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Bloom's Cognitive Abilities during Pandemic Corona: "Video versus Simulated Video" the best Learning Strategy that enhances the higher ability

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Abstract. A successful learning process is ensured by applying various teaching strategies. Corona Pandemic has forced teachers to teach through new distant educational sources, hence specific learning strategies must be applied by them. Thus the primary objective of this study is to investigate: 1) Distance learning strategies that are available to be used by science teachers 2) The best learning strategy to enhance the higher cognitive abilities or skills. 46 respondents from different levels were randomly chosen from Safir High School in South Lebanon. A questionnaire was used to investigate the teaching strategies used by the chemistry teachers. Two different learning strategies were applied on two groups (23 students each) one using a video only and the other using a video and a simulated video, each group performed a bloom's assessment after the learning session which included six questions listed in order from the lowest cognitive skill to the higher cognitive skill. Wilcoxon signed-rank test was applied to compare the two paired groups and to specify if the two sets are different from one another in a statistically significant manner. The results emphasized that the type of teaching strategy applied does affect the level of the cognitive skills that can be reached by students, using a simulated video proved to be the more effective strategy, were the vast majority of students reached the higher cognitive level "create" in contrary to just using a video, teachers should be aware of the effects of the learning strategies they choose on learning enhancement.

Keywords. Distance learning, Cognitive skills, simulated video

1. Introduction

The outbreak of the Corona Pandemic has directed the whole world towards distance learning, meaning that teachers have been forced to go towards new strategies that he/she may not be acclimatized to. Science subjects, especially chemistry, need to implement their goals in the laboratory, but the Corona pandemic has prevented that. These circumstances have led teachers to question the ability of these new methods to develop the cognitive abilities for students from level one (remember) to the highest level (create) according to Bloom's Taxonomy leading it to rise up.

Chemistry was taught through online learning by using modern video meetings and course management systems that allowed the teachers to better assess their students' problems (Teaching Analytical Chemistry in the Time of COVID-19, 2020). Chemistry can be taught through online learning by using online experiments that come in various forms such as written

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descriptions assisted with photos, video-recorded demonstrations, and simple simulations (Babinčáková, M., & Bernard, P., 2020). Add to that, the usage of active learning resulted in the academic improvement of various students of all levels (Linton et al., 2014). It is also attained online by dictating a few rules that include muting the microphone until wishing to speak, encouraging participants to use video highlighting and an increased engagement with video which all aim for a more dynamic and interactive learning experience (Almarzooq, Z. I. et al., 2020). Hosting of "class-wide-huddles" in order to emphasize the critical concepts of new assignments can in turn help in reinforcing major points of previous sessions (Sterlitz et al., 2020). Around 86% of students agreed that active learning gave them a much clearer understanding of the topic being discussed and taught (Gilkar et al., 2016). Teachers were also able to acquire and improve their teaching skills through active learning and receive useful feedback and resources that helped them in regard to their online presentations in classroom (Inra et al., 2017). Bloom's taxonomy, one of the utilized systems in online teaching, helped achieve a deeper learning process and transfer learnt academic and intellectual information and skills into different tasks and contexts (Adams, 2015). Bloom's taxonomy also allowed teachers to further assess their student-learning outcomes (Crowe et al., 2008). Furthermore, critical thinking is a skill of utmost importance among students to be able to distinguish claims based on facts, conclusions, judgements and opinions as well as developing cognitive skills that are required for analysis (Papathanasiou et al., 2014). Critical thinking helps in improving logical and rational thinking in daily decisions, improves student performance, and increases the ability to solve problems (Quitadamo, I. J., & Kurtz, M. J. , 2007). Critical thinking has been perceived as a way to overcome difficulties and facilitate access to information in life (Ghazivakili et al., 2014). Moreover, it's vital for evaluating multiple bits of information and making appropriate decisions based on them (Wallmann, H. W., & Hoover, D. L. , 2012). Lastly, watching educational videos helps in student engagement and learning all while keeping it short and simple (Brame, 2016). Student performances equally increased when taught exclusively with video based discussions, and their revision through videos became more efficient than normal textbook revision (Murthykumar et al., 2015). The usage of visual information from videos was further increased and enhanced throughout the internet whether educational or others due to the brain's large devotion to processing and analyzing input from the eyes (Datta et al., 2012) Students can use simulated videos in order to develop and refine their skills by using both visionary and interactive learning with simulated videos giving amateur learners realistic exposure to real-life scenarios (Lateef, 2010)

2. Objectives of the Study

The Objectives of this study are to:

1. List the learning strategies that could be applied through distance learning in chemistry.
2. Specify the most used learning strategy by science teachers.
3. Determine the strategy that most enhances the higher cognitive skills.

3. Methodology

This research applied descriptive and qualitative studies.

First: A questionnaire is used for the purpose of data collection. Part I the questionnaire investigates students' profiles with part II investigating the teaching strategies used during distance learning.

Second: Two groups of grade 8 students (48 students, 24 each group), were taught the same objective, one group using videos only and the other using videos and simulated experiments. At the end of the session the students performed an assessment that included 6 questions, the

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questions were organized in the order of Bloom's Taxonomy starting from the first cognitive level (remember) to the highest cognitive level (create).

The Data was collected and analyzed using a Wilcoxon signed-rank test to compare the two paired groups and to specify if the two sets are different from one another in a statistically significant manner. Wilcoxon test is a non-parametric statistical test which refers to the rank-sum test; it calculates and analyzes the difference between two paired groups (Statistics with matlab, 2004). It is used to test the null hypothesis H0 that describes the data relationship as occurred by error; there is no statistical significance between the two variables. Here are the several steps to calculate the Wilcoxon test as illustrated in Figure 1.

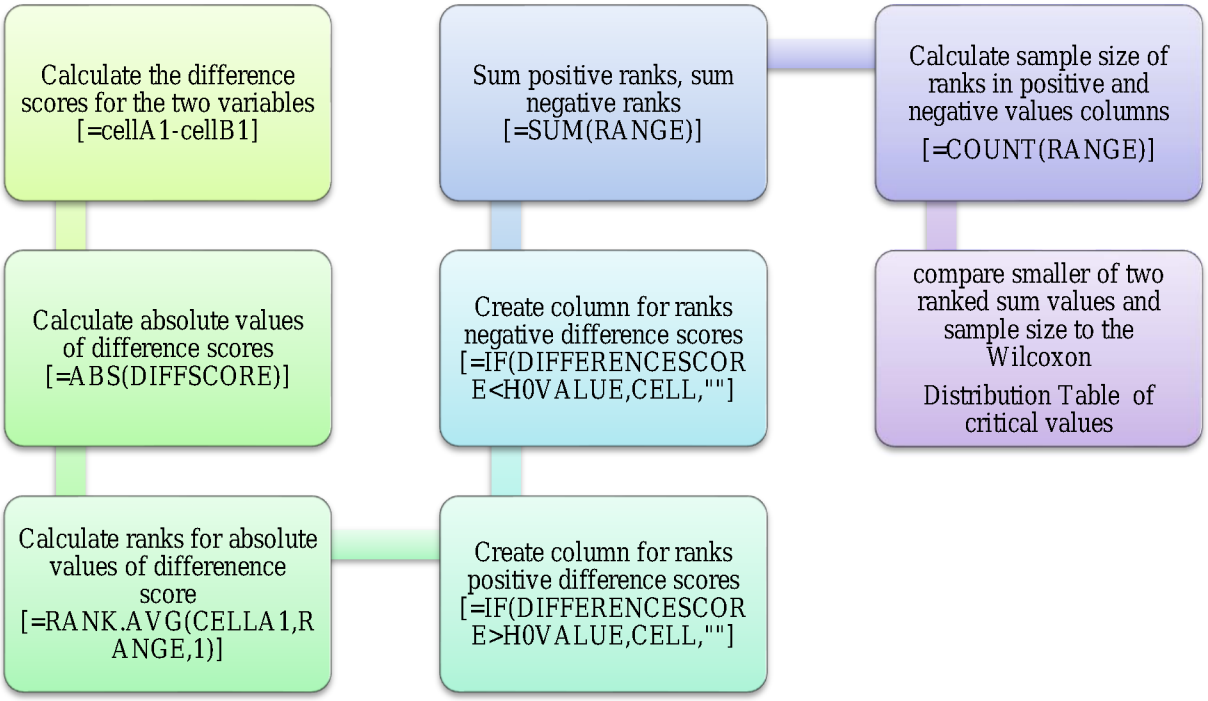

Figure 1: Wilcoxon Steps

- The null hypothesis was specified by: H0=0 (no differences) , H1 ± 0 (differences exist)

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4. Results

a. Methods used during distance learning

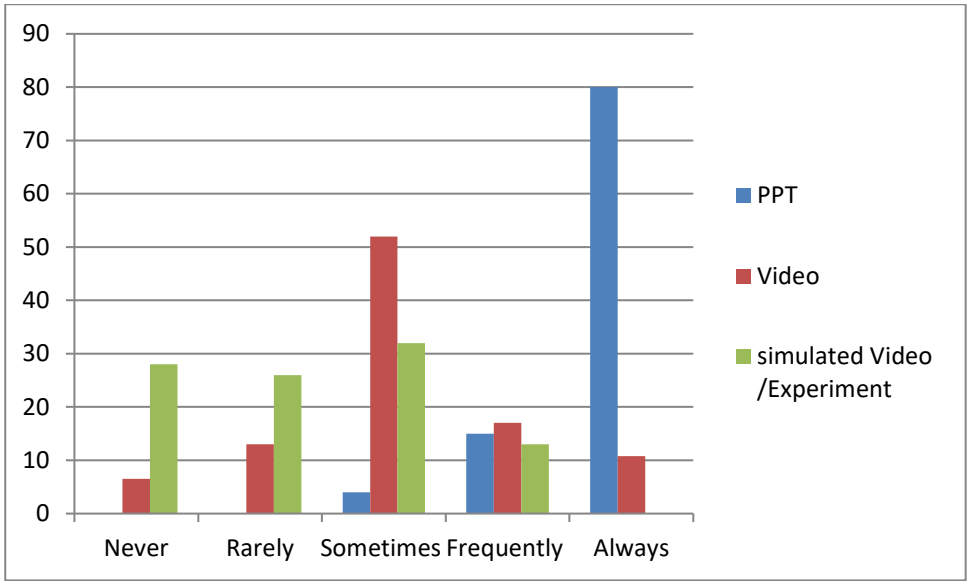

Figure 2: Types of Methods Used

b. Wilcoxon test: video versus simulated video

	Q1	Q2	Q3	Q4	Q5	Q6
Average	0.41-0.71	0.38-0.67	0.22-0.36	0.17-0.42	0.34-0.58	0.20-0.47
Sum positive	50	34.5	70.5	56	61.5	60
Sum negative	198	213.5	126	184	186.5	180
Sample Size	23	23	23	23	23	23
Test Statistic	50	34.5	70.5	56	61.5	60
Critical value	73	73	73	73	73	73
T-Statistical (< ; >) Critical value	50<73	34.5<73	70.5<73	56<73	61.5<73	60<73
H0	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected
H1	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted

5. Conclusion

The learning process can be enhanced using different learning strategies. Even if these strategies are specified due to health or economic issues, teachers should be aware of the best strategies present in order to optimize learning motivation and develop the necessary cognitive abilities. According to the results a significant difference was shown in all the cognitive levels, where H0 was rejected in all the six levels indicating that differences exist with the highest average being related to the simulated video method. Hence, to ensure effective learning, educators need to redefine the remedy of effective teaching and learning as well as the types of knowledge, skills and strategies that are deemed important (Sellars, 2008).

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