaching methods encourages students to use creative thinking skills to a relatively high degree. The design of calendar techniques provides opportunities to apply creative thinking skills and promotes creative students. From the researchers' perspective and experience, we see that an institution that wants to develop innovative thinking skills must have centered learning, and that the curriculum and its enriching activities are based on mind and mental activity in turn, this contributes to the development of the creative thinking of learners by raising their attainment level, understanding the issues facing them in their daily lives and being able to solve their different problems, and must offer thought-provoking curricula and an attractive school system for students. You support the learner and encourage him to try and do the maximum effort and get used to failing, and finding alternatives to solve problems so that students enjoy the learning process, what to learn, master, and learn about Attention must also be paid to all components: curriculum, environment, means, teacher, school methodology, method, teaching skills, etc., to become elements with effective advantages in raising students' internal motivations to overcome all impediments to love and enjoyment of learning, We enjoy our sights by welcoming students to their schools happily and excitedly, and cheering them on to learn with love. From the Sea of Science, research, insight, and thought-provoking strategies explore their potential. To produce their best, they occupy a prestigious place in the power of creativity and innovation.

## 6 Conclusion

Based on the results of the study, researchers recommend that secondary school teachers should be trained in the use of innovative thinking skills in students through training courses and the preparation of a guide for teachers that includes methods of developing innovative thinking and skills and creating an educational environment that allows teachers to practice innovative thinking methods during the educational process, as well as other studies on teachers' practices and their relationship to the development of other patterns of thinking such as critical thinking and the development of software that develops innovative thinking skills in students at different stages of education.

## Reference

- [1] Axenbeck, J., & Breithaupt, P. (2021). Innovation indicators based on firm websites-Which website characteristics predict firm-level innovation activity? *PloS one*, 16(4), e0249583.
- [2] Noval, Mohammed Bakr (2009). *Serious creativity concepts and applications*, Oman: Center Debono.
- [3] Dakani, Amal (2019). *Methods of developing creative thinking among pupils in the third year of primary school*, master's thesis unpublished, University of Akle Muhandad Olhaj, Republic of Algeria.
- [4] Nedellec, C. M. (2015). *Teachers' understanding of differentiated instruction in Swiss elementary schools*, Doctoral dissertation, Capella University.
- [5] Runco, M. A. (2003). Education for creative potential. *Scandinavian Journal of Educational Research*, 47(3), 317–324.
- [6] Gergen, K. J. (2015). An invitation to social construction. *An Invitation to Social Construction*, 1-272.
- [7] Hameed, W. U., Nisar, Q. A., & Wu, H. (2021). Relationships between external knowledge, internal innovation, firms' open innovation performance, service innovation, and business performance in the Pakistani hotel industry. *International Journal of Hospitality Management*, vol. 92.
- [8] Campbell, D. T. (1960). Blind variation and selective retention in creative thought as in other knowledge processes. *Psychological Review*, 67, 380–400.
- [9] Torrance, E. P. (1977). *Creativity in the classroom: What research says to the teacher*. Washington, DC: National Education Association.
- [10] Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.

- [11] National Advisory Committee on Creative and Cultural Education (NACCCE). (1999). All our futures: Creativity, culture, and education. London: Department for Education and Employment.
- [12] Prentice, R. (2000). Creativity: A reaffirmation of its place in early childhood education. *The Curriculum Journal*, 11(2), 145–158.
- [13] Torrance, E. P. (1963). Education and the creative potential. Minneapolis: The University of Minnesota Press.
- [14] Csikszentmihalyi, M. (1997). Creativity. Flow and psychology of discovery and invention. New York, NY: Harper Perennial.
- [15] Koestler, A. (1964). The act of creation. New York: Penguin Books.
- [16] Awad, Mohamed Anas. (2014). Degree in the Practice of Eloquence Teachers of Methods of Developing Creative Thinking from the Point of View of Students of the First Grade General Secondary School in Damascus, *Journal of the Islamic University for Educational and Psychological Studies*, (4), 283-304.
- [17] Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, 69, 220–232.
- [18] Csikszentmihalyi, M. (2008). Flow – The psychology of optimal experience. New York, NY: HarperCollins.
- [19] Dahlberg, G., Moss, P., & Pence, A. (2007). Beyond quality in early childhood education and care: Languages of evaluation. London: Routledge.
- [20] Ershadi, M., & Winner, E. (2020). Children's creativity. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (Vol. 1, pp. 144–147). London: Academic Press.
- [21] Wallas, G. (1926). The art of thought. New York: Harcourt Brace.
- [22] Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four C model of creativity. *Review of General Psychology*, 13(1), 1–12.
- [23] Dietrich, A., & Haider, H. (2015). Human creativity, evolutionary algorithms, and predictive representations: The mechanics of thought trials. *Psychonomic Bulletin & Review*, 22, 897–915. doi:10.3758/s13423-014-0743-x
- [24] Sternberg, R. (2006). The nature of creativity. *Creativity Research Journal*, 18(1), 87–98.
- [25] Beaty, R. E., Benedek, M., Wilkins, R. W., Jauk, E., Fink, A., Silvia, P. J., & Neubauer, A. C. (2014). Creativity and the default network: A functional connectivity analysis of the creative brain at rest. *Neuro psychology*, vol. 64, 92–98.
- [26] Beaty, R. E., Silvia, P. J., Nusbaum, E. C., Jauk, E., & Benedek, M. (2014). The roles of associative and executive processes in creative cognition. *Memory & Cognition*, vol. 42, 1186–1197.
- [27] Finke, R. A., Ward, T. B., & Smith, S. M. (1992). *Creative cognition: Theory, research, and applications*. Cambridge: MIT Press.
- [28] Heilman, K. M. (2016). Possible brain mechanisms of creativity. *Archives Clinical Neuropsychology*, vol. 31, 285–296.
- [29] Hélie, S., & Sun, R. (2010). Incubation, insight, and creative problem solving: A unified theory and a connectionist model. *Psychological Review*, 117, 994–1024.
- [30] Kalliala, M. (2011). Look at me! Does the adult truly see and respond to the child in Finnish day-care centers?, *European Early Childhood Education Research Journal*, 19(2), 237-253.
- [31] Kudryavtsev, V. (2011). The phenomenon of child creativity. *International Journal of Early Years Education*, 19(1), 45–53.

- [32] Pétervári, J., Osman, M., & Bhattacharya, J. (2016). The role of intuition in the generation and evaluation stages of creativity. *Frontiers in Psychology*, 7, 1420.
- [33] Reunamo, J., Lee, H.-C., Wang, L.-C., Ruokonen, I., Nikkola, T., & Malmström, S. (2014). Children's creativity in daycare. *Early Child Development and Care*, 184(4), 617–632.