Chemistry Teachers Level Of Awareness And Utilization Of Mastery Learning Approach In Teaching: A Panacea For Inculcation Of Life Coping Skills In Students

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Abstract

One of the indicators for determining student's academic achievements is the strategy/approach used in teaching them. Thus, this study investigated chemistry teacher's level of awareness and utilization of mastery learning approach for inculcation of life-coping skills in chemistry students. Four research questions guided the study. The study adopted a descriptive survey design. The population consisted of all the chemistry teachers in all the government owned secondary schools in Onitsha, Awka and Nnewi Education zones of Anambra State. The sample size was eighty-five (85) chemistry teachers selected from sixty (60) secondary schools in the 3 zones. A validated structured questionnaire which had a reliability coefficient of 0.83 using Cronbach Alpha

technique was used for data collection. Data collected were analyzed using frequencies, percentages and mean scores. The result of the study showed that differentiated and individualized instruction, giving sufficient time for mastery of concepts during teaching, frequent formative assessment with feedback and reinforcement through assignments were among the mastery learning approaches that chemistry teachers can use to teach for mastery. Other mastery learning approaches includes selecting a chemistry procedure or skill you want all students to master, engaging students in activities for skill practice and helping them approach problem solving in a step-by-step manner. However, the study also revealed that most of the chemistry teachers do not utilize most of these mastery learning approaches in their teaching of chemistry. Conclusion and recommendations were also made.

Keywords:

Mastering learning, Life coping skills, Teaching, Chemistry teachers, Panacea.

Introduction:

Panacea is technically all-round solution to a problem situation. It is a strategy of solving a problem and an ingredient of solutions to problem situations (Oguaju & Chikobi, 2017). The rise in the number of unemployed science graduates calls for science teachers' innovation and creativity to nurture talents and enhance students' learning for future career building and market competitiveness (Apata, 2017). Science including chemistry is not studied for its own sake but for the sake of the contributions it makes to the society (Okonkwo, et al 2002). The ultimate goal of teaching science subjects in secondary schools is to develop members of society that are sufficiently literate and that possess relevant skills needed for technological innovations as well as meet the manpower requirements for the development of a country (Keter, 2013).

However, schools have not been able to make significant improvement in science generally and chemistry in particularly despite the increase in provisions in terms of resources and facilities. It has been argued that one way of addressing the difficulties students experience in chemistry classroom is through the use of appropriate teaching methods (Wambugu 2006), correcting the alternative conceptions held by chemistry students (Egolum and Igboegwu, 2021), enhancing students' interest in chemistry (Egolum, Samuel & Okonkwo, 2021) etc. According to Wambugu (2006), the teaching approach that a teacher adopts is one of the factors that affect student's achievement in chemistry. This makes it imperative to suggest an approach for teaching chemistry that aims at enhancing understanding rather than promote memorization and juggling of facts such

as the use of individualized learning approach that can allow students proceed on academic work on the basis of their abilities. One of these individualized learning approaches is mastery learning approach (Spencer, 1996; Adepeju, 2003).

Mastering is the achievement of a superior level of knowledge or skill in a domain. The term implies you are knowledgeable or skilled enough to compete or collaborate with those at the top of your field (spacey, 2018). Mastery learning is a set of groups–based individualized, teaching and learning strategies based on the premises that students will achieve a high level of understanding in a given domain if they are given enough time (Guskey, 2009). According to Adepeju (2003), mastery learning is an innovative strategy designed to make students perform beautifully very well in an academic task. Agarwal (2004) defined mastery learning as a teaching approach which asserts that under appropriate conditions, all students can and almost will learn most of what is taught in schools. To Spacey (2018), mastery learning is an approach to education based on the idea that students should master fundamentals before moving on to more advanced topics.

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Mastery learning starts with assumption that almost all students can and will master a great deal of what is taught if instruction is approached systematically; if the students are helped when and where they have learning difficulties; if they are given sufficient time to achieve mastery and there is some clear-cut criterion of what constitutes mastery. Mastery learning approach involves (1) involvement of learners in relevant hands-on, hearts- on, and heads-on activities (2) Motivation (3) Allocation of more time on tasks (4) Frequent assessment and feedback (5) Connections with emphasis on cues. (6). Reinforcement through assignments.

From the above, it should be noted that mastery learning strategy focuses on students reaching a pre-determined level of mastering on unit before moving to another. Abakpa and Iji (2011) opined that mastering learning strategy can provide quality instruction, immediate feedback and remedial lessons for the attainment of lesson objectives. One of the key benefits of the chemistry mastery learning strategy is that it capitalizes on building of mastering goals and there is always something to strive for even if it is as simple as students being better tomorrow than they were today in chemistry concepts. It involves breaking down the subject to be learned into units of learning, each with its own objectives (Adeyemo & Babayide, 2014). The students are allowed to study material unit after unit until they master it. Teaching chemistry for mastery ensures that students obtain mastery in a given topic before moving on to the next unit. It assumes that any

student can reach high level of achievement given sufficient instruction, time and perseverance. Mastery learning boasts student's achievement levels, improve their attitudes towards learning and give them more confidence when they are learning new concepts. Mastery learning can help students develop a lifelong interest in learning thereby helping them to have confidence in their skills and these skills when developed can be life copying skills which will help students develop positive student's attitude towards chemistry and science in general.

Life coping skills refers to strategies used to help one get through difficult situations that life throws at you (Springbard center, 2021). Lockhart (2020) viewed life coping skills as the skills you have at your immediate disposal to solve problems and make decisions under pressure. Developing life coping skills can help students better manage their stress load and that can predict how effective they will perform both at home and school. Life copying skills can be integrated in a variety of settings including school and the most important life skill is the ability and willingness to learn. Life coping skills education is designed to facilitate the practice and reinforcement of psychological skills in a cultural and developmentally appropriate way.

The purpose of life –coping skill education is to (a) reinforce existing knowledge; positive attitude and values; pro-social and healthy skills and behavior (b) Prevent or reduce myths and misinformation; negative attitude; risky behaviors. Life coping skill education aims to inculcate the promotion of responsible behavior, self-confidence, equality and the prevention of prejudice and abuse. WHO (1999) delineates life skills as the abilities for adaptive and positive behavior that enables individuals to deal effectively with the demands and challenge of everyday life.

Science is a life skill and is an ever-evolving life skill. Life skills help students to grow into more capable being which results in more fulfilling life. Life skill can be inculcated through education by making it as an integrated part of education (Ravindra, Bosky & Dharmendra, 2016). Since our education system has not included life coping skills as core competences students should learn, many adults have gaps. Life coping skills can be taught through traditional classroom instruction, on-line learning, self- study, on-line digital coaching, mastery learning instructional approach and so on.

Therefore, the researchers intended to find out the chemistry teachers level of awareness and utilization of mastery learning instructional approach in teaching chemistry in secondary schools as a panacea for inculcation of life copying skills in chemistry students.

Purpose of the study

The study was designed to find out

1. The level of awareness of mastery learning approach among secondary school chemistry teachers
2. The extent of chemistry teachers' utilization of mastery learning approach in their teaching in secondary schools
3. The life– coping skills needed by secondary school chemistry students
4. The strategies chemistry teachers can use to inculcate life- coping skills in their students using mastery learning approach

Question research

The following research questions guided the study

1. What is the secondary school chemistry teachers' level of awareness of mastery learning instructional approach?
2. To what extent do chemistry teachers in secondary schools use mastery learning instructional approach in teaching?
3. What is the life coping skills needed by secondary school chemistry students?
4. What strategies can chemistry teachers use to inculcate life-coping skills in their students using mastery learning approach?

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Research method

The design for the study was descriptive survey design. The study was aimed at finding out chemistry teachers' level of awareness and utilization of mastery learning approach and how it will help to inculcate life- coping skills in their students. The population for the study comprised of all the Chemistry teachers in Onitsha, Awka and Nnewi Education Zones of Anambra State. These zones were purposively selected using purpose random sampling. From a total 121 schools in the three zones, 60 schools were purposively selected using criteria such as age of school, availability of standard chemistry laboratory, time the school presented students for WASSEC chemistry examination, etc. All eighty - five (85) chemistry teachers in sixty secondary school selected from the one hundred and twenty -one (121) secondary schools in the three zones were used for the study.

The instrument used for the collection of data for the study was a structured questionnaires developed by the researchers and titled "Chemistry teachers' level of awareness and utilization of mastery learning approach and inculcation of life-coping skills in

students?" The instrument was validated by two lecturers in science education department and one lecturer in measurement and evaluation department all from Nnamdi Azikiwe University Awka. Cronbach Alpha technique was used to determine the reliability of the instrument and it has a reliability coefficient of 0.83. The questionnaire had 2 parts (A & B). First seeks information on the respondents bio-data. The second had 4 sections A, B, C, and D. Section A consisted of 7 items designed to illicit information on the chemistry teacher's level of awareness of mastery learning approach, the respondents were expected to rate these items under aware and not aware. Section B had 7 items and sought information on the extent of utilization of mastery learning approach by chemistry teachers in their teaching and learning of chemistry. it was based on 4 - point Likert scale of Very High Extent (VHE)= 4 points, High Extent (HE) = 3 points, Moderate Extent (ME) = 2 points and Low Extent (LE) = 1 point. Section C and D sought information's on the life – coping skills needed by chemistry students and the strategies for the inculcation of life-coping skills by chemistry teachers in their students respectively. Both sections had 10 items each structured using 4-point Likert type of response with Strongly Agree (SA) 4 points, Agree (A) 3 points, Disagree (D) 2 points and Strongly Disagree (SD) 1 point.

Frequencies, percentages and mean scores were used to answer the research questions. Items with 50% and above indicated adequate awareness but items with less than 50% indicated inadequate awareness. Also mean scores of 2.50 and above indicated agreement while mean scores of 2.49 and below indicated disagreement.

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Results

The results were presented in tables according to the research questions.

Research Question I

What is the chemistry teacher's level of awareness of mastery learning instructional approach?

Table I: Frequencies (F) and percentages (%) of responses of chemistry teachers on their level of awareness of the mastery learning instructional approach

S/N	Item Description	Aware (f)	% (f)	Not Aware (f)	% (f)	Remarks

1.	Differentiated and individualized instruction	63	74.1	22	25.9	A
2.	Instructions are approached systematically and sensitively	38	44.7	47	55.3	NA
3.	Students are given sufficient time to achieve mastery	45	52.9	40	42.1	A
4.	Progress monitoring	27	31.8	58	68.2	NA
5.	Frequent formative assessment and feedback	44	51.8	41	48.7	A
6.	Reinforcement through assignment	50	58.8	35	41.2	A
7.	Continued study of unit until mastery standard is reached	15	17.6	70	82.0	NA
8.	Instructional alignment to minimize achievement gaps	22	25.9	63	74.1	NA
	GRAND MEAN		54.7			

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Table 1 revealed that chemistry teachers in the study agreed that they are aware of items 1,3,5, and 6 as mastery learning instructional approach (MLIA) but were not aware of items 2, 4, 7 and 8. Hence their level of awareness for items 1,3,5 and 6 are above 50% while for items 2, 4, 7, and 8, their level of awareness is below 50%. For out of 8 items, the teachers were aware of 4 items as mastering learning instructional approach (MLIA) while they are not aware of 4 items as MLIA.

Research Question 2

To what extent do chemistry teachers use mastery learning instructional approach in their teaching?

Table 2

Mean ratings of chemistry teachers on their extent of use of mastery learning instructional approach in their teaching.

S/N	Items Description	$\bar{X}$	REMARK

1.	Differentiated and individualized instruction	1.95	LE
2.	Instructional are approached systematically and sensitively	1.87	LE
3.	Students are given sufficient time to achieve mastery	2.32	ME
4.	Progress monitoring	2.20	ME
5.	Frequent formative assessment and feedback	2.04	ME
6.	Reinforcement through assignment	2.08	ME
7.	Continued study on unit until mastery standard is reached	2.24	ME
8.	Instructional alignment to minimize achievement gaps	1.85	LE
9.	Involving learners on relevant hands-on heart on activities	2.39	ME
	GRAND MEAN	2.10	

Results in table 2 showed that most of the chemistry teachers used for the study use items 1,2 and 8 to a low extent while items 3, 4, 5, 6, 7, and 9 are used to a moderate extent. Their grand mean is 2.10 meaning that they do not utilize most of the mastery learning approaches in their teaching.

Research Question 3

What is the life-coping skills needed by secondary school chemistry students?

Table 3: Mean ratings of responses of chemistry teachers on the life-coping skills needed by secondary school chemistry students.

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S/N	Items Description	$\bar{X}$	Remark
1.	Forming connections	2.94	A
2.	Problem solving	3.60	A
3.	Creative thinking	3.26	A
4.	Decision making	3.01	A
5.	Critical thinking	3.34	A
6.	Clear communication /questioning	2.62	A
7.	Abstract thinking	3.27	A
8.	Curiosity	2.73	A
9.	Forming judgments	2.31	NA
10.	Resiliency	3.32	A

Table 3 revealed that all the items in the table are life-coping skills needed by secondary school chemistry students. However, they agreed that forming judgment is not among the life-coping skills.

Research Question 4

What strategies can chemistry teachers use to inculcate life-coping skills in their students using mastery learning approach?

Table 4: Mean ratings of chemistry teacher's responses on the strategies that can be used to inculcate life-coping skills in their students using mastery learning approaches.

S/N	Items Description	$\bar{X}$	Remark
1.	Select a chemistry procedure or skill you want all students to master	2.98	A
2.	Develop short quizzes that contain problems representative of the skill	3.13	A
3.	Engage students in activities (deliberate skill practices) focused on reaching the objectives	3.36	A
4.	Provide a few minutes for students to review the skill in small groups	3.08	A
5.	Teach students mathematical content and procedures of each unit	3.15	A
6.	Provide opportunities for students to practice their computational skills	2.54	A
7.	Help them approach problem solving in a step-by-step manner	3.38	A
8.	Administer a timed quiz to all students usually 5 minutes	2.95	A
9.	Excuse any student who scored A from other quizzes and let them help others to correct their errors and prepare for next quiz	3.07	A
10.	Continue the process until virtually all students score A.	3.18	A

Results in table 4 showed that most of the chemistry teachers agreed that all the items in the table are among the strategies that can be used to inculcate life-coping skills in chemistry students using mastery learning approach.

Discussion of the findings

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The findings of research question one which shows the frequency and percentages of responses on the level of awareness by chemistry teachers on mastery learning approach revealed that the chemistry teachers agreed that differentiated and individualized instruction, giving sufficient time for mastery during teaching, frequent formative assessment and feedback and reinforcement through assignments were among the mastery learning approaches they are aware of and that could be used to teach chemistry students to master chemistry contents and develop skills. Also, the chemistry teachers agreed they were not aware of progress monitoring, approaching instructions systematically and sensitively, continued study on unit until all students achieve mastery and alignment of instruction to minimize achievement gaps. The findings of this study are in agreement with the work of Chargois (2013) who opined that mastery learning allows students to have additional time to understand the lesson or develop a particular skill. It allows students to progress at their own pace and teachers should provide students with feedback after each assessment.

The study is also in agreement with the study of Kampen (2019) who explained that mastery learning ensures students obtain mastery in a given topic before moving on to the next. Adepeju (2003) also opined that mastery learning involves learners in relevant hands-on, hearts-on activities frequent assessment and feedback etc.

The findings also showed that the chemistry teachers were aware of some of the mastery learning approach but they do not utilize any of them to a high extent during their teaching even though they help students to master the contents. Agboghoroma (2014) found out that the students through the mastery learning approach achieved statistically significant higher scores in Integrated Science Achievement Test (ISAT) compared to those that were taught through the conventional teaching method. Also, Furo (2014) reported high academic achievement by students who were exposed to mastery learning strategy in chemistry than those taught with conventional lecture method. Therefore, chemistry teachers should encourage to use mastery learning strategy in teaching because the result of the study showed that most of them do not utilize it in their teachings.

Table 3 revealed that self-awareness, problem solving, creative thinking, decision making, critical thinking, interpersonal relationship, coping with stress, coping with emotions and decision making were among the life coping skills needed by secondary school Chemistry students as revealed from the response of the chemistry teachers used for the study. This study is in agreement with the work of Home Science tools (2021) who opined that problem solving decision making, creative thinking, critical thinking was among the life copying skills needed for the teaching and learning of science but the study disagreed with some part of the work of Home Science tools (2021) who also opined that forming judgment is also among the life skills needed for the teaching of science.

Results in table 4 revealed that all the items in the table were among the strategies that can be used by chemistry teachers to inculcate life coping skills in their students through the use of mastery learning instructional strategy. This is in an agreement with the study of Chargois (2013) who opined in his study that mastery learning allows students to have additional time to understand the lesson or develop a particular skill because they progress at their own pace. The study is also in agreement with the study of kampen (2019) that teaching for mastery encourages lifelong learning because when students are given time to learn and succeed, they are more likely to understand their own learning needs and have confidence in their skills most of which may be life skills. Mastery learning if implemented well helps teacher's improve students' learning in a broad range of learning goals, from basic skills to highly complex cognitive processes and life skills.

Conclusion

From the findings of the study, students can achieve mastery of life coping skill if they are allowed to learn the material at their own pace. This means they obtain mastery in a given topic before moving to the next unit and when they master the lesson, they can move easily to learn more material. The skills and concepts students acquired during mastery learning provide a very strong foundation for learning new skills and concepts. Also, mastery learning instruction would gradually speed up because students would have a more thorough understanding of prerequisite skills. This will enable students learn beyond the classroom and have possibilities for development of more life-coping skills. When you are teaching students science, you are teaching them life skills and the skills will help them grow to more capable beings which results in more fulfilling life.

Recommendations

Based on the findings of this study, the following recommendations were made.

1. For all students to achieve mastery, classroom had to be re-imagined, students should work through the course at their own pace.
2. Chemistry teachers should be encouraged to use mastery learning approach in the teaching and learning of chemistry in secondary schools.
3. Chemistry teachers should always engage students in activities such as deliberate skills practice, calculations, data interpretation with focus on reaching the objectives.
4. The school activities should give more time to chemistry lessons to enable the teacher to adopt mastery learning strategies.
5. The government should improve on the existing infrastructure or build new ones to enable teachers do practice and develop skills in their students.
6. Chemistry teachers should be exposed to seminars, conference and workshops on the use of mastery learning as a means of enhancing student's achievement and life skills acquisition.

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