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Serious creativity and smart applications in the educational process

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Abstract: The current research aims to conduct a study of the theoretical and practical elements of smart applications, along with serious creativity in the educational process, in order to achieve educational goals and improve the classroom environment for learning. In this study, smart educational applications designed to improve learning motivation and enhance individual learning were examined. The researcher used the theoretical analytical research method to answer the following questions: What is the importance of smart applications in education? What are the requirements for using smart applications in education? What is the importance of serious creativity in the educational process? What are the sources of serious creativity in the educational process? What are the skills that can be taught in serious creativity? Within the presented ideas and theories and based on previous literature and studies, The researcher recommended the necessity of providing professional development for teachers to highlight the educational value of smart applications and innovative thinking strategies.

Keywords: smart applications, Serious creativity, Education

الإبداع الجاد والتطبيقات الذكية في العملية التعليمية

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المستخلص: يهدف البحث الحالي إلى دراسة الجوانب النظرية والتطبيقية للتطبيقات الذكية إلى جانب الإبداع الجاد في العملية التعليمية بما يحقق الأهداف التعليمية ويحسّن البيئة الصفية للتعلم. في هذه الدراسة تم اختيار تطبيقات تعليمية ذكية مصممة لتحسين دافعية التعلم وتعزيز التعلم الفردي. استخدم الباحث المنهج التحليلي النظري للإجابة على الأسئلة التالية: ما أهمية التطبيقات الذكية في التعليم؟ ما متطلبات استخدام التطبيقات الذكية في التعليم؟ ما أهمية الإبداع الجاد في العملية التعليمية؟ ما مصادر الإبداع الجاد في العملية التعليمية؟ ما المهارات التي يمكن تعلمها من خلال الإبداع الجاد؟ في ضوء الأفكار والنظريات المطروحة واستنادًا إلى الأدبيات والدراسات السابقة أوصى الباحث بضرورة توفير التنمية المهنية للمعلمين لإبراز القيمة التربوية للتطبيقات الذكية واستراتيجيات التفكير الابتكاري.

الكلمات المفتاحية: التطبيقات الذكية، الإبداع الجاد، التعليم

1.1 Research Problem

Serious creativity is a form of creative thinking that enables students to solve problems in novel and bizarre ways and this allows the learners to make steps forward in solving problems. Regardless of its significance, there is a lack of educational studies on serious creativity, particularly when used with modern smart applications. This disconnect makes the importance of engaging in research that will help us understand the importance of smart applications in learning institutions, concepts, and approaches to teaching, which may assist in the development of serious creativity, Through this study, we will be in a position to describe how the combination of the two can contribute to better problem solving.

1.2 Research Objectives

1. Study smart applications in the educational process.
2. Clarify the concept of serious creativity and its contribution to solving problems.

1.3 Significance of the Study

- In its contribution to the education theory, this research will give a detailed research on the analysis of smart applications in education and explain the contribution of Serious creativity in development of problem solving skills.
- It emphasizes the intersection of modern technological tools with non-traditional cognitive strategies, offering new directions for future research on integrating smart applications and creative thinking in educational settings
- It assists teachers and instructional designers in understanding the potential of smart applications to improve learning environments.
- It presents a practical framework for the importance of promoting Serious creativity in school curricula, aligning with the demands of creative education in the 21st century.

1.4 Definition of terms

- Smart applications: A computer program that can execute a given function or functions to the learners that is executed in tablets, mobile phones or computers (Abdul Sattar, 2022).
- Serious creativity: serious creativity is identified as being able to generate new insights and multiple visions instead of using a designated course to resolve a problem or elucidate a situation. It puts emphasis on finding new perspectives of problems. Problem solving is best done using serious creativity, which can be learnt through practice and training (Hamadneh, 2014).
- Teaching: Teaching is defined as the work that teachers do to help students achieve intellectual, emotional, and emotional growth through teaching methods that combine individual and collaborative learning. It also includes active participation with various educational tools (Al-Mansour, 2011).

2. Theoretical Aspects and Previous Studies

2.1. Theoretical Aspects

2.1.1. Smart applications: The concept of intelligent applications refers to a modern field of computer science that focuses on performing functions that are capable of solving problems, making decisions, and drawing logical conclusions in simplified ways. Intelligent applications involve several key processes, including:

- Gathering information and instructions for use in the modern era.
- Drawing accurate conclusions.
- The ability to improve results based on previous information. (Al-Ghamdi, 2024)

2.1.1 Smart schools

School boarded a pivotal role in the educational process as a whole, it has been very much the evolution of the concept of the school is an educational organization of traditional style to another style characterized by dynamic interaction with the surrounding medium intelligent and effective manner(Amin, 2014). Smart School is a virtual school that uses a technology platform provided for

remote location education. Smart School solution encourages and supports multi-way communication between teachers and students through easy access to abundant information and cooperative activities. Smart School enables teachers and students to interact in real-time with in-class functions like screen share monitoring, quiz and survey, etc. Teacher uses various resources through learning management system All students ask questions in real-time during class and teacher replies students' question and monitors each students screen to guide instantly. Supporting interactive class through screen and contents share among teachers and students. Enabling teacher to move around classroom so students concentrating on class easily. Collaborative Activities abortive activities using group activity like large canvas and contents and screen share. Smart Schools nurture a new generation of thinkers who are equipped with the relevant knowledge and skills to innovate and compete in an increasingly complex world. Components of a Smart School are Teaching and Learning, Management and Administration, People, Skills and Responsibilities, Processes, Technology and Policies. Figure shows the components of smart school. Smart applications process data and make decisions based on prior knowledge and interaction between smart devices and their surrounding environment (Government of Malaysia, 1997).

Figure1: content smart school

2.1.3. Serious creativity: Edward de Bono claims that Serious creativity is closely linked with creativity, stressing that while creativity is often perceived as an ultimate result, Serious creativity denotes a structured mental procedure geared toward exploring fresh concepts in original manners. Although associated with creativity, Serious creativity occasionally yields non-creative results, as not every output is a novel creation—but they might present new ways of perceiving circumstances. Creative thought is characterized by the aptitude for self-expression, while Serious creativity is available to anyone seeking to produce innovative ideas. De Bono formulated the term Serious creativity to differentiate it from vertical thinking, which depends on traditional logic and amassed experience (Muammar, 2006). He grounded his evolution of this thinking style on a scientific comprehension of how the brain works as a self-regulating information system, drawing from neuroscience. The notion of Serious creativity arose when De Bono composed a paper on "The Other Side of Thinking," referencing non-linear and non-sequential reasoning. This type of thought is also known by alternative labels used by researchers and interpreters, such as:

A. Peripheral thinking – viewing problems from numerous angles instead of a singular linear method,
B. Serious creativity- creating new thinking and decision making so as to enhance performance in everyday activities,
C. Renewed thinking – aiming to produce fresh ideas and surpass rigid logical limitations,
D. Out-of-the-box thinking – the capability to think beyond the established and address problems from distinct viewpoints.

Serious creativity is a combination of creativity and cognitive organization, aimed to produce indeed valuable ideas that can be applied in daily life and radical problem-solving. (Al-Khafaji & Al-Mousawi, 2023)

Table 1- Serious creativity Type

Serious creativity Type	Description	Example
Reverse Thinking	Looking at the problem from the opposite or unusual angle	If your goal is to save time getting to work, think about the ways that waste time to avoid them
Slight Change	Modifying a small element of the problem to find a new solution	Adding a simple step to your daily routine can save a lot of time
Combining Ideas	Merging two or more ideas to create an innovative solution	Using an umbrella that transforms into a small bag when not in use
Challenging Assumptions	Questioning common assumptions about the problem	If we assume a plane needs only two engines, can it be designed with just one?
Word Play	Using words and phrases in an unconventional way to find solutions	Riddle: 'What gets bigger the more you take away?' (Answer: A hole)
Experimental Approach	Trying unconventional solutions to see the results	Experimenting with arranging things in an unusual order to see the effect on productivity

2.1.4. The concept of mental self-government:

The model of thinking styles developed by Sternberg is based on his concept of mental self-governance that aims to enlighten the difference between smartness and achievement by proposing the idea that certain modalities of thought can be linked to certain patterns in sharing information. According to this theory, individuals in the same way as societies are forced to organize or to control themselves. It discusses the way people manage their mental activities in their day-to-day lives by comparing it with the various aspects of governance Individuals decide on which self-management styles to apply in their daily interrelation. They are flexible and they tend to make an effort to adapt their styles of thinking to suit different conditions (Zaghoul, 2012). These styles are also molded by social influences and can be modified by environmental factors, occasionally changing over time due to life circumstances. Styles are viewed as continuous rather than binary, and their effectiveness depends on the task and context.Studies on thinking styles have shown that most styles can be grouped into three categories. The first category (type I thinking styles) includes styles that foster creativity and employ advanced cognitive complexity: legislative, judicial, hierarchical, global, and liberal. The second category (type II) features styles that lean towards norms and are simpler: executive, local, monarchic, and conservative. The third set (type III) combines traits from both prior categories depending on the context: anarchic, oligarchic, internal, and external(Al-Mousawi, 2016).

Table 2- sample item and description 0f the 13 thinking style categories

Thinking style	Description	Sample item
Legislative	The person prefers tasks that require creative strategies.	When making decisions, I tend to rely on my own ideas and ways of doing things.
Executive	The person is more concerned with the implementation of tasks with set guidelines.	When discussing or writing ideas, I follow formal rules of presentation.
Judicial	The person focuses on evaluating the products of others' activities.	When discussing or writing ideas, I like criticizing others' ways of doing things.
Monarchic	The person prefers tasks that allow complete focus on one thing at a time.	When talking or writing about ideas, I stick to one main idea.
Hierarchical	The person prefers to distribute attention across several tasks that are prioritized.	I like to set priorities for the things I need to do before I start doing them.
Oligarchic	The person prefers working toward multiple objectives during the same period, without setting clear priorities.	When there are many important things to do, I try to do as many as I can in whatever time I have.
Anarchic	The person prefers working on tasks that require no system at all.	I like situations or tasks in which I am not concerned with details.
Local	The person prefers tasks requiring working with	I prefer to deal with specific problems rather than

Thinking style	Description	Sample item
	details.	with general questions.
Global	The person pays more attention to the overall picture of an issue and to abstract ideas.	I like situations or tasks in which I am not concerned with details.
Internal	The person prefers being engaged in tasks that allow working independently.	I like to control all phases of a project, without having to consult with others.
External	The person prefers being engaged in tasks that provide opportunities for developing interpersonal relationships.	When starting a task, I like to brainstorm ideas with friends or peers.
Liberal	The person prefers novelty and ambiguity.	I enjoy working on projects that allow me to try novel ways of doing things.
Conservative	The person adheres to existing rules and procedures in performing tasks.	I like to do things in ways that have been used in the past.

(Murphy & Janeke, 2013)

2.2. A Comparison Between Intelligence and Thinking: Intelligence is the efficient use of the mind and a skillful investment of cognitive abilities. It includes self-awareness, self-monitoring, and self-adjustment—producing outputs valued in a specific cultural context. On the other hand, thinking is a series of invisible mental activities performed by the brain when exposed to stimuli perceived through one or more of the five senses. It involves searching for meaning in situations or experiences and typically begins when an individual is uncertain about how to act(Abdulnour, 2015).

Table 3- A Comparison Between Intelligence and Thinking

Aspect	Intelligence	Thinking
Definition	The ability to learn, understand, and adapt to new situations.	The mental process of processing information, reasoning, and making decisions.
Nature	Relatively stable trait; innate potential.	Dynamic process; can be developed and improved with practice.
Scope	Broad cognitive capacity covering various mental abilities.	Specific cognitive activity used to solve problems or make decisions.
Measurement	Measured using IQ tests and cognitive assessments.	Difficult to measure directly; assessed through problem-solving and reasoning tasks.
Focus	Focuses on potential and overall cognitive ability.	Focuses on mental operations and processes applied to a particular task.
Examples	Solving abstract problems, understanding complex concepts, learning new skills.	Planning a strategy, analyzing a situation, generating solutions.
Relationship	Intelligence provides the foundation and capacity for effective thinking.	Thinking utilizes intelligence to perform reasoning and problem-solving tasks.

(Al-Sarour, 2013)

2.3. Previous Studies.

1. (Basim, 2020): The results showed that the use of smart boards in teaching mathematics to fifth-grade literary students contributed to the experimental group's clear superiority over the control group, as well as increased student interaction and motivation to learn.
2. (Tabarak, 2021): The results indicated that the smart schools project in Baghdad faces real challenges, the most important of which are reliance on traditional curricula, inadequate teacher training, and a lack of technological capabilities, which limited the potential for the project's success.
3. (Reem, 2022): The study showed that high school students who learned English using smart boards outperformed their peers who learned using traditional methods, and also demonstrated positive attitudes towards learning in this way.

4. (Ahmad, 2022): The results indicated that students at Kuwait University use smart applications for learning at a moderate level, and no statistically significant differences in this usage were evident.

Table 4- Summary Comparison Matrix of Pivotal Prior Studies

Researcher (Year)	Sample	Tool	Key Findings	Gap Addressed or Indicated by the Current Research
Basim 2020	Teaching Mathematics to 5th-grade Literary students	Use of Smart Boards in teaching	Experimental group significantly outperformed the control group	Focus on Tools: Most studies concentrated on the effectiveness of smart applications/tools (boards, apps) without integrating them with creative thinking strategies like Serious Creativity
Tabarak 2021	Smart Schools Project in Baghdad	Project Evaluation	reliance on traditional curricula, inadequate teacher training, and lack of technological capabilities.	Institutional Challenges: Highlighting that obstacles are not limited to technology but include teacher training and the adoption of a smart culture.
Reem 2022	Teaching English to high school students	Use of Smart Boards vs. Traditional methods	Students who learned using smart boards outperformed their peers and demonstrated positive attitudes toward this method.	Lack of Serious Creativity: Limited educational research on Serious Creativity, especially when combined with contemporary smart applications.
Ahmad 2022	Kuwait University students' use of smart applications for learning	Measuring usage level	Students' use of smart learning applications was moderate, with no statistically significant differences in usage.	Need of Integration: Requirement of comprehensive research about the importance of smart application in the learning institutions and the ways of integrating them with the creation of Serious Creativity to promote problem solving.

3. Research methodology.

The current research paper used an analytical theoretical design in the form of a literature review that examined the current trends in the field of research on smart applications and Serious Creativity in education. The systematic review procedure had the following key steps:

1- Databases and Search Sources: To guarantee the completeness and the accuracy of the results, effective and systematic searches were performed in the following scholarly databases:

- Main Academic Databases: Google Scholar and Research Gate.
- Peer-Reviewed Journals: Emphasis was placed on reputable, high-impact journals in the fields of education and technology.

2- Key Search Terms: Arabic and English keywords were used in conjunction to expand the search areas and make it more inclusive:

Table 5- Key Search Terms

English	Arabic
Smart applications, Education, Serious Creativity	التطبيقات الذكية، التعليم، الإبداع الجاد
Innovative thinking, Smart systems	التفكير الجانبي ، الأنظمة الذكية

3- Time Frame and Selection Criteria: To maintain relevance and recency, the following inclusion and exclusion criteria were applied:

Table 6- Time Frame and Selection Criteria

Criterion	Details
Time Frame	**Studies published between 2015 and 2024 were included, with particular focus on the period 2022–2024.**
Inclusion Criteria	**A. Studies integrating smart technologies into the learning environment.** **B. Research addressing Serious Creativity or lateral/innovative thinking as an educational approach.** **C. Peer-reviewed publications in credible academic journals.**
Exclusion Criteria	**A. Studies published before 2015.** **B. Non-academic sources such as newspapers or blogs.** **C. Research focusing on smart technologies in non-educational fields.**

3.1. Smart applications

3.1.1. The significance of smart application in education: Learning is among the highest-ranking spheres which demand the introduction of smart applications to enhance the educational process faster, more precise and less effortful. The significance of it could be summed up as such:

A. Even the trained teachers might not be able to address the needs of their students diversely. Applications are used to assist with core content and teaching skills and to give correct assessment data to enhance the learning process.

B. Apps are related to the evolution of non-cognitive skills and academic mastery, which enhances the educational success and contributes to adaptability and lifelong learning.

C. Smart applications assist in minimizing the administrative workloads of grading exams and assessment of assignments which the teachers can invest more time in doing research and curriculum building. (Jasim, 2022)

3.1.2. Smart application requirements in Education: The powerful implementation of smart applications in training requires 3 important dimensions:

- Arranging workshops to teach educational personnel on Smart applications usage.
- Modernizing conventional educational policies and supporting Smart applications culture amongst staff and scholars.
- Implementing guidelines and policies for Smart applications application in education.
- Smart administrative leadership able to enlist trainers and experts to design and create educational applications.
- Availability of qualified scientific staff and students able to work with Smart applications tools.
- Presence of technicians to service hardware and address network problems.
- Allocating budgets to employ experts and train educational personnel.
- Funding the purchase and upkeep of computers and educational software.
- Budgeting for the development of new applications and software solutions.

The requirements demonstrate that Smart apps in education need a long-term strategy and significant transformations in the educational system. (Daradkeh et al., 2023)

3.1.3. The Relationship Between smart applications, Thinking, and Learning Theories**:** The early philosophers were interested in intellect. Aristotle had the idea that individual attributes such as intelligence vary with the environment whereas Plato considered intelligence an in-built ability that is exhibited through learning and adaptability.

Sternberg proposed an inventiveness theory that has three interrelating elements:

- Inventiveness is connected to metacognitive processes and insightful thought.
- Accomplishing inventiveness necessitates a thinking style that guides mental capabilities innovatively.
- Creative people are distinguished by risk-taking, conquering obstacles, intrinsic motivation, and a longing for recognition. (Al-Kubaisi, 2013)

3.1.4. Challenges and Barriers to Implementing smart applications in Education: There are various challenges associated with smart applications in education, they include:

- Lack of trained and specialized staff to design and develop educational systems.
- Weak infrastructure, including outdated networks, computers, and software.

- The need to retrain educators to keep up with smart applications technologies.
- Difficulty in translating human expertise into usable smart applications-based systems.
- Low awareness among teachers and administrators about the importance and benefits of smart applications in education.
- Some teachers being resistant to change and having no self-confidence in using new technologies.
- Weak training programs and lack of adequate funding to implement it. (Kadhim, 2012)

3.2. Serious creativity

3.2.1. The Significance of Serious creativity**:** Serious creativity has become one of the modern strategies of building intellectual abilities and cognitive forces. In the modern and diverse world of science and technologies, the linear thinking and the routine way of thinking might not be sufficient enough to solve the current problem. Creative and innovative strategies are now required in problem-solving (Abaza, 2005).

Key aspects underscoring the relevance of Serious creativity include:

- Prompts individuals to go past conventional methods and produce innovative solutions.
- Entails re-examining assumptions and challenging existing beliefs.
- The complex nature of modern life demands flexible and open-minded cognitive approaches.
- Facilitates the development of analytical and evaluative and inventive abilities of the students beyond memorization.
- Incites the deliberation of a large number of options prior to the determination of the best solutions. (Al-Suwaidan, 2008)

3.2.2. Sources of Serious creativity: De Bono has found that there are a number of underlying factors that foster the existence of Serious creativity and aid in the production of new ideas:

- Little previous exposure to existing frameworks allows exploration of alternate solutions.
- Prior experiences offer a basis for developing practical, inventive strategies.
- Personal drive encourages people to seek new approaches even when current norms are accepted.
- Diverse thinking styles enhance the capacity to analyze and think of issues in different ways.
- Reducing fear, social pressures, or external limitations boosts creative potential.
- Eschewing preconceived notions facilitates the development of new conceptual patterns.
- Systematic application of creative processes enhances the production of innovative outcomes. (Abu Jado, 2013)

3.2.3. Serious creativity Skills: Authentic creativity goes beyond supposition and includes a set of instructional skills that can enhance problem-solving ability:

- Looking at situations with different perspectives and perception of events in different ways.
- Remodel conventional conceptions and explore new approaches to challenges.
- A range of solutions is developed without the rapid rejection of an odd proposal.
- Considering some of the potential solutions, whether based on some customary line of reasoning or case law.
- Building innovative solutions by exceeding conventional patterns. (Al-Mansour, 2011)

4. Conclusions and Discussion

1. Shortcomings of Modern Technology and Serious Creativity in Education
   - Deficiencies in Smart Systems: Despite significant technological advancements, the pedagogical application of smart systems in education remains inadequate.
   - Limited Integration of Serious Creativity: Serious creativity, a core component of creative thinking, isn't fully integrated into learning environments.
2. Enhancing Learning Experiences through Smart Applications
   - Increased Performance and New Approaches: Utilizing smart applications helps increase student performance and opens the door to new educational approaches.
   - Support in Content and Teaching Capabilities: The applications are used to support core content and teaching capabilities and provide precise assessment data to enhance the learning outcomes.

- Reducing Administrative Burdens: Smart apps can also help cut down the administration overheads, e.g., marking exams, marking assignments, etc. so that teachers can have more time to do research and curriculum development.

3. The Importance of Lateral Thinking and Problem-Solving
   - Developing Lateral Thinking: Developing lateral thinking allows learners to approach issues from diverse perspectives and devise unconventional solutions, thereby enhancing their critical problem-solving skills.
   - Enhancing Problem-Solving Skills: Serious creativity is defined as the most effective problem solving tool since it is acquired with practice and training. Serious creativity is targeted to discover new ideas in new ways and come up with unorthodox solutions.
4. Synergy Between Smart Applications and Serious Creativity
   - A Comprehensive Educational Model: The combination of smart applications and serious creativity is an effective educational model that improves creativity and complies with the latest possibilities of the virtual environment.
   - Necessity of Integration: The study sheds light on the necessity of comprehensive research that would investigate how smart applications can be applied in learning institutions and develop ideas and instruction strategies that can assist in building serious creativity, and how the combination of the two can contribute to problem-solving.
5. The Role of Serious Creativity in Skill Development
   - Moving Beyond Conventional Methods: Serious creativity prompts individuals to move past conventional methods and produce innovative solutions.
   - Skill Development: It supports the evolution of students' analytical, evaluative, and inventive skills, moving past rote memorization.
   - Teachable Skills: Teachable proficiencies encompassed by serious creativity include: examining circumstances from varied angles, remodeling typical notions, formulating a variety of solutions without quickly dismissing unusual proposals, and developing unique solutions by going beyond standard patterns.

5. Recommendations

1. Teacher training and curriculum development to guide innovative practices.
2. Design smart learning platforms to inspire deep creativity and facilitate unconventional problem-solving approaches.
3. Provide professional development and workshops for teachers to highlight the educational value of smart applications and innovative thinking strategies.
4. Encourage studies that explore the intersection of modern technologies and critical creativity, and develop practical, evidence-based educational frameworks.
5. Develop educational policies and infrastructure that enable the integration of smart applications, and efficiently address technological barriers and human resource challenges.

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