AN ASSESMENT OF THE INFLUENCE OF QUESTIONING LEARNING STRATEGY ON STUDENTS' CREATIVITY DEVELOPMENT IN SECONDARY SCHOOLS IN MUKAA SUB –COUNTY MAKUENI COUNTY, KENYA.

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ABSTRACT

Creativity, a 21st century skill is vital for the success of learners. Studies have shown that, the level of creativity in secondary school students has reduced. Some of the evidences of the reduced level of creativity is the students' low ability to come up with original ideas in Science fair projects, music and drama as well as coming up with entrepreneurial ideas that they can use to earn a living after form IV. The objectives of the study were to examine the extent to which questioning learning strategy influences students in making them: think more, increasing their inquisitivity, acquiring and retaining knowledge as well as reading more to get answers and understand better. The study was informed by discovery learning theory of Brunner and the creativity development theory by Wallas. The study employed mixed methods research methodology. The descriptive survey and phenomenology designs were employed. From the

target population of 39 secondary schools, the researcher sampled 12 schools which represented 30.8% of the target population using stratified sampling. From the 12 schools, the researcher solicited data from their 3 science teachers per school and 25 form IV students per school. The study revealed that, questioning learning strategy influences students' creativity development significantly by making them: think more, increasing their inquisitiveness (ability to question), acquiring and retaining knowledge, making them read more to get answers and understand better. Analysis of data showed that there is a strong positive relationship between questioning learning strategy and students' creativity development.

Key words: creativity development, questioning, inquisitiveness.

1.0 Introduction

This paper presents the background to the study, literature review, research design and methodology, research findings and their discussion, conclusions and references.

1.1 Background to the study

The practice of creativity, its purpose and place in education has arisen all over the world. Aud, (2007) opined that, creativity is of great academic interest in developed countries and industrialized nations. In such countries, technology and ingenuity are of paramount importance to continued and ongoing prosperity. Aud (2007) also observes that, we live in a world where success is closely related to the creative application of good ideas and where the transformation of knowledge to creativity is needed for further economic and social development.

Creativity is considered the primary source of innovation and an essential tool in addressing global challenges such as health care reform, mitigating climate change, and ensuring sustainable development. Creativity is needed in order to promote social cohesion and wellbeing. Pucio

(2006) insisted that, creative thinking plays a critical role in preservation of a society and promotion of its growth. Educators, parents, employers, and policy makers realize that, by being creative we will be able to solve current problems and those of the future. Creativity has been highly valued for its ability to develop a student's capacity to learn in all subjects. Aud (2007) writes that, in the year 2002 the secretary of education in the USA claimed that, if USA and American youngsters are to succeed in turning into service – driven enterprise, they will need an education that develops imaginative, flexible and tough minded thinking.

Corcoran **(**2006) did a study in Australia on teaching creativity in a senior secondary school. Using the findings of the study, Corcoran argued that, if teachers are to enhance their students' creativity, they must engage their students in activities that centre on social interaction by creating an environment that encourages motivation and facilitates the creative process. This is the strategy of active learning and is embedded within the Parnes Creative Problem Solving model.

In China, Science educators have recognized the importance of creativity in science education and have proposed different techniques which can improve scientific creativity. Most studies have generally used cognitive methods to foster scientific creativity of students. Cheng (2004) carried out a study on developing physics learning activities to foster scientific creativity in Hong Kong. From his study, Cheng (2004) found out that using open inquiry approach in teaching strongly influences student's creative abilities.

Tennent (2005) conducted a study in Rwanda about the environmental factors which are considered to be influential in the development of creativity in children. A sample of 121 mothers of children aged 4-6 years completed a questionnaire on specific aspects of the environment they provided at home, their valuing of particular personality characteristics in

children, and their valuing of self-directing and conforming behaviours in children. Factor analysis revealed that, most mothers provided home environments that could be considered nurturant of creativity and highly valued those personality characteristics associated with creativity. Mothers also valued the behaviours that were thought to be reflective of self direction in child behaviour. Education level, occupational and occupation status of the mother were found to be related to those values and practices that nurture creativity both in terms of the characteristics in children that mothers prefer and the manner in which family environments are organised.

A few studies on creativity have been done in Kenya. Kavuli (2013) did a study on Kenyan student-teacher counsellors' creativity and its relationship with their gender, age, and teaching experience. Seventy two participants (43 females and 29 males) responded to the Ibadan Creativity Assessment Scale. Results showed: flexibility, originality, fluency, and motivation scores to be 56.5%, 59.47%, 57.4%, and 68.81% respectively. Creativity overall score was 57.79%. Independent tests showed that, there were no significant differences in creativity as a result of age and gender, and teaching experience. The research therefore revealed that, creativity is not depended on age, gender and teaching experience. It is influenced by other factors, such as divergent thinking, intelligence, and training.

Studies on scientific creativity in science education conducted in Kenya in the recent past indicate low levels of scientific creative abilities in learners (Okere & Ndeke, 2013). Nevertheless, Bahr et al (2006) remarked that one's level of creative functioning can be enhanced. However, Byrne (2005) pointed out that, it is not known to what extent an individual's ability to create can be enhanced. These studies have also indicated that some appropriate instructional strategies when used enhance scientific creativity in students. A study done by

Abuto (2005) to investigate the effect of concept mapping teaching strategy on scientific creativity indicated a significant effect on performance in scientific creative abilities by high school Physics students.

The Kenyan secondary school science curriculum objectives emphasize the development of scientific creative abilities in learners. This is because industrial development can only take place if future manpower is trained to think creatively. Kenya is a country that hopes to be industrialized by the year 2030, calling for the development of creative skills amongst our students. In order for all members of a society to fully participate in nation building, knowledge of science is essential (Keraro 2002). Learners who have cleared form four are expected to have necessary practical knowledge and skills that they can utilize in life.

The theme of the national in-service education and training (INSET) 2016 for SMASE was enhancing effective learner involvement through innovative classroom practices (SMASE training manual 2016). The INSET focused on training Science and Mathematics teachers on how to help learners develop problem solving, communication and collaboration skills as vital 21st century skills. SMASE intends to equip Science and Mathematics teachers with skills that they can use to help foster creativity development in students. This is done by teachers administering ASEI (Activity Student Experiment Improvisation) lessons. ASEI lessons are student centered and highly foster creativity development. SMASE highly emphasizes student involvement in learning as exemplified by the Plan Do See Improve (PDSI) practice. This can highly spur creativity development in students.

Creativity is therefore worth of attention in education. When creativity is fostered in educational contexts, it can inspire and support student success, increase personal and social engagement through learning and lead to greater student satisfaction and higher levels of self efficacy

(Robinson, 2011). When creativity is not fostered, individual development may be diminished or misdirected, leaving a sense of self and personal achievement in doubt. The researcher proposes that more has to be done to nurture creativity and make it flourish to its best in students.

1.2 Statement of the problem

The low level of creativity that can develop in secondary school students can even make them lack self-direction, independence at work and clarity in communication. This would cause students who complete secondary school fail to adapt in life and consequently become failures or underachievers in life. This would mean that the education they received was less meaningful and useful for their lives. From this vantage point, the study intended to fill that gap by collecting data that would help education stakeholders in Mukaa Sub-County to be fully aware of the influence of learning strategies on secondary students' creativity development.

1.3 Purpose of the Study

The purpose of the study was to evaluate the effectiveness of learning strategies employed to foster development of creativity in secondary school students in Mukaa Sub-County, Kenya.

2.1 LITERATURE REVIEW

In this section, the researcher presents the literature of some previous studies related to the area of study. The researcher provides divergent views that are critical to different authors who raised various versions related to the issues being investigated.

2.1.1 Learning strategies

Learning strategies are the special thoughts or behaviors that individuals use to help them comprehend and retain information. Hennessey & Amabile (2010) define learning strategies as the systematic conscious plans, actions and thoughts that learners use to maximize effectiveness of learning. Learning strategies that work well for one learner may not work well for another.

Learning strategies can be categorized into cognitive, meta-cognitive and social learning strategies.

Cognitive learning strategies include brainstorming, memorization of facts and concept mapping. Concept maps help students to visualize how ideas are connected and hence how knowledge is organized. Concept mapping helps to improve communication, comprehension and problem solving (Abuto, 2005). Metacognitive learning strategies are higher order skills that students use to manage their own learning. They include planning for their own learning, assessing their own learning, problem solving and experiential learning. Social learning strategies are actions that learners take related to interactions with others that enhance their learning. This includes group discussions and center on questioning and brainstorming.

Students who do not use good learning strategies often learn passively and ultimately fail in school and in life. Learning strategies focus on making students more active learners by teaching them how to learn and how to use what they have learned to be successful. Mandernach *et al.*, (2009) did a lot of research that showed that creative thinking is enhanced through instructional strategies that promote active learning. Active learning is anything that involves students in doing things, talking and thinking about what they are doing. Most experts agree that, active learning or essentially learning by doing is an effective mode of learning. Stevens and Brenner (2009) also demonstrated that, active learning strategies are essential in fostering creative thinking. Their research indicated that, student nurses who used active learning approaches in their education improved their creative thinking skills. Following their case studies in four institutions of higher education, they found out that, active learning strategies promoted creative thinking in students.

2.1.2 Learning strategies and students' creativity development

A question is any sentence, which has an interrogative form or function. In classroom settings, questions are used as instructional cues or stimuli that convey to students the content elements to be learned and directions of what they are to do and how they are to do it. Questions can be categorized based on the Bloom's Taxonomy of learning objectives that they test. Questions can thus be testing on knowledge (recall), comprehension, analysis, synthesis application and evaluation. The six levels of learning can be used to divide questions into higher and lower order cognitive questions. Lower order thinking questions test on recall of facts (knowledge) and comprehension whereas higher order thinking questions test the other four learning outcomes hence allow students to mentally manipulate learnt information to create an answer to a problem (Robert, 2009).

Effective questioning by the teacher helps learners to better understand lesson content. The comprehension arouses their curiosity, stimulates their imagination, and motivates them to seek out new knowledge. If executed skillfully, questioning would elevate a students' level of thinking (Amabile, 2006). This elevates students' inquiry because it encourages challenging assumptions and exposing contradictions that lead to acquisition of new knowledge.

Educational researchers who have done extensive research on classroom questioning in inquiry based lessons reveal that, many teachers who extensively question advocate the use of higher order thinking questions. Higher order thinking questions produce superior learning outcomes compared to lower order thinking questions. Open-ended questions fall in the category of higher order thinking questions and are good at spurring creativity development in students. According to Runco (2007), techniques for effective questioning include asking concise questions, considering a student's cognitive abilities when determining the level of questioning,

maintaining a logical and sequential order of the questions, encouraging extension to a response, allowing sufficient time for students to answer a question and encouraging the student to ask questions as well.

In classroom questioning, teachers often disregard two crucial components of questioning i.e. consideration of students' abilities and wait time. This totally switches off a student's interest and inquisitiveness. This can be detrimental in the cognitive development of learners and in their learning. Inquiry takes the lead in preparing learners for the highly uncertain world of the twenty first century. Poor questioning practice can be counterproductive. Wait time is equally important. Wait time is a pause in a teacher's discourse when learners have more time to reflect, process the question and formulate a response. After the wait time, most learners attempt to respond to a question.

In a study, Berkeley *et al*. (2011) collected information on the influence of self-questioning techniques of children with learning disabilities. The children within the experimental group outperformed their peers who had no questioning technique instruction. Another important thing that the authors presented within the article was the fact that, the strategy was one that can be used across many different study areas. They stated that while there are other strategies that proved to be successful or perhaps even more successful than questioning, they are not as easy to implement within the classroom, which can then affect how well they are used by learners. This could explain why some teachers would be hesitant to use them within their classrooms. According to Berkeley *et al*., (2011), less time consuming and labor intensive strategies like questioning are likely to be more appealing to classroom teachers and therefore implemented as part of instruction. Berkeley *et al*., (2011) concluded that, questioning positively influences the students learning and creativity and it is more adaptable to many content areas. Based on the

review of Berkeley's research, questioning has been found to be a useful way of improving students' ability to understand information on their own. When taught explicitly, and when student limitations are taken into account, students did benefit from the use of self-questioning techniques.

3.1 RESEARCH METHODOLOGY AND DESIGN

The researcher used mixed methods research methodology. The researcher chose mixed methods research methodology because it increases the breadth and depth of answering research questions. Moreover, since the two methods have their strengths and weaknesses, combining them allows the researcher to reduce their weaknesses and draw on strengths of both. An insight missed by quantitative research can be captured by qualitative research. The researcher also chose mixed methods research approach because it helps answer different research questions hence increasing the reliability of the research findings.

According to Creswell (2013) one advantage of mixed research is that it provides the possibility of triangulation to examine the same phenomenon. An integration of quantitative and qualitative methods was not only used in data collection but also in data analysis, interpretation and inferencing.

The design for quantitative methodology employed was the descriptive design. The design for qualitative methodology was the phenomenological design. Using both designs concurrently provided the researcher with a range of available options to consider that were well defined to facilitate the researchers' use of a solid approach for addressing the research problem and help the researcher anticipate and resolve challenging issues. The data was eventually triangulated.

4.1 RESEARCH FINDINGS AND DISCUSSION

4.1.1 Descriptive statistics on the Influence of Questioning learning strategies on secondary school students' creativity development

To achieve the objectives of the study respondents were asked to indicate the influence that questions have on their creativity development using given statements on a scale of 1-5 where 1=Strongly Disagree (SD) 2=Disagree (D) 3=Undecided (UD) 4=Agree (A) 5=Strongly Agree (SA). The results are presented in table 1.

Table 1: Influence of Questioning learning strategy on students' creativity development

	SD		D		UD		A		SA		Mean	Std. Dev
	f	%	f	%	f	%	F	%	f	%		
Questions make me think more	0	0	30	11	12	4.4	102	37.4	129	47.2	4.21	.957
When I ask a question, my ability to question increases	0	0	30	11	15	5.5	105	38.4	123	45.1	4.18	.958
Answering questions helps me acquire and retain knowledge	7	2.6	8	2.9	21	7.7	180	65.9	57	20.9	4.00	.798
Questions make me read more to get answers and understand better	0	0	19	7.0	36	13.2	175	64.1	43	15.7	3.89	.746

Key: SD=Strongly Disagree, D=Disagree, UD=Undecided, A=Agree, SA=Strongly Agree f=Frequency. Std. Dev =Standard deviation

Table 1 indicates that majority of the respondents (47.2%) strongly agreed that questions made them think more. This was followed by 37.4% who agreed, 11% who disagreed and 4.4% were undecided. The mean for the test item was 4.21, which was in the range of agreeing. This implies

that, most students agreed that questions made them think more. 45.1% of the respondents strongly agreed that, when they ask a question their ability to question increased, 38.4% agreed, 11% disagreed and the remaining 5.5% were undecided. The mean for the test item was 4.18 which was in the range of agreeing. This implies that, most students agreed that when they ask a question their ability to question increased. A total of 65.9% of the respondents agreed that answering questions helped them acquire and retain knowledge, 20.9% strongly agreed, 7.7% were undecided, 2.9% disagreed and 2.6% strongly disagreed. The mean for the test item was 4 (agree). This implies that, most students agreed that answering questions helped them acquire and retain knowledge. Majority of the respondents (64.1%) also agreed that questions made them read more to get answers and understand better, 15.7% strongly agreed, 13.2% were undecided and 7.0% disagreed. The mean for the test item was 3.89 which was close to 4(agree). This implies that, most students agreed that questions made them read more to get answers and understand better. The standard deviation of the test items falls generally within one standard deviation of the mean. This implies that, the group characteristics are homogenous i.e. the respondents have similar opinion on questioning.

4.1.2 Inferential statistics on the influence of questioning learning strategy on students' creativity development

A Spearman's rank-order correlation was run to determine the relationship between questioning learning strategy and student's creativity development. The results are presented in table 2.

Table 1: correlation between questioning learning strategy and students' creativity development

		Questioning	CREATIVITY
Questioning	Pearson Correlation	1	.325**
	Sig. (2-tailed)		.000
	N	273	273
CREATIVITY	Pearson Correlation	.325**	1
	Sig. (2-tailed)	.000	
	N	273	273

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows that there was a positive correlation between questioning learning strategy and students' creativity development, which was statistically significant (r = .325, ρ< .000, α=.05).

4.1.3 Thematic Analysis on influence of Questioning learning strategy on students' creativity development

The views of the interviewed science teachers supported that questioning highly influenced students' creativity development. Teacher 1 pointed out that:

> *"Questioning makes learners study more to get answers for the questions and makes students increase in inquisitivity".*

The views of teacher 1 were supported by those of teacher 2.

Teacher 5 and 6 further supported the views of teachers 1 and 2 when they said that Questioning:

> *"changes students thinking habits" and "makes students think more and try to learn more on their own".*

According to teacher 9 and 10 questioning:

> *"widens the scope of creativity" and "helps students to acquire and retain knowledge"*

Questioning was also seen to work well towards improving the learners self esteem and expression.

Teacher 4 indicated that Questioning:

> *"goes hand in hand with the ability to express oneself, helps learners develop a sense of self confidence, is a way of involving the shy students and especially those who want to be silent in class"*

The opinions of teacher 4 were similar to those of teachers 7 and 8.

4.2 Mixing and interpretation of quantitative and qualitative data

Quantitative data from the questionnaire filled by students and qualitative data from the interviews of science teachers indicated that, questioning positively influences students' creativity development. The respondents viewed that questioning influences creativity by: making students to think more as they try to get answers, increase in the ability to ask questions and makes students understand and retain knowledge as they search information to answer a question. The standard deviation falls generally within one standard deviation of the mean. This implies that, the group characteristics are homogeneous since the responses are almost similar on questioning.

The findings on questioning mirror the work of Amabile (2006) who opined that, if executed skillfully, questions can elevate a student's level of thinking and creativity. The results also mirror the work of Runco (2007) who was of the opinion that, asking higher order thinking questions, allowing students sufficient time to answer a question and encouraging students to ask questions positively influences them to be creative.

4.3 Conclusion

The study found out that questions influence students' creativity development by making them: think more, increasing their inquisitiveness (ability to question), acquiring and retaining knowledge, making them read more to get answers and understand better. Analysis of data showed that there is a strong positive relationship between questioning learning strategy and students' creativity development.

The study also shows a positive significant relationship between creativity development and questioning learning strategies ($\rho<.001, \propto= .05$). These findings concur with the study of Berkeley *et al*., (2011) who concluded that, questioning positively affects the students learning and creativity and it was more adaptable to many content areas.

5.3 Recommendations

5.3.1: Recommendations of the study

Based on the findings of the study it is recommended that,

- Teachers should ensure that more assignments are given to the students. This would encourage students to read more and develop curiosity to search for answers.
- All the students in schools should be encouraged to participate fully in group work and discussions. Each student should take initiative to be a leader of a discussion group hence enabling them to be more creative when conducting group discussions by honing their fluency.
- Science clubs need to be encouraged and strengthened in schools.
- The students also need to be actively involved in debate clubs as debates would provoke them to think in a creative way as they compete in arguing out points.

5.3.2: Recommendations for further research

- The SMASE INSETS should highly focus on equipping teachers to be able to apply problem solving, questioning, brainstorming and experiential learning strategies to help boost creativity development in secondary school students.
- The teachers need to be encouraged and facilitated to use of experiential learning approach more in classes. This can be done by equipping the science laboratories. This

would encourage students to be more creative in sciences as they would interact more with science practically.

5.4 Recommendations for further studies

Based on the results of this study, it is suggested that there is need to carry a study on:

- Evaluation of the influence of learning strategies on students' creativity development in secondary schools in other Sub-Counties.
- The influence of the learning strategies on students' performance in secondary schools

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