

The Effectiveness of Brainstorming Techniques on Creative Problem-Solving and Team Consensus through Group Decision Processes: An Empirical Study of Learning Organisations

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Abstract

The paper explores the efficacy of brainstorming techniques on innovative problem-solving and team collaboration with the help of a team decision making procedure in an educational centre. Brainstorming is globally identified as an integrated strategy which motivates the emergence of novel ideas, improvises communication among the people of the group and accelerates creativity within a team. The research examines the way brainstorming helps in innovation, participation and decision-making efficacy within a learning and organizational environment. It also points out the chief policies, advantages and issues related to brainstorming, that incorporates team's thought processes, peer influence and different nature of people within a group. The study focuses on the role of brainstorming in improvising team inclusivity, developing thought processes and uplifting creativity in a dynamic knowledge sharing space. The results reveal that a productive brainstorming approach can notably amplify problem solving capabilities and team-based decision-making results when executed in an encouraging and all-encompassing surrounding. A sample of 319 was collected to find the result of the study. The factors the study the Effectiveness of Brainstorming Techniques on Creative Problem-Solving and Team Consensus through Group Decision Processes are Knowledge Sharing, Creative Problem-Solving, Team Collaboration and Decision Quality.

Keywords: Effectiveness, incorporates, brainstorming, Collaboration

Introduction

In a modern knowledge-based surrounding, organizations and educational institutions extremely depend upon collaborative approaches to enhance creativity, innovation and decision-making procedures. Amongst several group -decision making strategies, brainstorming has surfaced as the globally used policies for producing ideologies and solving intricate issues (Furnham, 2000). The rising requirement for innovation in educational institutions has moreover enhanced the significance of brainstorming as a tool that enhances participation, communication and collective intelligence amongst the group of people.

Educational institutions constantly look out for approaches that foster knowledge sharing and creative problem solving to adjust to varying environments and technological developments. According to Senge (1990), educational institutions are places wherein people constantly develop their skills to produce preferable outcome via collaborative learning and shared thinking. In such a surrounding, brainstorming serves as an effective strategy for motivating open discussion and idea production. Effective communication and collaborative interaction notably improvise participation and decision making results within teams (Das & Mittal, 2023). It enables team members to openly exchanges opinions, explore options and boost innovative solutions with fear of judgement.

Studies have shown that group discussions and collaborative innovation can optimistically impact institutional performance and decision quality when accurately managed (Amabile, 1996). Brainstorming sessions assists participants ponder over traditional techniques and enhance free thinking which is imperative for creativity and innovation. Further, brainstorming encourages group collaboration and assists team building by incorporating all team members in the decision-making procedures (VanGundy, 1988). Research also recommends that constant interaction and stakeholder involvement uplift collaborative surrounding and educational knowledge (Kudeshia & Mittal, 2015).

Inspite of the benefits, brainstorming also undergoes judgement because of challenges like production, blocking, assessment anxiety, and domination by few team members (Furnham, 2000). Nevertheless, when brainstorming is conducted in an organised and an encouraging environment, it can notably improvise innovative problem-solving and team productiveness. With respect to knowledge, brainstorming approaches have been found to improvise student involvement, communication skills, and collaborative learning experiences (Prince, 2004).

This research aims at comprehending the productiveness of brainstorming approaches in amplifying creative problem-solving attaining team collaboration within educational institutions. It focuses on examining the way brainstorming contributes to group decision-making procedures and the way it advantages can surpass the relatable issues when employed productively.

Literature Review

Concept Of Brainstorming

Brainstorming is a tool used by the team to allow each team member to bring out their ideas and present them in a systematic manner to all the other team members (Osborn, 1953). The tool solves the problems in calm, comfortable, casual atmosphere with lateral thinking (Rawlinson, 1981). There is a huge importance of new ideas in this generation but still there are students that do not have sufficient training to use this vital tool (Al-khatib, 2012). While providing training and giving space to use this tool it is very essential to create an atmosphere which is free of criticism to get creative and unrestricted exploration of options and solutions as well (Paulus & Nijstad, 2003). Brainstorming helps the team to break free of old, ineffective ideas and use this free-wheeling technique to generate ideas and produce some that seem half-baked but has the potential to lead to new and original solutions to problems (Osborn, 1953).

Brainstorming have number of benefits as it encourages creativity and help to expand thinking ability and include all the aspects of an issue and the solution both (Isaksen & Gaulin, 2005). It allows an individual and the team to identify a wide range of options and produce large number of ideas within no time. As it encourages people to offer whatever idea comes in their mind, help the group to develop number of ideas quickly (Paulus & Brown, 2007). The tool allows equal involvement of each team member by providing non-judgemental atmosphere that push everyone to present their ideas. Productive communication strategies and trust among team members moreover improvise team inclusion and collective results (Srivastav & Mittal, 2016). Since, brainstorming records all the ideas, it provides a sense of ownership to all the team members and this push the team members to actively participate in the Brainstorming process (Paulus & Nijstad, 2003). Generally, all the team member supports the idea and the project, as they all had personally contributed to the direction of decision. It is seen that brainstorming is very useful when someone needs to generate number of ideas for problem to tackle, possible causes of the issue, approaches to use, and the actions to take (Rawlinson, 1981).

Basically, brainstorming is a technique that helps in decision making and can be used in any situation that needs participation (Osborn, 1953). It is very well used in the educational sector by the teachers and students both (Al-khatib, 2012). The quantity is assured in the process of brainstorming as the tool is fundamentally based on physical and intellectual presence of the group. This leads expertise of the coordinator to choose best option from number of options. The level to which the decision body has understood the problem is also verified by this amazing tool. It is observed that there are people that move on with the decision without analysing the actual issue in deep and this creates problem in the future as the solution is then ineffective and can be harmful as well (Paulus & Nijstad, 2003). Brainstorming allows every team member to know about each other's sincerity and commitment towards the project and the institution they are working with. This push the expertise to generate sufficient number of alternatives and each alternative may have some relevance to the problem as they all are exposed before many members. This in turn creates the possibility of some reservations keeping the current situation in view.

Principle of Brainstorming

The key principle of brainstorming is to focus on generating large number of ideas for a problem, withhold criticism, encourage wild ideas, and build upon suggestions of others (Osborn, 1953). At the same time, it is very essential to make the process comprehensive, graphic, cooperative, and entertaining as well. Beside this key principle there are some more important principles of brainstorming discussed below:

1. Instructions in brainstorming are essential that emphasizes, illogically, number and not quality of ideas (Osborn, 1953)
2. A précised, problematic target should be set to get number of ideas (Rawlinson, 1981)
3. In spite of groups, individuals, should generate the original ideas (Paulus & Nijstad, 2003)
4. Groups should then merge and improve the ideas
5. Final ratings must be provided by individual to select the best idea. This will increase their commitment to the idea selected (Diehl & Stroebe, 1987).

The primary function and idea of brainstorming technique is to get large number of varied ideas and solutions for a goal or an issue. Brainstorming is considered as a second function that allows people to express their ideas without having the idea of being criticized (Osborn, 1953). There are few rules and principles that need to be followed to fulfil the function of brainstorming technique.

1. Do not criticize an idea. Each and every idea is acceptable during brainstorming, even if the idea doesn't sound very promising (Osborn, 1953). Since, the process is trying to gain large number of ideas, it is not good to criticise the idea and shut some people to come with idea.
2. Encourage piggybacking: Piggybacking is the technique that allows to pick the idea and alter it as per need. In this, people sometime take some little point from the idea, or even express some new idea which is exact the opposite of the expressed idea. It is surprised to know that during piggybacking, a new and beautiful idea is generated from screwiest thing an individual ever heard (Paulus & Brown, 2007).
3. Keep things moving: It is important to just keep moving and storm the brainstorming and keep the ideas to be revealed in the dull moment.
4. Don't forget to keep a record of the ideas expressed. It is essential for the leaders to list and record the idea as soon as possible because sometimes showing hesitation to record the ideas gives the impression of condemnation.
5. The leaders must add some encouraging words when a shy person present an idea.
6. Evaluation is only possible when huge number of ideas are brainstormed. It is done by the group that sort out the valuable project or the idea from the list (Diehl & Stroebe, 1987).

There are number of advantages of brainstorming technique like Greater number of alternative responses are created or generated by the target group as the information and knowledge with the group is complete and reliable,

the decision-making process of the group is democratic in nature that are easily accepted and are consistent in following democratic principles making sure of having academic opportunities, and since the entire group takes participate in the process, the implementation of brainstorming-based decision is more effective (Paulus & Nijstad, 2003). The above discussed advantages show the importance of brainstorming. The significance of the same can be felt both in general and educational context. Along with these there are some other important benefits of brainstorming such as:

Brainstorming technique provides multiple (often diverse) perspectives to use: Sometimes we work hard to solve an issue, but it is true that there are some problems that can't be solved alone. This does not give the sign of weakness; this only mean that the problem needs more than one mine to be solved. It is important to be thoughtful while creating a brainstorming group. It will be better to have the team member from different departments, backgrounds, ages, and experiences which will help to get fresh, diverse, and surprising ideas to the table (Isaksen & Gaulin, 2005).

Brainstorming technique helps avoid biases toward any particular viewpoint: It is possible that one can solve a problem alone in much efficient manner, but at the same time may have limited opinion and belief. Brainstorming allows different people to give different suggestions and ideas to solve the same issue that an individual might not think of on their own. Personal biasness is reduced in diverse group working together on the same issue. It is also true that when an individual gets to hear different viewpoints get to open his/her mind to new and better ideas (Paulus & Brown, 2007).

It often generates more ideas in a short period of time: There is high chance to uncover good, and great ideas when one generates a greater number of ideas. The situation becomes better when one reach to a good level of quantity of the ideas in less time. A group quickly reaches to dozens of ideas in the course of a productive brainstorming session where each member sparks to a dozen or more of the ideas. The participant can be pushed to commit to achieve a certain number of ideas within the allotted time limit through group dynamics. In any case, the results of a brainstorming group are always found to much better than an individual can hope to give (Diehl & Stroebe, 1987).

Brainstorming creates opportunities to explore each other's ideas: The root of brainstorming is the opportunity to explore the ideas of one another. Sometimes, it is like, considering and bouncing around number of solutions at once but this leads to a fast-flow of new ideas and this is called as "popcorn share". This group problem-solving approach in brainstorming is simple where an individual presents his/her idea or solution. After this, other members take steps to build on the concept that has been shared and at last, every member feels that they all share an equal contribution in bring the missing piece to the solution (Paulus & Nijstad, 2003).

It builds up companionship and fosters a sense of buy-in: Organisations that focus on value-based collaboration and inclusive participation often achieve stronger engagement and organisational commitment (Srivastav & Mittal, 2021). Building up stronger relationship is one of the best benefits of group brainstorming as the teams work together in this to solve the problems. Normally, the people who might not get the opportunity to work together on a project are allowed in group ideation sessions. Silos and prompts that everyone see themselves as stakeholders are broken down by the interactions while building camaraderie (Isaksen & Gaulin, 2005).

Challenges of Brainstorming

Along with so many advantages, there are some problems associated with brainstorming such as "negative effects of groupthink, difficulties when working remotely, peer pressure, personality differences, focusing on the problems, and disengaged participants" (Janis, 1972). Figure 1 presents the challenges of brainstorming briefly.

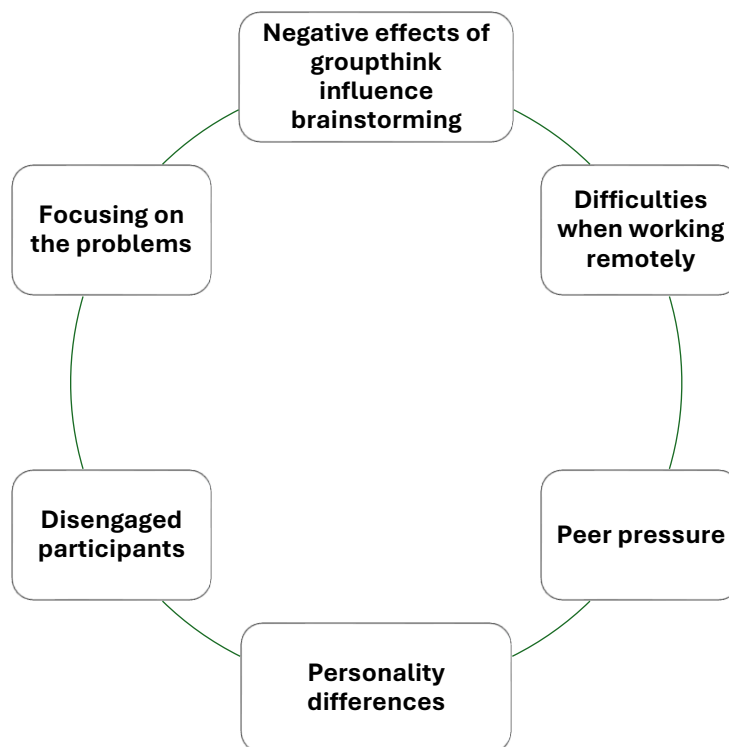


Figure 1 Challenges of Brainstorming

Negative effects of groupthink influence brainstorming: The group think is explained as “when you bring a group together to generate ideas, they tend to think alike, converging on a common solution” by Harvard Business Review (Harvard Business Review, 2012). Initially, the ideal brainstorming session produces as many ideas as possible and its aim is not to find one solution, but to create potential ideas that can be explored in the time ahead. Groupthink is a common problem which is generally noticed when we have one or two more dominant voices who really want to express their idea to the group.

Difficulties when working remotely: It of found to be less effective while working remotely where old approach to gather around a whiteboard equipped with stacks of Post-it notes is no longer possible. It is a serious matter for some of the managers that think get the signals of end of traditional brainstorming. This in turn creates space for new methods that can be also good enough, if not more effective than traditional brainstorming (Paulus & Nijstad, 2003).

Peer pressure: “Peer pressure is the influence of others to interact and think a certain way” and unfortunately, this is the common issue that comes into play during the brainstorming sessions. The peer pressure is felt by people that forced them to agree with some ideas that have been expressed by the team members in higher positions. Sometimes, peer pressure restricts them to share their own ideas having the fear that it may go against the grain (Janis, 1972).

Personality differences: The members of brainstorming sessions contributes both introverts and extroverts and the gap between the two is well noticed during the session. It is observed that an extrovert has the courage to share their wildest ideas in front of all the team members, but on the other hand, an introvert feels shy to express their ideas. Due to this challenge, it is important to set some parameters during brainstorming session to make it inclusive and ensures that each one’s is heard by other members (Cain, 2012).

Disengaged participants: Sitting idle in the meeting is one of the most energy-sucking task as compared to any other job. The meeting or brainstorming session will not be productive when it is noticed that the participants are

losing focus and energy. This leads to chances of creating biggest problem of not invested in gathering a good team that helps to get the outcome.

Focusing on the problems: The team cannot see through the problems when they are overwhelmed and bogged down in a particular project. They are approaching towards brainstorming session with lack lustre approach as they are exhausted overloaded tasks ahead. Instead of shutting the issues, it will be good to take advantage of this negativity and use it as the jumping off point for ideation.

Objective

1. To know the factors that determines the “Effectiveness of Brainstorming Techniques on Creative Problem-Solving and Team Consensus through Group Decision Processes”
2. To know the impact of Brainstorming Techniques on Creative Problem-Solving and Team Consensus.

Methodology

319 participants were surveyed from participants at different job level. The method of sampling was “Random sampling” for collection of data and examination was done by “Explanatory Factor Analysis” for results.

Findings

Table 1 demonstrates demographic details, it shows that 55.48% are Male, 44.52% are female. Looking at the age, 34.17% are between 30 to 35 years of age, 33.54% are between 35 to 40 years of age, and 32.29% are above 40 years of age. With regards to Job Level, 30.41% are Junior – senior employees, 36.68% are Supervisor & Middle management and 32.91% are Top management.

Table. 1 Respondent’s Details

Variables	Participants	Percentage
Gender		
Male	177	55.48%
Female	142	44.52%
Total	319	100
Ages in years		
30 to 35	109	34.17%
35 to 40	107	33.54%
Above 40	103	32.29%
Total	319	100
Job Level		
Junior – senior employees	97	30.41%

Supervisor & Middle management	117	36.68%
Top Management	105	32.91%
Total	319	100

“Factor Analysis”

“KMO and Bartlett's Test”

Table 2 “Kaiser-Meyer-Olkin Measure of Sampling Adequacy”

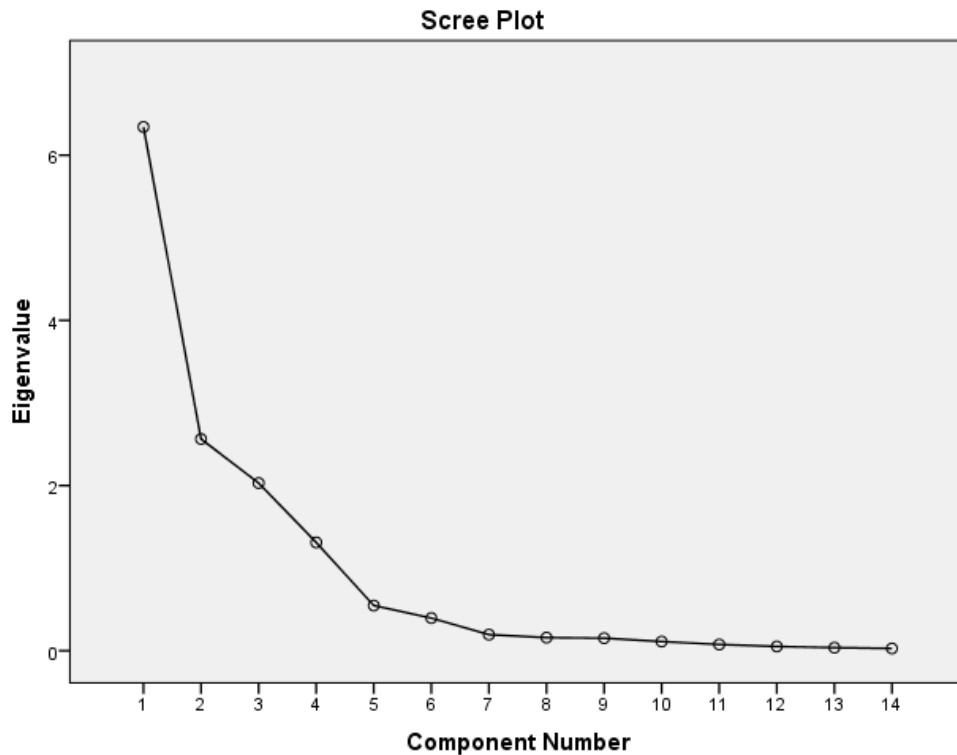
“Kaiser-Meyer-Olkin Measure of Sampling Adequacy”		.767
“Bartlett's Test of Sphericity”	“Approx. Chi-Square”	5549.465
	df	91
	Significance	.000

“KMO and Bartlett's Test”, value of KMO is .767 (Table 2).

Table 3 “Total Variance Explained”

“Component”	“Initial Eigenvalues”			“Rotation Sums of Squared Loadings”		
	“Total”	“% Of Variance”	“Cumulative %”	“Total”	“% Of Variance”	“Cumulative %”
1.	6.343	45.304	45.304	3.849	27.495	27.495
2.	2.564	18.315	63.619	3.618	25.840	53.335
3.	2.031	14.505	78.125	2.444	17.458	70.793
4.	1.311	9.368	87.493	2.338	16.700	87.493
5.	.547	3.910	91.402			
6.	.396	2.826	94.229			
7.	.195	1.391	95.620			
8.	.159	1.133	96.753			
9.	.152	1.087	97.840			
10.	.111	.792	98.631			
11.	.076	.541	99.173			
12.	.051	.367	99.540			
13.	.037	.261	99.801			
14.	.028	.199	100.000			

The four factors contribute towards explaining total 87.493% of variance. Variance explained by Knowledge Sharing is 27.495%, Creative Problem-Solving is 25.840%, Team Collaboration is 17.458%, and Decision Quality is 16.700%. (Table 3).



“Scree Plot”

Table. 4 “Rotated Component Matrix”

S. No.	Statements	Factor Loading	Factor Reliability
	Knowledge Sharing		.949
1.	Relevant knowledge is shared openly by team members during group discussions	.953	
2.	Exchange of expertise is facilitated by brainstorming sessions	.906	
3.	Employees learn from each other’s experience during problem-solving activities	.849	
4.	Knowledge-sharing practices enhance collaborative learning	.840	
	Creative Problem-Solving		.960

1.	Brainstorming helps identify innovative solutions to organizational challenges	.960	
2.	Team develop creative approaches to solve complex problems	.903	
3.	Employees are encouraged to think beyond traditional solutions	.895	
4.	Group discussions improve originality of proposed solutions	.867	
	Team Collaboration		.871
1.	Collaboration improves the quality of solutions generated,	.914	
2.	Employees respect and value each other's contribution	.861	
3.	Collaborative efforts enhance overall team performance	.757	
	Decision Quality		.839
1.	Decisions made through brainstorming are effective in addressing problems	.930	
2.	Group decisions lead to better organizational results	.929	
3.	Brainstorming improves accuracy of decision-making	.662	

Factors of the study and its related variables

The first factor of the study is Knowledge Sharing, the variables it includes are Relevant knowledge is shared openly by team members during group discussions, Exchange of expertise is facilitated by brainstorming sessions, Employees learn from each other's experience during problem-solving activities and Knowledge-sharing practices enhance collaborative learning. The second factor of the study is Creative Problem-Solving, it includes variables like Brainstorming helps identify innovative solutions to organizational challenges, Team develop creative approaches to solve complex problems, Employees are encouraged to think beyond traditional solutions and Group discussions improve originality of proposed solutions. Team Collaboration is the third factor, the variables it includes are Collaboration improves the quality of solutions generated, Employees respect and value each other's contribution and Collaborative efforts enhance overall team performance. Last and fourth factor is Decision Quality, it includes variables like Decisions made through brainstorming are effective in addressing problems, Group decisions lead to better organizational results and Brainstorming improve accuracy of decision-making.

Table 5 “Reliability Statistics”

“Cronbach's Alpha”	“Number of Items”
.896	14

Total reliability of 14 items that includes variables for “The Effectiveness of Brainstorming Techniques on Creative Problem-Solving and Team Consensus through Group Decision Processes” 0.896 (Table 5).

“Table 6 Model Summary”

“Model”	“R”	“R Square”	“Adjusted R Square”	“Std. Error of the Estimate”
1	.913 ^a	.834	.832	.29064
Predictors: (Constant), Knowledge Sharing, Creative Problem-Solving, Team Collaboration, and Decision Quality				

The adjusted R-squared value is 0.832 with approximately 83% of the variation.

“Table 7 ANOVA”

“Model”	“Sum of Squares”	“df”	“Mean Square”	“F”	“Sig.”	
1	“Regression”	133.407	4	33.352	394.837	.000 ^b
	Residual	26.524	314	.084		
	Total	159.931	318			
a. Dependent Variable: Overall impact of Brainstorming Techniques on Creative Problem-Solving and Team Consensus						
b. Predictors: (Constant), Knowledge Sharing, Creative Problem-Solving, Team Collaboration, and Decision Quality						

Value under significant column indicates a significant relationship between “Knowledge Sharing, Creative Problem-Solving, Team Collaboration, and Decision Quality” and Creative Problem-Solving and Team Consensus.

“Table 8 Coefficients”

“Model”	“Un standardized Coefficients”		“Standardized Coefficients”	“t”	“Sig.”
	“B”	“Std. Error”	“Beta”		
(Constant)	4.138	.016		254.289	.000
Knowledge Sharing	.194	.016	.274	11.908	.000
Creative Problem-Solving	.532	.016	.750	32.618	.000
Team Collaboration	.144	.016	.203	8.812	.000
Decision Quality	.280	.016	.395	17.203	.000
DV: Overall impact of Brainstorming Techniques on Creative Problem-Solving and Team Consensus					

All the factors Knowledge Sharing, Creative Problem-Solving, Team Collaboration, and Decision Quality are showing significant impact on Creative Problem-Solving and Team Consensus. Highest impact is shown by Creative Problem-Solving with beta value .750 followed by Decision Quality (.395), Knowledge Sharing (.274), and Team Collaboration (.203).

CONCLUSION

The research emphasizes that brainstorming is a fruitful and pragmatic approach for improvising innovative problem-solving and attaining team harmony in educational institutions. By fostering transparent communication and open exchange of ideas, brainstorming enables individuals to take part enthusiastically in group discussions and offer creative solutions for intricate issues. The approach not just improvises creativity and decision making but also reinforces teamwork, collaboration and mutual comprehension amongst team members.

Moreover, the results recommend that brainstorming crafts an optimistic surrounding wherein team members feel inspired to voice out their thoughts without fear of judgement. This assists institutions and centre of learning produce a variety of mindsets and lead to more productive decisions via collective perception. On the other hand, issues like group discussions, peer influence, and different mentality and affect the productivity of brainstorming sessions in case they are not handled appropriately. Henceforth, an effective brainstorming session needs real guidance, equal participation and a motivating surrounding.

Altogether, brainstorming serves a remarkable role within educational institutions due to its capability to persuade towards innovation, active learning and collaborative decision-making. The research determines that when applied effectively, brainstorming can boost both individual innovation and entire team performance, making it an imperative mode for organizational development and constant learning (Serrat, 2017). Furthermore, communication-based techniques and technology-oriented communication systems can reinforce collaborative decision-making procedure in contemporary institutions (Mittal et al., 2024). The factors the study the Effectiveness of Brainstorming Techniques on Creative Problem-Solving and Team Consensus through Group Decision Processes are Knowledge Sharing, Creative Problem-Solving, Team Collaboration and Decision Quality.

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