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Interrelationship Among Students' Level of Expectancy, TaskValue,and Engagement in Learning Organic Chemistry

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Abstract

Student expectancy, task value, and engagement contribute significantly to behavioral and cognitive achievement. These variables encourage students to commit to learning by requiring them to question their ideas and evaluate and integrate new perspectives. Therefore, the major aspiration of the study is to examine and investigate the acquisition of students' expectancy, task value, and engagement in learning organic chemistry and the interrelationship that circulates among them.The study utilized a quantitative correlational research design. They were conductedonninety (n=90) first- and second-year BSED General Science students enrolled in Organic Chemistry. Results revealed that student's level of expectancy was "moderately high," indicating that the students are proficient in learning, internally focused, perform better academically, and have a moderate ability to delay gratification. Likewise, task value and engagement were also "high," implying that students understand how interesting learning about a topic is, how important it is to them to perform well in a topic, how useful it is to their future, and how difficult and time-consuming learning that they pay close attention and go out of their way to engage in the class, respectively.In general, Expectancy, Task-Value, and Engagement in Learning Organic Chemistry show a positive correlation. Proving that regardless of how difficult, complex, or abstract Organic Chemistry subject is, if students have high expectations for it, they are more likely to be interested in it, feel motivated to learn, exert maximum effort and value in the task, and be more engaged in various learning tasks and activities it provides.Subsequently, it is pivotal that teachers implement innovative teaching techniques that supportstudents' expectancy, task value, and engagement to analyze, evaluate, resolve, and create solutions to problems or be equipped with authentic skills.

Keywords: academic expectations; educational engagement; chemistry education; student motivation; perception; educational psychology; attitudes

1. Introduction

In the study of Eccles et al. [1], it was articulated that expectations are a person's beliefs about their ability to do a task successfully. It refers to whether we expect to succeed in a task if we attempt to do it respectively. Expectancy-value theory defines task-values as "one of the most proximal predictors of performance behaviour." Intrinsic value, utility value, achievement value, and cost are the four major sorts identified by Eccles and colleagues [2]. Student engagement refers to the extent of a student's active involvement, the degree of attention, interest, and passion that the students show when participating in the learning process [3]. Due to the pandemic, a switch to online learning was adopted, positing active engagementsaccomplished through learner–content, learner–instructor, learner–learner, and learner–technology interactions [4,5].

Furthermore, success factors of online learning rely not only on advanced information and communication technology but also on students' learning strategies. Because autonomy and responsibility are requisite if students are to play an active role in their education, only by engaging in tasks can one set high expectations and put more value on them. Success is required. Therefore, this study investigates the interrelationship among students' expectancy, task value, and engagement in learning Organic Chemistry.

2. Methods

The research design, environment, research environment, respondents, data gathering procedure, and statistical data analysis process. This quantitative study uses a descriptive-correlational research design to examine and investigate the interrelationship among students' expectancy, task value, and engagement in Organic Chemistry. Researchers prefer the correlational design because it effectively demonstrates relationships between two or more variables [6]. The method was considered appropriate because the researchers used questionnaires as the main method of gathering data. The researchers of this study used a purposive sampling technique in selecting the samples from the population. It is a non-random technique that does not need underlying theories or a set number of participants.

Simply put, the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by knowledge or experience. Theresearchers employed this type of sampling, which involves identifying and selecting individuals or groups of proficient and well-informed individualsabout a phenomenon of interest [7]. This study was conducted in one of the public colleges in the Philippines, located in Mati, San Miguel, Zamboanga del Sur, particularly to the School of Teacher Education, specifically science major students who encountered difficulties and problems in their self-regulation, problem-solving skills, and engagement in learning chemistry. The study's respondents were the 1st to 2nd-year students of J.H. Cerilles State College, Main Campus, who are enrolled in the subject Organic Chemistry during S.Y. 2021-2022. The modified Interrelations Among Expectancies, Values and Perceived Costs in Undergraduate Biology Achievement" from Kaplan et al.[8] and adopted Students Science Engagement Scale (SSES); Developing the Constructs to Measure Science Engagement from Lee G. Baraquia[9]. The student's level of Expectancy and Task-value in learning Organic Chemistry will be measured with a five-point Likert, adapted from "Interrelations Among Expectancies, Task Values, and Perceived Costs in Undergraduate Biology Achievement" Kaplan et al. [8]. The researchers used a Likert scale wherein higher numbers indicate positive responses to the questions and lower numbers indicate negative responses. This study section shows how the researchers will gather all the necessary data step-by-step.

Figure 2. The Data Gathering Process

Ask permission: In this stage, the researchers will obtain the necessary permissions and endorsement documents that the Dean of the STE Department approves in gathering data by following the proper research ethics standards.

Conduct survey: In this stage, the researchers will email first-year, second-year, and third-year advisers requesting a list of all students' names. Following the approval request, the researchers will contact each student individually and hand them the survey letter, which includes the five-point Likert scale questions.

Collect data: In this stage, the respondents will be asked to complete questionnaires via Google Forms. Respondents will be asked to take a screenshot of their Google tab before closing it to confirm their participation in the study.

Analyze data: After collecting the data, the researchers used the given questionnaires to the statistician to analyze the data of their respondent's overall results.

Interpret data: Following the data collection, the researchers tallied, computed, analyzed, and interpreted the figures to arrive at the accurate results reflected in the data.

To interpret the data, the researchers employed a statistical tool such as weighted mean multiplying the weight or probability associated with a specific outcome. The Spearman correlation measures the degree between two variables; it assesses how the two variables can be described or evaluated. The two statistical tools, weighted mean, and Spearman Correlation, examine the relationship between

students' level of expectancy, Value, and engagement in learning organic chemistry.

3. Results and Discussions

Table 1. ***Descriptive levels of students' expectancy towards Organic Chemistry (n=88)***

Items	M	SD	QD
1. Compared to other students, how well do you expect to do in this Organic Chemistry course this semester?	3.36	0.75	M
2. Howwelldoyou think youwilldoin thisOrganicChemistry course this semester?	3.51	0.69	H
3. How good are you at this Organic Chemistry course?	3.26	0.80	M
4. If you were to order all of the students in this chemistrycourse from the worst to the best in Organic Chemistry, where would you put yourself?	3.36	0.71	M
Overall	**3.38**	**0.60**	**M**

Note: *M = mean, SD = Standard deviation, QD = Qualitative description: 1.00 – 1.79 = Very Low (VL), 1.80 – 2.59 = Low (L), 2.60 – 3.39 = Moderately High (M), 3.40 – 4.19 = High (H), 4.20 – 5.00 = Very High (VH)*

Results revealed that the respondents generally obtained a Moderately High level in their Expectancy towards learning Organic Chemistry. Respondents had stated that they expect to do well in the course compared to the others. Based on the coined results, students rank themselves as thebest among all the students in the subject (from the worst to best). This indicates that the students might be significantly more proficient in learning because they have a moderately high success expectancy in the course.

Table 2.***Descriptive levels of Task-value towards Organic Chemistry (n=88)***

Items	M	SD	D
1. I feel that, to me, being good at solving problems in this Organic chemistry course is.	4.01	0.85	H
2. Compared to other courses, how important is it to you to do well in this Organic chemistry course?	4.05	0.74	H
3. Being someone who is good at this Organic chemistry course is important to me.	4.18	0.85	H
4. Being good at this Organic chemistry course is an important part of who I am.	3.99	0.80	H
5. How interesting do you find this Organic chemistry course?	4.11	0.73	H
6. In general, I find working on assignments/studying for this Organic chemistry course	3.82	0.70	H
7. Compared to othercourses, how much do you like thisOrganic chemistry course?	3.74	0.80	H
8. I am fascinated by this Organic chemistry course.	3.61	0.75	H
9. I enjoy this Organic chemistry course.	3.81	0.74	H
10. This Organic chemistry course is exciting to me.	3.82	0.78	H
11. I like this Organic chemistry course.	3.80	0.73	H

12. How useful is this Organic chemistry course for what you want to do after you graduate?	4.11	0.79	H
13. This Organic chemistry course will be important when I get a job or go to graduate school.	4.10	0.82	H
14. This Organic chemistry course will be useful for me later in life.	4.18	0.77	H
15. Concepts in this Organic chemistry course are useful because they will help me in the future.	4.17	0.79	H
16. When I think about the hard work neededto get through my Organic chemistry course, I am not sure that it will be worth it in the end.	3.43	0.96	H
17. I am not sure if I've got the energy dowell in my chemistry course.	3.52	1.02	H
18. For me, taking this Organic chemistrycourse just might not be worth the effort.	2.98	1.19	M
19. This Organic chemistry course sounds like it reallyrequires more effort than I'mwilling to put into it.	3.89	0.86	H
20. Studying for this Organic chemistry course takes a lot of timeaway from other activities that I want to pursue.	3.73	0.93	H
21. I'm concerned about losing track of some Valuablerelationshipsbecause ofthe work required for this Organicchemistry course.	3.43	0.96	H
22. I'm concerned that I have to give up alot to do well in this Organic chemistry course.	3.45	0.97	H
23. I'm concerned success in this Organic Chemistry courserequires that I give up a lot ofother activities I enjoy.	3.60	0.89	H
24. I'm concerned about being embarrassed if my work in this Organic chemistry course is inferior to that of my peers.	3.52	0.91	H
25. I'm concerned that my self-esteem willsuffer if I amunsuccessful in this Organicchemistry course.	3.63	1.01	H
26. I worry that others will think I am a failure if I do not do well in this Organic chemistrycourse.	3.72	1.07	H
Overall	**3.79**	**0.51**	**H**

Note: *M = mean, SD = Standard deviation, QD = Qualitative description: 1.00 – 1.79 = Very Low (VL), 1.80 – 2.59 = Low (L), 2.60 – 3.39 = Moderately High (M), 3.40 – 4.19 = High (H), 4.20 – 5.00 = Very High (VH)*

Results show that the respondents in this study generally obtained a High level in their *Task-Values* in learning towards Organic Chemistry**).** One of the items respondents believed learning concepts of organic chemistry is an important part of who they are and will be very useful in the future, especially when they are going to get a job in graduate school. Respondents found working assignments/studying in this subject interesting, fascinating, and exciting. However, respondents also think that the hard work and effort needed to get through this subject are not worth it. Aside from that, respondentsstate that they are concerned about losing track of some valuable relationships because of the work required for this course and worried that others will think they are a failure if they do not do well in this chemistry course.

Table 3. ***Descriptive levels of students' engagement towards Organic Chemistry (n=88)***

Items	M	SD	QD
1. My Organic Chemistry lesson and performance task are important and relevant to my life.	4.13	0.67	H
2. My Organic chemistry lesson and performance task are interesting and meaningful.	3.99	0.78	H
3. My Organic chemistry lessons and performance are realistic and contextualized.	3.90	0.76	H
4. I am inspired to learn new things in Organic chemistry class.	4.03	0.79	H
5. My Organic chemistry lesson and performance task stimulate my curiosity.	3.94	0.79	H
6. I feel encouraged and interested to work on something in Organic chemistry class.	3.94	0.76	H
7. I am having fun during collaborative learning activities in Organic chemistry.	3.69	0.81	H
8. I want to ask my Organic Chemistry teacher or classmate personally or through social media if I have a trouble understanding a lesson.	3.70	0.83	H
9. I want to investigate and understand to societal and environmental impacts and implications from Organic chemistry and technology.	3.90	0.76	H
10. I participate and interact during small-group discussion in Organic chemistry.	3.85	0.69	H
11. I appreciate the nature of the scientific method or process.	3.70	0.78	H
12. I consult a share my views and knowledge with my classmates and Organic chemistry teacher.	3.83	0.79	H
13. I use my creativity and inventiveness in doing my Organic chemistry work.	3.69	0.75	H
14. I do and finish my Organic chemistry task on time.	3.72	0.80	H
15. I raise my hand to participate in Organic chemistry class discussion.	3.64	0.83	H
16. I read and review my class notes, hand-outs, and textbook between classes to make sure that I learn from these Organic chemistry learning materials.	3.50	0.88	H
17. I prepare thoroughly before the summative test or exam in Organic chemistry.	3.82	0.72	H
18. I give maximum effort to my Organic Chemistry class.	3.77	0.78	H
19. I always pay attention to my teacher and classmates who communicate during Organic chemistry class.	3.99	0.75	H
20. I feel supported by my classmates and Organic chemistry teacher.	3.03	0.75	H
21. I follow the instructions closely indoing my Organic chemistry work.	3.83	0.90	H
Overall	**3.85**	**0.56**	**H**

Note: *M = mean, SD = Standard deviation, QD = Qualitative description: 1.00 – 1.79 = Very Low (VL) 1. 80 – 2.59 = Low (L), 2.60 – 3.39 = Moderately High (M), 3.40 – 4.19 = High (H), 4.20 – 5.00 = Very High (VH)*

Results show that the respondents generally obtained a High level ofEngagement in learning Organic Chemistry. As one of the constructs of students' engagement in the learning process, the research participants emphasize the need to design interesting and meaningful science lessons and performance tasks. Respondents agreed that these lessons and tasks encourage and challenge them to work in their Chemistry class.

Table 4. ***Correlation matrix among expectancy, task-value, and engagement towards OrganicChemistry***

		Expectancy towards OrganicChemistry	**Value towards OrganicChemistry**
Expectancy towards Organic Chemistry	Pearson Correlation	-	.362**
	Sig. (2-tailed)		0.001
	N	88	88
ValuetowardsOrganicChemistry	Pearson Correlation	.362**	-
	Sig. (2-tailed)	0.001	
	N	88	88
Engagement towards Organic Chemistry	Pearson Correlation	.357**	.535**
	Sig. (2-tailed)	0.001	0.00
	N	88	88

Note: *Cell contains Correlation coefficient (above) and p-values (below), * Correlation is significant at the 0.05 level (2-tailed). r is interpreted using Cohen's Scale: -0.3 to +0.3 = weak, 0.5 to -0.3 or +0.3 to +0.5 = moderate relationship, -0.9 to -0.5 or +0.5 to +0.9 = strong relationship, -1.0 to - 0.9 or +0.9 to +1.0 = very Strong relationship.*

The analysis revealed students' expectancy level and task value towards learning in Organic Chemistry r (88 =.362**), p<0.01. This indicates that as the students' level of expectancy rises, so does the task value. Students' level of expectancy and task-value towards learning in Organic Chemistry r (88=.362**), p<0.01. Hulleman et al. [10] found that expectancy was correlated with the task value and that changes in expectancy and task values were highly correlated. In other words, students who started the semester with higher expectancy also have higher perceptions of task values.

4. Conclusion

In this study, the researchers examined the significant correlation amongStudents' level of expectancy, task value, and engagement toward learning in Organic Chemistry. The researchers found a significant relationship among the students' level of expectancy, task value, and engagement. The study of Hulleman et al. [10] found that expectancy was correlated with task value and that changes in expectancy and task value were highly correlated. The students are significantly more proficient in learning because they have a moderately high success expectancy in the course. Similarly, the greater the strength, the more likely a certain outcome will follow the act. If a student judges that he can achieve an outcome, he will be more motivated to try; the higher the expectancy, the more likely a student will exert energy to accomplish the outcome.

Moreover, when students perceive an academic assignment/task to be intrinsically useful and fascinating, they are more likely to pay attention, process material more thoroughly, and achieve better results. Student's active involvement or participation in the learning process was perceived to be a contributory construct to engagement. Hence, teachers should uphold pedagogical approaches that will engage students in making sense of scientific ideas and allow them to ask questions and look for answers

in investigating and understanding real-world phenomena using Chemistry concepts in their learning practices. Furthermore, Eccles et al. [1] asserted that students who increased their expectancy over the semester also increased their task values. In addition, the EVT model also agreed that expectations of success and task values are postulated as the most proximal predictors of achievement, choice behaviors, and effort in academic settings. Thus, the students' level of expectancy and task-value toward learning in Organic Chemistry has a higher relationship with each other.

5. Recommendation

The study revealed the students' expectancy, task value, and engagement in learning organic chemistry of JHCSC Science students and the interrelationships of the three constructs. Thus, the following recommendations are presented.

1. Teachers, administrators, and policymakers may utilize the results of this study to improve classroom teaching and learning atmosphere and to craft policies related to this area.

2. Teachers may change classroom instructions and other teaching and learning-related undertakings that may promote metacognition for the students, as these were found to lessen the students' anxiety and avoidance of Organic Chemistry.

3. The result of this study may be utilized by the academe to enhance the curriculum and to promote academic activities that will enhance the students' expectancy, task value, and engagement toward learning in Organic Chemistry.

4. The sample size of this study is only limited to 88 respondents. For better results of this study, other researchers may also consider increasing the number of respondents.

5. Other researchers may use different research methodologies, such as qualitative approaches and experimental designs, to validate the results of this study.

6. We recommend that the researchers explore how teachers can implement motivation-supportive instructional techniques in their classrooms with minimal time and resources.

7. We also recommend that researchers explore whether it may be beneficial for teachers to target motivation interventions to specific struggling students rather than implementing interventions with the whole classroom.

8. Organic Chemistry teachers should understand students' learning difficulties in Organic Chemistry topics and design appropriate instructional strategies and approaches with relevant interjections whenever applicable.

9. Chemistry teachers or curriculum designers should encourage students to use different models to help them develop visualization abilities.

10. Students should be encouraged to follow algorithms for problem-solving in Chemistry. This will further enable them to see the study of Organic Chemistry as a process.

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