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"The Relationship Between the Understanding of the Nature of Physics, Achievement Motivation toward Students' Preferences of Physics among Teachers in Oman"

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ABSTRACT:

This study aimed to elucidate the relationship between the understanding of the Nature of Physics (NOP) and Achievement Motivation (AM) in relation to students' Preferences for Physics (SPP) among teachers in Oman. Additionally, the study aimed to investigate whether Am mediates the relationships between the independent variables. The sample of this study consisted of (523) male and female science teachers from all governorates of Oman. The study followed a quantitative method design and was analyzed using Structural Equation Modeling (SEM). The findings indicated significant positive relationships among NOP, Am, and SPP. The results demonstrated that NOP significantly influenced SPP among teachers. Furthermore, Am was found to mediate the relationships between NOP and SPP. Gender and specialization of respondents significantly moderated the relationship between NOP, while teaching experience did not have a significant moderating effect. Conversely, teaching experience significantly moderated the relationship SPP, whereas gender and specialization did not. The relationship between NOP and Am in relation to SPP among teachers particularly in Oman was successful and provided significant and valuable contributions to theoretical, methodological, and educational practices in physics education.

Keywords: Nature of Physics (NOP), Students Preference of Physics (SPP), Achievement motivation (Am), Gender; specialization, science teachers.

1. Introduction

In the modern century, the world has witnessed a wide revolution in the evolution of physical science through its theories and applications to meet the requirements of human life and the human's need to describe, interpret and control natural phenomena and to invest those processes in achieving his needs, meeting the challenges, and making progress in different sectors.

Education is essential to all people and societies, and it defined as the process by which the aspects of the human personality are developed in all its aspects, whether cognitive, emotional, or psychological. When crises emerge in a society, many calls and movements call for the need for reform and renewal for community institutions and activities to move in new directions

in response to those crises. The educational system in the world has recognized the importance of the role of the teacher in the educational process. They are keen to provide all the necessary resources for preparing him, including educational and professional qualifications, as well as pre-service and in-service training, regardless of the state of the schools. Although all these elements are essential, they remain of limited utility if there is a lack of efficient teachers. Therefore, it is necessary to pay attention to the conditions of the teacher and his training and qualifications (Hussein, 2014).

The effectiveness of education lies not in the teacher's personal knowledge, but in how this knowledge is used in class. This was demonstrated in a comparative study of the teachers of the United States and China conducted by Ma (1999) on teachers' understanding of the fundamentals of mathematics in China and the United States in order to investigate the causes of decline US students while Chinese students have passed the Trends in International Mathematics and Science Study (TIMSS) exam for several years. The results of the study indicate that the reason for this decline is related to the understanding of teachers, noting that the understanding of teachers in the United States was superficial compared to the Chinese teachers were more understanding of the mathematics and teaching methods. This is despite the knowledge of teachers in the United States was higher than the knowledge possessed by Chinese teachers. It also showed that each teacher, whether a beginner or experienced, has a degree of this knowledge and affects the amount and type of knowledge the teacher possesses in everything he teaches, how he teaches him, and how effectively he communicates with his students (Mohlouoa et al., 2012).

Generally, many countries, such as the European Union, China, Japan, Malaysia and Thailand, have adopted a new concept in their educational system: "lifelong learning for the teacher". So, in order to make the teachers professional and knowledge-based they must engage in continuously developing professional practice (Siyam, 2014; Al-Khubati, 2003). In view of the Omani Economy 2020 vision, the Sultanate has been keen on developing advanced Omani human resources with capabilities and skills in line with technological development and management of change in all fields, especially the field of education (Ambosaidi & Al-Shuaili, 2010; Issan, & Atari, & Alani, 2007). It may be noted that confirmed by the ' vision of Oman 2040

' in continuing to focus on the educational system as a whole, starting with the teacher and paying particular attention of the teaching of science (Future Foresight Forum, 2017). Moreover, the Ministry of Education in Oman has focused on scientific subjects, developing them and keeping them in line with the modern orientations in science education.

In the same topic of the nature of physics, the American Association of Physics Teachers (AAPT, 2002), published the basic lines of physics programs in the secondary stage based on the standards of science teaching, pointing out that the physics teacher must possess a strong physics knowledge in the topics of physics. In 2015, the PRAXIS group published standardized tests of the physics skills, concepts, and knowledge that a physics teacher needs to teach physics. The most important topics are mechanics, electricity and magnetism and their applications, light and sound waves, thermal energy and thermodynamics, modern physics, knowledge of scientific inquiry and methods of research (Educational Testing Services ETS, 2015).

To have excellent students in physics, teachers must know about the nature of physics. Physics education is a basic science that contains many abstract concepts, which are difficult for students to fully understand as these concepts mean. Physics is based on the study of behaviour and relations between a wide range of physics concepts and phenomena. By learning physics, students acquire these concepts and attitudes toward physics (Slaughter, Bates, & Galloway, 2012; Bajpai, 2012). Many educators pointed out that one of the most important reasons for students' reluctance to study physics, have no interest and to avoid studying it is the lack of using modern and varied teaching methods (Keller; Neumann, & Fischer, 2017). Generally, teaching of physics is no less than being filled with students' theoretical knowledge through memorization. For that, most of teachers and curriculum developers have sought to find new ways to help students understand difficult concepts (Almazidi, 2017; Abdul Hamid, 2015; Cohen, 2013; Droui, 2012; Abasa, 2012; Drake, 2009; Za'ani, 2007). Basically, with given the reality of physics teaching and the disparity between science teachers in general and physics teachers in particular, it is not necessary for a teacher to has a great deal of intelligence or excellence to be successful in teaching and his ability to communicate information to students and communicate effectively with them in academic intelligence and excellence

(Za'ani, 2007; Reif, 1995). In contrast, they enjoy the admiration of their students and their satisfaction and passion for their participation and good behaviour in critical situations and social relations with their colleagues and students alike. This discrepancy can be attributed to the understanding of the nature of physics and mastery of scientific subject, and diversity in teaching methods (Mohammed, 2013; Mistades, 2008).

As confirmed by some educational research that, when physics is made inaccessible to school students, almost always through information overload, they tend to resort to memorization to pass examinations and this, in itself, seems to generate negative attitudes towards physics" (Mbajiorgu, & Reid, 2006).

2. Problem statement and research questions

Physics is a core subject of STEM-related fields and a core requirement for future life (Kennedy, & Odell, 2014). Generally, several factors make us interested in teaching physics, such as the fact that physics plays an essential role in most scientific and practical fields. Moreover, it is one of the core areas in technical development and other theoretical sciences such as chemistry, geology, mathematics, astronomy, biology, and applied science, including medicine, engineering, and agriculture. In fact, almost everything around us can be described accurately by the laws of physics.

Generally, promoting scientific knowledge among students is one of the main goals of science education, as referred to by the National Research Council NRC (1996). Therefore, teachers of science must have some ideas and directions that may help them influence their student's acceptance and interest in studying science subjects, especially physics (Salih, Mai, & Shibli, 2016; Vilaythong, 2011). From an education perspective, the teacher is considered a person who is educationally qualified if he understands his specialization. For instance, to understand the nature of physics (NOP), a physics teacher should have the ability to teach and impart knowledge with all competence. In addition, they must have excellent communication skills and efficiently exercise their educational jobs and scientific roles. Physics teachers have to be capable of self-skills in communication and exercise their educational jobs and scientific roles with all efficiency. Moreover, teachers

are also responsible for the effort to know the educational requirements, provide scientific knowledge, and reach the way that makes their teaching practices successful in serving educational goals (Zayton, 2013).

Some studies dealt with the nature of science for science teachers during the service, such as the study of Al-Tamimi, & Rawaqa (2017), which aimed to study the nature of science among the teachers of the science of the upper stage and its relation to the level of understanding of controversial scientific issues in Jordan. The results showed that the level of understanding of the nature of science among teachers was average. Similar results were found in the study of Janabi (2016), which aimed to know the level of understanding of the nature of physics among physics teachers in Iraq and similar study by Mohammed (2013) was done in Palestine. Moreover, the study of Alswelmyeen & Al Olimmat (2013), sought to reveal the level of understanding of physics teachers of the nature of science in Jordan. Al-Shuaili (2008), aims to detect the level of understanding of chemistry teachers of the nature of science in the Sultanate of Oman and the results indicated that the level of understanding of science teachers of the nature of science is not at an acceptable level. Furthermore, Al-Hajri (2006) aims to determine the level of understanding of the nature of science for the teacher of science in fifth to 10th grade in basic education along with its relation to their practices in the classrooms. The result showed the performance of science teachers was significantly lower than the accepted rate of 80%.

In the Sultanate of Oman, the results of many local and international evaluation studies of the reality of science education revealed the existence of some problems threatening the achievement of objectives. The most important of the results is the reluctance of students to study physics to a greater degree than their reluctance to study other branches of science (Ministry of Education, 2008). In the same context, the results of Trends in International Mathematics and Science Study TIMSS in the academic years 2011 and 2015 indicate the existence of a lack of understanding of physics among students, as indicated by the report TIMSS, 2015 (Ministry of Education, 2015). Students in Oman were ranked 41st in the academic year 2011 and ranked 37th in 2015 out of 48 countries participating in the international study (Al-Shabiba, 2016). Altogether, the report of TIMSS, 2011 and 2015 explained that the reason for the low achievement in science is the weakness of students'

skills in physics knowledge and in understanding the physics concepts and nature of physics and their attitudes towards physics (Almazidi, 2017). On the other hand, the results of the seventh session of the International Study TIMSS 2019 indicate that students of the Sultanate of Oman were able to achieve the international average (500 points) and higher in science. However, the performance of the students of the Sultanate of Oman increased slightly compared to the results of the sixth session of TIMSS 2015. Overall, the proportion of students below the low level fell from 55% in 2011 to 39% in 2015 and then 37% in 2019 (Ministry of Education, 2021).

In light of that, there is a need to elucidate the relationship between the understanding of the Nature of Physics (NOP) and Achievement Motivation (AM) in relation to students' Preferences for Physics (SPP) among teachers in Oman. Therefore, this study aimed to answer the following questions:

- Question 1- Is there a significant relationship between the understanding of the nature of physics and the students' preference of physics?
- Question 2- Does achievement motivation mediate the relationship between the understanding of the nature of physics and students' preference of physics?
- Question 3- Do gender and specialization moderate the relationship between the understanding of the nature of physics and students' preference of physics?

3. Study hypotheses

The hypotheses were formulated as follows:

Hypothesis 1- The understanding of the nature of physics has a significant effect on the students' preference of physics.

Hypothesis 2- Achievement motivation mediates the relationship between the understanding of the nature of physics and students' preference of physics.

Hypothesis3- Gender moderates the relationship between the understanding of nature of physics and students' preference of physics.

Hypothesis4- Specialization moderates the relationship between the understanding of nature of physics and students' preference of physics.

3.1. Definition of terms

The following terms were commonly used in this study:

- Nature of Physics (NOP): The essence of physics includes the objectives and characteristics of physics, science processes and ethics, and interaction with physics, technology, and the community (Mohammed, 2015). It will be expressed by the degree the science teacher obtains in physics specialization by answering a questionnaire. The Dimensions used by Al Janabi (2016) and Mohammed (2015) in their studies will be adapted for this study.
- Students' Preference of Physics (SPP): A set of responses of the individual emotionally accepting or refusing physics and its applications to life (Almazidi, 2017). The statements in the questionnaire adapted from several studies, such as Almazidi (2017) and Ibrahim & Saleh (2011) in their studies will be adapted to the purposes of this study.
- Achievement motivation (Am): the extent to which an individual is prepared to achieve his personal and cognitive goals to accomplish the work assigned to him in his field of specialization (Al-Dafry, 2021). And Al-Adwan and Al-Rababaah (2018) defined achievement motivation as: Strive for success and accomplish tasks at a high level and efficiency.
- Specialization: The main specialization of a science teacher (physics, chemistry, and biology) (Mebley, 2010).

3.2. Study objectives

The general objective of this study is to identify the significance of the nature of physics (NOP), Achievement motivation and Students' preference of physics from the view of the science teachers. Additionally, this study intends to study the moderating effects of possible variables on the construction, which may develop teachers' views of students' Preference of Physics.

4. Research methodology

The study was meticulously designed and executed, following a quantitative method and employing Structural Equation Modeling (SEM) for analysis. Quantitative approaches, which utilize statistical techniques, are commonly used to test or validate theories, identify study variables, and establish relationships between variables in questions or hypotheses. The study also provided a robust instrument for the pre-test and pilot tests, ensuring the thoroughness of the research methodology.

4.1. Sample of the study

Table 1 shows the study sample based on the gender variable in each governorate.

Table 1. Sample of the study.

t	Governorate	Gender		Total
		Male	Female	
1	Muscat	44	46	332
2	Al-Batinah North	40	31	349
3	Al-Batinah South	47	22	227
4	Al-Dakhlya	31	21	291
5	Al-Sharqiah South	23	34	156
6	Al-Sharqiah North	20	24	157
7	Al- Buraimi	11	17	49
8	Al-Dhahirah	22	24	147
9	Dhofar	16	10	234
10	Al-Wusta	12	9	41
11	Musandam	9	10	30
	Total	275	248	523

5. Theoretical Framework

Based on one of the essential aims of physics teaching is to provide the learner's knowledge and scientific culture and link him to the world in which he lives and to the realities of its environment, and his daily life and interests for feel the value of what he learns that leads to increases his motivation and its tendencies, scientific trends and preferences grow. In this context, the Federal Commission responsible for the Development of Science Education in the United States of America has considered that one of the essential aims of teaching science is the preparation of a scientifically educated citizen (Ghassan, 2020).

5.1. The relationship between the nature of understanding physics and teaching strategies

Understanding the nature of science is crucial in instructing teachers to choose and implement different teaching strategies and methods in classrooms. Many pedagogical studies and research, such as Mohammed, 2013, Phan, 2006, Lising, and Elby 2004, emphasize that the more physics teachers understand the nature of physics, the keener they are to employ diverse teaching strategies and methods. In general, education specialists confirm that each branch of knowledge has a nature that distinguishes it from other branches. As physics is a branch of science, it has teaching methods that distinguish it from others. The nature of teaching physics differs from teaching other subjects, as there are several abstract, intangible natural concepts (Alwani & Mehdi, 2018). These concepts have created two main things in teaching physics: difficulty in teaching physics and educational attempts to seek new teaching methods that help clarify physical concepts.

Pedagogically, many teachers and physicists have conducted studies and research to identify the difficulties that physics teaching faces to overcome. As mentioned in the study conducted by Al-Kalbani and Al-Adili (2020), aims to reveal the reasons why 10th graders are reluctant to choose physics in the Sultanate of Oman from the point of view of science teachers specializing in physics in post-basic schools. The study sample consisted of 83 teachers, who were selected in a randomly stratified manner. The study used the survey's descriptive methodology for data collection and identification as an instrument for the study. The results of the study showed that the reasons associated with students themselves were the most influential factor in students' reluctance to choose physics from the point of view of physics teachers, followed by those associated with physics subjects in science. The results also revealed statistically significant differences at the level of significance (α= 0.05), the causes associated with physics subjects in science for female favor.

5.2. The relationship between preference and physics teaching

Previous studies in pedagogical literature have indicated that there are preferences for individuals in regulating excitement, making preference synonymous with cognitive style (Ottom, 2004). In general, everyone has a cognitive preference for everyday information and attitudes, and their understanding of the sensory thrills they deal with reflects their way of thinking

and their emotional and social motivations. The results of some studies in the field of physics education, such as Ghassan, 2020; Almazidi, 2017; and Afifi et al., 2015 pointed out that there is an apparent deficiency in the implementation of some modern strategies based on individual or collective practical experimentation aimed at gaining students positive trends towards physics and helping to develop students' physics knowledge. Additionally, the studies noted that the reason for this is the lack of tools and devices to perform experiments experience in practical terms only, and students are required to make conclusions only. Thus, the student needs to acquire the required physics skills. That leads students to lose a proper understanding of the direction of physics, and that perception goes from class to class. In considering modifying and adapting teaching methods and strategies to meet students' needs, educators should reflect on these needs and desires by considering individual differences in general capacities and teaching methods and strategies.

6. Research instruments

The questionnaire was the main instrument used to achieve the study's objectives. The researcher developed and designed the questionnaire based on the study's questions and objectives, taking advantage of the theoretical framework and previous studies relevant to the study's topic, which were studied and reviewed comprehensively to support the instrument. The study instrument consists of two parts. The first section (Demographic background) included general information on sample individuals according to study variables related to the demographic background of the participants, such as (gender, governorate, and specialization). The second section included 50 items that clarify the relationship between understanding the nature of physics, Achievement motivation and students' preference of physics.

6. Results and discussion

6.1. Statistical processing

This study analyzed statistical data using Structural Equation Modeling (SEM). Statistically, SEM can simultaneously examine the relationship between a set of constructs represented by several variables while accounting for measurement

error. SEM has two methods: (1) covariance-based SEM and (2) Partial least square SEM. In addition, a structural equation model (SEM) was developed, and the maximum likelihood estimation of path analysis was applied to investigate whether it is a significant determinant of the NOP and SPP. In SEM, the Model fit should be examined using multiple fit indices (Collier, 2020; Kabakci, 2018; Arbuckle, 2009; Blunch, 2008).

6.2. Invariance Tests

Since this study focuses on moderating the structural model with two (Gender, Specialization) categorical variables, Configural, Metric, and Scalar invariance tests were conducted. Kline (2015) argued that multi-group confirmatory factor analysis (MGCFA) is one of the most popular strategies for examining measurement invariance. Therefore, CFA evaluates whether the hypothesized measurement model fits the data well. Moreover, the MGCFA could precisely compare the measurement model across groups. The three typical phases of measurement invariance testing are as follows. (Kline, 2011; Vandenberg, Lance, & Lance, 2000). The results of the invariance tests for each group are presented in Tables 2 and Table 3.

6.3. Tests of Measurement Invariance Across Gender Groups

Table 2

Results of measurement invariance test across Gender groups

Model	χ2	df	CFI	RMSEA	Model compassion	Δχ2	Δdf	p
Model 1: Configural invariance	3415.925	2278	0.953	0.031	---	---	---	---
Model 2: Metric invariance	3481.197	2328	0.953	0.031	M 1 vs. M 2	65.273	50	0.072
Model 3: Scalar invariance	3541.102	2378	0.952	0.031	M 3 vs. M 2	59.905	50	0.159

Note, N = 523; Male n = 263; Female n = 260.

Table 2 displays the fit indices for the models that tested measurement invariance. In comparing the fit of hypothesized models, chi-square tests and goodness-of-fit indexes (CFI, RMSEA) are used. As shown in Table 2, the initial model assessed configural invariance. The model fit of the Configural invariance had an adequate fit ($\chi 2$ (df) = 3415.925 (2278), CFI 0.953, and RMSEA = 0.031), indicating that the model is configurable invariant. Testing full metric invariance (Model 2) yielded an acceptable fit, the compassion results between Model 1 (Unconstrained) and Model 2 (Metric invariance) show that the chi-square increase is not significant ($\Delta\chi 2$ (df) = 65.273 (50), $p > 0.05$). The full scalar invariant model (Model 3) accepted as the chi-square increase is not significant ($\Delta\chi 2$ (df) = 59.905 (50), $p > 0.05$). Thus, the measurement model meets the criteria for metric invariance across gender as well.

6.4. Tests of Measurement Invariance Across Specialization Groups

Table 3

Results of measurement invariance test across Specialization groups

Model	χ2	df	CFI	RMSEA	Model compassion	Δχ2	Δdf	p
Model 1: Configural invariance	3514.299	2278	0.950	0.032	---	---	---	---
Model 2: Metric invariance	3581.286	2328	0.949	0.032	M 1 vs. M 2	66.987	50	0.055
Model 3: Scalar invariance	3639.927	2378	0.949	0.032	M 3 vs. M 2	58.641	50	0.188

Similar to tests of measurement invariance across Gender groups, the initial model assessed configural invariance. The model fit of the Configural invariance had a good fit ($\chi 2$ (df) = 3514.299 (2278), CFI 0.950, and RMSEA = 0.032), indicating that the model is configurable invariant. Testing full metric invariance (Model 2) indicated an acceptable fit. The results show that the chi-square increase is not significant ($\Delta\chi 2$ (df) = 66.987 (50), $p > 0.05$). The full scalar invariant model (Model 3) accepted as the chi-square increase is not significant ($\Delta\chi 2$ (df) = 58.641 (50), $p > 0.05$). Thus, the measurement model meets the criteria for metric invariance across Specialization groups as well.

7. Conclusions

In this study, the results obtained from the data analysis revealed that significant relationships existed between the Understanding of the Nature of Physics and the students' preference of physics. Mediation effects of achievement motivation were found in the relationships between the Nature of Physics. Meanwhile, based on the quantitative result, the gender and specialization of respondents were found to have a significant moderating effect on the relationship between the Nature of Physics and students' preference of physics. The current study produced the relationship between the understanding of the Nature of Physics (NOP) and Achievement Motivation (AM) in relation to students' Preferences for Physics (SPP) among teachers in Oman, as in Figure 1.

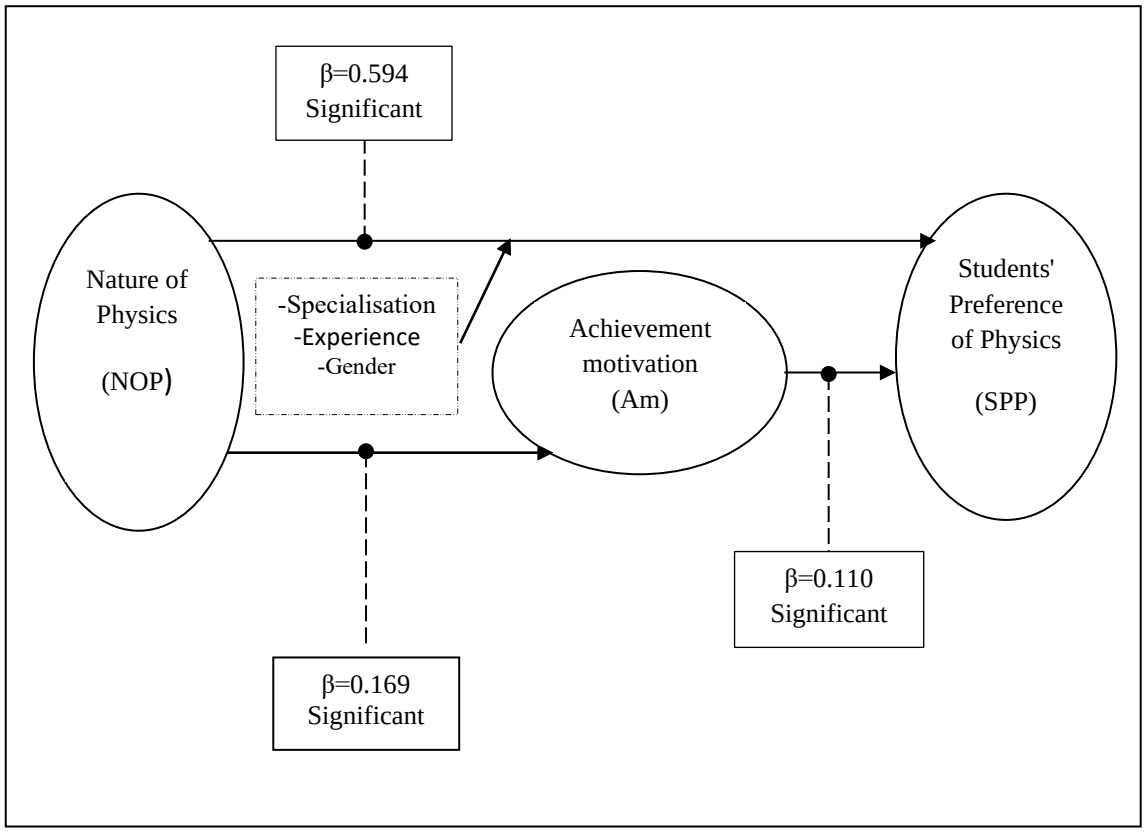

Figure 1. The relationship between the understanding of the nature of physics and students' preference of physics

8. recommendations

In light of the above, the present study recommends also:

i. Training physics teachers before and during the service on the updated nature of physics science to create positive trends for teachers toward students to prefer physics.

ii. It's essential to include subjects related to physics in the specialised university courses in the preparation programs of physics teachers in the faculties of education.

iii. Researchers in the field of natural physics guide the conduct of further research and studies on understanding the nature and effectiveness of physics in teaching physics content to physics students through a research plan prepared for this purpose.

iv. In-service physics teachers' courses must include the nature of physics and modern trends in the teaching of physics content.

v. Train high school physics supervisors in these modern trends in their knowledge and practice so that they have a positive role to play in activating their use by physics teachers in classrooms and evaluating them in the light of their importance in achieving effective learning.

REFERENCES:

Abasa, M. (2012). The Effect of Teaching Physics Using Blended Learning and E-learning in Achievement and Material Orientation among 10th Grade Students in Aqaba Governorate. Unpublished Master Thesis, Mo'tah University, Jordan.

Abdul Hamid, W. (2015). The Effectiveness of a Suggested Unit in Integrated Physics in the Light of Environmental Dimensions in Developing the Trend towards Physics and Environmental Responsibility among First Grade Secondary Students. Journal of Studies in Curriculum and Teaching Methods, 209, 142-166.

Al-Adwan, S., & Al-Rababaah, J. (2018). The Achievement Motivation in Relation to the Attitude towards bachelor's degree of Special Education among Students of Princess Alia University College. Journal of the Psychological Sciences, College of Education, 42(3), 53-86.

Al-Dafry, S. (2021). Investigate work stress and its relationship to job satisfaction and achievement motivation among Life Skills teachers in basic education schools in the Sultanate of Oman. Doctoral dissertation, Universiti Sains Islam, Malaysia.

Al-Janabi, A. (2016). The level of the relationship between understanding the nature of physics and the methods of teaching science among the physics teachers in the preparatory stage. Journal of the College of Basic Education for Educational and Human Sciences, (26), 686-701.

Al-Kalbani, S. M., & Al-Adili, A. (2020). Reluctance Reasons for Grade 10th Students to choose physics from their point of view in Sultanate of Oman, Journal of Educational and Psychological Sciences,4 (42), 89-104.

Al-Khubati, A. (2003). A developmental perspective of self-development of teachers: the model of "lifelong learning for teachers." Available on: www.iformations.gov.as\ebook\book\teachimprove.doc.

Almazidi, N. (2017). The Effect of Teaching Physics using Computerized Scientific Explorations and Experiences in Acquiring Physics Concepts and Developing the Skills of Laboratory Work and Towards Physics. Unpublished PhD thesis, University of Sultan Qaboos, Muscat. Sultanate of Oman.

Ambosaidi, A. & Al-Shuaili, A. (2010). The degree to which the students possessing specialized science teachers at the Sultan Qaboos University for beliefs about the nature of science and its relation to some variables. Journal of the Union of Arab Universities Jordan, (55), 43-72. (2010).

Al-Shuaili, A. (2008). The level of understanding of the chemistry teachers in the Sultanate of Oman of the nature of science in the light of some variables. Journal of Educational and psychological, Egypt, 14(3): 71 – 92.

Al-Tamimi, R., Rawaqa, G. (2018). The Nature of Science at the Upper Elementary Science Teachers and its Relationship with the Level of Understanding of the Controversial Scientific Issues. Studies in Educational Sciences, 44(4), 69-82.

Alwani, M; Mehdi, E. (2018). Difficulties of physics teaching in secondary stage from teachers´ Point of view in AL Anbar Governorate, Iraq. Master's thesis, Middle East University, Amman, Jordan.

Ambosaidi, A, & Al-Hajri, F. (2013). Evaluation of the importance of knowledge of pedagogic content in science from the point of view of a sample of material teachers in the Sultanate of Oman, Educational Sciences Studies Dirasat: Educational Sciences, 162(725), 1-31

Ambusaidi, A. & Al-Shuaili, A. (2009). Science Education Development in the Sultanate of Oman, in Saouma BouJaouda, and Zoubeida Dagher (eds.). The World of Science Education: Arab States Volum3, Rotterdam, Sense Publishers: pp. 205–219.

Arbuckle, J. L. (2009). Amos 18.0 user's reference guide. Chicago, IL: SPSS, Inc.

Bajpai, M. (2012). Effectiveness of Developing Concepts in Photo Electric Effect through Virtual Lab Experiment. International Journal of Engineering and Advanced Technology, 1(6), 296-299.

Blunch, N. (2008). Introduction to structural equation modeling using SPSS and AMOS. Los Angeles: SAGE.

Cohen, E. C. (2013). Employing inquiry-based computer simulations and embedded scientist videos to teach challenging climate change and nature of science concepts. Doctoral dissertation, Rutgers University-Graduate School of Education. New Brunswick, New Jersy.

Collier, J. E. (2020). Applied structural equation modeling using AMOS: Basic to advanced techniques. Routledge.

Drake, C. T. (2009). African American College Student Attitudes Toward Physics and Their Effect on Achievement. Unpublished Doctoral Thesis, The University of Southern Mississippi.

Droui, M. (2012). The impact of a simulation on mobile and collaborative devices on understanding the photoelectric effect at the college level. Un Published Doctoral Thesis, University of Montreal, Canada.

Educational Testing Services (ETS) (2015). The PRAXIS Study Companion, Physics: content knowledge. Retrieved March 27, 2015, from: https://www.ets.org/s/praxis/pdf/5265.pdf.

Future Foresight Forum (2017). Future Vision Forum Report. Sultanate of Oman, 6th-7th Dec,2017, Muscat,oman: http://fffoman.com.

Ghassan A. (2020). The effectiveness of an electronic program based on a strategy (simulation) in the cognitive preference of fourth graders in physics. Journal of the Faculty of Basic Education for Educational and Human Sciences, Meg. 2020, p. 47, p. P.O. 806-833.

Ibrahim, B., & Saleh, J. (2011). The Effect of Teaching Physics Using Authentic Tasks on Acquiring Scientific Concepts among the Basic Ninth Grade Female Students and on their Attitudes toward Physics. An-Najah University Journal for Research (Humanities), 25(7), 1748-1784.

Issan. S. Atari, A. & Alani, A. (2007). Recent trends in education. Amman: Dar Al Masirah for Publishing, Printing and Distribution.

Keller, M., Neumann, K., & Fischer, H. (2017). The Impact of Physics Teachers' Pedagogical Content Knowledge and Motivation on Students' Achievement and Interest. Journal of Research in Science Teaching, 54(5), 586-614.

Ma, L. (1999). Knowing and teaching elementary mathematics: Teachers' understanding of fundamental mathematics in China and the United States. Routledge.

Mbajiorgu, M & Reid, N. (2006). Factors Influencing Curriculum Development in Higher Education Physics. Higher Education Academy Physical Sciences Centre, University of Hull.

Ministry of Education. (2008). Educational Development. Journal of Educational Development, 41, March 2008, Sultanate of Oman.

Ministry of Education. (2015). National Report of the International Study in Mathematics and Science (TIMSS, 2015). International Studies Program, General Directorate of Educational Evaluation, Sultanate of Oman, Science Materials, 27-199.

Ministry of Education. (2021). National Report of the International Study in Mathematics and Science (TIMSS, 2019). International Studies Program, General Directorate of Educational Evaluation, Sultanate of Oman, Science Materials, 1-160.

Mistades, V. M. (2008). High School Physics Teachers. Journal of Research in Science, Computing and Engineering, 3(3), 25-32.

Mohammed, Y. (2013). The Nature of physics and its relation to the teaching methods of physics teachers in secondary schools in Palestine. Al-Aqsa University Journal, 17(2), 177-217.

Mohammed, Y. (2015). The level of understanding of the physics teachers of the nature of physics and its relationship to emotional intelligence in the secondary stage in Palestine. Journal of Education and Psychology, 10(48), 223-251.

Mohlouoa, N. H., Rollnick, M., & Oyoo, S. (2012). Exploring PCK in the Process of Teaching Radioactivity: Strategies Employed by Lesotho Physics Teachers. SAARMSTE COMMITTEES, 414.

Reif, F. (1995). Understanding and teaching important scientific thought processes. Journal of Science Education and Technology, 4(4), 261-282.

Unpublished master's thesis, University of Nizwa, Nizwa, Sultanate of Oman.

Salih, M., Mai, M. Y. M., & Shibli, A. Al. (2016). Students' motivation toward science learning in secondary schools in Oman and Malaysia: A comparative study, Journal of Research, Policy & Practice of Teachers & Teacher Education (JRPPTTE), 6(1), 16-24.

Siyam, M. (2014). Pedagogical Content Knowledge of Eighth Grade Mathematics Teachers in Gaza. Unpublished master thesis in curriculum and teaching methodology, Islamic University in Gaza.

Slaughter, K. A., Bates, S. P & Galloway, R.K. (2012). A longitudinal study of the development of attitudes and beliefs toward physics. Paper presented at the Physics Education Research conference, pp 359- 362, Ann Arbor, Michigan.

Za'ani, R. (2007). The Effectiveness of a Computer Science Unit on the Development of Educational Achievement among Ninth Grade Students in Palestine and their Attitudes toward Computerized Learning. Unpublished Master Thesis, Ain Shams University, Egypt.

Zayton, A. (2013). Methods of Teaching Science, 7th Edition. Dar El Shorouk For Publishing & Distribution, Amman, Jordan, p17.

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"العلاقة بين فهم طبيعة الفيزياء ودافعية الانجاز وتفضيل الطلاب للفيزياء لدى معلمي العلوم بسلطنة عُمان"

إعداد الباحثين:

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الملخص:

هدفت هذه الدراسة إلى دراسة العلاقة بين فهم طبيعة الفيزياء ودافعية الانجاز وتفضيل الطلاب للفيزياء لدى المعلمين بسلطنة عُمان. هدفت الدراسة أيضًا إلى تحديد ما إذا كان دافع الإنجاز يتوسط العلاقة بين المتغيرات المستقلة (فهم طبيعة الفيزياء، وتفضيل الطلاب للفيزياء). تكونت عينة **الد**راسة من 523 معلماً ومعلمة من معلمي العلوم بالمدارس الحكومية في سلطنة عُمان، وقد تم اختيارهم بالطريقة العشوائية الطبقية للإجابة على أسئلة الدراسة من جميع محافظات سلطنة عُمان. استخدمت الدراسة المنهج الكمي لتحقيق أهداف الدراسة، وتم جمع البيانات باستخدام استبانة تناولت متغيرات الدراسة، كما تم تحليل البيانات الكمية التي تم جمعها باستخدام نموذج المعادلة الهيكلية (SEM). توصلت الدراسة إلى عدة نتائج من أهمها وجود علاقات إيجابية مهمة بين فهم طبيعة الفيزياء، ودافعية الانجاز وتفضيل الطلاب للفيزياء. كما أوضحت النتائج أن طبيعة الفيزياء ومعرفة المحتوى التربوي أثرت بشكل كبير على تفضيل الطلاب للفيزياء بين المعلمين. بالإضافة إلى ذلك، أظهرت النتائج أن دافع الإنجاز يتوسط العلاقة بين فهم طبيعة الفيزياء وتفضيل الطلاب للفيزياء. كما أظهرت النتائج أن جنس وتخصص المجيبين له تأثير معتدل كبير على العلاقة بين فهم طبيعة الفيزياء وتفضيل الطلاب للفيزياء. وأشارت نتائج الدراسة إلى أن خبرة التدريس ليس لها تأثير معتدل كبير على العلاقة بين فهم طبيعة الفيزياء وتفضيل الطلاب للفيزياء. واختتمت الدراسة في إيجاد العلاقة بين فهم طبيعة الفيزياء ودافعية الانجاز وتفضيل الطلاب للفيزياء لدى معلمي العلوم في تعليم الفيزياء بنجاح. وتوصلت الدراسة إلى أن العلاقة بين متغيرات الدراسة لها مساهمات كبيرة وقيمة في الممارسة النظرية والمنهجية والتعليمية والمعرفية في مجال تعليم الفيزياء. وأوصت الدراسة بعدة توصيات للدراسات المستقبلية في مجال تعليم الفيزياء.

الكلمات المفتاحية: فهم طبيعة الفيزياء، دافعية الإنجاز، تفضيل الطلاب للفيزياء، معلمي العلوم، تعليم الفيزياء.