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Difficulties for high school students in dealing with the biology course

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Abstract

Secondary school students face many difficulties to understand the lessons of the biology course. These difficulties may be related to the topics of the biology course, to the way teacher explains, his style, the way he introduces the topics, and his use of modern methods to help understanding topics. School environment may cause distraction, lack of concentration, or inability to follow up on understanding lessons. The current research aimed to study the various difficulties faced by the male students of Al-Nokrashy Secondary School in Hadyek El Koba administration, by conducting personal interviews and applying questionnaires, the results of which were that the students stated that the most difficulties facing them in studying and understanding the biology course are related to the topics of the biology course itself with percentage of (54%), followed by the teacher (47.6%) and finally the difficulties related to the school environment (32.2%). At the end of the research, the researchers supposed solutions that would handle the difficulties faced by students at Al-Nokrashy Secondary School, in particular, and could be applicable to all secondary schools in general to improve necessary skills of secondary school students to understand biology course smoothly and easy.

Key Words: Biology course, Teaching and learning skills, Biology teacher, School environment.

1. Introduction:

In the realm of education, the challenges high school students encounter while navigating the complexities of the biology curriculum have become increasingly apparent. As we enter an era marked by advanced scientific understanding and technological innovation, the significance of biology education cannot be overstated. However, it's clear that many students find it challenging to grasp the fundamental concepts and principles of this discipline, leading to numerous obstacles in their academic journey. Acknowledging the importance of this issue, our research aims to delve into the difficulties high school students face when engaging with the biology course (West et al., 2013).

The relevance of this research topic lies in its potential to uncover the root causes of student struggles in biology education and, consequently, to inform pedagogical strategies aimed at fostering deeper understanding and mastery of the subject matter. By pinpointing the specific challenges students encounter, educators can tailor instructional approaches and support mechanisms to effectively address these obstacles. Ultimately, our primary objective is to enhance the overall learning experience and academic outcomes for high school students enrolled in biology courses. (Kayumova and Tippin, 2016).

High school biology serves as a foundational pillar in preparing students for academic and professional pursuits in the life sciences. Despite its importance, many students encounter significant challenges when navigating the complexities of the biology course. This research seeks to explore and address the difficulties faced by high school students in dealing with the biology curriculum, aiming to improve educational outcomes and foster a deeper understanding of biological concepts (Adebowale and Moye, 2013).

The significance of this research topic lies in its potential to enhance the effectiveness of biology education and support student success. Biology isn't merely a subject to be memorized; it requires critical thinking skills, conceptual understanding, and the ability to apply knowledge to real-world scenarios. Yet, many students struggle to grasp fundamental biological principles and fail to see the relevance of the subject to their lives and future aspirations (Kavale and Forness, 2003).

Understanding the obstacles hindering students' success in biology education is crucial for several reasons. Firstly, high school biology lays the foundation for advanced studies and careers in various STEM disciplines, including medicine, environmental science, and biotechnology. Therefore, addressing the difficulties faced by students in this subject is essential for fostering interest and proficiency in these fields. Secondly, promoting effective biology education is vital for developing scientifically literate citizens who can make informed decisions about pressing societal issues, such as climate change, genetic engineering, and public health.

2. The Theoretical Framework:

At the core of our research lies a comprehensive theoretical framework that elucidates the multifaceted nature of student difficulties in the biology course. Drawing upon established concepts and theories in educational psychology and curriculum design, our framework aims to provide a nuanced understanding of the factors

influencing student learning outcomes in biology education (Turkmen, 2009).

Central to our theoretical framework is the concept of cognitive load theory, which suggests that students' ability to process and retain information is limited by the cognitive resources available to them. Within the context of the biology curriculum, complex terminology, abstract concepts, and intricate biochemical processes often contribute to cognitive overload, impeding students' comprehension and retention of key content (Hsiao and Petersen, 2019).

Moreover, socio-cultural perspectives on learning highlight the influence of social and environmental factors on student engagement and achievement. Peer interactions, family dynamics, and socio-economic background can significantly impact students' motivation, self-efficacy, and academic performance in biology. By integrating socio-cultural considerations into our framework, we aim to elucidate the interplay between individual cognitive processes and contextual influences on student learning experiences (Lauderdale-Littin and Brennan, 2018).

Furthermore, our theoretical framework incorporates insights from prior research on student misconceptions and alternative conceptions in biology education. Studies have documented common misconceptions held by students regarding biological phenomena such as evolution, genetics, and ecological systems. By synthesizing these findings with our own empirical data, we seek to identify recurring patterns of misunderstanding and illuminate potential instructional strategies for effectively addressing these misconceptions (Lee et al., 2019).

In summary, our theoretical framework provides a holistic lens through which to examine the difficulties faced by high school students in the biology course. By integrating cognitive, socio-cultural, and conceptual perspectives, we aim to elucidate the underlying mechanisms driving student struggles and inform evidence-based interventions to support their learning and academic success (Park et al., 2016).

3.Methods:

Personal interviews and a precise questionnaire were conducted on 120 male students from all stages in Al-Nokrashy Secondary School in Hadyek El Koba administration. Answers of students were recorded thoroughly and then questionnaire was applied directly after interview. The questionnaire was categorized based on three main points: first one was taking about the difficulties related to understanding biology course, second was concerned with difficulties facing students due to the personality of the teacher as all, and third was discussing difficulties specific to the school environment.

We have identified some topics based on the votes of several students that are so hard to understand, mainly the effect of enzymes on the body.

Statistical analysis was accurately done by using Microsoft Excel (Office 365), mean, standard deviation, and standard error were calculated and then graphs were constructed according to the results of the questionnaire.

4. Results:

The results obtained from our study are shown in the following tables and figures. Tables (1), (2), and (3) show mean and standard deviation values

to the answers of the questions of the three categories of the questionnaire respectively. Figures (1), (2), and (3) illustrate the data recorded in the previous tables.

Table (1): Responses to the first category of questions in the questionnaire (understanding biology course)

No. of question	Response (Yes)	Response (No)	Response (Approximately)
1	14	12	12
2	15	7	13
3	16	10	13
4	18	11	8
5	25	2	12
6	7	23	8
7	20	9	12
8	30	3	11
9	11	10	16
10	20	9	8
11	30	4	2
12	16	5	12
13	18	6	14
14	20	4	14
Mean	19	8	11
Standard deviation	6	5	4

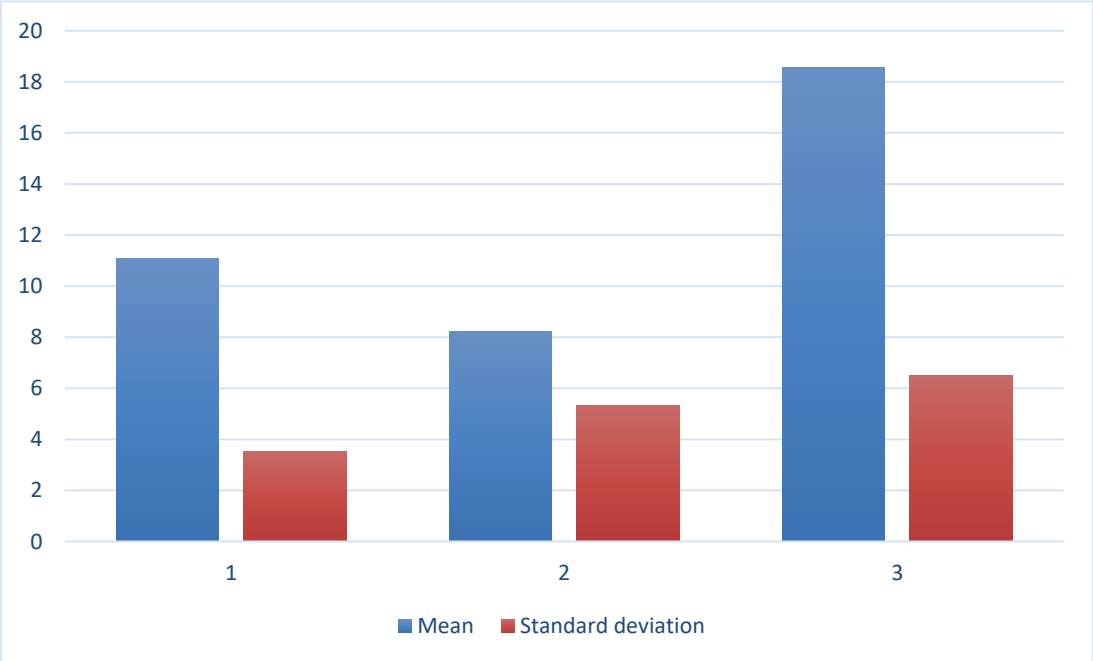

Figure (1): Means and standard deviations of the questions of the first category of questions in the questionnaire (understanding biology course)

Table (2): Responses to the second category of questions in the questionnaire (the teacher)

No. of question	Response (Yes)	Response (No)	Response (Approximately)
1	6	19	12
2	9	20	10
3	22	4	5
4	23	7	7
5	27	6	5
6	14	10	16
7	18	6	15
8	25	10	6
Mean	16	10	10
Standard deviation	8	6	4

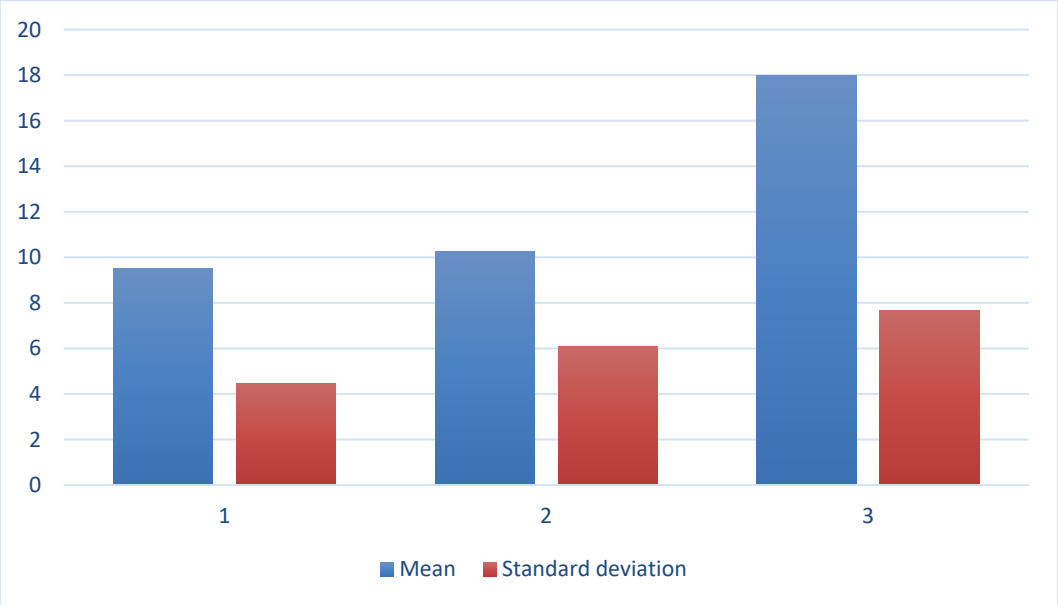

Figure (2): Means and standard deviations of the questions of the second category of questions in the questionnaire (the teacher)

Table (3): Responses to the third category of questions in the questionnaire (the school)

No. of question	Response (Yes)	Response (No)	Response (Approximately)
1	6	19	11
2	10	18	8
3	15	16	6
4	18	11	9
5	13	7	15
6	14	6	12
7	14	7	13
8	1	24	10
Mean	11	14	11
Standard deviation	6	7	3

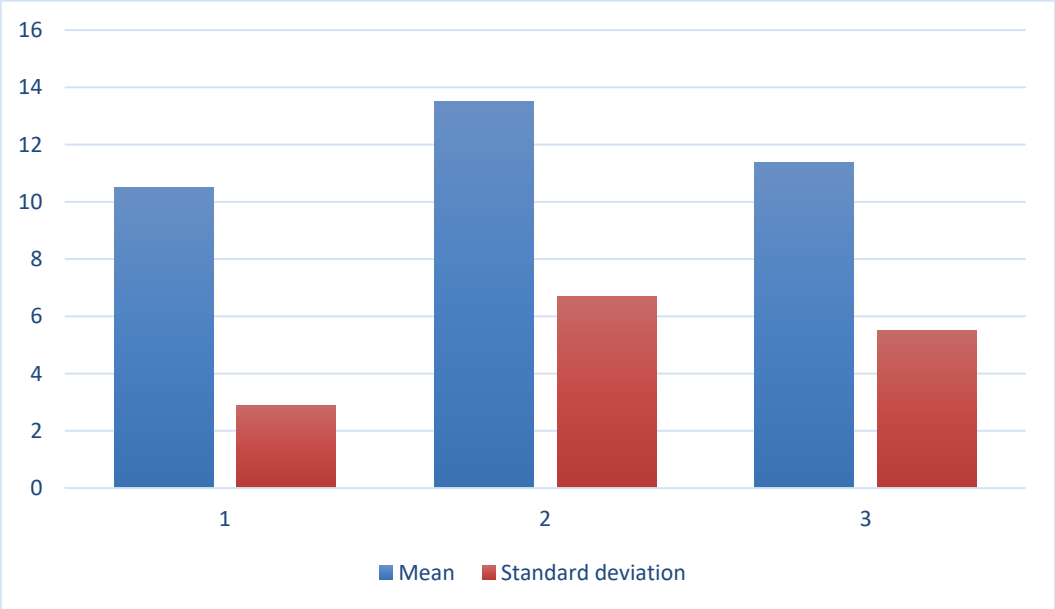

Figure (3): Means and standard deviations of the questions of the third category of questions in the questionnaire (the school)

5. Interpretation of Results:

It was clear that there are various difficulties facing secondary school students in understanding the topics of the biology curriculum at the secondary level (Sciuchetti, 2016). We tried to reach unusual solutions to these difficulties.

The first category of understanding the biology course comes first in the difficulties facing students under study. This difficulty may be due to the role of the teacher in simplifying some of the concepts of the biology course, we must put an important point in our concern that the scientific terminology may be introduced to for the first time to the students in their studies (West et al., 2013).

It also became clear from the results that the teacher has a major role in conveying information in a good way to the students, and that the psychological factors that may affect him, as well as the teaching burden placed on the teacher due to the large number of classes per day, directly affect his motivation and his desire to explain in detail and convey the information well. Moreover, we may find that the teacher may be involved in teaching several different grades or in several different schools due to the lack of teachers of biology, which increases the physical burden on his shoulders. Therefore, he explains to the students with minimal effort in order to save his effort and energy (Turkmen, 2009).

The role of the school and the educational environment comes in the third place to directly influence students' understanding and achievement (Kayumova and Tippin, 2016), as our current study found that the role of the school is no less important than the role of the curriculum and the teacher because of its great impact on concentration during class time due to the school environment, the location of the school, the availability of appropriate educational tools, and the extent to which the school administration facilitates the educational process for students. Al-Nokrashy Secondary School in Hadyek El Koba administration is located directly on one of the vital crowded roads in this area, and this had a major impact on the students due to the noise of cars and buses, which increases the students' distraction and difficulty concentrating. It was noted that some educational equipment was damaged in school laboratories, which reduces the opportunity to watch experiments virtually under the lowest circumstances (Lee et al., 2019).

All of the previous topics come together and present major difficulties in students' understanding and achievement, not only of the biology course at their secondary level, but also of the rest of the academic courses, which made us think actively about solutions that would help increase their achievement and excellence.

6. Conclusion:

It was concluded that the curriculum, the teacher, and the school environment represent the most influential factors on the difficulty of learning among students of Al-Nokrashy Secondary School. There are other factors that were not addressed in the research, such as the psychological factors of students, which are considered the main motivator for receiving or rejecting information, as well as cognitive factors. Some students have problems with reading and writing, which affects the learning process. We recommend some useful recommendations as follow:

1. Reconsidering the biology course and developing it to solve the problems of students' learning difficulties.
2. Educating parents about the new curriculum system and examination systems.
3. constructing training courses for teachers to understand the problems of learning difficulties and how to use appropriate strategies to solve them.
4. Great attention from society to learning difficulties.
5. well-trained teachers to suit current students' needs.
6. Moving schools to places far from residential areas, roads, and noise.

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References:

Adebowale, O. F., & Moye, G. P. (2013). Teachers' Knowledge of and Attitude Towards Learning Disabilities. Online Educational Journal.

Hsiao, Y. & Petersen, S. (2019). Evidence-based practices provided in teacher education and in service training programs for special education teachers of students with autism spectrum disorders. Teacher education & special education, 42 (3), 193-208.

Kavale, K. A.; Forness, S. R. (2003). Learning disability ax.Discipline. Swanson, H. Lee (Ed); Harris, Karen R. (Ed): Graham, Steve (Ed). (2003). Handbook of learning disabilities. (pp. 76-93). Guilford Press. XVII.

Kayumova, S. & Tippin, D. (2016). Toward re-thinking science education in terms of affective practices: reflections from the field. Cult Stud of Sci Educ, 11, 567-575. USA.

Lauderdale-Littin, S., & Brennan, M. (2018). Evidence-based practices in the public school: The role of preservice teacher training. International Electronic Journal of Elementary Education, 10 (3), 369-375.

Lee, W.C., Wang, L. & Chen, D. (2019). A qualitative inquiry into the relationships between teacher efficacy beliefs and teaching task analysis in the context of learner-cantered pedagogy. The Australian Educational Researcher. 47, 611-628.

Park, M., Dimitrov, D., Das, A., & Gichuru, M. (2016). The teacher efficacy for inclusive practices (TEIP) scale: dimensionality and factor structure. Journal of Research in Special Educational Needs, 16 (1), 2-12.

Sciuchetti, M. B., McKenna, J. W., & Flower, A. L. (2016). Teacher Knowledge and selection of evidence-based practices: A survey Study. Journal of Vincentian Social Action, 1 (2), 20-31.

Turkmen, H. (2009). Examining Elementary Science Education Teachers Disposition After Reform. Asia- Pacific Forum on Science Learning and Teaching, 10 (2), Article 13.

West, E., McCollow, M., Kidwell, J., Umbarger, G., & Cote, D.L. (2013). Current status of evidence-based practice for students with intellectual disabilities and autism spectrum disorders. Education and Training in Autism and Developmental Disabilities, 48 (4), 443-455.