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Breakthrough Thinking Among Graduate Students

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Abstract

The present study aims to explore breakthrough thinking among postgraduate students and examine differences based on gender (male-female) and specialization (scientific-humanities). To achieve the study's objectives, the researchers adopted the Breakthrough Thinking scale developed by Gerald Puccio (translated by Hanoun, 2018). This scale is based on Puccio's insight theory, which defines breakthrough thinking as "deep thinking, clarification, and development around a problem to achieve an optimal solution" (Puccio, 2011). The final version of the scale consists of 36 items distributed across four dimensions. The study was conducted on a sample of 300 postgraduate students from various colleges at the University of Thi-Qar, including 143 males and 157 females, selected through a stratified random sampling method. The scale items were analyzed logically and statistically to determine their discriminative ability and validity coefficients. The researchers verified the scale's face validity, construct validity indicators, and reliability using test-retest and Cronbach's alpha methods, utilizing the SPSS statistical package. The results indicate that postgraduate students possess a high level of breakthrough thinking. Additionally, there are statistically significant differences based on gender in favor of females and based on specialization in favor of humanities students. Based on these findings, several recommendations and suggestions were proposed, including integrating breakthrough thinking strategies into postgraduate curricula to enhance critical thinking and innovative problem-solving. Furthermore, academic advisory programs should be developed to support students in cultivating breakthrough thinking skills.

Keywords: Breakthrough Thinking, Brainstorming, Penetrative Thinking, Postgraduate Students.

Introduction

We live in an era where life's challenges have become increasingly complex, demands have grown, pressures have intensified, and ambitions have multiplied. These factors, among others, have placed postgraduate students in situations requiring appropriate solutions. Students who lack breakthrough thinking find it difficult to resolve their problems, leaving them unable to tackle the challenges they encounter due to their conventional way of thinking (Saleh, 2000:3).

The ability of students to develop breakthrough thinking skills in the face of academic pressures and environmental constraints may be negatively influenced by factors such as curricula, teaching methods, and institutional support. Thinking in an unconventional and breakthrough manner is a fundamental trait of postgraduate students, given the nature of academic life and the educational and research tasks it entails (Al-Mubarak, 2009:4). Achieving this requires advanced levels of breakthrough thinking while reducing mental rigidity and cognitive inflexibility. Empirical studies conducted by psychologists confirm that low levels of breakthrough thinking hinder students' problem-solving skills (Debono, 2012:2).

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A decline in breakthrough thinking leads to difficulties in problem-solving within educational and professional environments. It also impairs students' ability to critically and innovatively analyze situations. Moreover, excessive reliance on the internet and social media may further obstruct breakthrough thinking.

The researchers' focus on breakthrough thinking among postgraduate students is driven by several reasons, primarily the concern that low levels of breakthrough thinking prevent students from generating innovative solutions to complex problems, thereby leaving them unable to address the challenges they face. Based on this premise, the current study seeks to answer the following research question: Do Postgraduate Students Possess Breakthrough Thinking?

Theoretical Framework

University education plays a crucial role in the cognitive, intellectual, psychological, spiritual, ethical, and social development of students in general, and postgraduate students in particular. As students enhance their cognitive and intellectual performance, their academic, economic, social, and ethical productivity improves. This, in turn, elevates their lifestyle, increases their active engagement in society, enables them to utilize their free time productively, and equips them with the ability to selectively acquire valuable information by referring to the most credible and rigorous scientific sources (Al-Zamili, 2022: 13).

Thus, the university serves as an educational institution that uniquely leads society by preparing well-trained and highly qualified professionals across various disciplines. These individuals are groomed to assume leadership positions in different fields of life. Additionally, these academic elites play a pioneering role in conducting applied and field research that addresses societal challenges, thereby acting as a driving force for progress and development (Al-Kubaisi & Abdul Rahman, 1991: 3-5).

Postgraduate students represent the true foundation of scientific and professional cadres, on whom great expectations are placed. They are considered a vital intellectual reserve for any society striving for advancement and prosperity. Therefore, rigorous selection processes are implemented to admit only the most distinguished candidates into postgraduate programs that award advanced degrees (Higher Diploma, Master's, or Ph.D.), particularly in specialized and rare fields.

This study aligns with the admission criteria for postgraduate education, as it examines a significant psychological variable—breakthrough thinking. The ability to engage in breakthrough thinking is essential for postgraduate students, as it constitutes a fundamental prerequisite for creativity and innovation (Bannett & Mueller, 2005).

Breakthrough Thinking and Its Importance for Graduate Students

The academic performance of graduate students requires a high level of intellectual effort to accomplish academic tasks and assignments, which are fundamental to fulfilling the requirements for obtaining their designated academic qualifications. This intellectual effort necessitates a significant degree of creativity, which cannot be achieved without the most crucial and fundamental component—breakthrough thinking (Zamili, 2022: 12).

Breakthrough thinking plays a vital role in enhancing students' insightfulness in solving complex and intricate problems that they encounter in their academic and professional lives (Alwan, 2005: 21). By experimenting with multiple approaches and solutions, students can reconstruct their thought processes creatively, allowing them to transition from an inductive, analytical, and

deconstructive mode of thinking to a deductive, synthetic, and constructive approach, ultimately fostering the desired creative behavior (Roshka, 1989).

Breakthrough thinking is one of the fundamental elements that contribute to innovation and progress in various academic and professional fields. With the increasing demand for innovative solutions to address contemporary challenges, understanding how to develop and enhance breakthrough thinking among graduate students becomes essential. These students represent the next generation of thought leaders and practitioners in their respective disciplines; thus, their ability to think innovatively is critical to achieving success and excellence.

Breakthrough thinking enables graduate students to develop novel and innovative ideas, thereby enhancing their research capabilities and problem-solving skills. As they often face complex academic and research-related challenges, this mode of thinking helps them analyze issues from multiple perspectives and generate unconventional solutions (Starko, 2017: 68). Additionally, it improves communication skills by fostering the exploration of new viewpoints and the sharing of innovative ideas with peers and faculty members. Furthermore, it enhances intellectual flexibility, making students more receptive to new ideas and theories (Borysiuk, 2024: 65), and strengthens their research skills by encouraging unconventional thinking approaches, enabling them to access new sources and data, ultimately improving the quality of their research. Moreover, it aids in achieving academic and professional goals, as those who excel in their academic fields are more likely to secure employment and achieve professional success after graduation (Lewis & Grigg, 2018: 71).

Thinking styles are an essential set of skills necessary for engaging with diverse and unfamiliar cultures. Each individual possesses a unique thinking style and personal cultural framework, necessitating the ability to observe, understand, accept, and communicate effectively across different cultural and intellectual paradigms. This competency allows individuals to shape their ethical convictions in a professional and adaptive manner that aligns with their surrounding environment. These thinking styles influence how individuals "store" their experiences, and by learning to regulate their thought processes, they gain the ability to construct the life and career they aspire to achieve (Al-Zaghloul & Al-Zaghloul, 2003: 62).

Based on the above, the researchers believe that there is a pressing need to give significant attention to the research variable at present, given the major transformations occurring in various aspects of life, which have had a profound impact on society in general and on graduate students in particular.

From the discussion presented, the significance of the current research can be summarized in both theoretical and practical terms as follows:

1. The study helps clarify the concept of breakthrough thinking (creative thinking that goes beyond conventional solutions).

2. The importance of breakthrough thinking, as it is a core concern in educational psychology due to its relevance at all levels of cognitive and social activity, as well as its role in problem-solving and idea generation.

3. The research findings could contribute to improving graduate curricula by incorporating strategies that enhance breakthrough thinking.

4. The study provides deeper insights for academic institutions on how to develop creative skills among graduate students, ultimately producing graduates who are capable of finding solutions to challenges in professional environments.

Research Objectives

The present study aims to:

1. Identify breakthrough thinking among graduate students.

2. Examine the significance of differences in breakthrough thinking among graduate students based on gender (male-female) and field of study (scientific-humanities).

The current study is limited to graduate students at the colleges of the University of Dhi Qar for the academic year (2024-2025).

Definition of Terms:

Breakthrough Thinking (Breakthrough Thinking) as Defined by:

• Nader (1998):

"A new programming of the brain and a novel process of planning and designing solutions to challenges faced by individuals, enabling them to clarify their vision and reach solutions effortlessly without the need for extensive data collection." (Nader, 1998: 7).

• Puccio (2002):

"An individual measure that defines a person's cognitive decision-making priorities, allowing access to new, unprecedented, and unexpected ideas. It is used for problem-solving in various fields, significantly increasing the likelihood of developing or applying an effective innovative solution." (Puccio, 2002: 2).

• Bozeman (2005):

"A revolutionary new approach to creative problem-solving that leads to original and lasting solutions. It does not merely address immediate problems but also provides a solid foundation for continuous improvement and constructive change. It serves as an alternative to classical problem-solving methods by offering a systematic planning approach." (Bozeman, 2005: 22).

• **Puccio (2011):** "Deep thinking, clarification, and development of a problem to achieve an optimal solution." (Puccio, 2011: 4).

3. Theoretical Definition:

The researcher adopts Puccio's (2011) definition, as he is the originator of the adopted theory.

Operational Definition:

Breakthrough thinking is defined as the total score obtained by participants in the research sample on the breakthrough thinking scale used in this study.

Concept of Breakthrough Thinking

Thinking is one of the distinguishing characteristics of humans compared to other living beings. It is a complex process with multiple dimensions, and scholars have offered various perspectives on its nature, reflecting the intricate and multifaceted operations of the human mind. Thinking

occurs as a sequence of mental activities carried out by the brain when it encounters stimuli received through one or more of the five senses. It involves the search for meaning, requiring deep contemplation and reflection on the components of a given situation or experience. Through thinking, individuals interact with their environment, processing situations and challenges even without overt physical action. It is a cognitive behavior that utilizes symbolic representations of absent objects and events that can be recalled, imagined, or envisioned (Al-Amiri, 2018: 2).

Breakthrough thinking, sometimes referred to as lateral thinking or divergent thinking, is a form of creative thinking that encourages exploring solutions or ideas from unconventional perspectives. Rather than following established methods or recognized solutions, breakthrough thinking seeks to examine problems differently and overcome barriers to creativity. This approach involves the use of imagination and experimentation, often leading to innovations and novel ideas (Elder & Paul, 2014).

Some of the key strategies associated with breakthrough thinking include brainstorming defined as a group creativity technique where members generate ideas and solutions spontaneously (Al-Dakhil, 2005: 35)—as well as employing analogies and exploring alternative solutions. These methods enhance the ability to view problems from fresh angles, which is crucial in various fields such as business, arts, and education (Runco, 2004: 70-75).

Charles Nadler took a different approach to defining thinking after observing how individuals solve problems and break away from conventional patterns. He introduced the term breakthrough thinking, describing it as a systematic concept for strategic creative planning (Billou & Souter, 2007: 98).

The Emergence of Breakthrough Thinking

The origins of breakthrough thinking date back several decades and have evolved gradually over time. This methodology for problem-solving emphasizes individual creativity and iteration to understand problems and develop innovative solutions. The roots of breakthrough thinking can be traced to design movements in the 20th century, particularly in architecture and industrial design during the 1960s and 1970s. Designers and engineers began developing more user-focused methodologies, such as "Participatory Design" and "Human-Centered Design" (Martin, 2009: 78).

Herbert Simon (1969), in his book *The Sciences of the Artificial*, introduced fundamental concepts about the design process as a form of problem-solving. His work laid one of the intellectual foundations for breakthrough thinking (Simon, 1969).

Historically, the concept of breakthrough thinking emerged in response to a major agricultural crisis in the United States during the 1970s. At the time, agricultural scientists and experts struggled to find a solution to a devastating problem caused by the (moth) insect, which was consuming vast agricultural lands. Despite their efforts, experts failed to eliminate the threat (Baseman, 2000: 65).

In 1973, the U.S. Congress, along with representatives from the United Nations, pressured the agricultural engineering sector to take immediate action before the pest completely devastated American farmland (Nadler, 1998: 35). Teams were formed to study the insect, its spread, and its impact on agriculture if left unchecked.

By 1977, after years of research without a viable solution, one of the participants, demonstrating courage and initiative, reached out to Nadler (1998) at Hustcon University in the United States, stating, "We have gathered enough information about the insect and its environmental effects, but we have not yet found a solution to combat it."

Nadler responded, pointing out that the problem was not the amount of information but how it was organized. He suggested that those engaging in breakthrough thinking should follow these key principles:

- 1. Avoid involving unsuitable individuals in the problem-solving process.
- 2. Refrain from solving problems using incorrect methods.
- 3. Do not adhere to false assumptions about the problem.
- 4. Focus on solving the intended problem rather than unrelated issues.
- 5. Accept effective and practical solutions.

Thus, breakthrough thinking allows individuals to reach unprecedented and unexpected solutions. It relies on planning and design to address challenges, transforming ideas into actions. This approach is applicable across various fields and significantly increases the likelihood of developing or implementing effective and innovative solutions (Nadler, 1998: 35-36).

The Evolution and Principles of Breakthrough Thinking

During the 1980s, researchers at Stanford University began developing educational methodologies that emphasized design as a thinking process. This led to the establishment of the Stanford Design Institute, which was dedicated to teaching breakthrough or design thinking (Stanford, 1981).

The 1990s witnessed further expansion in this field, with Tim Brown (2008) playing a significant role in promoting breakthrough thinking through his leadership at the global design firm IDEO. Brown introduced the concept of "design thinking" as a method for developing human-centered products and services (Brown, 2008).

Principles of Breakthrough Thinking

The term *breakthrough thinking* first emerged in the United States in 1977 when it was used to address the agricultural crisis caused by the moth insect. This event demonstrated the importance of innovative thinking in problem-solving. In 1979, academic and governmental delegations in the U.S. convened to formally introduce the concept of breakthrough thinking into education and pedagogy.

According to Puccio (2002:10), effective breakthrough thinking requires the application of at least two of its seven core principles. Due to human limitations, it is unrealistic to apply all principles simultaneously. These principles are as follows:

1. **Uniqueness Principle**: Every problem is unique and should be approached based on its specific context and requirements.

2. **Purpose Principle**: Identifying the core objective of a problem helps avoid distractions and irrelevant considerations.

3. Next Solution After the Current One Principle: The ideal solution often emerges after an initial solution has been identified, as the first attempt provides clarity for developing a more refined and innovative approach.

4. **Systems Principle**: A problem should be viewed as part of a broader system. Understanding this system's components and dimensions aids in diagnosing key considerations for potential solutions.

5. **Limited Data Collection Principle**: Excessive data collection can obscure viable solutions by overwhelming the problem-solving process with unnecessary information.

6. **Human Organization Principle**: Teams composed of specialists from diverse fields are more successful in problem-solving, as they bring varied perspectives and knowledge sources.

7. **Timing of Improvement Principle**: A solution must be continuously refined and improved to remain effective and impactful (Al-Taie, 2020: 18-19).

These principles collectively provide a structured framework for fostering creativity and innovation in problem-solving across various disciplines.

4. Theories Explaining Breakthrough Thinking

1. TRIZ Theory (1946)

TRIZ Theory (theory of inventive problem solving) is a systematic methodology that aims to solve problems in an innovative, non-classical manner. It is based on a broad knowledge base and focuses on human cognition directly, providing individuals with the tools necessary to maximize their mental capabilities to solve problems in exceptional and extraordinary ways (Qutayt, 2011: 233).

This theory is designed to help individuals think innovatively by supplying mechanisms that enhance their capacity to solve challenges through non-traditional approaches (Ghabayn, 2008: 66).

TRIZ, introduced in 1946 by Genrich Altshuller, is a technique developed through an extensive knowledge base. The strength of TRIZ, as described by practitioners in various fields, lies in its reliance on multiple systems that have been developed effectively and successfully. Moreover, it allows individuals to overcome psychological barriers and limitations, preventing them from focusing solely on a narrow scope of work. TRIZ gathers successful methods and strategies from diverse fields of human activity and reinterprets them into a set of tools applicable across various domains (Abu Jado and Nofal, 2007: 393).

TRIZ involves a comprehensive set of techniques for problem-solving and stands out from other theories due to its unconventional and unique methods that foster creative, breakthrough thinking. It cultivates the ability and motivation to think in a breakthrough manner (Qutayt, 2011: 234).

Over time, TRIZ has proven successful in finding solutions to problems in all areas of human activity, following several developmental stages, which can be outlined as follows:

Development Stages of TRIZ Theory

1. Traditional TRIZ Stage (1946-1985)

In the early phase, **Henry Altshuller** began his research and studies on the TRIZ theory in **1946**, which continued until **1985**. During this period, TRIZ primarily focused on technological issues and problem-solving methods in technological fields. However, Altshuller later halted his research in technology, believing that this classic phase had ended. He argued that it was time to transition into a new phase, one that would focus on applying TRIZ in non-technological fields.

2. Contemporary TRIZ Stage

The contemporary phase of TRIZ is divided into two sub-stages:

• First Sub-Stage (1985-1990): During this period, the focus of TRIZ expanded, and new methods and applications were explored, moving beyond the traditional technological boundaries.

• Second Sub-Stage (1990-Present):

This phase marked the global dissemination of TRIZ, especially as it entered Western countries. By the early 1990s, TRIZ became widely known in over 28 countries, with its principles being taught in more than 45 universities worldwide. Additionally, thousands of websites in English began to discuss and promote TRIZ methodologies (William, 2005: 89).

The main goal of the TRIZ problem-solving process is to be teachable at various levels, adaptable to the capabilities and interests of individuals. It is used in a broad range of subjects, such as mathematics, and highlights problem-solving and the role of language in various disciplines (Abu Jado and Nofal, 2007: 396).

TRIZ is a knowledge-based framework rooted in cognitive assumptions that guide individuals in arriving at solutions to problems using principles such as:

- Principle of Generalization
- Principle of Integration
- Principle of Penetrating Materials
- Principle of Transition from One State to Another
- Principle of Using the Spatial Properties of System Components

2. Insight Theory (1994)

The Insight Theory emerged in 1994, developed by Puccio. He was a professor and the head of the Department at the International Center for Studies in Creativity and is known for writing over 50 papers. Among his most notable works, co-authored with Chris Grivas, is the book titled "Innovative Teams", where they applied tools for creative thinking.

Puccio's research bridged the gap between an individual's behavior and their creative preferences when solving problems or finding creative solutions. After ten years of research, along with a group of researchers, Puccio developed his theory, which he termed Insight Theory. The foundation of this theory is based on a process called CPS (Creative Problem Solving), a model that provides individuals and teams with the ability to:

- Analyze problems
- Refine and generate ideas

- Master action plans
- Implement them more effectively to achieve the ideal solution

The Insight Theory is seen as a more refined and developed version of the Creative Problem Solving model, and it offers a methodology for recognizing and measuring individuals' preferences and thinking patterns. This theory focuses on understanding the four main components that influence creative problem-solving abilities (Billout, 2007: 103).

Objective of the Insight Theory:

The primary objective of the Insight Theory is to assess the mental processes individuals go through during the stages of **Creative Problem Solving** (CPS). These stages are divided into:

1. **Data Collection**: Searching for and gathering relevant information related to the problem.

2. **Idea and Solution Generation**: Producing new and innovative ideas for solving the problem.

The Insight Theory was tested over a span of 7 years by Bocchio and his colleagues, who applied and experimented with it on over 1,000 individuals. In 2011, they published the second edition of their book, "Creative Leadership", which discusses the skills that drive change. In recognition of his groundbreaking work, Bocchio received the Recognition Award from New York University, as well as the President's Medal for Scholarly and Creative Achievements (Puccio, 2002: 33).

In 2012, Bocchio was selected by Educational Company as one of America's top lecturers and was invited to design and deliver a training course consisting of 24 videos of 30 minutes each.

Testing and Validity of the Insight Theory:

As part of testing the validity of the Insight Theory, Wheeler analyzed the interaction of a group of individuals during the CPS training, based on the theoretical foundation of the CPS Creative Model. The research showed varying responses from individuals with different orientations to the same training content or session. Moreover, the analysis of student interactions with the CPS course revealed differences in individual responses based on their Insight orientations (Wheeler, 2001: 58).

Innovation and Insight Tools:

Innovation and Insight tools help individuals effectively confront challenges. They are also used by teams and organizations to find innovative solutions to problems, build strong teams, and strengthen relationships.

Kirton's Adaption-Innovation (KAI) Inventory:

Kirton's Adaption-Innovation (KAI) Inventory is a method to express an individual's creative style. The results of correlating KAI with Insight revealed three major outcomes, indicating that the fourth Insight factor is unbiased toward either KAI or innovative style, with both holding equal value.

Myers-Briggs Type Indicator (MBTI):

The Myers-Briggs Type Indicator (MBTI) was developed in 1985 based on Carl Jung's model. The MBTI includes four main psychological measurements:

1. **Individual's orientation to the world**: Whether the individual leans towards interacting with the external world or the internal world.

- 2. **Preference for information gathering**: How individuals prefer to collect information.
- 3. **Decision-making style**: The approach individuals take to make decisions.
- 4. Life structure: How individuals organize their daily lives (Puccio, 2002).

CPS Problem-Solving Inventory:

In 1990, Pasador, Krain, and Wakabayashi developed the CPS Problem-Solving Inventory as a tool to measure the ability to solve problems creatively.

This measurement has been developed to evaluate the different priorities in Pasador's 8-Stage Model (CPS). Similar to Pasador's models, the Insight Function describes specific activities linked to the four priorities of CPSC, which is based on a theory derived from the simple Pasador model, containing two measurements of information: the first focuses on how an individual acquires information, while the second concerns how they use it (Puccio, 2000: 23).

The fourth measurement of Insight Theory is based on Descriptive Testing (ACL), developed by Hugh and Heilbrun in 1983, aiming to study creative personality at the Personality Building and Research Institute. The four Insight Priority Measurements help identify breakthrough thinking in individuals. Across all measurements, creative personality is linked to the fourth Insight Theory, based on all creative abilities.

The second validation of Insight Theory (2001) involved William testing an individual's reaction to the CPS Model. The research showed that individuals from different Insight Theory groups responded differently to the same content. The Insight Preferences for breakthrough thinking are based on the Creative Problem-Solving (CPS) Process Model. The Creative Problem-Solving (CPS) model, created by Alex Osborn in 1953, is a systematic process that helps individuals and teams analyze problems, generate and refine ideas, and implement action plans more effectively. Ultimately, the CPS Process allows individuals and teams to unlock their full creative potential.

The CPS Model has a long history, originally conceived by Alex Osborn and developed through nearly 50 years of research. When Alex Osborn worked on developing the creative thinking tool Brainstorming, he retired from his executive position at one of the largest advertising companies. Upon retirement, he focused intensely on proving that creative thinking could be developed, mainly through the development and testing of CPS. Today, CPS is one of the most widely used and highly regarded models for creative thinking and breakthrough thinking development worldwide.

The benefit of the Insight Theory is that it enables individuals to face challenges effectively. It is used by individuals, groups, and organizations to find optimal solutions to problems and build strong communities. Analysis has shown that students' reactions to CPS within a single course can vary based on their Insight priorities. This method is an excellent tool for developing ethical decision-making, cognitive style, skill development, and moral performance. The cognitive style

in skill development is an overlapping process that combines both perceptual awareness and effective measurement (William, 2005).

An effective physical educational approach must address both the cognitive and skill-based aspects of an individual according to the psychological cognitive school. This school has produced continuous, comprehensive information-processing operations across various fields, encouraging the study of cognitive processes that directly collaborate with education. It promotes continuous progress toward high performance levels to achieve desired goals. There is little doubt about the potential of education to excel in skill performance, enabling individuals to reach the highest levels of self-confidence and success through the perception of various situations—whether through what they think or what they do not think, as mentioned earlier. This process allows for tracking the individual's subsequent performance during and after events.

An example of this would be the two types of steps an individual takes: the personal (closed) step and the personal (open) step. These types are available in the athletic field, depending on the information available during the process, which requires effort at every step. Any failure at any stage of the process leads to poor performance. The cognitive process of external steps includes decision-making and solving problems more rapidly (Barg, 1981).

Breakthrough thinking has been classified as one of the revolutionary new methods for solving problems creatively. According to Insight Theory, breakthrough thinking involves five stages:

1- Defining the purpose: This refers to understanding the specific task that the solution system will achieve in practice.

2- Generating possible solutions: This is how to reach the goals without restrictions on resources and time.

3- Testing the goal plan: This phase takes the ideas from the second phase and transforms them into ideal plans or solution systems.

4- Specific details: The goal of this fourth phase is to develop the details of the goal system and reconcile exceptions to the rule.

5- Implementation and evaluation: Preparation and readiness for execution may involve simulating, developing, and testing the practical components and determining the tools, profession, and time (Vogel, 2005:90).

Components of Breakthrough Thinking:

According to Insight Theory, the components of breakthrough thinking are divided into four components, as shown in figure (1):



Figure (1): Components of Breakthrough Thinking

1- **Developer Thinking**: These individuals enjoy spending time analyzing latent solutions, breaking them down, and testing their strengths and weaknesses. They take raw ideas and turn them into practical, easy-to-implement concepts. They may take more time to reach the best possible solution, ensuring it is viable and easy to implement. Developers are characterized by their ability to create workable solutions, their desire to measure the positive and negative aspects of a particular idea, and their inclination to compare solutions. They enjoy analyzing solutions, planning steps, executing those steps, and spending long hours producing a complete, executable idea.

2- **Clarifier Thinking**: Clarifiers enjoy spending significant time challenging the problem, meaning they fully understand the issue before starting. Their thinking is precise and cautious to achieve the best results, and they ask simple questions while paying close attention to details. Their characteristics include enjoying presenting challenges and problems, testing details, trying to understand the problem thoroughly, using unconventional ways to solve the issue, and struggling with excessive analysis.

3- **Ideator Thinking**: These individuals are the creators of ideas and tend to have more imaginative thinking. To reach a particular idea or outcome, they approach problems with their imagination fully engaged. Ideators are flexible and fluid in their thinking, capable of generating multiple solutions to a single problem. Their desire is to produce more than one idea and potentially move from one idea to another.

4- **Implementer Thinking**: Implementers use all their energy and abilities to work and produce. They tend to rush from one step to another and lack patience in the process, meaning they may abandon one problem to jump to another (Puccio, 2011:20-24).

Justifications for Adopting the Insight Theory: The researchers adopted the Insight Theory to explain and measure the research variable (breakthrough thinking) for several reasons: 1- It clearly and simply defines the concept and provides a comprehensive interpretation of the variable. 2- The scale items were developed based on the domains of the theory. 3- It explains breakthrough thinking and illustrates how ideas can be transformed into solutions. 4- The theory emphasizes the importance of creativity and the willingness to challenge traditional ideas. 5- It highlights the importance of abstraction and analysis in developing new ideas and improving performance.

Section Two: Previous Studies: Previous studies are of great importance in enriching the research topic. The researchers presented a selection of related studies as follows:

First: Arab Studies:

Hanoon Study, 2018 : Title of the Study: Breakthrough Thinking and its Relationship 1with Persuasion Department Social among Heads. The study's objectives were to identify the degree of breakthrough thinking among department heads in the universities of the Middle Euphrates and to examine the correlational relationship between breakthrough thinking and social persuasion. The sample consisted of 250 department heads from scientific and humanitarian faculties at the governmental universities in the Middle Euphrates region, including both male and female participants, and those from scientific and humanitarian specializations. The measurement tool used was the "Puccio" scale for measuring breakthrough thinking, developed by Puccio in 2011. The results showed that the sample of department heads exhibited breakthrough thinking, and there was a positive correlation between breakthrough thinking and social persuasion (Hanoon, 2018).

2- Al-Ta'i Study, 2020

:Title of the Study: Breakthrough Thinking and its Relationship with Positive Coping among Secondary School Teachers.

The primary objectives of the study were to identify the degree of breakthrough thinking and to explore the correlational relationship between breakthrough thinking and positive coping among secondary school teachers. The sample consisted of 400 teachers (male and female). The measurement tool used was the "Puccio" scale for breakthrough thinking, developed in 2011. The results revealed that the sample possessed breakthrough thinking, and a positive relationship was found between breakthrough thinking and positive coping (Al-Ta'i, 2020).

Second: Foreign Studies

Smith Study, 2022

Title of the Study: Alternative Thinking: The Impact of Breakthrough Thinking on Problem Solving.

The primary objectives of the study were to examine the role of breakthrough thinking in enhancing creativity among university students and to explore the relationship between breakthrough thinking and problem-solving. The sample consisted of 200 university students. The measurement tool included a standardized questionnaire with measures for breakthrough thinking, problem-solving, and creative problem-solving tests. The results indicated that students with high levels of breakthrough thinking were more capable of solving problems creatively, and a positive relationship was found between breakthrough thinking and creativity (Smith, 2022).

Aspects of Benefit from Previous Studies: The scientific benefits of previous studies are as follows: 1- The researchers gained insight into previous studies, which helped them in identifying the research problem and formulating their research objectives. 2- It assisted the researchers in constructing the theoretical framework for the study. 3- It enabled the researchers to identify gaps that have not yet been addressed, thereby clarifying the importance and scientific uniqueness of the new research. 4- It provided an opportunity to compare results and examine how previous studies have found relationships between variables. 5- It offered an idea of

conclusions and recommendations that might emerge from new studies, making it easier for the researchers to propose innovative ideas or suggested solutions.

4. Research Methodology and Procedures

First: Research Methodology: The current research is based on the descriptive-correlational methodology, which involves describing what exists and providing a precise description of the phenomenon (Malham, 2010: 370).

Second: Research Community and Sample: The research community consists of 1413 individuals, distributed as 674 males and 739 females. The sample was selected using a stratified random sampling method with multiple stages, and 300 graduate students from the University of Dhi Qar were chosen. The sample consisted of 143 males and 157 females.

Third: Research Tool: After reviewing the literature and previous studies that addressed the variable of breakthrough thinking, the researchers adopted the Gerald Puccio Breakthrough Thinking Scale to measure the concept of breakthrough thinking, as translated by Hannon (2018). This scale is based on Gerald Puccio's Insight Theory (2011), which defines breakthrough thinking as "deep thinking, clarification, and development around a problem to achieve an ideal solution." The scale consists of 36 items distributed equally and sequentially across four domains: Clear Thinking, Conceptual Thinking, Developed Thinking, and Implementing Thinking. Each item is rated using a five-point Likert scale: "Strongly applies to me," "Somewhat applies to me," "Does not apply to me," "Strongly does not apply to me," and "Does not apply to me at all," with corresponding weights of (1, 2, 3, 4, 5) for positively phrased items and reverse for negatively phrased items.

Validity of the Scale Items: To verify this, the researchers presented the 36 items of the Breakthrough Thinking Scale to a panel of 39 experts for their judgment on the suitability of the items. After completing this process, it was concluded that all items of the scale were valid.

Statistical Analysis of the Breakthrough Thinking Items: To perform the statistical analysis of the items, the researchers selected a sample of 300 graduate students from the research community. Subsequently, they calculated the **discriminatory power of the items** using the correlation between each item's score and the total score on the scale, as well as the correlation between each item's score for the specific domain it belongs to.

First: Correlation Between the Item Score and the Total Score: To achieve this, the researchers used the Pearson correlation coefficient to examine the correlation between each item score and the total score for the 300 participants in the sample. By comparing the correlation values with the Pearson correlation coefficient table value of (0.11) at the (0.05) significance level and (298) degrees of freedom, it was found that all correlations were statistically significant. Table (1) shows the results.

Parag raph	coeffic ient Link	coeffic ient Link	Parag raph	coeffic ient Link	Signific ance	Parag raph	Signific ance	Signific ance
1	0.39	0.26	13	0.24	functio	25	functio	Functio
					n		n	n
2	0.45	0.34	14	0.37	functio	26	functio	Functio
					n		n	n

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1100 Breakthrough Thinking Among Graduate Students

3	0.19	0.16	15	0.38	functio	27	functio	Functio
					n		n	n
4	0.19	0.42	16	0.37	functio	28	functio	Functio
					n		n	n
5	0.34	0.38	17	0.14	functio	29	functio	Functio
					n		n	n
6	0.18	0.39	18	0.31	functio	30	functio	Functio
					n		n	n
7	0.39	0.18	19	0.35	functio	31	functio	Functio
					n		n	n
8	0.43	0.30	20	0.36	functio	32	functio	Functio
					n		n	n
9	0.45	0.26	21	0.34	functio	33	functio	Functio
					n		n	n
10	0.16	0.31	22	0.39	functio	34	functio	Functio
					n		n	n
11	0.36	0.34	23	0.47	functio	35	functio	Functio
					n		n	n
12	0.33	0.36	24	0.38	functio	36	functio	Functio
					n		n	n

 Table (1): Validity of the Breakthrough Thinking Scale Items Using the Item-Total Score Correlation Method.

Second: Correlation Between the Item Score and the Domain Score of the Breakthrough Thinking Scale:

To achieve this, the researchers calculated the correlation between each item score on the Breakthrough Thinking Scale and the total score of the domain to which the item belongs. It was found that all correlations were statistically significant when compared to the Pearson correlation coefficient table value of (0.11) at the (0.05) significance level and (298) degrees of freedom. Table (2) presents these results.

Clear thinking			Improved thinking			Executable thinking		
Signific	coeffic	Paragr	Signific	coeffic	Paragr	Signific	coeffic	Paragr
ance	ient	aph	ance	ient	aph	ance	ient	aph
	Link			Link			Link	
function	0.55	1	function	0.44	19	function	0.43	28
function	0.56	2	function	0.48	20	function	0.53	29
function	0.34	3	function	0.50	21	function	0.51	30
function	0.23	4	function	0.43	22	function	0.20	31
function	0.44	5	function	0.56	23	function	0.52	32
function	0.27	6	function	0.48	24	function	0.41	33
function	0.55	7	function	0.44	25	function	0.47	34
function	0.50	8	function	0.46	26	function	0.52	35
function	0.51	9	function	0.23	27	function	0.48	36

 Table (2): Validity of the Breakthrough Thinking Scale Items Using the Item-Domain Total Score

 Correlation Method

Psychometric Properties of the Breakthrough Thinking Scale:

1. **Face Validity:** This type of validity was achieved after the scale was presented to a group of specialists in the field of psychology for their evaluation.

2. **Reliability:** The researchers calculated the reliability using two methods:

a. External Consistency (Test-Retest Method): To determine reliability through this method, the Breakthrough Thinking Scale was applied to a sample of 40 graduate students. After two weeks, the same scale was re-administered to the same sample. The Pearson correlation coefficient was used to examine the relationship between the scores of the first and second administrations. The reliability coefficient for the scale as a whole was found to be **0.84**.

b. Internal Consistency (Cronbach's Alpha Coefficient): To calculate reliability using this method, the Cronbach's alpha formula was applied to the scores of the statistical sample (300 graduate students). The value of the Cronbach's alpha reliability coefficient was found to be 0.73.

Final Version of the Scale: The Breakthrough Thinking Scale, in its final version, consists of 36 items.

Descriptive Statistical Properties of the Breakthrough Thinking Scale: After applying the scale to a sample of 300 graduate students, the researchers obtained several statistical indicators as shown in Table (3).

Scale	Avera ge	Brok er	Line s	Standar d deviati on	Convoluti on	flatteni ng	Lowe st degre e	Highe st score
Breakthrou gh thinking	113.43	111	103	15.63	0.47	0.58	83	162

Table (3): Descriptive Statistical Properties of the Ethical Conviction Scale



Figure (2) :Distribution of Scores of the Statistical Analysis Sample on the Breakthrough Thinking Scale

5. Presentation of Results, Interpretation, and Discussion

First Objective: Identifying Breakthrough Thinking Among Graduate Students To achieve this objective, the Breakthrough Thinking Scale was applied to the research sample of 300 graduate students. The results showed that their average score on the scale was 113.43 with a standard deviation of 15.63. When comparing this average to the theoretical average (the theoretical average for the Breakthrough Thinking Scale was calculated by adding the weights of the five response options, dividing by the number of options, and multiplying by the number of items, which is 36, resulting in a total of 108), and using a t-test for a single sample, it was found that the difference was statistically significant in favour of the calculated mean, as the calculated t-value was higher than the table t-value (1.96) with 299 degrees of freedom at a significance level of 0.05.

This result indicates that the research sample of graduate students demonstrates a high level of Breakthrough Thinking. This can be interpreted through the lens of Pucccio's (2011) Insight Theory. The graduate students exhibit breakthrough thinking, meaning they provide solutions, test their strengths and weaknesses, and evaluate their impact on the overall academic environment. Moreover, they are willing to spend considerable time challenging problems and evaluating the effectiveness of proposed solutions. Their thinking is cautious, seeking the best results, and they focus on the finest details while questioning basic issues. They possess a wide imagination and offer multiple solutions to the problems they face. They invest all their energy in addressing the issue and carefully consider the proposed solutions before making a decision.

Discussion of the Results with Previous Studies:

The current results align with those of Smith (2022), who found that students with high levels of Breakthrough Thinking were more creative and effective problem-solvers (Smith, 2022).

Second Objective: Identifying the Significance of Differences in Breakthrough Thinking Among Graduate Students According to Gender (Male-Female) and Specialization (Scientific-Humanities)

To achieve this objective, a Two-Way ANOVA was used to identify the significance of differences in Breakthrough Thinking based on gender and specialization. The results indicated the following:

1. There is a statistically significant difference in Breakthrough Thinking based on gender, with females showing higher scores. The calculated F-value was 13.30, which is higher than the table F-value of 3.84 at a significance level of 0.05 and degrees of freedom (1,296).

2. There is a statistically significant difference in Breakthrough Thinking based on specialization, with humanities students showing higher scores. The calculated F-value was 5.76, which is higher than the table F-value of 3.84 at a significance level of 0.05 and degrees of freedom (1,296).

Interpretation of Results:

These results can be explained in light of the adopted theory of Breakthrough Thinking. The differences may be attributed to various social and psychological factors. The finding that females exhibit higher Breakthrough Thinking could be linked to educational methods and socialization practices that encourage girls to express their ideas more creatively. Humanities fields often require critical and analytical thinking, as well as the ability to understand the complexities of human life. Graduate female students may excel in these fields due to their experiences and passion for human and social interaction.

There might also be cultural or social influences that support women in higher education, leading to an enhancement of their Breakthrough Thinking skills. Moreover, personal inclinations might affect students' choice of specialization, with females possibly being more interested in social, ethical issues, and interaction with others, which could foster their creative thinking abilities.

Comparison with Previous Studies:

This finding aligns with the study by Smith (2022), which found that females exhibited higher levels of Breakthrough Thinking (Smith, 2022).

Second: Conclusions:

Based on the results obtained by the researchers through data analysis and discussion, the following conclusions were drawn:

1. Graduate students possess Breakthrough Thinking, as the results showed that this type of thinking enhances students' ability to develop innovative solutions to challenges, they face in their academic fields.

2. There are statistically significant differences in Breakthrough Thinking according to gender, with females showing higher levels. Additionally, there are statistically significant

differences based on specialization, with humanities students exhibiting higher levels of Breakthrough Thinking.

Third: Recommendations:

Based on the results of the current research, the researchers recommend the following:

1. It is important to integrate Breakthrough Thinking strategies into the curricula for graduate students to enhance critical thinking and problem-solving through innovative methods.

2. Encourage the exchange of knowledge by having graduate students share experiences and information with others, such as working in teams. This promotes a scientific environment capable of growth and strengthens collaboration among students to address the problems they encounter.

Fourth: Suggestions:

Considering the results of the current research and to extend it further, the researchers propose the following:

1. Develop academic guidance programs that support students in developing Breakthrough Thinking skills.

2. Conduct research on other samples and societal segments, such as (clergy, media professionals, politicians, and gifted students), and compare the findings with those of the current study.

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