

The Effectiveness of Brainstorming in Developing Students' Creative and Critical Thinking. A Case of Kakungulu Memorial School Kibuli in Makindye Division Kampala District

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ABSTRACT

This qualitative study was conducted at Kakungulu Memorial School-Kibuli in Makindye Division, Kampala District, to assess the effectiveness of brainstorming in developing learners' critical and creative thinking. The target population was all students from grades one to three where the competence-based curriculum had been implemented. The researcher used a convenient sampling technique to select all the one hundred (100) Form 2 history students to participate in the intervention. The technique was preferred because in Uganda, history is a compulsory subject from one to four, implying that all students in Form 2 were potential participants in the study. The researcher did this to avoid the influence of external factors that could be a threat to the validity of the study. The majority of the groups worked within the principles of cooperative learning to include positive interdependence, face-to-face promotional interaction, individual and group accountability, and displayed relevant social skills such as effective communication, leadership, and meaningful decision-making. However, a number of groups were not well informed about managing conflicts in groups. Brainstorming sessions can be a useful strategy to encourage genuine collaboration and interaction in the classroom. Putting together a well-stated problem and careful planning strategies can lead to meaningful idea generation and idea building, which can be used in solving problems or addressing specific course-related issues.

Keywords: Brainstorming, Creative Thinking, Critical Thinking, Learners

INTRODUCTION

The curriculum review process that culminated in the current competence-based curriculum at both primary and secondary levels of learning in Uganda was informed by the need for holistic education for personal and national development in the country [1]. According to Mubangizi [1], the competence-based curriculum is intended to allow learners to develop understanding and skills according to their ability, as well as provide each one of them with an opportunity to acquire knowledge, skills, and attitudes and to achieve appropriate recognition for their attainment during their time in school. Guided by a set of objectives to include promoting effective learning and acquisition of skills and reducing content overload by specifying a realistic set of expected learning outcomes with a range of essential generic skills at the heart of the curriculum. A careful selection of learner-centered methods of instruction has been made to facilitate this competence-based learning approach. It is assumed that this mode is most likely to promote learners, creative and critical thinking and allow flexibility to absorb emerging

fields of knowledge in a rapidly changing world. Brainstorming is one of the learner-centered methods that is being used for instruction. However, little information is known about its principles of application, its effectiveness, and its pitfalls. Brainstorming is one of the constructivist methods of teaching based on constructive learning theories that assert that learning is greater when the learner is actively involved in the learning process and is the maker of their own learning. With the implementation of a competence-based learning approach in both primary and secondary schools in Uganda, one of the appropriate methods of teaching is brainstorming. Brainstorming is using the brain to storm a creative problem in such a way that each stormer audaciously attacks the same objective. It is done in such a way that all contributed ideas will not be evaluated or discussed until all of the stormers have run dry of ideas. Legitimate ones, and often the most farfetched ones, are fertile. By doing this, creativity is encouraged [2]. The method of brainstorming was introduced by Alex F. Osborn in his 1953 book

entitled "Applied Imagination: Principles and Procedures of Creative Thinking". Osborn, an advertising executive, realized that conventional business meetings were inhibiting the creation of new ideas and proposed some rules designed to stimulate them. Constructive teaching gives maturity to critical thinking and creates a dynamic and independent learner. It believes that new knowledge is constructed on the foundation of previous knowledge, which is called schema. According to this theory, all new learning is filtered through a pre-existing schema. The theories suggest that learning is most effective when the learner has a chance to actively participate in the learning process, even though he or she

acquires knowledge through perseverance. In such a gradual way, the teacher engages his students through questions and activities, leading them to self-research and self-exploration [3]. Brainstorming is one of the methods that has been identified by curriculum experts as one that could bring about desirable learning outcomes as far as learners' creative and critical thinking is concerned. However, little is known about its principles of operation and how effective it is as a realization of its intentions, hence the need to carry out this study. The purpose of this study was therefore to assess the effectiveness of brainstorming in developing learners' critical and creative thinking.

Objectives of the study

The researcher formulated these objectives to guide the study:

1. To establish whether the resources used strictly follow the formal principles of the brainstorming method of teaching.

2. To assess the effectiveness of brainstorming in improving learners critical and creative thinking.
3. To investigate the challenges of brainstorming methods.

Research Questions

The researcher set three questions to be answered at the end of the study:

1. Do teachers and guides address the principles of using brainstorming?

2. How effective is the method of brainstorming in improving learners critical and creative thinking?
3. What are the challenges of using the brainstorming method?

LITERATURE REVIEW

The brainstorming strategy is one of the most important strategies for provoking creativity and solving problems in the educational, commercial, industrial, and political fields. Brainstorming means the use of the brain for active problem solving, and the brainstorming session aims to develop creative solutions to problems [4]. On the other hand, creative

thinking is known as a compound mental activity aiming to direct a strong desire to look for solutions or reach original solutions that were not known before [5]. It is multiple thinking that includes the breaking up of old ideas, making new connections, enlarging the limits of knowledge, and the onset of wonderful ideas.

Creative problem solving

Scholars and researchers discussed the issue of creative problem solving in general and especially in the field of gifted students. Creative problem solving can be defined within its three components as the solution, which means finding a way to solve the problem. The problem refers to obstacles that present a challenge for the individual to reach the goal. This challenge needs a solution or a decision. Thus, creative solving is a frame or system including productive thinking tools that can be used to understand problems or generate different ideas that are not traditional, then evaluate them to reach new solutions [6]. It is taking a creative decision through thinking, reflecting, and predicting ideas and solutions through deep awareness [7]. It is noted that through the steps of the creative problem-solving

model, brainstorming strategy has its own importance since the aim is to generate many ideas that may be the solution to a problem [8]. The creative problem-solving approach is the effort by the individual or group's creative thinking to solve a problem. It can be used in many areas and provide a framework regulating the use of tools and specific strategies to help generate and develop products that are characterized by novelty and utility. It is a framework of processes with a regulatory function, a system used by the product of the thinking tools in order to understand the problems and opportunities, and the generation of many diverse ideas is familiar, as well as evaluating, developing, and implementing the proposed solutions [9].

Why teachers must use brainstorming as a method of teaching

According to AlMutairi [10], while conventional group problem solving may be undermined by unhelpful group behavior, brainstorming provides a free and open environment that encourages everyone

to participate. Weak ideas are welcomed and built upon, and all participants are encouraged to contribute fully, helping them develop a rich array of creative solutions. When used during problem

solving, brainstorming brings team members' diverse experiences into play. It increases the richness of ideas

explored, which means that you can often find better solutions to the problems that you face.

How to effectively use the brainstorming tool

Al Muthaili [10] advised on how to run a group brainstorming session effectively by following these steps:

the start of the session to write down as many of their own ideas as they can. Then, ask them to share their ideas while giving everyone a fair opportunity to contribute.

Step 1: Prepare the Group

First, set up a comfortable meeting environment for the session. Make sure that the room is well-lit and that there are tools, resources, and refreshments.

Step 3: Guide the discussion

Once everyone has shared their ideas, start a group discussion to develop other people's ideas and use them to create new ones. Building on others' ideas is one of the most valuable aspects of group brainstorming. Encourage everyone to contribute and to develop ideas, including the quietest people, and discourage anyone from criticizing ideas.

Step 2: Present the Problem

Clearly define the problem that you want to solve and lay out any criteria that you must meet. Make it clear that the meeting's objective is to generate as many ideas as possible. Give people plenty of quiet time at

RESEARCH METHODOLOGY

Research design

This research adopted an experimental approach to investigate the effectiveness of brainstorming on learners' critical thinking. The researcher then

applied some quantitative techniques towards the end of the study to answer the preset questions.

Research Area

The study was conducted at Kakungulu Memorial School. The school is located in Kibuli. The school is classified as a mixed day and boarding, O and A level; although it recognizes all religions, it is a Muslim-founded secondary school. Kakungulu Memorial was started way back in 1994 by the Uganda Muslim Supreme Council, under the patronage of Prince Kassim Nakibinge Kakungulu. Kakungulu Memorial School was started with the aim of providing quality

and affordable education to the young generation. The school runs the competence-based curriculum prescribed by the National Curriculum Development Center from Senior One to Three currently and the subject-based curriculum from Four to Six. The study was conducted in January 2023 through the School Practice Exercise, which began in June and ended in October of the same year.

Target Population

The target population was all students from grades one to three where the competence-based curriculum had been implemented.

technique was preferred because in Uganda, history is a compulsory subject from Form 1 to Form 4, implying that all students in Form 2 were potential participants in the study. The researcher did this to avoid the influence of external factors that could be a threat to the validity of the study.

Sample size and selection techniques

The researcher used a convenient sampling technique to select all the one hundred (100) Form 2 History students to participate in the intervention. The

Types of data collected

The researcher collected two types of data, namely, primary and secondary data.

Primary Data

Primary data comprised students' scores generated from the activities of integration given at the end of every theme or topic. The researcher recorded in the journal daily information about students' changing behavioral characteristics, students' level of interest, the development of skills such as positive interdependence, face-to-face promotional interaction, and their gradual development of reflection, individual and group accountability, and the development of social skills such as effective communication, interpersonal and group skills, leadership, decision-making, trust-building, friendship-development, communication, and conflict-management skills that were observed as daily history lesson activities were administered.

Secondary Data

The researcher reviewed literature sources that had studied problem-solving learning techniques to obtain a solid background of theories, principles, and knowledge forwarded to explain the characteristics, principles, and benefits of problem-based learning methods and how to effectively apply the technique in classroom situations. The researcher also revisited the constructs of curriculum published by the NCDC to get more information on the required approaches to teaching using student-centered methods in secondary schools.

Students' opinions regarding their experiences in the form of motivation and challenges during intervention, as well as the knowledgeability of instructors to understand and apply the approach to teaching history.

Data collection instruments

The following instruments were used to collect relevant data before, during, and before the intervention. Activities of integration that required students to solve problems were given at the end of every term. This gave the researcher a chance to collect data in the form of students on academic progress and, in particular, the development of generic skills. The researchers' journal is the researchers' notebook, where daily recordings were made to monitor learners' interest, motivation, and interactive mode during the implementation of the innovation. The observation schedule served to help the researcher make meaningful observations of learners' behavior during the implementation of the intervention. Two interview schedules were designed and used by the researcher to conduct one-on-one conferencing with students and history teachers to get detailed information on positive and negative experiences of the implemented strategies.

Validity and reliability of instruments

This study relied on the ability of the researcher to develop standardized daily history exercises, post-test, and pre-test effectiveness in measuring change in knowledge because there was no pilot test done before the study was conducted. Having a pretest also safeguarded against the threat of earlier knowledge affecting the outcome of the study. Since only one class was tested over the course of one term, there was an increase in both content and face validity. The study sample being only one stream of Form Two

DATA PRESENTATION ANALYSIS AND INTERPRETATION OF FINDINGS

The effectiveness of brainstorming in developing students' ability to collaborate and communicate

Being a good collaborator means knowing how to function well as part of a team. This encompasses establishing common ground, resolving discrepancies, negotiating the actions that a group is

History students in Kakungulu Memorial Secondary School decreased the ability to generalize findings. The researcher taught single-handedly carried out history instruction to one Form 2 stream of 60 students to reduce the effects of different teachers.

The researcher scored all tests to eliminate the threat of scorer variability. There was a single selected group under observation, with a careful measurement being done before applying the experimental treatment and then measuring after. This design has a lot of internal validity because the influence of external threats on the outcomes being measured has been minimized. It had no external validity and very little generalizability because there was no comparison group and no random assignment.

Data Analysis Procedure

Data collected from daily journal recording as well as their scores in activities of integration were analyzed using a frequency table with the intention of establishing the mean score and the failure rate of students in history before the intervention was implemented.

Ethical Considerations

To avoid plagiarism, for every piece of literature used in this project, the researcher had to indicate the source and reference. The researcher sought permission from the head teacher of Kakungulu Memorial Secondary School in Kibuli to conduct this study.

Limitations

This innovation was implemented in only one secondary school, and therefore the results obtained cannot be applied to the factors that influence Form Two History students' achievement in other secondary schools.

going to take, and coming to an agreement [11]. The researcher observed students as they interacted in their groups.

Table 1 shows the percentage distribution of students' ratings of their ability to collaborate during brainstorming sessions.

| Students' ability to collaborate | Yes | No |
|--|----------------|---------------|
| All group members understood that they are linked together to achieve success | 7 | 1 |
| Willingness of group members to encourage and facilitate each other's efforts to pool ideas to solve a problem and achieve its goal. | 7 | 1 |
| Each student was accountable for their learning and eliminating social loafing. | 7 | 1 |
| Members communicated effectively during the brainstorming session. | 7 | 1 |
| Evidence of leadership and decision making | 6 | 2 |
| Evidence of conflict management | 7 | 6 |
| Evidence of friendship and trust building | 6 | 3 |
| Members reflected on their progress and their working relationships. | 7 | 2 |
| Total | 132/160 | 24/160 |
| Percentage | 83% | 16% |

Source: Primary Data 2023

Regarding the group's positive interdependence, seven (7) members understood that they were linked together to achieve success, but the remaining one (1) did not. As to whether group members possessed the attribute of the group's collective responsibility, seven (7) of the group had members who were willing to encourage and facilitate each other's efforts to solve their problems and achieve their goals, but the remaining one (1) was not. About the social skills of the groups, members of the seven (7) groups communicated effectively, but the remaining one (1)

was not good at this. When it came to leadership and decision-making, this component was defined among the six (6) groups, except for two (2). Seven (7) of the groups managed conflicts well, but the remaining one (1) did not.

Six (6) of the group members worked in friendship with other members and had built trust, but this was not the case for the remaining two (2). Seven (7) groups had members reflect on their progress and their working relationships, but one (1) did not.

The effectiveness of brainstorming in improving students' historical knowledge and understanding

Constructivism is a theory that believes in the human generation of knowledge and meaning from the interaction between their experience and ideas [14]. The researcher observed and rated students working

in groups to establish their abilities to generate new knowledge from previous knowledge by transforming, organizing, and reorganizing previous knowledge.

Table 2 shows the percentage distribution of students' generation of knowledge and meaning after engaging in brainstorming.

| Students' ability to generate new geographic information | Exceptional | Good | Average | Poor |
|---|--------------------|--------------|----------------|-------------|
| Transformation of old knowledge to new knowledge | 1 | 4 | 2 | 1 |
| Organization of geographical concepts and processes | 1 | 3 | 3 | 1 |
| Reorganization of geographical processes and concepts | 1 | 3 | 3 | 1 |
| Total | 3/24 | 10/24 | 8/24 | 3/24 |
| Percentage | 13% | 42% | 33% | 13% |

Source: Primary Data 2023

From table two above, one (1) group was ranked exceptional in transforming old geographic information into new knowledge. During brainstorming, four (4) were good, two (2) were average, and the remaining one (1) was average. No group was poor at performing this task. One (1) group was exceptional in organizing

geographical concepts and processes to generate knowledge; three (3) were good, and the remaining three were average in this task. None of the groups displayed weaknesses in this. One (1) group was exceptionally good at reorganizing old geographic information to generate more ideas; three (3) were

good; the remaining three (3) were average; and none of the other groups were not capable of performing this task.

Challenges to using brainstorming to carry out instruction in history

The researcher interviewed the students and gathered their opinions regarding the brainstorming sessions as follows:

Table 3 shows the percentage distribution of student challenges to problem-based learning

| Students' ability to construct an extensive and knowledge | Frequency | Percentage |
|---|-----------|-------------|
| Some students dominated during the brainstorming sessions | 23 | 70 |
| Some students were reserved and therefore did not contribute their ideas. | 8 | 100 |
| It was discouraging to some students because their ideas were always rejected and never featured anywhere during the sessions | 38 | 95 |
| Inadequate time to look for relevant information | 41 | 100 |
| Some groups were often found diverting away from the problem in focus | 9 | 30 |
| Some topics were complicated to students who failed in this lesson | 35 | 100 |
| Total | 41 | 100% |

Source: Primary Data 2023

Twenty-three (21) of the forty-one students complained that some students dominated during the brainstorming sessions. Eight (8) said that some colleagues were reserved and therefore did not contribute their ideas.

Thirty-eight (38) complained that it was discouraging to some students because their ideas were always rejected and never featured anywhere during the sessions.

The level of senior achievement of students after the implementation of the brainstorming method

The researcher tested students' historical achievement using integration activities that require students to work in their assigned groups to establish

All forty-one (41) students observed that the given time for brainstorming during history lessons was not enough for them to look for relevant information.

Nine (9) of the students had observed some of their group members, who were often found diverting away from the problem in focus.

Thirty-five (35) of the history students realized that some topics were so complicated that some failed to interpret them in order to generate ideas during the brainstorming lesson.

their level of achievement. The results have been presented and analyzed in the table below.

Table 4: Interpretation of Form Two students' history results before the innovation was implemented.

| Students' assessment scores after the innovation | Frequency | Percentage |
|--|-----------|-------------|
| Exceptional | 1 | 10 |
| Coherent | 4 | 30 |
| Accurate | 2 | 50 |
| Relevant | 1 | 10 |
| Total | 8 | 100% |

Source: Primary Data 2023

Findings from the foregoing table show that out of the eight (8) groups of students that participated in this innovation, one (1) was ranked exceptional in performance and therefore displayed an exceptional response, unsolicited in the instructions. Four (4) were coherent in performance because they presented ideas that were connected to each other smoothly, logically, in choice of words, and in a way that gave

meaning to the issue. Two (2) groups displayed accuracy when it came to the presentation of ideas that carefully conformed to the facts and truth known about the issue. And the remaining one (1) group was ranked as relevant in performance since they presented ideas that were connected, correct, and suitable for the issue at hand.

SUMMARY OF FINDINGS AND DISCUSSION

The effectiveness of brainstorming in developing students' ability to collaborate and communicate

Being a good collaborator means knowing how to function well as part of a team. This encompasses establishing common ground, resolving discrepancies, negotiating the actions that a group is going to take, and coming to an agreement [11]. The majority of the groups worked within the principles of cooperative learning to include positive interdependence, face-to-face promotional interaction, individual and group accountability, and displayed relevant social skills such as effective communication, leadership, and meaningful decision-making. However, a number of groups were not well informed about managing conflicts in groups. As cited, being a good collaborator means knowing how to function well as part of a team. This encompasses establishing common ground, resolving discrepancies, negotiating the actions that a group is going to take, and coming to an agreement [11]. These tasks require an open exchange of ideas and engagement by all members of the group [12, 13].

The effectiveness of brainstorming in improving students' historical knowledge and understanding.

Constructivism is a theory that believes in the human generation of knowledge and meaning from the interaction between their experience and ideas [14]. The researcher observed and rated students working in groups to establish their abilities to generate new knowledge from previous knowledge. by transformation, organization, and reorganization of previous knowledge. Based on the foregoing findings, students were able to generate new information during brainstorming sessions. This was because of the daily interactions between both the learners' internal and external processes, as a consequence of

Brainstorming sessions can be a useful strategy to encourage genuine collaboration and interaction in the classroom. Putting together a well-stated problem and careful planning strategies can lead to meaningful idea generation and idea building, which can be used in solving problems or addressing specific course-related issues.

Recommendations of the study

The following were recommended for the study: The facilitator must keep students on task. Here, the researcher advised facilitators to ensure that the students collaborate rather than compete with one another when generating ideas. The teacher should walk around the room and listen for inappropriate group behavior. Encouraging students to build on each other's ideas to help them build their critical

the relationship or interaction between cognitive experience or prior knowledge and social interactions with knowledgeable peers who gave help to the weak ones and during scaffolding, which activated previous knowledge, as earlier on opined by Owo et al. [14].

Challenges to using brainstorming to carry out instruction in history

Students' shared challenges included dominating individuals during sessions, a lack of relevant prior information that limited creativity during sessions, students' personalities, such as being reserved to contribute ideas and their inability to observe the rules of brainstorming, and the problem of time limit. These findings range from individual attributes of learners, such as the inability to work together in a group to share ideas, to slow learners. As a matter of fact, this intervention was implemented on short notice during school practice; there was no time to encourage learners to explore more geographic information in order to take part in the session, which resulted in constraining students' creativity. In addition to that, the researcher, who was also the facilitator, realized that other techniques to help students learn better were required to attain balanced learning. The teacher also observed that classroom control was at stake here.

The level of senior achievement of students after the implementation of the brainstorming

The researcher tested students' history of achievement using integration activities that require students to work in their assigned groups to establish their level of achievement. Findings show a good performance by seven (7) groups, scoring accurately in their activities of integration. This is evidence that, to some extent, the innovation was a success, although with some irregularities during its implementation resulting from students' individual indifferences.

CONCLUSION

thinking skills. Facilitators should work forward with any student who may be in this category and remark on their contribution both to them personally, to their group, and to the whole class. Facilitators should explain that, as part of this course, all students are expected to bend a little, which may have them participating in activities that might make them uncomfortable. Facilitators must never force someone who is adamant about a particular situation; instead, they must coax those who are hesitant at first by creating a trusting and caring classroom environment from the beginning of the semester. This approach can help students be more accepting of change and those who tend to feel uncomfortable working with others. Facilitators need to help groups move forward if they are "stuck" and not able to generate ideas by

reconvening the group to review the problem or issue or provide an example of a possible solution. Facilitators need to get students to reach consensus, which becomes less of a problem if all students are

given equal time to provide input, feel comfortable as valued members of the group, and are respected for their points of view.

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