Journal of Social Sciences and Management Studies
https://doi.org/10.56556/jssms.v3i2.932
ISSN: 2957-879

RESEARCH ARTICLE

Improving grade 10 students' performance using the contextualized learning resource material on the theory of evolution

Joaquin Dolim Norcio[1*], Rhea Nacino Coles[2], Edelyn Gura Depalco[1]

[1]Llorente National High School, Llorente, Eastern Samar, Philippines
[2]Schools Division of Eastern Samar, Borongan City, Eastern Samar, Philippines

Corresponding Author: Joaquin Dolim Norcio: Email: joaquinnorcio97@gmail.com
Received: 24 May, 2024, Accepted: 26 June, 2024, Published: 30 June, 2024

Abstract
This quasi-experimental study investigated the effectiveness of contextualization in teaching the hardest curricular content in biology – evolution. It tested a Contextualized Learning Resource Material (CLRM), a modular learning material developed by Norcio (2023), among two comparably similar heterogenous Grade 10 classes. The findings of the study showed that (a) the performance of the students under the comparison group, wherein the LM and the SLM were utilized, improved from a mastery level of "Low" to "Moving Towards Mastery". On the other hand, the performance of the students in the experimental group, wherein the CLRM was utilized, improved from a mastery level of "Low" to "Closely Approximating Mastery"; (b) there is a significant difference in the pre-test and post-test scores of the students both in the comparison group and experimental group, and (c) there is a significant difference between the post-test scores of Grades 10 students taught under the experimental group and the comparison group. Therefore, the CLRM should be used either with the LM and SLM or alone in the instruction for the topic evolution.

Keywords: contextualization; biological evolution; learning material

Introduction

The theory of evolution is one of the grandest and most sophisticated scientific theories, but it is also the most misconceived theory. The top five misconceptions about evolution include *it is just a theory*, *fittest survival*, *humans descend from apes*, *no one was there, and it cannot be proven*, and *Darwin was wrong* (Ashraf & Sarfraz, 2016). These broad misconceptions plague the minds of students in different levels of studies. Among college students, even biology majors were found out to have low level of evolution concepts' mastery which consequently leads misconceptions of various kinds (Putri, Rahman, & Priyandoko, 2017). These findings corroborate with the results of the study by Peregrino et al., (2022), who also found similar disheartening proficiency levels on the evolutionary concepts and principles among senior high school students. Their assessment showed that the students have a modest average mastery level in learning evolution, and a difference in mastery levels among students can be attributed to gender (Peregrino et al., 2022). Moreover, they have discovered the challenges in learning evolution.
They include the issue on students' learning style, ability, and interest, the lack of learning resources, and the unfamiliarity with the theories and concepts of evolution (Peregrino et al., 2022).

On a similar note, the recent thesis study of Norcio (2023) likewise revealed an alarming low proficiency level in the two competencies for the most important topic in biology–evolution. He found out that the Grade 10 students of Llorente National High School have an overall mean percentage score (MPS) of 41.19% (Norcio, 2023). Although it was interpreted as an "Average" mastery level, it is clearly far less than the desired 75% proficiency level. The results indicate that the students failed to recognize the evidence of evolution such as comparative anatomy, fossils, anatomical structures, and genetic or molecular biology information. Moreover, they also failed to explain the mechanisms and types of evolution such as divergent, convergent, and parallel. Certainly, these statistical indicators of poor learning on a very important scientific content contributes to the more general scientific competence among students. To highlight, the 2018 National Achievement Test results in the subject science showed the Schools Division of Eastern Samar attained a mean percentage score (MPS) of 39.21%, slightly greater than the region's MPS of 37.50%. The results also indicate that science has the second lowest MPS among the five learning areas at the division, regional, and national levels.

The problems on evolution education mentioned above obviously imply related sets of consequent issues. For one, faulty conceptual understanding of the theory of evolution creates persistent doubts and unacceptance among different groups of people, especially in the academic field. A recent study conducted by Aberilla et al. (2021) showed that 23.9% of university students thinks that the local scientific community does not believe in the phenomenon of biological evolution. Moreover, 27.1% does not accept the process of evolution to be true, and only 44.3% believes that the theory has a strong scientific basis as opposed to the 55.6% who believes otherwise (Aberilla, et al., 2021). Noting that the population of the study is in the academe, the issue is more serious than what the figures indicate. University students are expected to be the educators who will instill scientific literacy among the next generations, but they were found out to be doubtful of a major and foundational scientific knowledge. This concern becomes more pronounced when we realize that among the different colleges involved in the study, the college of education recorded the lowest acceptance of the theory (Aberilla, et al., 2021).

One of the most effective ways to address the issues on student knowledge and acceptance of evolution is to employ the suggested and tested pedagogical approaches such as inquiry-based learning, use of models, games, and simulations, and using metacognitive strategies for students to monitor their acquisition of accurate knowledge (Hanisch & Eirdosh, 2020). The challenge, however, is that science teachers are either generally unaware or incapable of implementing skillfully these pedagogical approaches in their classrooms. Clearly, something must be done with the current instruction and learning resources in teaching the content. This implies an innovation in teaching strategies and improvement in the instructional materials.

In the contemporary classroom setting, learner-centered instruction is highly encouraged. One way of promoting learner-centered classroom is taking the students' personal, social, and cultural experiences into account and making them relevant to the lesson. This strategy is called contextualization. This strategy does not quite necessarily demand the complexity of inquiry-based learning and metacognitive strategies, nor does it require expensive and inaccessible models and computer simulations. In contextualization, students' social, cultural, and everyday experiences can be used as rich resources of expanding understanding on evolution to other domains. Moreover, in contextualization, examples that closer to student everyday experiences (e.g. use of human examples) increases motivation and perceived relevance of evolution (Pobiner, Beardsley, Bertka, & Watson, 2018).

Contextualization is a relatively novel and promising teaching strategy. Section 10.2 of DepEd Order No. 43 series of 2013 states, (d) "the curriculum shall be contextualized and global," moreover, (h) "the curriculum shall be flexible enough to enable and allow schools to localize, indigenize, and enhance the same based on their respective educational and social contexts" (DEPED, 2013).

Following this mandate are a few studies that have demonstrated the effectiveness of contextualization. Examples of these studies that utilized contextualization in teaching science are that of Ballesteros (2016) among Grade 9 students and Grade 10 students (Manuel, 2018). It has even proven its positive effect on teaching basic statistics (Garin et al., 2017). Clearly, it is worthy to contribute to this growing body of evidence of contextualization's effectiveness in instruction.

This study is conceptualized to add to the promising field of study in contextualization and as a follow-up of the developed and validated Contextualized Learning Resource Material (CLRM) on the Theory of Evolution of a thesis study of Norcio (2023).

Literature Review

Teaching Biological Evolution

Theory of evolution is a core scientific theory that is reliably established based on evidence from biology as well as from anthropology, psychology, astrophysics, chemistry, geology, physics, mathematics, and even in behavioral and social sciences (Ashraf & Sarfraz, 2016) and yet, it is still the most controversial content in science education. Teaching evolution is consistently facing the challenge of misconceptions and unacceptance. In schools, it is strongly opposed and wanted to be replaced by nonscientific alternatives such as "creation science" or "intelligent design" (NSTA). In fact, the National Science Teachers Association listed eight settled state and federal legal issues regarding the teaching of evolution in a span of more than three decades, starting from 1968 to 2005 which is highlighted by the controversial Dover Area School District legal proceeding in Pennsylvania.

As mentioned earlier, misconceptions or faulty understanding is a main challenge for teaching evolution. Misconceptions are observed not only among students but also even among teachers who teach evolution. Caballes and Abenes (2020) revealed that public secondary school science teachers adhere to misconceptions on fundamental concepts on evolutionary theory. For instance, 87% of the teachers does not agree that the theory of evolution is supported by evidence; 81.5% has a faulty understanding of the idea of "survival of the fittest"; 85.2% thinks that evolution is always an improvement; and quite surprisingly, 77.8% believes that the earliest humans lived at the same time as the dinosaurs (Caballes & Abenes, 2020). Their misconceptions were identified as coming from electronic media, textbooks, and their teachers (Caballes & Abenes, 2020).

Teacher is considered the most important factor in student learning (Mahler, Groβschedl, & Harms, 2017). Their accurate knowledge is undeniably crucial. Considering the role of science teachers, it is therefore, implicated that their biological evolution-related misconceptions are transferred to their students through instruction (Yates & Marek, 2014).

Evolution has been consistently described as the most difficult topic to teach in biology. Regardless of its difficulty, teachers should have an accurate understanding because international studies have shown that sophisticated knowledge promotes acceptance of the theory among students (Barnes et al., 2017; Fiedler et al., 2019; Ha & Baldwin, 2015). And part of the process of attaining sophisticated understanding of the evolutionary theory is being able to pinpoint misconceptions. To gain knowledge about students' errors, the teacher must examine or diagnose the students' understanding by identifying the existing misconceptions and mistaken assumptions (Förtsch, et al., 2018). As emphasized by Fischer et al. (2021), failing to diagnose students' misconceptions accurately makes individualized support impossible.

A recent study by Panol et al., (2021) revealed that the competence of science teachers is mostly "experienced" on the six learning competencies of evolution in senior high school biology curriculum. However, the teachers face difficulties in teaching evolution due to religious differences, mastery of content, a lack of training programs or seminars/workshops, time allotment, instructional approaches, and a lack of educational resources, and so they would still benefit from further training and development (Panol et al., 2021). Such findings on competence level conflicts with an earlier study which revealed that majority of the teachers responded incorrectly when their understanding was assessed (Caballes & Abenes, 2020). This could probably be due to the descriptive nature of the later study that did not track and specify the instructional context and strategies through which misconceptions can be transferred. Teaching strategies and instruction is mainly the way of developing students' understanding. Thus, its essence and role should not be overlooked in biological evolution education.

Pedagogical approaches have been found out to promote understanding and acceptance of the theory of evolution. They include inquiry-based learning, use of models, games, and simulations, and using metacognitive strategies for students to monitor their acquisition of accurate understanding (Hanisch & Eirdosh, 2020). However, science teachers are either generally unaware or incapable of implementing the suggested pedagogical approaches.

A thematic analysis by Picardal (2019) revealed six stages of common instructional processes, which attempts conceptual change in students' understanding, currently employed by science teachers. The stages include *recognition, reinforcement, relevance, restructuring, reflection,* and *enrichment*. The stages facilitated conceptual change but did not develop sophisticated understanding among students due to the teachers' beliefs, biases, and deficit in content mastery (Picardal, 2019). Recognizing these problems in instructional strategies, it is perfectly reasonable to explore and come with other ways of teaching that will add to the effective pedagogies already identified.

Contextualization

Contextualization is one of the highly encouraged teaching-learning approaches in K12 science basic education curriculum in the Philippines. The Department of Education mandated that the "the curriculum shall be contextualized and global," moreover, "the curriculum shall be flexible enough to enable and allow schools to localize, indigenize, and enhance the same based on their respective educational and social contexts" (DEPED, 2013). However, there are only a handful of studies following this mandate.

Contextualization can be done in all learning areas. In practice, to contextualize means to use authentic learning resources and base the instruction on leaners' personal and socio-cultural lives (Bringas, 2014). In other words, contextualization involves a transfer of learning from the context of familiar experience to a context of detached and hard scientific facts and principles.

Wyatt (2014) formulated a theoretical understanding of the process of contextualization from a few case studies. According to her, it proceeds through three main processes: (a) inviting students into the lesson, (b) making the connection, and (c) ensuring the academic goal was met. The first step can be done in either of two ways. Creating context introduces all students to similar normal experience to create a "level field" for everybody. This serves as the base for learning the new material. Introducing the skill/concept before schema activation involves direct presentation of the material to be learned and eliciting students' personal knowledge with which connections will be built with the new material.

The second step, making the connection, connects students' experiences with the lesson objectives. This step is the core of contextualization process. Application and analysis tasks are utilized. This is necessary to show that acquisition of knowledge and skills is not enough. All along, the teacher serves as a facilitator.

The last step, ensuring the academic goal was met, is a common feature among almost all instructional processes. This step ensures that the students learn the new material and did not settle on the existing knowledge recalled at the beginning of the instructional process.

In the context of evolution education, contextualizing could mean using examples closer to student everyday experiences (e.g. use of human examples) to increases motivation and perceived relevance of evolution (Pobiner, Beardsley, Bertka, & Watson, 2018). This is significant as evolution educators are raising their sentiments about students' difficulty understanding the complexity and multilevel nature of evolutionary change (Hanisch & Eirdosh, 2020).

Learning is the core of all educational process, and it does not occur only in classrooms. It is therefore sensible to make their background knowledge and personal experiences as a springboard for learning a new material. This can be done by transferring what they know into different contexts. This is a must because rote learning has already been found out to be unfavorable for students. Decontextualized instruction diminishes students' intrinsic motivation and appreciation for an abstract and detached topic that they are learning Garin et al. (2017).

Few studies have already proven the effectiveness of using contextualized instructional materials in teaching science. Gapasin (n.d.) localized and contextualized her computer-based instructional materials to improve her Grade 5 pupils' "low" to "high" competency level in science. On the other hand, Ballesteros (2016) observed an improvement of his Grade 9 students' competency from "developing" to "proficient" at the end of the intervention. Likewise, in a quasi-experimental study by Manuel (2018), a significant difference between the control and experimental groups in terms of academic performance of the students was observed, denoting that the use of contextualized instructional materials is more effective than the decontextualized ones. In teaching basic statistics, Garin et al. (2017) also discovered that contextualization strategy improved students' performance. Similarly, the study of Carreon (2018) showed that contextualized blended learning integration and intervention positively increased student achievement among Grade 7 students in Technology and Livelihood Education (TLE) Exploratory. Clearly, contributing to the empirical studies that support this novel and creative teaching strategy is worth pursuing.

Employing contextualization, albeit effective and useful, is without its challenges. Showalter Wollett and Reynolds (2014) listed three barriers: first, external curriculum designers have very limited contexts to consider during curriculum development; second, contextualized curriculum demands extensive resources in terms of time, energy, professional knowledge, and financing; and insufficient familiar contexts and relevance can hinder student achievement. In response to these barriers, the teachers demonstrated reactive adaptations including omitting portions of the lessons that learner were struggling with and used additional explanations or found extra resources to help learners understand the lesson, and others reduced the amount of material covered due to time constraint. Eventually, the teachers employed proactive adaptation by expanding the contexts in which the lesson could be brought into such as workplace, sports, and actual problems that student were dealing with (Showalter, Wollett, & Reynolds, 2014).

Contextualization is a complex approach that demands resources and most importantly, skill. These requirements, however, pale in comparison with the learning imprinted deeply into the minds of students and integrated with their actions.

Methodology

Participants of the Study

The participants of this study included two sections of officially enrolled Grade 10 students in Llorente National High School in the Province of Eastern Samar during the school year 2023-2024. Random selection of the two sections was done to ensure that all ten sections had the chance to be chosen as experimental and comparison groups. The experimental group was taught the topic of evolution using the CLRM within two weeks or 10 contact hours. On the other hand, the comparison group was taught using the Leaner's Material (LM) issued by the central office of DepEd within two weeks or ten contact hours as well.

The study started after the approval of the appropriate research ethics committee. Also, parents' permission was gathered, and approval of the school head was secured. The students were informed of the voluntary nature of the study to make them aware of their right to withdraw or stop participating in the study if they wanted to. Moreover, confidentiality of personal information was observed. The results of this study were made available to the participants.

Data Collection Method

The main data gathering tools used in this study are the pre-test and the post-test. The modified and validated tests, originally from an earlier study by Peregrino et al., (2022), can be found in the CLRM. It is composed of 10 multiple-choice items that cover the three topics and the two learning competencies under study.

At the start of the instruction, the pre-test was administered to both the experimental and the comparison groups. After two weeks of experimentation in the form of different strategies, the post-test was given to gauge possible knowledge and competence gains among the participants.

Throughout the duration of the instruction, possible confounding factors were controlled so as not to influence the validity and reliability of the findings. One teacher handled the Science subject for the two sections.

Data Analysis

The mean, standard deviation and mean percentage scores (MPS) were computed. MPS was interpreted based on the DepEd Memorandum No. 160 series of 2012 to describe the students' mastery level of the identified learning competencies. It is shown below.

Mastery/Achievement Level

Mean Percentage Score Range	**Equivalent Description**
96 to 100%	Mastered
86 to 95%	Closely Approximating Mastery
66 to 85%	Moving Towards Mastery
35 to 65%	Average
15 to 34%	Low
5 to 14%	Very Low
0 to 4%	Absolutely No Mastery

The matched-comparison quasi-experimental group design was used in this study. Its experimental nature entails testing the hypothesis, thus the null hypotheses proposed earlier.

To test if a significant difference exists between the pre-test and post-test scores in the two groups, the statistical analysis used was a paired-sample t-test. Independent sample t-test was applied to test the second null hypothesis of this study, and that is, there is no significant difference between the post-test scores of Grade 10 students taught under the experimental and the comparison groups. An alpha level of 0.05 was observed to decide whether or not the null hypothesis was rejected.

Results and Discussions

This section discusses the findings and implications of this study. The participation rate of the experimental group is 95% (39 of 41 officially enrolled students). Two (2) students were unable to participate in the study due to health concerns. On the other hand, the participation rate of the comparison group is 97.5%. One student was not able to participate due to health concern.

Student Performance Before and After Instruction

*Without Using the CLRM on the Theory of Evolution***.** Table 1 below shows the performance of the students belonging to the comparison group before and after the instruction.

The findings indicate that the students taught using the decontextualized Learner's Material (LM) and Self-Learning Module (SLM) issued by the Department of Education (DepEd) have gained significant learning. The males however, appeared to perform better (MPS = 82.63%) than the females (MPS = 70%).

Overall, the comparison group progressed from Low Level (MPS = 29.49%) to Moving Towards Mastery (MPS = 76.15%).

Table 1. Student Performance of the Comparison Group in the Pre-test and Post-Test

Group	Test	f	Ave.	SD	MPS (%)	Descriptive Equivalent
Male	Pre-test	19	2.74	1.59	27.37	*Low*
	Post Test	19	8.26	2.18	82.63	*Moving Towards Mastery*
Female	Pre-test	20	3.15	1.42	31.5	*Low*
	Post Test	20	7.00	1.65	70.0	*Moving Towards Mastery*
Combined	Pre-test	39	2.95	1.50	29.49	*Low*
	Post Test	39	7.62	2.00	76.15	*Moving Towards Mastery*

*Using the CLRM on the Theory of Evolution***.** Table 2 shows the performance of the students belonging to the experimental group before and after instruction.

The findings indicate that the utilization of the Contextualized Learning Resource Material (CLRM) on the Theory of Evolution made the students attain a proficiency level of 86.41% (MPS) on the two learning competencies targeted. This is an impressive gain from practically knowing too less (MPS = 31.53%) before instruction.

Similar to the performance of the male students in the comparison group, the male students (MPS = 88.64) in the experimental group performed a little better than their female counterparts (MPS = 83.53). Both groups' performances are interpreted as Closely Approximating Mastery.

Table 2. Student Performance of the Experimental Group in the Pre-test and Post-Test

Group	Test	*f*	Ave.	SD	MPS (%)	Descriptive Equivalent
Male	Pre-test	22	3.77	1.54	37.72	*Average*
	Post Test	22	8.86	0.89	88.64	*Closely Approximating Mastery*
Female	Pre-test	17	2.35	0.86	23.53	*Low*
	Post Test	17	8.35	0.86	83.53	*Moving Towards Mastery*
Combined	Pre-test	39	3.15	1.46	31.53	*Low*
	Post Test	39	8.64	0.90	86.41	*Closely Approximating Mastery*

Comparison of the Pre-Test and the Post-Test Results

*Without Using the CLRM on the Theory of Evolution***.** Table 3 presents the significant difference (p-value = 1.42×10^{-15}) of the students' performances in the comparison group in the pre-test and the post-test. This entails that an increase in their scores from before instruction to after instruction due to the use of the LM and SLM.

Table 3. Paired Sample t-test for the Pre-test and Post-Test of the Comparison Group

Group	Test	Statistic					Interpretation
		F	Ave.	SD	*df*	*p-value*	
Male	Pre-test	19	2.74	1.59	18	2.09×10^{-08}	*Significant*
	Post Test	19	8.26	2.18			
Female	Pre-test	20	3.15	1.42	19	1.11×10^{-09}	*Significant*
	Post Test	20	7.00	1.65			
Combined	Pre-test	39	2.95	1.50	38	1.42×10^{-15}	*Significant*
	Post Test	39	7.62	2.00			

**0.05 level of significance*

*Using the CLRM on the Theory of Evolution***.** Table 4 shows the performance of the students before and after instruction. It is noticeable that they have learned significantly (Ave, for Post Test = 8.64) the concepts, principles, evidences, and theories of evolution. Such a score is far greater than when the instruction was not yet implemented (Ave. for Pre-test = 3.15) and as indicated by the p-value of 9.30×10^{-22} which is significantly lesser than the 0.05 level of significance. Similar deductions could be made when the respondents are grouped according to sex.

These findings entail that the increase in their scores from the Pre-test to the Post-Test is due to the utilization of the CLRM, demonstrating its effectiveness in practice. These findings support the previous studies of Ballesteros (2016) among Grade 9 and Grade 10 students (Manuel, 2018) when they used contextualization in their instruction.

Table 4. Paired Sample t-test for the Pre-test and Post Test of the Experimental Group

Group	Test	Statistic					Interpretation
		F	Ave.	SD	*df*	*p-value*	
Male	Pre-test	22	3.77	1.54	21	6.27×10^{-11}	*Significant*
	Post Test	22	8.86	0.89			
Female	Pre-test	17	2.35	0.86	16	4.19×10^{-13}	*Significant*
	Post Test	17	8.35	0.86			
Combined	Pre-test	39	3.15	1.46	38	9.30×10^{-22}	*Significant*
	Post Test	39	8.64	0.90			

**0.05 level of significance*

Comparison of Post Test Results

Table 5 highlights the comparison of the students' performances belonging to the comparison group and the experimental group. With a p-value of 0.244, there is no statistically significant difference in the performances between the male students of the two groups. However, the comparison group has a more heterogenous (SD = 2.18) set of data compared to that of the experimental group (SD = 0.89).

On the other hand, the female students of the experimental group (Ave. = 8.35) performed better than their female counterparts in the comparison group (Ave.= 7.00). The p-value of 0.005 implies a statistically significant difference between the two average scores.

Table 5. Independent Sample t-test for the Post-Test Results of the Experimental Group and Comparison Group

Sex	Group	Statistic					Interpretation
		f	Ave.	SD	*df*	*p-value*	
Male	Comparison Group	19	8.26	2.18	39	0.244	*Not Significant*
	Experimental Group	22	8.86	0.89			
Female	Comparison Group	20	7.00	1.65	35	0.005	*Significant*
	Experimental Group	17	8.35	0.86			
Combined	Comparison Group	39	7.62	2.00	76	0.005	*Significant*
	Experimental Group	39	8.64	0.90			

**0.05 level of significance*

Overall, the Grade 10 students in the experimental group showed greater learning (Ave. = 8.64) on the concepts, principles, evidences, and theories of evolution compared to their counterpart students in the comparison group (Ave. = 7.62).

Such statistically significant difference (p-value = 0.005) is interpreted to be due to the difference in the instructions received. This analysis led to the rejection of the null hypothesis stating that "there is no significant difference between the post-test scores of Grade 10 students taught under the experimental group and the comparison group".

Conclusion

Considering the findings of this study, the following conclusions were drawn.

1. The performance of the students under the comparison group, wherein the LM and the SLM were utilized, improved from a mastery level of "Low" to "Moving Towards Mastery". On the other hand, the performance of the students in the experimental group, wherein the CLRM was utilized, improved from a mastery level of "Low" to "Closely Approximating Mastery".
2. There is a significant difference in the pre-test and post-test scores of the students both in the comparison group and experimental group.
3. A significant difference exists between the post-test scores of Grade 10 students taught under the experimental group and the comparison group, except between male students when grouped according to sex.

Recommendation

Based on the findings and conclusions of this study, it is therefore recommended that science teachers and researchers:

1. Utilize the Contextualized Learning Resource Material (CLRM) on the Theory of Evolution either alone or in addition to the already-available Self-Learning Module (SLM) or Learner's Materials (LM) issued by the DepEd in the instruction for evolution.
2. Develop more contextualized learning materials for other science topics in Grade 10 or different grade levels.
3. Investigate further on the causal factors that made male students belonging to the experimental and comparison groups performed statistically similar.

Declaration: The authors declare that this research study submitted to the Journal of Social Sciences and Management Studies is their own independent work and has not been previously submitted to other journal or publishing entities.

Acknowledgment: The completion of this study is an implication of the collaborative professional and collegial culture of Llorente National High School. And it is for this reason that the researchers express their attitude to the following entities. Judy B. Operario, for his approval and support for the researchers to complete the study. Jomelle V. Alde, for accepting the temporary rearrangement of teaching loads just for the researcher to be able to perform the experimental instructions. His help is greatly appreciated. The Grade 10 Advisers, for letting their classes be subjected to rigorous experimental instruction and being considerate and flexible in accommodating the schedule of their classes. The Parents of Grade 10 Students, for accepting and giving their permission for their children to participate in the study even without monetary or material renumerations. The Grade 10 Students, for engaging and learning science through the interesting strategy of contextualization.

Funding: The research work is self-funded by the authors.

Conflict of Interest: N/A

Authors contribution: All authors listed here contributed to the completion of the research work. Joaquin Norcio is the main author who conducted the experimental instructions.

Data availability: Please contact Joaquin Norcio in joaquinnorcio97@gmail.com for access to the data collected and analyzed in this study, subject to the ethical and legal considerations surrounding data sharing and participant confidentiality.

References

Aberilla, O. D., Salic, M. H., Orbita, R. R., Bagaloyos, J. B., Demayo, C. G., & Torres, M. G. (2021). University Students' Acceptance of Evolution: Basis for STEM-Based Instructional Design. *International Journal of STEM Education for Sustainability*, 33-44.

Ashraf, M. A., & Sarfraz, M. (2016). Biology and Evolution of Life Science. *Saudi Journal of Biological Sciences*(23), S1-S5.

Ballesteros, J. (2016). Localization and Contextualization of Science Activities in Enhancing Learner's Performance. Retrieved April 21, 2023 from https://www.academia.edu/26424467/Localization_and_Contextualization_of_Science_Activities_in_Enhancing_Learners_Performance

Barnes, M. E., Evans, E. M., Hazel, A., Brownell, S. E., & Nesse, R. M. (2017). Teleological Reasoning, Not Acceptamce of Evolution, Impacts Students'Ability to Learn Selection. *Evol Edu Outreach*, 1-12.

Bringas, H. A. (2014). *Localization-Contextualization*. Retrieved April 21, 2023 from Slide Share: www.slideshare.net/lenferndz/localization-contextualization

Caballes, D. G., & Abenes, F. D. (2020). Misconceptions of Science Teachers in Evolution. *CiiT International Journal of Biometrics and Bioinfrmatics*, 31-38.

Carreon, J. R. (2018). Facebook as Integratedd Blended Learning Tool in Technology and Livelihood Education Exploratory. *International Journal of Educational Technology*, 19-25.

DEPED. (2013). *DepEd Order No. 43. s. 2013 Implementing Rules and Regulations (IRR) of Republic No. 10533 Otherwise Known as the Enhanced Basic Education Act of 2013.* DEPED.

Fiedler, D., Sbeglia, G. C., Nehm, R. H., & Harms, U. (2019). How STrongly Does Statistical Reasoning Influence Knowledge and Acceptance of Evolution. *Journal of Research for Science Teaching*, 183-206.

Fischer, J., Jansen, T., Moller, J., & Harms, U. (2021). Measuring Biology Trainee Teachers' Professional Knowledge About Evolution: Introducing the Student Survey. *Evolution: Education and Outreach, XIV*(4).

Förtsch, C., Sommerhoff, D., Fischer, F., Fischer, M. R., Girwidz, R., Obersteiner, A., . . . Neuhaus, B. J. (2018). Systematizing Professional Knowledge of Medical Doctors and Teachers: Development of an Interdisciplinary Framework in the Context of Diagnostic Competencies. *Education Sciences, VIII*(207).

Gapasin, C. A. (n.d.). *Improving the Science Competency of Grade 5 Learners in Matter Through Localized Computer-Based Instructional Materials.* DepEd-Division of La Union.

Garin, R. M., Reyes, R., Domantay, G. F., & Rosals, J. (2017). Contextualized and Localized Teaching as a Technique in Teaching Basic Statistics. *Asia Pacific Journal of Education, Arts and Sciences, IV*(1), 62-67.

Ha, M., Baldwin, B. C., & Nehm, R. h. (2015). The Long-Term Impacts of Short-Term Professional Development: Science Teachers and Evolution. *Evolution Education Outreach*, 1-23.

Hanisch, S., & Eirdosh, D. (2020). Educational Potential of Teaching Evolution as an Interdisciplinary Science. *Evolution: Education and Outreach*, *XIII*(25), 1-26.

Mahler, D., Groβschedl, J., & Harms, U. (2017). Using Doubly Latent Multilevel Analysis to Elucidate Relationships Between Science Teachers' Professional Knowledge and Students' performance. *International Journal of Science Education*, 213-237.

Manuel, E. R. (2018). *Biolink: A Localized and Contextualized Instructional Material.*

Norcio, J. D. (2023). Development and Validation of Contextualized Learning Resource Material on the Theory of Evolution. *A Master's Thesis*. Graduate School - Eastern Samar State University.

NSTA, N. S. (n.d.). *The Teaching of Evolution.* Retrieved July 6, 2024 from NSTA: https://www.nsta.org/nstas-official-positions/teaching-evolution

Panol, R. F., Vasquez, A., Caballes, D. G., & Valdez, M. R. (2021). Competency Level of Science Teachers in Teaching Evolution: Basis for Training Design. *Global Journal of Advanced Research*, 235-243.

Peregrino, L. P., Javillonar, M. G., Caballes, D. G., Necio, C. R., & Belina, M. D. (2022). The Students' Challenges in Learning Evolution and Thier Level of Mastery: An Input to An Enhancement Program. *Journal of Social Sciences and Managament Studies*, 42-47.

Picardal, M. T. (2019). Does Conceptual Change Process of Instruction Promote Scientific Understanding of Biological Evolution? *Liceo Journal of Higher Education Research*, 131-154.

Pobiner, B., Beardsley, P. M., Bertka, C. M., & Watson, W. A. (2018). Using Human Case Studies to Teach Evolution in High School A.P. Biology Classrooms. *Evolution: Education and Outreach*, *XI*(3), 1-14.

Putri, L., Rahman, T., & Priyandoko, D. (2017). Analyzing Concepts Mastery and Misconception About Evolution of Biology Major Students. *Journal of Physics: Conference Series* (pp. 1-6). IOP Publishing Ltd.

Showalter, D. A., Wollett, C., & Reynolds, S. (2014). Teaching a High-Level Contextualized Mathematics Curriculum to Adult Basic Learners. *Journal of Research and Prctice for Ault Literacy, Secondary, and Basic Education*, *III*, 21-34.

Wyatt, T. R. (2014). Understanding the Process of Contextualization. *Multicultural Learning and Teaching*, 1-21. doi:10.1515/mlt-2013-0026

Yates, T. B., & Marek, E. A. (2014). Teachers' Teaching Misconceptions: A Study of Factors Contributing to High School Biology Students' Acquisition of Biological Evolution-Related Misconceptions. *Evolution: Education and Outreach*, *VII*(7).