Attitudes Toward Teaching Science and Self-Efficacy as Predictors of Science Teaching Anxiety Among Preservice Teachers

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***Abstract*—** The sudden shift of teaching modality from traditional face-to-face instruction to flexible learning modality brought by Covid-19 pandemic had caused problems in the teaching-learning process like teaching anxiety. These may result in weak performance in teaching preparation programs and in future classrooms, as well as poor learning of teaching techniques and scientific knowledge, aversion to teaching science, and unfavorable student outcomes. This quantitative study aimed to determine if the attitudes toward teaching science and self-efficacy predict the science teaching anxiety among preservice teachers. The regression analysis technique was used to identify the level of association between the two independent variables and a dependent variable. Both attitudes toward teaching science and self-efficacy have significant relationship to science teaching anxiety. Moreover, attitudes toward teaching science among preservice teachers was found to be a predictor of science teaching anxiety. The results will benefit preservice teachers because the study's findings could serve as the foundation for intervention plans and programs to lessen the level of science teaching anxiety among preservice teachers.

***Keywords*—** MAED-Teaching Science, attitude towards teaching science, self-efficacy, science teaching anxiety, Philippines.

I. INTRODUCTION

Preservice science teachers` anxiety may lead to poor performance in teacher preparation programs and in future classrooms, as well as poor acquisition of teaching skills and knowledge about science, avoidance of science teaching, and undesirable student outcomes [28]. Teaching anxiety in planning and implementation of classroom activities has the potential to have a significant impact on teachers' professional effectiveness and classroom behavior. The repercussions of anxiety on a teacher's behavior impair classroom effectiveness, especially in conjunction with lower student accomplishment [1]. Additionally, anxiety was the most widely reported experience by educators in surveys during the COVID-19 issue, and they propose that anxious teachers are more likely to alienate students [9]. In the study of Mosaddaq [18], Arabian preservice teachers experience anxieties on classroom and time management, instructional strategies, supervision and assessment, and language.

It is crucial to study science teaching anxiety and its impact on teachers' performance. Teachers who were more comfortable with science, according to Yuruk [28] were more inclined to commit more time to it and approach it with more creativity and diversity, besides, less anxious science teachers more likely used open-ended inquiry. On the other hand, teachers with a higher level of anxiety, used teacher- directed instructional strategies. Teachers who suffer from science anxiety may unintentionally pass on their fears to their learners, prolonging the vicious cycle [15].

The study of Bursal and Paznokas [8] have investigated the relationship between attitudes toward science and science teaching anxiety. Significant correlation between the two variables is found that preservice teachers who had a positive attitude toward science had a low level of anxiety in teaching science. Moreover, a study on the relationship between self-efficacy and science teaching anxiety that anxiety has a negative impact on self-efficacy [16].

The researcher has not come across a study investigating attitudes toward teaching science and self-efficacy as predictors of science teaching anxiety. Most of the studies only include either attitudes toward teaching science or self-efficacy as its independent variables separately. There are other studies that focus specifically on the impact it has on teachers' classroom performance. The focus of this study is to determine if attitudes toward teaching science and self-efficacy predict the science teaching anxiety among preservice teachers. If the factors that predict science teaching anxiety are identified, it will benefit preservice teachers because the study's findings could serve as the foundation for intervention plans and programs to lessen preservice teachers' levels of science teaching anxiety, as well as Teacher Education programs, as they may be modified to be less anxiety-provoking. In general, this functioned as a springboard for creating viable instructional and

intervention plans for science teaching. Due to the limited studies concerning preservice teachers` anxiety in the Philippines where the majority of studies on teaching internships concentrated on factors such as teaching competency and challenges encountered during the process [27], this study can be beneficial in future research. Hence, the urgency to do conduct the study.

II. METHODOLOGY

This is a quantitative non-experimental research design that uses the causal effect to describe the possible existence of a relationship between two recognized variables and to determine the direction and degree of that relationship, if one exists, with regression analysis. The descriptive correlation method is considered appropriate when the purpose is to describe the condition of the situation as it existed at the time of the study in order to investigate the causes of a specific phenomenon. Correlational research focuses on establishing correlations between two or more variables in the same population and measuring the statistical link between them with no effort to control minor variables [14]. Regression analysis, as a statistical tool, investigates the relationship between variables [25]. In this study, the researcher additionally examines the "statistical significance" of the findings, estimated relationships, or the degree of certainty that the relationship exists

This study applied cluster sampling technique in selecting the study`s respondents. This technique divides the population into groups or clusters from where a random sample is taken and are used in the final sample [26]. Only two (2) higher educational institutions (one having three branches, namely, Maragusan, Montevista, and New Bataan) will be chosen to represent the total population of all tertiary educational institutions in Davao de Oro. The qualified respondents of this study are the preservice teachers enrolled in PED 11 (Teaching Internship) who specialize in either General Science or Elementary Education – Generalist for SY 2021-2022 of the Davao de Oro State College Compostela, Maragusan, Montevista, and New Bataan Campus, and Legacy College of Compostela, Davao de Oro. Those who are enrolled in PED 11 (Teaching Internship) outside Davao de Oro, and who do not specialize in either General Science or Elementary Education – Generalist are not qualified to be the respondents of the study.

The participation of the respondents to the study is purely voluntary. Thus, the participants can withdraw anytime if they are threatened in the conduct of the study. However, the researcher will make sure that the respondents will be informed of the purpose of the study and that the information will remain confidential and private which are also included in the consent form provided. In addition, all potential benefits and harm will be explained to the respondents and that their participation is purely voluntary and can withdraw anytime.

The number of samples was determined using Slovin's formula (n = N / (1+Ne2), where "n" pertains to the sample size, "N" represents to the population size, and "e" denotes to the margin of error.

III. RESULT AND ANALYSIS

Level of Attitudes Toward Teaching Science among Preservice Teachers

Table 1 shows the level of attitude towards teaching science among preservice teachers in terms of comfort-discomfort, science as basic needs, time required to teach science, and handling science equipment. The overall mean is 2.62, which is described as moderate. This means that the level of attitudes toward teaching science of the preservice teachers is moderately observed by the preservice teachers.

As eloquently stated by Erdogan [10] that teachers' attitudes toward science are a fundamental component of a successful science education. This investigation measures how the participation in an elementary activity-based science course affected the attitudes of preservice primary teachers about teaching science. The attitude of teachers has an impact on their affectivity, self-sufficiency, and confidence. In this scenario, fostering students' confidence and independence depends heavily on their views about science and the way science is presented to them.

Among the four indicators, time required to prepare and teach science got the highest mean of 3.53, described as low, followed by the comfort-discomfort, which posted a mean of 3.07, described as moderate, then handling science equipment 2.04, described as high and finally science as a basic need, which attained a mean of 1.85 with a verbal description of high. The indicator time required to prepare and to teach science has a low descriptive equivalent which indicates that the level of attitudes toward teaching science is less observed by the preservice teachers. Meanwhile, the comfort-discomfort got a moderate descriptive equivalent which indicates that the level of attitudes toward teaching science is moderately observed by the preservice teachers. And lastly, the indicators: handling science equipment and science as basic needs got a high descriptive equivalent which indicates that the level of attitudes toward

teaching science is much observed by the preservice teachers.

The results subscribe to the study of Alanazi [2] that the time allotted for science lesson preparation was insufficient, causing stress among preservice teachers. The majority of participants said lesson preparation is a difficult and time-consuming task. The majority of participants stated that teaching in the field was a new and exciting experience in which they gained both experience and stress.

Additionally, Bolkan [5] emphasized that some pre-service teachers are not comfortable in teaching science. The majority of them prefer teaching literacy than to any science-related subjects. Teachers' discomfort feeling in teaching science discipline maybe because of inadequate training, lack of preparation, or just a general dislike of science. Instructors may feel pressure from administrators or policymakers which put more emphasis on literacy.

The study of Putri, Risdianto, and Sutarno [23] revealed that many primary science instructors, both preservice and on-service teachers are still found practical work like handling laboratory equipment to be one of the most difficult jobs, and they use it seldom or ineffectively in many scientific classes. Barriers for application inquiry approaches in scientific courses include teachers' opinions lack of equipment, laboratory safety difficulties, preparing students for standardized test and official exams and fulfilling mandatory curriculum topics within a given time constraint. Teachers' ideas about teaching, learning, and classroom management are one of the main obstacles to the use of inquiry approaches in scientific classrooms.

The result is also related to the study of Ates [3] that preservice teachers also exhibit beliefs that science is a basic need. Teachers' beliefs on science as a means of knowledge include an understanding of science's nature. Understanding the nature of science is an important aspect of scientific literacy. People's perceptions of science have an impact on their daily actions and scientific endeavors.

Level of Self-Efficacy among Preservice Teachers

Presented in the table 2 below is the level of self-efficacy of the pre-service teachers in terms of personal science teaching efficacy and science teaching outcome expectancy. The overall mean is 2.23 and a verbal equivalent of high. This indicates that the level of self-efficacy is much felt by the pre-service teachers.

This is related to the study of Peker et al [22] that the ability to conduct science teaching well and increase student achievement can be characterized as a teacher's self-efficacy in science teaching. Teachers must believe they can impart high-level scientific knowledge while yet finding fulfillment in their employment.

Among the two indicators, science teaching outcome expectancy got the highest mean of 2.24, and a verbal description of high. On the other hand, the indicator personal science teaching efficacy got the mean score of 2.23 yet still described as high. The aforementioned indicators got a high descriptive equivalent which indicates that the level of self-efficacy of the preservice teachers is much felt by the pre-service teachers.

This is supported by the study of Moslemi & Mousavi, (2018) that it is one of the most essential aspects contributing to a good teaching–learning result for both the teacher and the students is a teacher's self-efficacy. Numerous researchers have found a link between student self-efficacy, academic achievement, teacher burnout, and teacher self-efficacy.

The result is also in congruence to the study of Sharp, Rutherford II, and Echols [24] that the idea of outcome expectancy, which is more usually studied in fields relating to behavior and health, may therefore also have a positive impact on educational outcomes. In an effort to raise the self-efficacy and outcome expectancy of science teachers, it offers to adopt an inquiry-based learning approach such as providing positive science experiences. Science teaching outcome expectancy is described as high. It indicates that the level of self-efficacy of the preservice teachers is much felt by the preservice teachers.

Level of Science Teaching Anxiety among Preservice Teachers

Table 3 showed the level of science teaching anxiety among the preservice teachers in terms of field competence, communication, and classroom management. The overall mean is 2.75, and a verbal description of moderate. This indicates that the level of teaching science anxiety is moderately felt by the preservice teachers. It corroborates the study of the study of Aydin [4], anxiety about science competency, communication, and classroom management are some of the further difficulties connected with teaching anxiety, as are problems with planning and time management. While it may appear to be a typical human feeling, it can lead to failure, poor academic performance, inability to concentrate in class, avoidance of personal interactions and social situations, and

introversion. Among all the indicators for this variable, communication got the highest mean of 3.40 and a description of high. This was followed by classroom management with a mean of 2.43 and has a verbal description of low. And lastly, field competence got a mean of 2.42, described as low. The indicator, communication projected a high descriptive equivalent which indicates that the level of teaching science anxiety is much felt by the preservice teachers. On the other hand, classroom management and field competence possessed a descriptive equivalent of low, which indicates that the level of teaching science anxiety is less felt by the preservice teachers.

The findings are consistent with the study of Jaca and Javines [12], which found that preservice instructors had concerns about speaking to their pupils in English in the classroom. It is crucial that Teacher Education Institutions cultivate teachers who have the requisite English communication skills in addition to the information, skills, attitudes, and values for teaching. as secondary schools use it as their main teaching medium.Furthermore, Önder and Önder, [21] pointed out that anxiety in science and classroom management, anxiety in teaching science also includes classroom management, which appears to be a condition in which teachers are anxious, troubled, and uneasy about managing a positive teaching and learning environment.This condition may be caused by a teacher's personality trait as well as a lack of knowledge about classroom management and field knowledge.

Table 1. *Level of Attitudes Toward Teaching Science among Preservice Teachers*

Indicators	Mean	SD	Descriptive Equivalent
Comfort-Discomfort	3.07	0.67	Moderate
Science as a Basic Need	1.85	0.74	High
Time Required to Teach Science	3.53	0.74	Low
Handling of Science Equipment	2.04	0.84	High
Overall	**2.62**	**0.53**	**Moderate**

Table 2. *Level of Self-efficacy among Preservice Teachers*

Indicators	Mean	SD	Descriptive Equivalent
Personal Science Teaching Efficacy	2.23	0.53	High
Science Teaching Outcome Expectancy	2.24	0.79	High
Overall	**2.23**	**0.63**	**High**

Table 3. *Level of Level of Science Teaching Anxiety among Preservice Teachers*

Indicators	Mean	SD	Descriptive Equivalent
Field Competence	2.42	0.52	Low
Communication	3.40	0.44	High
Classroom Management	2.43	0.46	Low
Overall	**2.75**	**0.29**	**Moderate**

Table 4. *Significance on the Relationship between Attitude toward Teaching Science, and Self-Efficacy to Science Teaching Anxiety*

Independent Variable	Dependent Variable	r-value	r-squared	p-value	Decision $\alpha = 0.05$
Attitude toward Teaching Science	Teaching Anxiety	0.366*	0.1340	0.000	Ho is rejected
Self-Efficacy		0.318*	0.1011	0.000	Ho is rejected

*p<0.05

Table 5. *Regression Analysis on Attitude toward Teaching Science and Self-Efficacy as Predictors of Science Teaching Anxiety*

Independent Variable	Unstandardized coefficients		Standardized Coefficients Beta	t-value	P-value	Decision
	B	Std. Error				
(Constant)	2.160	0.089		26.042	0.000	
Attitude toward Teaching Science	0.154	0.044	0.278*	3.502	0.000	Ho is rejected
Self-efficacy	0.060	0.037	0.130	0.632	0.104	Ho is not rejected
Dependent Variable: Teaching Anxiety *p<0.05 R=0.378 R^2=0.143 F=20.999 p-value=0.000						

It was claimed by Buatip, Chaivisuthangkura, and Khumwong, [6] that it is widely acknowledged that pre-service teachers lack significant teaching experience, thus they should receive thorough training on the teacher professional experience or a teaching practicum. An expert with greater classroom management experience should mentor pre-service teachers during this program to assist them understand how to develop lesson plans, manage a classroom, and get along with other instructors.

Significance on the Relationship between Attitude toward Teaching Science and Self-Efficacy to Teaching Science Anxiety among Preservice Teachers

Presented in table 4 the significance on the relationship attitude toward teaching science and self-efficacy to science teaching anxiety among preservice teachers. It can be noticed in chapter 2 that the hypotheses of the study were tested with a 0.05 level of significance. Using the Pearson-r correlation, the relationship of the independent variables and dependent variables was tested. In order to identify the relationship, the p-value found in the table must be compared to 0.05 level of significance.

Table 4 presents the significant relationship between the level of attitude toward teaching science and self-efficacy to science teaching anxiety. The r-value of attitude toward teaching science is 0.366, with a p-value of 0.000, which shows a weak negative correlation. Meanwhile, the r-value of self-efficacy is 0.318 with a p-value of 0.000, which also shows a weak negative correlation.

Since the table shows that the independent variables: attitude toward teaching science and self-efficacy have the probability level of 0.000, which is obviously less than the level of significance at 0.05, the null hypothesis which stated that "there is no significant relationship between attitudes toward teaching science and self-efficacy to science teaching anxiety" is rejected. The correlation shows that the two independent variables have negative association toward science teaching anxiety among preservice teachers.

This is supported by the result of the study of Novak and, Wisdom, [20] that pre-service science teachers' self-efficacy in teaching science was positively correlated with attitude toward scientific education and negatively correlated with teaching anxiety. Additionally, it was discovered that pre-service science teachers' locus of control was negatively correlated with anxiety in the classroom and positively correlated with attitude for teaching science. Finally, science teaching anxiety was negatively impacted by pre-service science teachers' attitudes regarding science teaching. In order to emphasize the impact of instructors' attitudes and efforts on student achievement, the results highlight the significance of providing positive role models and increasing teaching practice in pre-service science teacher education

Regression Analysis on Attitude toward Teaching Science and Self-Efficacy as Predictors of Science Teaching Anxiety

Presented in table 5 is the regression analysis on attitude toward teaching science and self-efficacy as predictors of science teaching anxiety. The table shows the F-ratio of 20.999 and p-value of 0.000 when taken in general, which means that the two independent variables are evidently less than the 0.05 level of significance. The two independent variables: attitude toward teaching science and self-efficacy can significantly predict science teaching anxiety when taken as a whole. This allows the researcher to reject the null hypothesis, which

states that "attitudes toward teaching science and self-efficacy do not significantly predict science teaching anxiety in preservice teachers." Thus, attitudes toward teaching science and self-efficacy predicts science teaching anxiety among the pre-service teachers.

Meanwhile, since this study aimed to determine which among attitudes toward teaching science and self-efficacy significantly predict the science teaching anxiety among preservice teachers, linear regression is necessary to arrive at a satisfactory conclusion based solely on the standardized coefficient (B) presented in the table. The Attitude toward Teaching Science has a beta of 0.278 with a p-value of 0.000, which means that the researcher will reject the null hypothesis which states that "attitudes toward teaching science do not significantly predict science teaching anxiety in preservice teachers. It means that the first independent variable Attitude toward Teaching Science significantly predicts science teaching anxiety.

On the other hand, the independent variable, self-efficacy has a beta of 0.010 with a p-value of 0.903, which is evidently greater than the level of significance of 0.05. It allows the researcher to accept the null hypothesis "self-efficacy do not significantly predict science teaching anxiety in preservice teachers." It means that the variable self-efficacy does not significantly predict science teaching anxiety among preservice teachers. In other words, when taken as a whole, attitudes toward teaching science and self-efficacy predicts science teaching anxiety among preservice teachers. However, among the two variables, only attitudes toward teaching science significantly predicts science teaching anxiety among preservice teachers.

The R-value of 0.378 indicates a favorable association between attitude toward teaching science and self-efficacy as predictors of science teaching anxiety among pre-service teachers. The overall R2 (0.143) indicates that 14% of the variability in the level of teaching anxiety can be attributed to the changes in level in attitude towards teaching science and level in self-efficacy. The remaining percentage is accountable to other variables not included in the study.

IV. CONCLUSION AND RECOMMENDATION

Referring back to the results of the research objectives, the researcher concluded that the level of attitude towards teaching science among pre-service teachers was moderate. Among the four indicators, time required to prepare and teach science got the highest mean of 3.53, described as low, followed by the comfort-discomfort, which posted a mean of 3.07, described as moderate, then handling science equipment 2.04, described as high and finally science as a basic need, which attained a mean of 1.85 with a verbal description of high.

The level of self-efficacy was recorded high. Among the two indicators, science teaching outcome expectancy got the highest mean of 2.24, and a verbal description of high. On the other hand, the indicator personal science teaching efficacy got the mean score of 2.23 yet still described as high.

Meanwhile, the level of teaching science anxiety among preservice teachers was moderate. Among all the indicators for this variable, communication got the highest mean of 3.40 and a description of high. This was followed by classroom management with a mean of 2.43 and has a verbal description of low. And lastly, field competence got a mean of 2.42, described as low.

For the significant relationship between variables, both attitude toward teaching science and self-efficacy have significant relationship to science teaching anxiety. Moreover, attitude towards teaching science among pre-service teachers was found to be a predictor to science teaching anxiety. When taken as a whole, attitudes toward teaching science and self-efficacy predicts science teaching anxiety among preservice teachers. However, among the two variables, only attitudes toward teaching science significantly predicts science teaching anxiety among preservice teachers.

Recommendation

Upon thorough analysis of the study's findings and conclusions, the researcher made several recommendations as to how the science teaching anxiety of the preservice teachers diminish from moderate to low.

First, conduct a Pedagogical Competency Training Program. This could be done through establishing student organization among the teacher education department which aims to provide intensive training to education students until they become preservice teachers. Since the findings revealed that attitudes toward teaching science in terms of time required to prepare and to teach science was less observed by preservice teachers, this proposed program will enhance their pedagogical competencies - advance their skills in crafting instructional materials, lesson planning, and conduct of demonstration. Through this, the preservice teachers can have a wide outlook on how to approach and teach science positively.

Additionally, the institution should also craft an Institutionalized Practice Teaching Manual for Blended Learning or design guidelines for the conduct of face-to-face, synchronous, and asynchronous classes for preservice teachers. Considering the current situation of blended learning modality in which the preservice teachers can neither choose when to attend to face-to-face or virtual classes, it would be beneficial for them to have a clear flow or list of tasks that they need to accomplish in face-to-face, synchronous, or asynchronous class within a day, week, and month. This will help them manage their time and tasks effectively, which will potentially increase their positive attitude in the preparation of teaching science.

Lastly, the institution should conduct personal and professional development program. This could be done through constantly conducting seminars and workshops which aim to promote the personal and professional development of the preservice teachers, which, aside from pedagogical skills, should also be focused. To mention, as resulted in this study, anxiety in communication has found to be the highest indicator of science teaching anxiety, therefore this must be the first priority to be diminished.

REFERENCES

[1] Akinsola, M.K., (2014). "Assessing Pre-Service Teachers Teaching Anxiety." American Journal of Educational Research, vol. 2, no. 12A (2014): 41-44. doi: 10.12691/education-2-12A-7.

[2] Alanazi, M. H. (2019). A Study of the Pre-Service Trainee Teachers Problems in Designing Lesson Plans. Arab World English Journal, 10 (1) 166 - 182. DOI: https://dx.doi.org/10.24093/awej/vol10no1.15

[3] Ateş, Z. (2019). Preservice Teachers' Views of Nature of Science and Their Metaphoric Perceptions of Science and Scientists. International Online Journal of Educational Sciences, 11(4), 141–159. https://doi.org/10.15345/iojes.2019.04.011

[4] Aydın, S. (2021). A systematic review of research on teaching anxiety. International Online Journal of Education and Teaching (IOJET), 8(2). 730-761.

[5] Bolkan (2017) Preschool Teachers Are Uncomfortable with Science, Teach It Rarely. The Journal. https://thejournal.com/articles/2017/09/28/research-preschool-teachers-are-uncomfortable-with-science-teach-it-rarely.aspx?s=the_bc_111017

[6] Buatip, S., Chaivisuthangkura, P., & Khumwong, P. (2019). Enhancing Science Teaching Competency among Pre-Service Science Teachers through Blended-Mentoring Process. International Journal of Instruction, 12(3), 289-306.https://files.eric.ed.gov/fulltext/EJ1220208.pdf

[7] Bandura, A. (1988) Self-efficacy conception of anxiety, Anxiety Research, 1:2, 77-98, DOI: 10.1080/10615808808248222

[8] Bursal, M., Paznokas, L. (2010). Mathematics Anxiety and Preservice Elementary Teachers' Confidence to Teach Mathematics and Science. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1949-8594.2006.tb18073.x

[9] Cipriano, C,. Bracket, M. (2020): Teacher are anxious and overwhelmed, They need SEL more than ever. Social Emotional Learning. EdSurge.

[10] Erdogan, S. C. (2017). Science Teaching Attitudes and Scientific Attitudes of Pre-Service Teachers of Gifted Students. Journal of Education and Practice, 8(6), 164-170. Retrieved from https://eric.ed.gov/?id=EJ1133039

[11] Fishbein, M. (2008). Theory of reasoned action. Retrieved from https://doi.org/10.1002/9781405186407.wbiecr017

[12] Jaca, C., Javines, F. (2020). Oral Communication Needs of Pre-Service Teachers in Practice Teaching. Randwick International of Education and Linguistics Science (RIELS) Journal. DOI: https://doi.org/10.47175/rielsj.v1i1.31

[13] Kahraman, M., Polat D. (2017). "Anxiety scale for science teachers' laboratory work and teaching: Validity and reliability analyses". Uludağ Üniversitesi Eğitim Fakültesi, 30(2), 757-780.

[14] Leedy, P. D., & Ormrod, J. E. (2010). Practical research: Planning and design (9th ed.). Upper Saddle River, NJ: Prentice Hall. https://pce-fet.com/common/library/books/51/2590_%5BPaul_D._Leedy,_Jeanne_Ellis_Ormrod%5D_Practical_Res(b-ok.org).pdf

[15] Liu, M., Wu, B. (2021). Teaching Anxiety and Foreign Language Anxiety Among Chinese College English Teachers. Retrieved from https://journals.sagepub.com/doi/full/10.1177/21582440211016556

[16] Morsy, S. (2018). Understanding Self-Efficacy, Science Classroom Teaching and Learning Experiences and High school Science Achievement in Egypt and the United States. Retrieved from https://eric.ed.gov/?id=ED590188

[17] Mosaddaq, Y.B. (2016). A study of sources of EFL student teachers' anxiety during their practicum experience. European Journal of Research and Reflection in Educational Sciences, 4(1): 16-25.

[18] Moslemi, N., Mousavi, A., (2018). A Psychometric Re-Examination of the Science Teaching Efficacy

and Beliefs Instrument (STEBI) in a Canadian Context. Educ. Sci. 2019, 9, 17. Retrieved from https://tinyurl.com/3fvuppkn

[19] Nieswandt, M. (2005). Attitudes toward science: a review of the field. Retrieved from http://www.cios.org/encyclopedia/persuasion/Gtheory_1reasoned.htm

[20] Novak, E., & Wisdom, S. (2018). Effects of 3D Printing Project-based Learning on Preservice Elementary Teachers' Science Attitudes, Science Content Knowledge, and Anxiety About Teaching Science. Journal of Science Education and Technology, 27(5), 412–432. https://doi.org/10.1007/s10956-018-9733-5

[21] Önder, E. & Önder Öz, Y. (2018). Variables that predict classroom management anxiety and classroom management anxieties level of pre-service teachers. https://www.pegegog.net/index.php/pegegog/article/view/pegegog.2018.025

[22] Peker, M., Erol, R., & Gultekin, M. (2018). Investigation of the teacher self-efficacy beliefs of math teachers. MOJES: Malaysian Online

[23] Putri, D. H., Risdianto, E., & Sutarno, S. (2017). Pre-service physics teachers' perception toward hands-on lab activity and 21st century skills. In Journal of Physics: Conference Series (Vol. 895, No. 1, p. 012015). IOP Publishing.

[24] Önder, E. & Önder Öz, Y. (2018). Variables that predict classroom management anxiety and classroom management anxieties level of pre-service teachers. https://www.pegegog.net/index.php/pegegog/article/view/pegegog.2018.025

[25] Peker, M., Erol, R., & Gultekin, M. (2018). Investigation of the teacher self-efficacy beliefs of math teachers. MOJES: Malaysian Online Journal of Educational Sciences, 6(4), 1-11.

[26] Sharp, S. R., Rutherford II, G. L., & Echols, K. I. (2022). Creative Science Through Inquiry: Improving Teacher Self-Efficacy and Outcome Expectancy Through Adaptable, Mystery-Based Professional Development. International Journal of Innovation in Science and Mathematics Education, 30(1). https://doi.org/10.30722/ijisme.30.01.005

[27] Sykes, A. (1993). An Introduction to Regression Analysis. Coase-Sandor Institute for Law & Economics Working Paper No. 2. Retrieved from https://chicagounbound.uchicago.edu/law_and_economics/51/

[28] Taherdoost, H. (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. International Journal of Academic Research in Management (IJARM). Retrieved from https://hal.archives-ouvertes.fr/hal-02546799/document

[29] Ulla, M.B. (2016). Pre-service teacher training programs in the Philippines: The student-teachers practicum teaching experience. EFL Journal, 1(3): 235-250.

[30] Yürük, N. (2011). The predictors of pre-service elementary teachers' anxiety about teaching science. Retrieved from http://www.scientiasocialis.lt/jbse/files/pdf/vol10/17