

## Perception of Teachers on Chemistry Teaching for Creativity-Fostered Behaviour in Nigeria Secondary Schools

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### Abstract

This study investigated perception of teachers on Chemistry teaching for creativity-fostered behaviour in Nigeria secondary schools using descriptive research design guided by three research questions. The population of the study was the 220 Chemistry teachers in all the 360 secondary schools in Ondo State. The sample size of the study was 142 obtained by using Taro Yamane formula. A self-designed instrument titled: Questionnaire on Chemistry Teachers' Creativity-Fostered Behaviour (QCTCFB) was employed. It was adequately validated. The reliability of the instrument using Cronbach's Alpha yielded  $r = 0.88$ . Data collected were analyzed using mean score. The results showed numerous challenges in promoting creativity-fostered behavior especially lack of pedagogical content knowledge and learning resources ( $\bar{X} = 3.04$ ). The result further showed student-centred learning and professional development of teachers on creativity-fostered behaviour ( $\bar{X} = 3.22$ ). The study concluded that emphasizes on creativity-fostered behavior through opportunities for students' engagement in practical learning experiences and provision of learning resources as well as professional development of teachers on the use of innovative strategies for curriculum delivery in the classroom setting are imperative. It was recommended that policy makers develop curriculum, procure and distribute instructional materials that has the potentials to promote creativity-fostered to schools, encourage teachers to use of innovative teaching methods, and government to refocus polity attention to teachers' welfare and provide learning resources to support the implementation process, in addition to providing professional development training for teachers on means of promoting creativity-fostered behaviour.

**Keywords:** Chemistry teaching, Creativity-fostered behavior, Secondary school, Teachers' perspectives.

### Introduction

Creativity is an essential component of human development and this is apparent for its vital roles in developing individuals and the society at large for future endeavours. In science education and particularly in Chemistry as a central subject to other science disciplines, creativity is important in fostering innovation, problem-solving and critical thinking (Akinyemi 2015). National Policy on Education (2013) emphasized the importance of inculcating in the children the spirit of enquiry and creativity through the exploration of nature and local environment. NPE (2013) further stipulates that both primary and secondary education objectives should be based on diversified curriculum to cater for the differences in talents, opportunities and future roles as prerequisites for meeting the global world economy.

Teachers as curriculum implementers and a key stakeholder in education, play a significant role in promoting and fostering creativity behaviour on their learners. However, despite the utility value of creativity in teaching learning process, observations showed that Chemistry teachers' perspectives of creativity-fostered behaviour implementation process mechanism and its promotion in the classroom setting is limited (Craft, 2005; Jeffery, 2006). Often times in Nigeria as the study locale, studies such as (Irinoye and Adeleke, 2019; Irinoye and Ikuejube, 2024) have showed that the teaching and learning of Chemistry emphasized rote memorization that leads to regurgitation of facts without requisite conceptual knowledge among secondary school students in Nigeria, therefore may not promote creativity, problem solving and critical

thinking required for 21<sup>st</sup> century challenges. The identified gap could impact negatively on students' learning outcomes and personal growth in learning Chemistry for conceptual understanding.

In order to widen the horizon on creativity, some of the elements that creativity could be based upon according to Nwosu (2020) are succinctly enumerated below:

- i. having intention of inverting something new;
- ii. being able to make perception of ones environment to generate a unique and fruitful end;
- iii. making connections through discovery or finding out in formation in the environment
- iv. engaging in mental process invention in both useful and original ideas;
- v. providing new ideas, improvements, innovations and thinking on useful ideas, and
- vi. searching for problems that demands urgent solutions.

National Policy on Education (2013) also emphasized the development of individual into a morally sound, patriotic and effective citizens and acquiring appropriate skills and competencies to contribute positively to the development of the society. The above could only take place by training minds in schools especially the mind of young ones. Teachers are nation builders hence, any national development hinges on ability of the teachers in promoting creativity-fostered behaviour among students.

Chemistry stands as cornerstone discipline with profound implications for both individual development and societal progress. As we navigate the intricacies of our contemporary world, this subject extend beyond academic realms, influencing our daily lives and contributing significantly to effective functioning and participation in the society. This importance is not merely theoretical but is underscored by practical applications that impart various aspects of our existence. In exploring the multifaceted roles of Chemistry, it becomes evident that proficiency in this discipline is essential for problem-solving, critical thinking, creativity, innovation and informed decision-making. The practical applications of Chemistry are omnipresent, influencing technological comprehension through creativity-fostered behavior enhancement in learners and overall adaptability in our rapidly changing world (Irinoye, Ikuejube and Adetunji (2024)). The importance of preparing learners to function effectively

in society is intrinsically linked to the mastery of Chemistry as a central subject in sciences, since without it, a student may not be versatile enough in Biology, Physics and Mathematics. It has in-built-potentials to shaping a future generation capable of meeting the challenges of the 21<sup>st</sup> century (Bamidele, Irinoye and Adetunji, 2019). The objectives of Chemistry, as outlined in the National Policy on Education (NPE) of 2013, emphasize the crucial role of laying a solid foundation for scientific and critical reflective thinking which could be easily achieved by fostering creativity behavior in the learners.

There is a growing recognition of the need to promote creativity in science education. In order to achieve the aforementioned, a shift from traditional teaching methods to more innovative and inquiry-based approaches in secondary education by encouraging students to think creatively and out of box, ask questions and explore scientific concepts in hands'-on and interactive way becomes imperative. Irinoye, Ikuejube and Adetunji (2024) posited that there are some aspects of Chemistry curriculum that needs creativity-fostered behavior in the process of implementation in Nigerian secondary schools. The aspects include among others explanation of chemical phenomena, solving problems, identifying patterns and making connections to develop solutions, designing experiments, creating visual representation and communicating scientific ideas to mention but a few. Fostering creativity behavior among students at all levels of education is tenacity to realization of Nigerian educational goals and global economic development. Creativity is known for its characteristics of enabling self-reliance which seems to be the main antidote for school learners unemployment problem. Chemistry is very germane to everyday life applications. In spite of the importance of Chemistry in promoting scientific literacy and critical thinking, the teaching of Chemistry in Nigeria secondary school is often ineffective, taught in didactic and theoretical manner leading to poor students' outcomes and lack of creativity-fostered behavior in learning. Also, observation showed that the implementation of Chemistry curriculum in Nigeria secondary schools is often hindered by lack of learning resources which limits the ability of teachers to promote creativity-fostered behavior in teaching learning process and prepare students for the challenges of the 21<sup>st</sup> century. In addition, it seems as if teachers have limited ability on strategies to creativity-fostered behavior in learning and encounter numerous challenges in promoting it in classroom setting,

therefore may negatively impact students learning outcome and personal development, hence, this study.

### Research Questions

1. What are the challenges Chemistry teachers encounter that hinders creativity-fostered behaviour in classroom setting?
2. What are the solutions to the challenges Chemistry teachers encounter that hinders creativity-fostered behaviour in classroom setting?

### Methodology

The study used descriptive survey research design and was guided by three research questions. The population of the study was the 220 Chemistry teachers in all the 360 secondary schools in Ondo State. The sample size of the study was 142 obtained by using Taro Yamane (1967) sample size formula:  $n = N / (1 + N (e^2))$ . The participants were selected by purposive sampling technique by making use of Chemistry teachers with at least five (5) years of teaching experience. The instrument used to gather data for the study was self-developed one namely: Questionnaire on Chemistry Teachers' Creativity-Fostered Behaviour (QCTCFB). The questionnaire was validated by two experts in Test and Measurement, Obafemi Awolowo

University, Ile-Ife. Corrections and modifications were carefully made on the instrument and final draft was obtained. A Cronbach Alpha reliability method was employed to ascertain the reliability coefficient of the instrument by giving the draft to Chemistry teachers in two Local Government Areas (LGAs) in Osun State that does not constitute the participants used for the study. When the responses of the teachers in the two LGAs were correlated, it yielded  $r = 0.88$ , which the researcher adjudged reliable since it has high coefficient. The questionnaire comprised two (2) sections. Section A consists of respondents' biodata while Section B contains thirteen (13) questions. Questions 1- 5 elicited information on challenges that Chemistry teachers encounters that hinders creativity fostered behaviour in learning while question 6 – 13 sought for solutions on challenges Chemistry teachers encounters that hinders creativity fostered behaviour in learning. The instrument used a four-point Likert-type scale for rating the response options using SA = 4, A = 3, D = 2 and SD = 1 respectively ( $\bar{X} = 4 + 3 + 2 + 1/4 = 2.50$ ). The bench mark for agree was a mean value 2.50 and above, while value less than 2.50 indicates disagree. The researcher administered the questionnaire through respective schools' Vice Principals. Data collected were analyzed using mean score.

### Results

**Table 1: Respondents' Views on Challenges Chemistry Teachers Encounter that Hinders Creativity-Fostered Behaviour**

S/N	ITEM	SA	A	D	SD	$\bar{X}$	Decision
1.	Inadequate teachers' pedagogical content knowledge to promote creativity-fostered behavior among the teachers. .	220 (55)	147 (49)	40 (20)	18 (18)	2.99	Agree
2.	Misconception of teachers that implementing creativity-fostered behavior will add to the workload of teachers in classroom.	320 (80)	132 (44)	18 (9)	9 (9)	3.37	Agree
3.	Lack of learning resources for easy implementation process of creativity-fostered behavior in Nigerian secondary schools.	260 (65)	135 (45)	26 (13)	19 (19)	3.10	Agree
4.	Non-conducive environment that stifle creativity-fostered behavior in Nigerian secondary schools	256 (64)	132 (42)	12 (24)	18 (18)	3.08	Agree
5.	Difficulties in methods of assessment of creativity-fostered behavior..	280 (70)	126 (42)	24 (12)	18 (14)	3.17	Agree
<b>Cluster Mean Score</b>						<b>3.04</b>	<b>Agree</b>

Table 1 revealed that items 1 - 5 were agreed upon by the respondents with cluster mean score ( $\bar{X} = 3.04$ ) which is greater than the bench mark value ( $\bar{X} = 2.50$ ) . This indicated that there was agreement that all

the items were challenges to promoting creativity-fostered behaviour in teaching and learning Chemistry the study locale, the major ones being misconception of teachers that implementing creativity-fostered behavior

will add to the workload of teachers in classroom, difficulties in methods of assessment of creativity-fostered behavior, and Non-conducive environment that stifle creativity-fostered behavior in the study locale.

**Table 2: Respondents' Views on Solutions to the Challenges Chemistry Teachers Encounter that Hinders Creativity-Fostered Behaviour**

SN	ITEM	SA	A	D	SD	$\bar{X}$	Decision
6.	Allow students to take ownership of their learning task by encouraging student-centred learning	320 (80)	135 (45)	14 (7)	10 (10)	3.37	Agree
7.	Incorporate more practical activities into Chemistry curriculum	280 (70)	132 (44)	20 (10)	18 (18)	3.10	Agree
8.	Provide teachers with training to support creativity-fostered behavior	320 (80)	132 (44)	16 (8)	10 (10)	3.36	Agree
9.	Provide teachers with adequate resources to support creativity-fostered behavior	308 (77)	129 (43)	20 (10)	12 (12)	3.30	Agree
10.	Use assessment methods that promote creativity-fostered behavior through project-based assessment and exhibition.	320 (80)	132 (44)	16 (8)	10 (10)	3.36	Agree
11	Incorporate technology and digital tools into Chemistry curriculum implementation in the classroom	268 (67)	120 (40)	20 (10)	25 (25)	3.05	Agree
12.	Foster collaboration that promotes communication among learners	240 (60)	132 (44)	26 (13)	21 (21)	2.95	Agree
13.	Encourage students to think out of box by solving problems creatively.	320 (80)	120 (40)	14 (7)	15 (15)	3.30	Agree
<b>Cluster Mean Score</b>						<b>3.22</b>	<b>Agree</b>

Table 2 showed that items 6 - 13 were agreed upon by the respondents with cluster mean score ( $\bar{X} = 3.22$ ) which is greater than the bench mark value ( $\bar{X} = 2.50$ ). This indicated that there was agreement that all the items could promote creativity-fostered behaviour in teaching and learning Chemistry in secondary schools in the study locale, the major one being allowing students to take ownership of their learning task by encouraging student-centred learning and hands-on activities..

### Discussion of Findings

In discussing the findings of this study, the researcher followed a sequence of data analyzed using relevant literature to support the findings. Research question one revealed that teachers are confronted with different problems in promoting creativity-fostered

behavior in teaching Chemistry among which are inadequate teachers' pedagogical content knowledge to promote creativity-fostered behavior, misconception of teachers that implementing creativity-fostered behavior will add to the workload of teachers in classroom, lack of learning resources for easy implementation process of creativity-fostered behavior, non-conducive environment that stifle creativity-fostered behavior, and difficulties in methods of assessment of creativity-fostered behavior. The above findings could be adduced to lack of motivation of teachers due to poor remuneration by the government coupled with lack of professional development right from the schools where most teachers graduated from. The finding is congruent to that of Adeyemi (2015) who posited that environmental pressure, inadequate funding of education and divided loyalty of teachers are bottle-

necks for effective implementation of curriculum for promoting creativity-fostered behaviour in learners in Nigeria. Also, the findings of this study supports the assertion of Kampylis (2017) whose study revealed that the major hindrance to creativity-fostered behaviour in education was attributable to non-supportive environment that could encourage both the teachers and the students to be independent thinkers that are prerequisite for knowledge of creativity.

Likewise, research question two revealed numerous ways to promoting creativity-fostered behaviour in teaching and learning Chemistry in secondary schools in Nigeria as panacea to the challenges confronting creativity-fostered behaviour among learners. Some of the solutions include among others allowing students to take ownership of their learning task by encouraging student-centred learning, incorporating more practical activities and experiments into Chemistry curriculum, providing teachers with training and resources to support creativity-fostered behavior, integrating real-world examples and applications, using assessment methods that promote creativity-fostered behavior through project-based assessment and exhibition, incorporating technology and digital tools into Chemistry curriculum implementation in the classroom, fostering collaboration and communication among learners and encouraging students to think out of box and solve problems creatively. Reasons for this findings is traceable to the use of unimpressive, inappropriate and non-innovative methods of teaching used by Chemistry teachers that does not engender creativity-fostered behaviour among learners. The finding is in tandem with study of Nwosu (2020) who found out that creativity-fostered behavior practices are enhanced when the teachers allow the students to engage in collaborative learning, project based assessment and exposed to problem-solving through peer-to-peer involvement. Furthermore, the findings support the work of Adeyemi (2015) who found out that teacher viewed creativity as innate potential, therefore, not everyone can be taught creativity and in addition, much emphasis is given to Traditional Method of Teaching that promotes rote learning and regurgitation of facts that does not promote creativity-fostered behaviour, however, teachers that incorporates collaboration and communication among learners and encouraging students to think out of box and solve problems creatively are on the right path to promote creativity-fostered behaviour among learners, and therefore,

should imbibe innovative strategies of curriculum delivery.

### Conclusion

The study concluded that numerous challenges are confronting creativity-fostered behavior in Nigerian secondary schools. The challenges include among others inadequate teachers' pedagogical content knowledge, misconception of teachers on its implementation process, lack of learning resources, non-conducive environment that stifle creativity-fostered behavior, and difficulties in methods of assessment of creativity-fostered behavior probably as a result of lack of professional development. The study further concluded that panacea to the challenges could be achieved by allowing students to take ownership of their learning task through student-centred learning, incorporating more practical activities and experiments into Chemistry curriculum, providing teachers with training and resources to support creativity-fostered behavior, integrating real-world examples and applications, using assessment methods that promote creativity-fostered behavior through project-based assessment and exhibition, incorporating technology and digital tools into Chemistry curriculum implementation in the classroom, fostering collaboration and communication among learners and encouraging students to think out of box and solve problems creatively, and more importantly, use of innovative strategies of curriculum delivery in the classroom setting.

### Recommendations

Based on the findings of this study, it was recommended that:

1. Policy makers in Nigeria should make it a priority to develop, procure and distribute curriculum and instructional materials that has the potentials to promote creativity-fostered behavior and critical thinking to both public and private schools for curriculum implementation process.
2. Teachers should imbibe and make use of innovative teaching methods to motivate students to think creatively and out of box to enhance collaboration among learners.
3. Government should refocus polity attention to teachers' welfare and provision of learning resources to support the implementation of creativity-foster behavior in learners.





4. Government and other education stakeholders should regularly organize seminars, workshops and professional development training for teachers on means of promoting creativity-fostered behaviour.

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