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Conference Proceedings

The 19th Biennial Conference of International Study Association on Teachers and Teaching

"Education beyond the crisis: new skills, children's rights and teaching contexts"

1st - 5th July 2019
Sibiu, Romania

PROCEEDINGS

THE 19TH BIENNIAL CONFERENCE OF INTERNATIONAL STUDY ASSOCIATION ON TEACHERS AND TEACHING (ISATT)

"EDUCATION BEYOND THE CRISIS: NEW SKILLS, CHILDREN'S RIGHTS AND TEACHING CONTEXTS"

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"EDUCATION BEYOND THE CRISIS: NEW SKILLS, CHILDREN'S RIGHTS AND TEACHING CONTEXTS"

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All papers passed a double-blind review process

ISBN: 978-606-12-1659-8
"Lucian Blaga" University Publishing House

FOREWORD

This volume emerged from the need of debating and sharing ideas for the professional and personal development of teachers. Being a teacher means facing challenges that might be considerably different in various countries but the focus of teachers all over the world is becoming aware of current perspectives on children and childhood, while developing a critical relationship with the content of education and continuously curving their attitudes. Recent studies reveal that the impetus for change in Education is energetic and powerful. These new findings call for a new perspective on teacher training thus raising new questions on how the next generation of teachers should be trained. Children need new skills, considered vital to adapt to a world in constant change. Teachers are forced by the pressure of the rising volume of information and by the rapid changes to adapt and to question paradigm shifts. Facing this challenging professional context, teachers need a continuous and deeper collaboration and the present volume aims to prove that important directions for such collaboration might be strengthening the community of the teachers who care, changing perspectives, discussing about universal education in the context of current changes in the evolution of children, providing moments of reflection on the teacher's mission in the future, endorsing both teacher and student action through authentic feedback for a better joined path and sharing knowledge.

According to Thomas L. Friedman, winner of the Pulitzer Prize in 1983, 1988 and 2002, in his *Brief History of the 21st Century,* published in 2006, The Earh is getting smaller and flat...In the author's opinion, the world began to get smaller when Columbus sailed to find a connection between the New World and the existing one. It is not a paradox that finding the New World leaded to a smaller world – this brought change, power, global integration, and the first step of the globalization. The next and more spectacular step of the globalization was made during 1800-2000, when international companies expanded world-wide. Walls were falling, the economy was expanding and connecting countries, and power was not any more related to countries, but to economical entities. The most important step of the globalization was just about to come – internet brought the power to the individuals that got the chance to collaborate globally. This is the most important stage of globalization, when individuals can create and develop either individually or being part of groups sharing same values and thus increasing their creative power. This being the most favorable epoch for collaborative effort and for sharing ideas and values, individuals and professional groups should take the most of this advantage in order to bring value to their career development, as well as their personal development, empowering self-determination, creativity, success – on a different scale.

This is where we stand – teachers of a New World, facing different challenges, but having the enormous benefit of interconnection. How is this world today, what problems are brought to us to be solved, and how can we exploit the major advantage of a smaller world?

These challenges are brought up by the same evolution that made our world smaller. The increasing impact of information, the dramatic and dynamic change that shapes our evolution is also bringing a major shift in education – its needs, its new direction, the changing profile of the children interests and challenges, their need to fit into a world that is changing faster than ever. Preparing young students for jobs that have not been yet invented, preparing new teachers for new times, identifying the best skills that future demands and finding the most appropriate ways of developing such skills – this might prove being a rather difficult task.

The present volume considers challenging main topics such as Teaching and learning in contemporary society, Technology and open education, Learning opportunities inside and outside the classroom, Teacher education-experiences and challenges and Education in a multicultural world. The volume gathers valuable research within these thematic areas from all the continents, proving that teachers of Nigeria, Russia, Romania, Greece, The United States of America, Australia, India, Brazil, Hong Kong, France, Spain, Japan, Slovenia and Croatia, Iceland or Germany share the same purpose – finding the most relevant answers to the same problems, no matter the continent these are coming. The world is rapidly shifting towards a greater unity in approaching a wider range of competencies intended to cover

new development of the future ahead. Teachers should be the first to react to these dramatic changes of our world, aiming to bring this future closer and properly prepare the children to emerge into this future. Preparing for the future was never such a complex process, thus working together is not only necessary, but vital.

Daniela Roxana Andron

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SECTION 1

TEACHING AND LEARNING IN CONTEMPORARY SOCIETY

SCAFFOLDING, LEARNER-CENTEREDNESS FOR EFFECTIVE TEACHING OF SOME GENETIC CONCEPTS

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ABSTRACT This paper deployed the use of scaffold instructional strategy into learning some abstract concepts in genetics in a student-centered classroom. Some types of scaffolds were constructed to guide students in the learning of the DNA structure, concepts of homozygous and heterozygous genotypes. A sample of 80 Bachelor Degree students of Delta State University, Abraka, was divided into groups I, II and III respectively and lectured theoretically on some basic genetic concepts and were tested a week later. The lecture was repeated for two groups using the scaffolding methods. All three groups were later tested on the concepts. There was no significant different among students in group I whereas significant differences were noted in groups II and III at the 0.05 level of significance. The paper recommended the application of scaffolding techniques to other aspects of genetics to remove phobia from learners of the subject.

KEYWORDS: Effective teaching, genetic concepts, learner-centeredness, scaffolding.

INTRODUCTION

Teaching and learning is gradually focusing more on generating facts and ideas through inquiry. This is a shift from the traditional system where the teacher offload instructional details to learners. Gentry (2000) recorded that students learn best when they are engaged in the learning process and discover the meaning of knowledge for themselves. A learner-centered classroom is one in which the students are practically engaged in the learning process. In this case, the learners become the focus of the entire process so the learning process should be structured to achieve the following:

The classroom must be supportive to provide room for active involvement of the learners, interaction and socialization so as to adequately explore the learning resources available.

The environment should be conditioned to give learners the opportunities to confront challenges using previous experiences to elicit a shift from dependence on the teacher to dominance of the learning process.

New meaning should be acquired through a process of personal discovery through a completely individualized process adapted to the learners' own style and pace for learning. Source: Crombs (2003) (as cited in Morka, Molua, Ukpene, Obiwulu and Ogwu (2018).

As recorded by Andrew (2015), students-centered learning breaks the restrictions inherent in the traditional approaches. It shifts concentration from the teacher to the learners and encourages active participation of the latter as their actions are monitored to elicit the desired behavioral outcomes. Furthermore, instructional strategies comprises of the various approaches which the teacher may decide to adapt to effectively engage the students in the process of learning (Meador, 2018). Bogler (2018) recorded that student-centered approach prepares students for collaborative learning with their colleagues thereby developing skills they will require in adulthood. A student-centered learning support system is predicated by scaffolding.

According to Alber (2014), scaffolding is breaking up the learning process into chunks and then providing a tool or structure with each chunk. Furthermore, Sarikas (2018) noted that instructional scaffolding, is a teaching method that helps students learn more by working with a teacher or a more advanced student to achieve their learning goals. He equally explained that students learn more when they collaborate with others of higher level and skills, thereby expanding their learning boundaries and learning much more than they would have done on their own. Similarly, Benette (2017) reported that scaffolding makes it easy

for teachers to adapt the differences in the learning pace of the students to his creativity in order to assist them meet their educational needs, especially when learning new tasks or strategies with multiple steps.

THEORETICAL FRAMEWORK

Essence of instructional scaffolds in biology lessons

According to Bennete (2017), instructional scaffolding gives students the freedom to ask questions, generate feedback and support peers in learning difficult concepts. The learners become more active in their own learning. So instructional scaffolding increase opportunities for learners to attain instructional goals and objectives. In this case scaffolding may include peerteaching and cooperative learning which transforms the classroom into a collaborative learning space. Also, instructional scaffolds can be recycled and used for other learning tasks. In addition, it can bring about academic success which increases motivation, engagement and participation as well as give students a foundation from which to understand the new information that will be learn (Lewis, 2017).

Drawbacks in using scaffolds

Despite the enormous array of benefits that learning derives from scaffolding, its deployment in the teaching of genetics could be faced with obvious challenges. For instance, developing supports for multi-step problems could be time-consuming. Besides, the diversity in learners' abilities demand that teachers have to design scaffolds that is appropriate for each, being patient at the same time with those who are slow to master the concept.

Problems of the study

Genetics is one of the components of biology education that is dreaded by most students and perceived as abstract in contents and comprehended by learners. The Science Teachers Association of Nigeria once classified genetics among the difficult concepts in biology. Some teachers lack pedagogy skills and ability to effectively teach students without failing to meet prescribed standards.

Objectives

The paper specifically seeks to:

- Examine the effectiveness of scaffolding in teaching some genetic concepts to students.
- To generate a scaffold framework for teaching genetics in schools.

2. *METHODOLOGY*

A class of 150 biology 2nd year Degree students studying genetics from Delta State University, Abraka, Agbor affiliate campus served as the study population. A sample of 85 was randomly selected from the class using the simple ballot technique. The sample was divided into 3 groups consisting of group I (25), group II (30) and group III (30). All the groups were given a theoretical lecture on the structure of DNA as consisting of two polynucleotide chains, sugar and phosphate molecules, nitrogenous bases (Guanine and Cytosine; Adenine and Thymine, bonded by triple and double hydrogen bonds respectively) and tested a week later (pre-test). The lesson was demonstrated for groups II and III after an interval of two weeks using instructional scaffolds consisting of plastic moulds, binding wires and strings. The plastic moulds were of different colours, each representing sugar and phosphate molecules, nitrogenous bases and hydrogen bonds respectively. After an interval of one week, all three groups were tested to practically construct the DNA structure using plastic moulds or chips of palm fronds. The results were presented in Tables I, II and III respectively.

Hypotheses

The study tested two hypotheses at the 0.05 level of significance.

- There is no significant difference in the academic performance of students taught with different methods
- Scaffolding has no significant influence on the academic performance of students

3. RESULTS.

	$\overline{X}$	SD	df	Level of significance	t_{cal} t	crit	Decision
Pre test	15.8	4.95	24	0.05	-8.20	1.71	NS
Post test	7.68	2.85					

Table I: Academic performance of students in group I

From Table I, the critical value exceeds the calculated value at 0.05 level of significance. Therefore, the null hypothesis is accepted for students in group I, where there was no significant difference in their academic performance.

	X	SD	Df	Level of significance	t_{cal}	t_{crit}	Decision
Pre test	10.97	2.33	29	0.5	13.64	1.70	S
Post Test	21.67	3.02					

Table II: Academic performance of students in group II

Table II showed that the calculated value, 13.64 exceeds the critical value, 1.70. The null hypothesis is therefore rejected at the 0.05 level of significance. It is inferred that scaffolding significantly influenced the academic performances of students in group II.

			Df	t_{cal}	t_{crit}	Decision
Pre test	N	SD		14	1.70	S
	30	17.83	4.84			
Post test			29			
	30	26.83	3.99			

Table III: Academic performance of students in group III

From Table III, the calculated value 14.00 exceeds the critical value 1.70 at the 0.05 level of significance, therefore the null hypothesis ist rejected. It showed that there is significant difference in the academic performance of the students in group III as a result of scaffolding.

4. IMPLICATIONS/DISCUSSION.

The study was based on the impact of scaffolding in a learner-centered biology classroom. The students in group I were not taught with scaffolds and so recorded a low mean value of 7.68 as against 15.80 in the post and pre-tests respectively. Furthermore, academic performances of students were not significant (Table I). Higher mean scores were recorded for posttests in groups II and III respectively (21.67, Table II, and 26.83, Table III respectively). Also, calculated values of the 't' distribution showed proportionately higher values for groups that were taught with scaffolds (13.64, group II and 14.00 group III) as opposed to one that was taught without scaffolds (-8.20 group I). Academic performances of students taught with scaffolds were significant, indicating that scaffolds could enhance the attainment of learning goals and objectives. The results obtained in this study was in agreement with Gentry (2000), who cited that engaging the learners enables them to discover the meaning of knowledge for themselves. The study was able to adapt the differences in the learning pace of the students to their creativity in order to assist them to meet their educational needs in agreement with Benette (2017).

5. CONCLUSIONS

Based on the findings and discussion of the study, it is pertinent to note that learners learn best when they enjoy the learning process. Scaffold lessons and student-centered learning makes learning relevant,

removes boredom and boost incentives to further drive desires to learn. It literary enables students to follow the entire learning process, thereby removing classroom frustrations and saving quality time needed for teaching. When scaffolds and student-centered learning are effectively deployed into the learning process, students take control of their education and are guided towards meeting their educational goals irrespective of inherent diversities in their socio-cultural backgrounds.

6. RECOMMENDATIONS

The study recommends that:

- Adequate learning resources should be provided for learners to construct scaffolds during lessons.
- Available learning materials should be adaptable to varying learning experiences to guarantee learner dominance of the entire learning process.
- Teachers should consider the diversity in learners' ability and design scaffolds that are appropriate for each so as to elicit the desired behavioural outcomes.

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"Plus Education" (JPE), Publisher: Aurel Vlaicu University Publishing House

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The International Academy of Sciences (Akademio Internacia de la Sciencoj, AIS) San Marino

EDITORS

Diana MIHĂESCU and Daniela Roxana ANDRON

Lucian Blaga Publishing House
Sibiu 2019