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Creative Thinking skills – A Review article

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Abstract The main objective of this current research article aimed to provide more information about creativity skills that are among the foremost sought-after life and work skills within the 21st century as innovative thinking, problem-solving, or critical thinking ability is that the critically preliminary ability of world citizens in diversified societies. Human resource development in past years, therefore, stresses the promotion of creative thinking ability, because the “brain” will substitute “strength” within the knowledge economy era with fiercely international competition. Creativeness will make someone move “sideways” to do different perceptions, different concepts, and different points of entry. They will use various methods including provocations to unravel the issues. Creativeness has much to try to with perception to place forward different views. The various views don't seem to be derived each from the opposite but are independently produced. During this sense, creativeness has got to do with exploration even as perception has got to do with exploration.

1. Introduction

The world and society are advancing at a remarkable pace. We need to equip ourselves with the ability to adapt to this trend, not to hold back. We can achieve great success by facing challenges and responding to them with a new way of thinking and self-confidence. The ability to apply creative thinking in both a digital and non-digital environment has become a characteristic of successful people nowadays.

Information technology is rapidly developed in the 21st century, and innovative thinking, problem-solving, or critical thinking ability is the critically preliminary ability of world citizens in diversified societies. Human resource development in past years therefore stresses the

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promotion of creative thinking ability, as the “brain” will substitute “strength” in the knowledge economy era with fiercely international competition. **Cheng-Shih Lin** (2016). According to Sternberg and Lubart (1996), creativity refers to the capacity for coping with a given problem in authentic ways. Such capacity is about looking at a specific situation and problem from different perspectives. Creativity is beyond creating out of nothing since a new idea or thought is often a variation version of an older thought or a combination of thoughts known or possessed previously. Thus, creativity can be defined as synthesizing previous thoughts and redefining previous thoughts (Bessis 1973). Creativity is a basic skill included in all aspects of human beings’ life and the evolution of human beings (San 1985). According to Torrance (1974), creativity is “being sensitive to problems, insufficiencies, shortage of information, nonexistent elements and incompatibility; identifying challenges, seeking for solutions, estimation and hypothesizing or modifying hypothesizes in relation with insufficiencies, selecting and trying one of the solutions, retrial, and concluding accordingly” (cited by Aslan 2001). Seeking an answer to “What’s creativity?” Repucci found around 50-60 definitions in the literature in early 1960s (Parkhaust, 1999).

2. Methodology

This research is an integrative study as adopted the survey method. We will perform a systematic review of the current literature on the Creative Thinking database to identify relevant articles and will be supplemented by a review of the references of relevant articles identified.

3. Discussion

3.1. Creative Thinking

A definition of creativeness is defined as a way to seem at and solve problems from a singular perspective, avoiding orthodox solutions and thinking outside the box. This creative process allows you to discover connections, meet new challenges and seek resolutions that are uncommon, original and new.

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Several consider that creative thinking techniques are built on experience and knowledge, including Steve Jobs: Creativity is just concerning things. When you ask creative people how they did something, they feel a little guilty because they did not really do it, they just saw something. It seemed obvious to them after a while. That is because they were able to connect experiences they have had and synthesis new things. Moreover, the reason they were able to do that was that they had had more experiences, or they have thought more about their experiences than other people have. After that, we have to understand that creative thinking is a skill we need to improve primary on.

We have to be ready to break the patterns and traditional way of thinking to be ready to start thinking in a creative way. The way that's go to facilitates you to create a brand new approach to a selected situation or an issue. Starting with this method too soon guarantees more experience as you learn from many various examples, as you become grownup.

So Creative thinking is:

A way of observing problems or situations from a fresh perspective that means unorthodox solutions (which may look unsettling at first). Creative thinking are often stimulated both by an unstructured process like brainstorming, and by a structured process like heuristic program. Moreover, it can be mean observing something during a new way. It's the very definition of "thinking outside the box." Often, creativity during this sense involves what's called heuristic program, or the power to perceive patterns that aren't obvious. The fictional detective Sherlock Holmes uses heuristic program in one famous story when he realizes that a dog not barking is a very important suggest a murder case.

At the best level, "creative" means bringing into being something that was not there before and has been brought into being. The word "creativity" covers a large range of various skills. Creative skills needed to alter concepts and perceptions.

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In most descriptions of problem-solving, there's usually a step called “search for alternatives”. This suggests that creativity is required during this step. Creativity is poorly understood and difficult to show but there are positive techniques that everybody can learn. Edward de Bono notes creative techniques like focus, challenge, alternatives, concepts, etc. De Bono, E. (1993). Creativity should take its place alongside our other methods of handling information. Someone sitting down with the deliberate intention of generating a concept in an exceedingly certain area then proceeding to use an ingenious thinking technique systematically should represent a traditional state of affairs

Creative thinking will make an individual move “sideways” to undertake different perceptions, different concepts, and different points of entry. They will use various methods including provocations to resolve the issues. Creative thinking has considerably to try to do with perception to place forward different views. The various views are not derived each from the opposite but are independently produced. During this sense, ability must do with exploration even as perception must do with exploration.

Idea fluency is that the ability to come up with a large number of ideas from which to settle on. Research has indicated that the more ideas one has the greater is that the likelihood of finding a usable solution. Delaying evaluation of the ideas during the method of generating ideas can facilitate idea fluency. Students can make notes, records their observations and opinions of problems during thanks to assist within the process of idea fluency. A distinct way of developing idea fluency is to use special times or locations during which students tend to create a discussion during a creative way.

3.2. There are three aspects to creativity:



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A Defining the Focus

There is also problems that arise and identify themselves. Individuals make definite creative focuses. There is also a noticeable creative need. Of these are ways within which creative focuses can emerge.

B-Structure for Creative Thinking

Once the creative focus has been defined, it are often subjected to deliberate ability. This may be done by groups, individuals, or a mix of both in a very discussion session among group members. It often happens that the group that has the priority or problem will organize its own deliberate ability session to tackle a combination.

C-Evaluation and Implementation

The group that has the creative focus might also be involved in evaluating the ideas that start deliberate creative thinking. In such cases, the process is continuous. If the “thinking” group is different from the “implementation” group, attention must be paid to the transfer of ideas so those expected to act on the thought are brought in at an early enough stage to feel some ownership within the new ideas. Learning with creativity is vital to be creative at each stage of dialogue. The definition of a thinking task must be creative. The structure for applying the thinking process must be creative. The output of the thinking effort must be creative. Finally, the evaluation and implementation must be creative. Creative thinking needs a framework of the appliance. Otherwise, students are not visiting find themselves in a very position where they are expected to come up with new ideas. Regardless of how good the techniques maybe, if they are not used, they are going to not achieve much. (Awang, and Ramly, 2008) also, they mention that Problem-based learning (PBL) as an Instructional model that might encourage creativity skills during the training process.

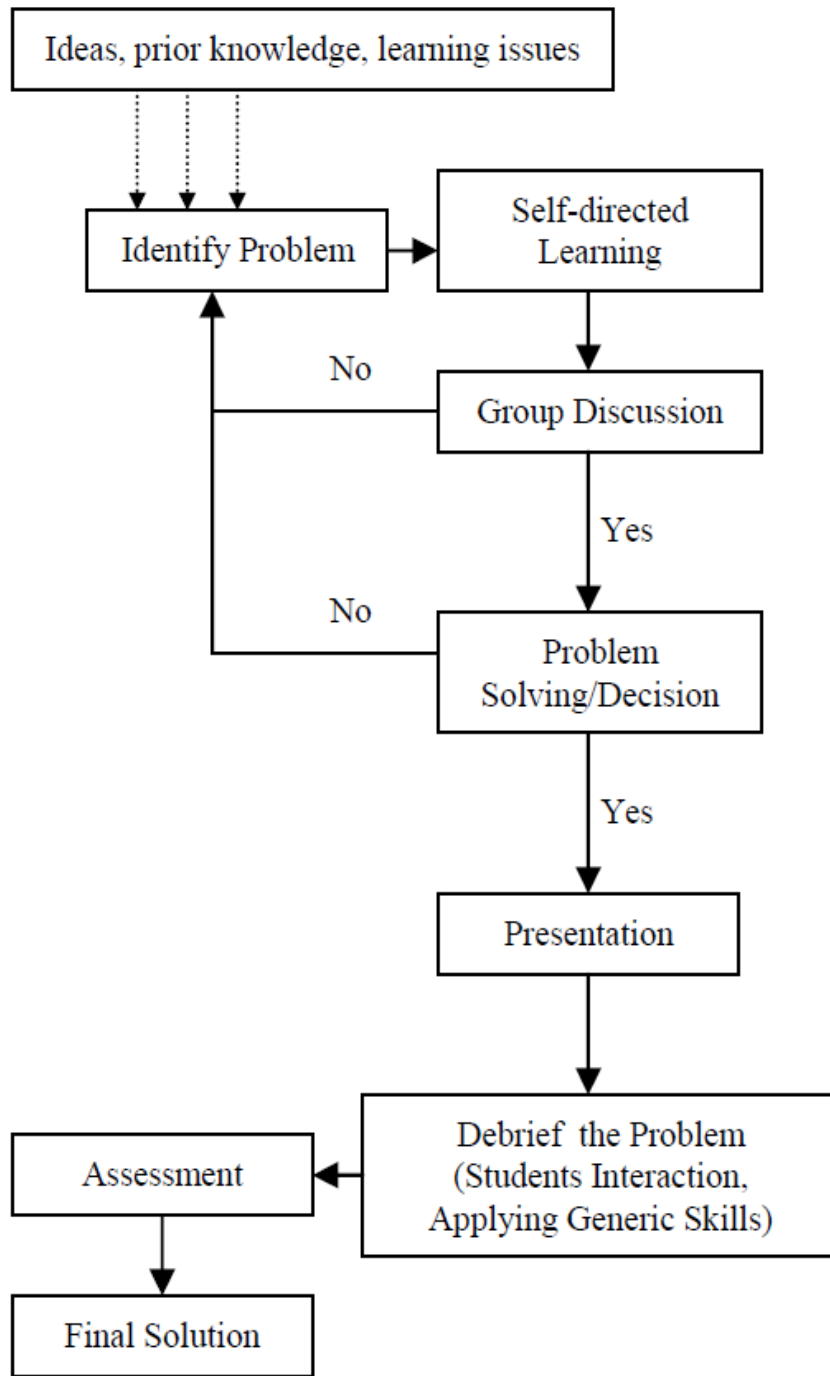


Fig. 1 Flowchart of Problem Solving Process in PBL

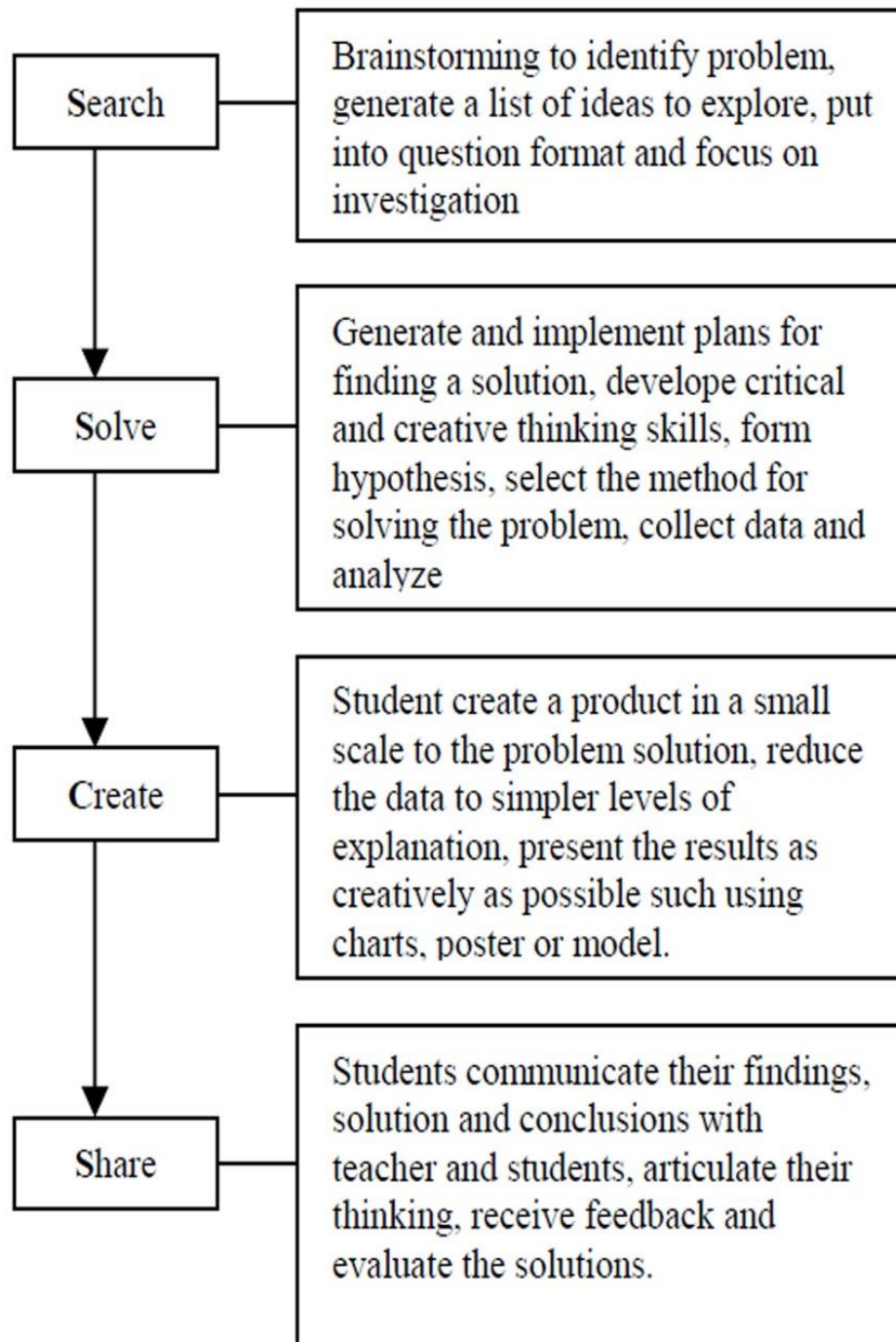


Fig 2 Model SSCS

By using & Fl wchart of Problem Solving Process (fig1) and SSCS (fig2) model specifically for science instruction on the premise that for an issue to be meaningful to a student.

3.3. Characteristics of creative thinkers include

a- They are communicators

Creativity and confidence are expressed in some ways through both listening and communicating. This is often why creative thinkers are good communicators. Collaboration is additionally important for this type of thinking, and good communication is crucial for work performed as an element of a team.

b- They are open-minded

An open mind could be a mind that appreciates criticism, is prepared for brand new solutions and concepts, and is not frightened of evaluating ideas. An individual who is open-minded is willing to be told from both successes and mistakes, having the ability to grow and develop.

c- They are risk-takers

Exploring new ideas and techniques is impossible without risk-taking, as a willingness to face challenges and accept change. Creative thinkers are resilient, and that they do not seem to be terrified of taking an opportunity, knowing that one has to be brave when exploring innovative and original ways of brooding about and solving problems. They know that leaving a temperature is typically necessary to succeed, whether or not it means facing the unknown.

d- They are knowledgeable

To develop an understanding of things and situations, you would like a background story. Knowledge allows creative thinkers to determine the total picture, which is why they know lots about the world they add and that they are experts in what they are doing, and also the and what they base their expertise on.

e- They are flexible

Abilities to adapt to changes and think outside the standard patterns are parts of creative thinking, which is why being flexible could be a characteristic trait of creative thinkers. They

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welcome changes; they are not petrified of changing their method of labor, and that they are good at working with others.

3.4. The main benefits of developing creative thinking include:

- Increase your self-confidence
- Solve problems more efficiently
- Earn respect
- Be an innovator
- Make a difference
- Be more successful at work

3.5. Creative thinking techniques

As an innovative way of approaching and analyzing ideas, creative problem solving became an essential skill for the 21st century. Although some people might seem more creative than others might, this skill is something that is developed and improved using various techniques and practices.

• *Brainstorming* :

This technique includes thinking about something and putting down all the ideas that come to your mind—regardless of how silly or unrelated they may seem initially. During this ocean of ideas, you're guaranteed to find one which will stand out, one which will be tangible and innovative. Used as a personal or medical practice, brainstorming could be a good way to develop creativity and problem-solving. It encourages thinking during a different way and exploring many options that may be applied therein situation. The more options come to your mind, the potential you may need to find great ideas

• *Mind mapping* :

Mind mapping is that the process of connecting the dots. While brainstorming involves putting all the ideas down as they are available to your mind, mind mapping is about arranging your

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thoughts, thinking during a logical way, using associations, recognizing patterns, and creating an order. All that cluster of ideas from brainstorming should move in mind mapping. This exercise engages both the left and right hemispheres of the brain; it encourages you to give some thought to the connection between aspects and concepts. It also includes a positive influence on organizational skills.

- ***Reframing :***

Since reframing focuses on analyzing the identical situation or an issue from a unique perspective, it is an excellent exercise for developing creative thinking. Reframing means changing the frame of things, so you may have to examine an issue or a situation during a different way, to be able to come up with a brand new, innovative approach. Explore other meanings of things, analyze the context, spread the angle to identify new opportunities, and expect potential obstacles. Again, this exercise and way of thinking are applicable in many professions nowadays.

- ***Envisaging the future :***

The goal of this exercise is to prepare your mind to anticipate the future supported the pictures of today. Start with this situation. Regardless if you're using images or data to know it, try and give some thought to the longer term and where you would like the future to require you. Through this process, you'll have to create bridges from present to future, and this can be where creativity comes in useful, as ideas to beat gaps become solutions that may take you to the required future and facilitate your achieve your goals.

- ***Role-play :***

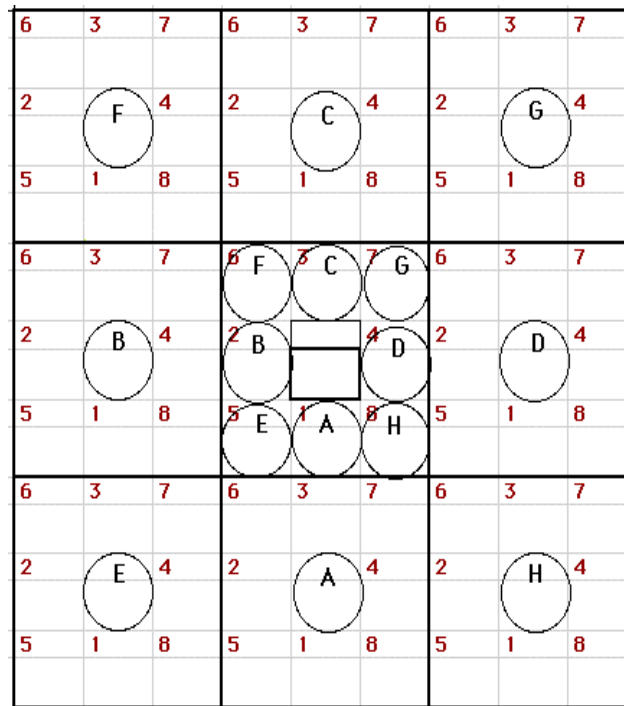
The technique of using role-play is a great way to vary the way you're thinking and explore true from a special perspective. creative thinking encourages you to be open-minded, so when using this method, you'll try and consider true from the purpose of somebody else you wish to reframe your way of thinking to determine a distinct perspective of things, to vary the attitude and find

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new solutions that reassess your limits and overcome your personal variety of problem-solving. Assuming a replacement role encourages you to come back up with solutions that may not be typical for you, but they're what you wish for creative problem-solving.

- **Lotus blossom technique :**

This technique includes initial with a central theme or problem and dealing external, using ever-widening circles or "petals." Central themes cause ideas that themselves become central themes, and then forth. The relating themes activate new ideas and new themes.



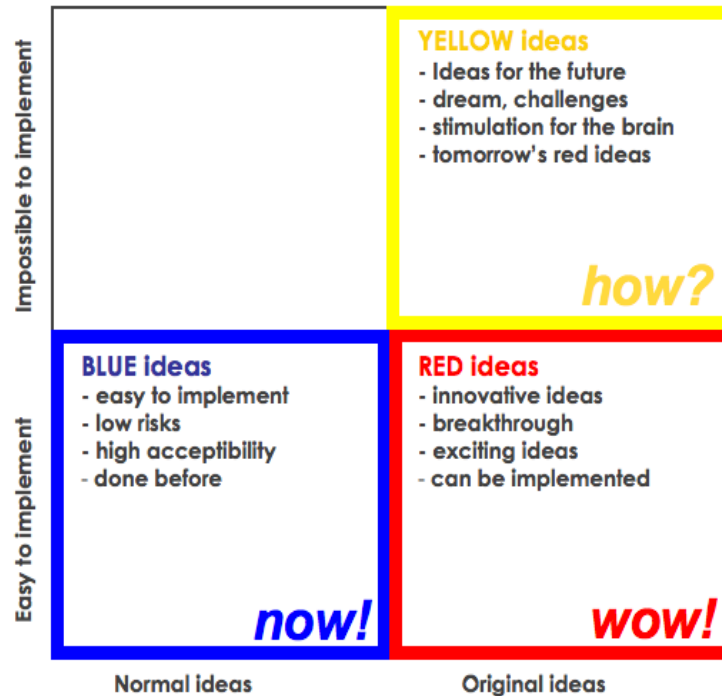
- **COCD-Box:**

The COCD (Centre for development of creative thinking) has developed an extremely handy tool to select out ideas and stop loss. We necessity think of that at the structure of practically each model change stood an 'impossible' or apparently 'unsuitable' idea. The COCD-box assistances you to prevent the Crea-Dox: you're thinking that of agreeable new ideas, up till now

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you choose on the old ones (well-known resolutions) to prevent that, a classification can be made employing a matrix: the COCD-box. The matrix has 2 axes:

- Originality
- Ease of implementation



- ***Hundred euro test :***

Allocating points may be a relatively cold way of scoring ideas. Money is very important for people than other things. The notion of paying money grabs their attention and that they are rather more careful about deciding a way to allocate it. Attention on money also reminds people of the ultimate goal of most creative and inventive activities: to create a profit and sustain the business.

- ***Six thinking hats :***

It is common technique created by Edward de Bono and could be used it in different types of thinking and individuals would feel inhibited by taking these roles without prior legally. And

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we can use it to encourage more than other thinking processes. You can use it to discover ideas when choosing which to take forward. And also you can explore how other people will react when you try to go with your idea.

- ***Random input :***

It is a lateral thinking tool that is very useful when you need new ideas or fresh viewpoints during problem-solving. Random input is a technique for connecting another thinking outline into the one we are using. Besides with this new pattern derives all the knowledge you have linked to it.

- ***PINC filter :***

Use the PINC (Positives, Intriguing, Negatives, Concerning) Filter when you have created a number of ideas and you want to select those to move to the next step of development. Only use the PINC filter after you have reduced the number of ideas to a very shortlist. Each PINC valuation is not short, and evaluating many ideas would take more time.

- ***NUF (New Useful Feasible) test :***

This test used when you want to quickly check that an idea that has been selected is likely to be effective and work in practice. And you can use it when you want to be more creative, developing the idea or getting something that you will be able to implement. So this type is a very simple quick check that you can use and criteria are already selected in only three of them.

3.6. Top Creative Thinking Skills

- ***Analysis :***

Before thinking creatively about something, you initially must be ready to know it. This needs the flexibility to look at things carefully to know what they mean. Whether you're observing a text, a data set, a lesson plan, or an equation, you would like to be ready to analyze it first.

- ***Open-Mindedness :***

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Creativity involves thinking of things during a novel way within the context of the question. You have got to line aside any assumptions or biases you'll have, and appearance at things during a completely new way. By coming to an issue with an open mind, you permit yourself the prospect to think creatively.

- ***Problem Solving***

Employers don't simply want to rent creative people because they're impressive. They need creative employees who will help them to resolve work-related issues. Therefore, when applying for jobs, highlight your ability not only to think creatively but also to use your creativity to resolve important problems.

- ***Organization :***

This influence sound guess: aren't creative people known for being somewhat disorganized? Really, the organization is a very imperative a part of creativity. While you may must get a touch messy when trying out a brand new idea, you then must organize your ideas in order that others are going to be ready to understand and follow through together with your vision having the ability to structure an idea of action with clear goals and deadlines is important.

- ***Communication :***

People will only appreciate your creative idea or solution if you'll be able to communicate it effectively to the people you're employed with (or to your clients or vendors). Therefore, you would like to own strong written and auditory communication skills. Doyle (2019) you also must be ready to understand a situation fully before thinking creatively about it. Therefore, you furthermore may must be an honest listener. By asking the proper questions and understanding the matter, you'll be able to come up with a singular solution.

3.7. Examples of Creative Thinking

Doyle (2019) found Opportunities for creative thought within the workplace vary from the apparent artistic position to the highly technical one. Generally, anything that involves an “Aha”

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moment is taken into account creative. Here are some samples of the way to display power in several jobs.

- ***Artistic Creativity :***

You do not be an artist for your work to possess an inventive element. Perhaps you arrange retail displays for optimum impact or shape the trail of an attractive hiking trail. Other creatively professions maybe enclose designing logos, writing advertising copy, creating the packaging for a product, or drafting a phone script for a fundraising drive. Creating a new fundraising script for volunteers

- Composing dialogue for a television or radio commercial
- Creating an exam to test student knowledge
- Creating packaging for a product
- Designing a logo
- Devising a lesson plan that will engage students
- Proposing a new look for a clothing line
- Writing compelling copy for a print or online advertisement

- ***Creative Problem-Solving :***

Creative problem-solving is considered innovative so a creative solver will find new solutions in place of identifying and implementing the standard only. You would possibly brainstorm new ways to cut energy use, find new ways to chop costs during a budget crisis or develop a novel litigation strategy to defend a client. These all entail power on your part.

- ***Creativity in STEM (science, technology, engineering, and math) :***

Some people think of science and engineering as the careful opposite of art and creativity. However, the converse is real. The field of STEM (science, technology, engineering, and math) is highly creative .For example, designing a more efficient assembly line robot, writing an innovative new computer program, or developing a testable hypothesis, are all highly creative

acts. Actually, the history of science and technology is filled with projects that did not work, not because of errors in technique or methodology, but because people remained, stuck in their assumptions and old habits. The STEM field needs essential creativity in order to flourish and grow.

3.8. Creative vs Critical Thinking

The Critical and creative functions of the mind are so interwoven that neither is separated from the opposite without an important loss to both. Generally, creative thinking is correlated with critical thinking and problem-solving. Actually, there are three dimensions of creative thinking as synthesizing, articulation and imagination having the subsequent qualities (Rhodes,1961; Sternberg, 2009)

1- *Synthesising*: It involves forming the old and new knowledge or expanding the present knowledge with the assistance of the new one, constructing unusual relationships to supply authentic solutions, and make thought concrete with the assistance of imagination and use of the materials

2- *Articulation*: It involves forming the old and new knowledge or expanding the present knowledge with the assistance of the new one, constructing unusual relationships to supply authentic solutions, and make thought concrete with the assistance of imagination and use of the materials

3- *Imagination*:

Imagination: This dimension is consisted of constructing a relationship between valid and reliable thoughts, presenting flexible ways of thought with the assistance of imagination, to return up with different insights during idea producing process.

Based on the scopes of the creative thinking, its general features can be listed as the following (Gilhooly, Ball & Macchi, 2015; Kember & Leung, 2009; Liu, He & Li, 2015);

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- Flexibility
- Authenticity
- Multiple thinking
- Wondering
- Thinking fast and independent
- To be open to criticism
- Rationalism
- Being suspicious
- To come up with different solutions
- To realize and define the problem
- To suggest possible solutions

Certainly, critical thinking skills involve identification and analysis of informational sources for credibility, indicating previous knowledge and making connections and deducing to conclusions (Thurman, 2009). Presently, the general characteristics of critical thinking can be listed as the following;

- Reasoning and suspecting
- Looking at situations from multiple perspectives and dimensions
- To be open to changes and innovations
- To look at thoughts without prejudices
- Being open minded
- Thinking analytically
- Paying attention to details

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Advantages of critical thinking;

- People who are critical thinkers think freely and independently
- People don't behave without thinking
- Individuals can state the problem explicitly (Demirel, 2012).

In educational viewpoint both critical and creative thinking skills should be developed because in each division of area, to analyze a discussion

- ***Creative thinking is described as:***

- Making and connecting links to think of many possibilities
- Thinking and experiencing in various ways and use different points of view
- Thinking of new and unusual possibilities and giving guidance in generating and selecting alternatives

- ***Critical thinking is described as:***

- analyzing and developing possibilities to compare and contrast many ideas
- improve and refine ideas
- make effective decisions and judgments
- provide a sound foundation for effective action

- ***The Creative Process***

Some other mockups have been planned, but one common theme is that the creative process involves:

- Analysis (breaking down the problem/issue into smaller more easily understandable parts)
- Evaluation (determining whether an item or activity meets specified criteria)
- Imagination (forming images and ideas in the mind)
- Synthesis (combining existing ideas/concepts into something new)

- ***Critical and Creative Thinking Process***

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- Both creative and critical thinking involve the use of high order thinking skills
- In the creative process one uses
- Creative thinking skills (synthesis and imagination) in the research and verification phases
- Critical thinking skills (analysis and evaluation) in the incubation and illumination phases

4. Conclusion

From this research, we could conclude that creativity skills are among the foremost sought-after life and work skills within the 21st century as an innovative way of approaching and analyzing ideas, problem-solving, or critical thinking, and this skill could be developed and improved using various techniques and practices.

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