SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 8 | August 2022 - Peer Reviewed Journal

EXPLORING THE SCIENTIFIC SKILLS AND LEARNING STYLES OF FUTURE SCIENCE MENTORS: A SPRINGBOARD IN ENGAGING EFFECTIVE SCIENCE TEACHING PEDAGOGY

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ABSTRACT

Fundamental competencies, skills, and styles of learning among students are the basis of planning an effective teaching-learning activity. Since most of the enrollees in the Bachelor of Secondary Education major in Science were graduates of non-Science, Technology, Engineering and Mathematics (STEM) strand, there is a must to address the gap between the student's competencies and skills from their chosen field by identifying their level of scientific skills and learning styles to effectively meet the demand of the mandated competencies in the major courses offered in the aforesaid program. In this study, the level of scientific skills and its components and the learning style of future science mentors were determined together with the correlation between the level of scientific skills and learning style. The research instrument used in this study was the researcher-made questionnaire for scientific skills which was subjected to reliability and validity testing and an adopted survey questionnaire developed by Kolb (1984) for learning style. Thus, it was determined that future science mentors as an entire group possess a "proficient" level of scientific skills and in terms of scientific inquiry and practical skills, both were determined as "proficient" in terms of processing data, it was determined as a "developing" level. Also, the learning style of future science mentors was an "activist" style of learning. A significant relationship was determined between the level of scientific skills and the learning style of future science mentors with a medium positive correlation. This study as well concluded that social constructivism and pragmatism science teaching pedagogies were the best-fit pedagogies among future science mentors in designing their learning landscape which the researchers recommend among science professors to be the reference in formulating effective strategies and learning activities to efficiently and effectively transfer learnings among their students.

KEYWORDS: *Competencies, Experiential Learning, Learning Style, and Scientific Skills*

INTRODUCTION

Attaining intended learning outcomes among students is the most crucial task of teachers, from planning from scratch on what teaching and learning activity would be effective among learners and addressing the individual differences are the most painstaking part of designing a syllabus for the course during the semester.

In the case of the Bachelor of Secondary Education major in Science at Capiz State University – Roxas City Campus, it is observed that most of the enrollees are non-Science, Technology, Engineering, and Mathematics (STEM) strand graduates in their secondary education and obviously it shows that the fundamental competencies and skills required of the Bachelor of Secondary Education major in Science program are perhaps far-off from the demand of the mandated competencies in the major courses offered in the aforesaid program.

As future Science mentors, the respondents are expected to characterize scientific skills which according to Stein et al. (2001), it is the ability to use scientific knowledge to identify questions that can be answered through a scientific process and draw conclusions based on facts. Scientific skills are the basic skills of facilitating learning in science, allowing students to be active, developing a sense of responsibility, increasing the permanence of learning, and providing research methods (Ertuk and Kaptan, 2010). More so, it is the building block of critical thinking and inquiry in science that can be obtained through science instruction and activity (Bagaloyos, 2017) carried out by teachers with sufficient scientific skills to efficiently guide their students to perform science processes effectively (Miles, 2010). However, teaching scientific skills among those future science mentors may not be effective

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enough in utilizing a one-size-fits-all learning strategy. Basically, they may learn in many ways depending on their learning style. Learning style refers to the concept that individuals differ in regard to what mode of instruction or study is most effective for them and it classifies students according to where they fit on a number of scales pertaining to the ways they receive and process information (Pashler et al., 2009).

In order to effectively meet the intended learning outcomes of the major courses and the competencies embedded in the aforementioned program, and to address the mandate of catering graduates of the Kto12 program regardless of what track and strand the student finish, it is a must to build the bridge of connectivity and address the gap in their chosen field by identifying the level of scientific skills and their learning styles.

This study was anchored on the transformative learning theory postulated by Mezirow (1991) that in principle, personal experience is an integral part of the learning process. It suggests that a learner's interpretation of the experience creates meaning, which leads to a change in behavior, mindset, and beliefs. When transformational learning occurs, a learner may undergo a paradigm shift that directly impacts future experiences.

STATE OF THE PROBLEM

Primarily, this study aimed to determine the level of scientific skills and the learning style of future Science mentors.

Specifically, this study sought to answer the questions:

1. What is the level of the scientific skills of future science mentors as an entire group and according to scientific inquiry, processing data, and practical skills?
2. What is the learning style of future science mentors?
3. Is there a significant relationship between the level of scientific skill and the learning style of future science mentors?
4. What science teaching pedagogy can be recommended to improve the scientific skills of future science mentors vis-à-vis their learning style?

HYPOTHESIS

There is no significant relationship between the level of scientific skill and the learning style of future science mentors?

METHODOLOGY

This study used the descriptive correlational research design to determine the scientific skills level and the learning style of future Science mentors of Capiz State University – Roxas City Campus. The respondents of the study were the 84 randomly selected future Science mentors out of 106 who were enrolled in the Bachelor of Secondary Education major in Science program. The sample size was determined using Slovin's formula. Simple random sampling was employed in determining the respondents of the study.

The responses of the future Science mentors among the benchmarks pertaining to scientific skills and learning style were gathered using a researcher-made questionnaire for scientific skills and an adopted questionnaire developed by Kolb (1984) for learning style.

This involves quantitative research focusing on the gathered data for analysis. This was conducted at Capiz State University – Roxas City Campus during the first semester of the academic year 2019 – 2020.

The researcher formulated a 15-item survey questionnaire in determining the scientific skills level of the respondents encompassing the factors of scientific inquiry, processing data, and practical skills. For learning style, this study used an adopted questionnaire developed by Kolb (1984). Content validation and reliability test were employed on the questionnaire for Scientific Skills which was a researcher-made questionnaire. The content validation was done by subjecting the researcher-made questionnaire to scrutiny among five Science Professors and the reliability testing was conducted among 30 randomly picked future Science mentors, it obtained a Cronbach's alpha coefficient of 0.838 which indicates that the research instrument has good reliability.

Mean and standard deviation was used to analyze the responses of the respondents as to their scientific skills level. The scientific skills level was interpreted as Advanced (4.21-5.00), Proficient (3.41-4.20), Developing (2.61-3.40), Emerging (1.81-2.60), and Beginning (1.00-1.80) and as to the learning style of the respondents, rank analysis was employed. Inferentially, Pearson's moment of correlation was used to find out the relationship between variables which was set at 0.05 level of significance.

RESULTS AND DISCUSSIONS

On the Level of Scientific Skills of Future Science Mentors

The gathered data shows that the scientific skills level of the future Science mentors was "proficient". Considering the factors of scientific inquiry, processing data, and practical skills, the result showed that future Science mentors were "proficient" in terms of scientific inquiry and practical skills, and have a "developing" level in processing data. This implies that future science mentors were ready to deal with the science courses offered in the BSEd Science curriculum considering that they have prior knowledge on how to

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conduct experimentation, and ensure safety precautions in dealing with the scientific undertaking, however, it is underscored that they need to improve their skills in making calculations and measurements utilizing apparatuses, and in presenting data. More so, the need for supplementary learning and further reinforcement to attain mastery of scientific skills was evident. The result of this study conforms with the findings of Ngoh (2008) that science process skills form the core of inquiry-based learning wherein to learn to do science is to master the science process skills and apply them in a scientific investigation.

Table 1: Level of Scientific Skills of Future Science Mentors

Scientific Skills	Mean	Verbal Interpretation
Scientific Inquiry	3.96	Proficient
Processing Data	3.21	Developing
Practical Skills	3.66	Proficient
Grand Mean	**3.45**	**Proficient**

On Scientific Inquiry of Future Science Mentors

In terms of Scientific Inquiry, the result reveals that future science mentors were “proficient.” All of the items as well were scored as “proficient,” however, taking into consideration the mean scores, item number 5 entails “writing a simple method that can be followed in experimentation” scored lowest among the five. This implies that future science mentors were able to make use of evidence be it tangible evidence or part of the experience in conceptualizing predictions and inferences by recognizing the order in which sequenced events take place, they can also report events systematically written or verbal. However, the need for a thorough presentation on how to draw methodology should be considered. The result of the study affirms the findings of Ling and Towndrow (2005) which reveals that the acquisition of an effective mastery of scientific skills was through manipulative and procedural instructions to enable students to understand the tasks they are carrying out on their level.

Table 1a: Scientific Inquiry of Future Science Mentors

Scientific Inquiry	Mean	Verbal Interpretation
1. Writing a hypothesis and justifying it using scientific reasoning.	3.98	Proficient
2. Making predictions for an experiment based on the aim and variables.	3.98	Proficient
3. Making and recording accurate observations from a range of experiments.	3.99	Proficient
4. Identifying variables and describing how they can be manipulated to ensure the validity of results.	3.98	Proficient
5. Writing a simple method that can be followed in experimentation.	3.87	Proficient
Grand Mean	**3.96**	**Proficient**

On Processing Data of Future Science Mentors

As to the processing data, the result discloses that future science mentors have a “developing” level that emphasizes item number 1 and 4 revealing that students can identify inconsistent results and were able to draw appropriate results tables for any given method. However, it was also revealed that future science mentors have an “emerging” level underpinning items 2 and 3 that shows future science mentors were challenged in “using the standard form in calculating results” and “calculating simple units using a formula.” The result implies that future science mentors can work with a degree of precision appropriate to the task and be able to compare and comprehend experimental results but were challenged in terms of using appropriate measures and computations. The result of the study was supported by the findings of Rodriguez (2010) who asserted that to make an effective interpretation of concrete results, students’ basic and practical understanding is demanded.

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Table 1b: Processing Data of Future Science Mentors

Processing Data	Mean	Verbal Interpretation
1. Identifying inconsistent results.	4.02	Proficient
2. Using the standard form in calculating results.	2.06	Emerging
3. Calculating simple units using a formula.	2.06	Emerging
4. Drawing an appropriate results table for any given method.	4.02	Proficient
5. Inferring on how the percentage error affects the confidence of a conclusion.	3.87	Proficient
Grand Mean	**3.21**	**Developing**

On Practical Skills of Future Science Mentors

The practical skills of future science mentors were determined as "proficient" highlighting item number 3 disclosing that "collecting and selecting the correct equipment safely and calmly" was very evident, however, item number 4 was an emerging concern since future science mentors professed that "working successfully as a practical pair" was not amenable to them. Thus, the result implies that future science mentor has the competence in handling and manipulating materials with safety and efficiency, they can work with a degree of precision appropriate to the task, and they can as well conceptualize and infer by simply looking into the sequence of events that took place. However, there was a need to develop their sense of fellowship to be able to work with others effectively and efficiently, they should learn to act modestly by respecting one's perception and prohibit themselves from criticizing things unfairly, instead work as a team with dependability and decency so that they could go further progressively. The result of this study affirms the result presented by Martin (2009) revealing that in learning skills, one should undergo a process of continually refining existing knowledge and constructing concepts in intricate organized networks.

Table 1c: Processing Data of Future Science Mentors

Practical Skills	Mean	Verbal Interpretation
1. Demonstrating skillful technique when using basic measuring equipment.	3.98	Proficient
2. Following an experimental method successfully.	4.02	Proficient
3. Collecting and selecting the correct equipment safely and calmly.	4.25	Advanced
4. Working successfully as a practical pair.	2.07	Emerging
5. Performing practical tasks with little teacher guidance in obtaining concordant results.	4.00	Proficient
Grand Mean	**3.66**	**Proficient**

On Learning Style of Future Science Mentors

The learning style of science future mentors revealed that they were "activist" learners and least to be "theorists". Thus, the result implies that these future science mentors perform well on practical tasks but were inattentive to theories because their learning style aligns with the emphasis on new experiences as they focus on the present scenario and doing such activities as games, problem-solving, and simulations. They are into a lot of practical and hands-on work which can lead them to generate novel ideas. More so, they are equipped on responding to challenges and take risks. On the other hand, they can learn, too, through other ways but not as effective as the aforementioned style of learning, and these other ways are by exploring methodologies through logical and rational points of view. Also, they can learn through experimentation but they prefer that material was directed towards the techniques that make their work easier since they practice what they have learned from what they read. The result of this study conforms with the findings of Bhatnagar and Sinha (2018) which discloses that students in today's generation enjoy the here and now and are happy to be dominated by immediate experiences since they are open-minded, but not skeptical, and this tends to make them enthusiastic about anything new.

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Table 2: On Learning Style of Future Science Mentors

Scientific Skills	Mean	Rank
Activist	3.62	1st
Theorist	3.34	4th
Pragmatist	3.43	3rd
Reflector	3.51	2nd

On Correlation of Scientific Skills and Learning Style of Future Science Mentors

The correlation test between the scientific skills and learning style of future science mentors revealed that there was a medium positive correlation and exhibited a significant relationship. The result implies that the scientific skills level was influenced by the instructional strategies that fit the learning style. The result of the study conforms with the findings of Aboe (2018) that there was a positive influence between learning styles and student academic achievement and the same findings were disclosed by Magulod (2019) that there were significant relationships between learning styles, study habits and academic performance of students in applied science courses.

Table 3: On Correlation of Scientific Skills and Learning Style of Future Science Mentors

Variables	Pearson Correlation	Significance (2-tailed)	Remarks
Scientific Skills and Learning Style	0.455**	0.000	Significant

***. Correlation is significant at the 0.01 level (2-tailed).*

On the Science Teaching Pedagogy Recommended in Improving the Scientific Skills of Future Science Mentors vis-à-vis their Learning Style

The Science teaching pedagogies considered out from the aforementioned results of this study were the social constructivism underlining future science mentors' experience, personalization, and relationship and pragmatism underscoring the mastery, valuation, and interaction. These two science teaching pedagogies drive evident learning acquisition and high learning retention that fits their learning styles.

CONCLUSIONS

1. Future science mentors as an entire group possess a "proficient" level of scientific skills. Overpinning its components, their scientific inquiry was determined as "proficient" level, processing data were determined as "developing" level, and practical skills were determined as "proficient" level. Therefore, it was viewed that they were able to deal with the science courses offered under the BSEd Science curriculum for they embody the needed fundamental skills.
2. The learning style of future science mentors was an "activist" style of learning wherein it regards that they can easily acquire learning through experiential learning activities.
3. There was a significant relationship between the level of scientific skills and the learning style of future science mentors with a medium positive correlation.
4. Social constructivism and pragmatism science teaching pedagogies were the best-fit pedagogies among future science mentors in designing their learning landscape to drive evident learning acquisition and high learning retention.

RECOMMENDATIONS

It is recommended that advanced scientific skills enhancement be designed in the teaching of science where learning tasks conform with scientific inquiry, processing data, and practical skills to develop an advanced level of scientific skills among future science mentors. Further, the practice of an activist learning landscape is recommended to greatly engage future science mentors in acquiring learning and building greater knowledge retention. Lastly, science professors may use social constructivism and pragmatism in science teaching pedagogies in formulating effective strategies and learning activities to efficiently and effectively transfer learnings among their students. Also, the result of this study encourages them as well to be kept abreast of the constantly changing demands of how science disciplines should be taught in such ways that future science mentors may cope.

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REFERENCES

1. *Aboe, R. (2018). Correlation between students learning styles and their learning achievement. Khairun University*
2. *Bagaloyos, J. (2017). Effectiveness of experiential activity in science process skills of grade six pupils, Munich, GRIN Verlag. Retrieved from https://www.grin.com/documents/359336*
3. *Bhatnagar, T. & Sinha,V. (2018). Learning styles: a comparison between Indian and German business students. Journal of International Students 473 ISSN: 2162-3104 Print/ ISSN: 2166-3750 Online Volume 8, Issue 1 (2018), pp. 473–487*
4. *Dziuban, C., Moskal, P. & Hartman, J. (2005). Higher education, blended learning, and the generations: Knowledge is power: No more. Elements of quality online education: Engaging communities. Needham, MA: Sloan Center for Online Education.*
5. *Erturk, G. & Kaptan, S. (2010). The Awareness Levels of Pre-school Education Teachers Regarding Science Process Skills. Turkey*
6. *Kolb, D. (1984). Experiential learning: Experience as the source of learning and development. Englewood Cliffs, NJ: Prentice-Hall.*
7. *Ling, T. A. and Towndrow, P. A. (2005). Giving students a Voice in Science Practical Assessment: Centre for Research in Pedagogy and Practice, National Institute of Education.*
8. *Magulod, G.C. (2019). Learning styles, study habits and academic performance of Filipino university students in applied science courses: Implications for instruction. Journal of Technology and Science Education. JOTSE, 2019 – 9(2): 184-198.*
9. *Martin D.L. (2009). Elementary Science Methods: A Constructivist Approach. Fifth Edition, Wadsworth, USA*
10. *Miles, E. (2010). In-service Elementary Teachers' Familiarity, Interest, Conceptual Knowledge and Performance on Science Process Skills. USA*
11. *Millar, R. (2004). The Role of Practical Work in the Teaching and Learning of Science. Commissioned paper) Committee on High School Science Laboratories; Role and Vision. Washington DC: National Academy of Sciences.*
12. *Mezirow, J. (1991). Transformative Dimensions of Adult Learning. San Francisco, CA: Jossey-Bass*
13. *Grant, M. (2020). Sustainability. Retrieved 21-April-2021 from https://www.investopedia.com/terms/s/sustainability.asp*
14. *Ngoh, T.J. (2008). Mastery of Science Process Skills. Kuala Lumpur Malaysia*
15. *Pashler, H., McDaniel, M. & Rohrer, D. (2009). Learning styles: Concepts and evidence. Research article. Retrieved from https://doi.org/10.1111/j.1539-6053.2009.01038.*
16. *Rodriguez, M. H. (2010). Success of a Practical Session. Paris: Western Express.*
17. *Stein, M., McNair, S. & Butcher, J. (2001). Drawing on student understanding. Science and Children, 38(4), 18-22.*
18. *Sun, K. T., Lin, Y. C. & Yu, C. J. (2008). A study on learning effect among different learning styles in a web-based lab of science for elementary school students. Computers and Education, 50(4), 1411-1422.*