Salud, Ciencia y Tecnología - Serie de Conferencias. 2024; 3:987
doi: 10.56294/sctconf2024987

Category: Finance, Business, Management, Economics and Accounting

ORIGINAL

Improving the scientific literacy of primary school students from the perspective of double reduction: practical inspiration

Mejora de la alfabetización científica de los alumnos de primaria desde la perspectiva de la doble reducción: inspiración práctica

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Cite as: Tan W, Huang C, Xiang H. Improving the scientific literacy of primary school students from the perspective of double reduction: practical inspiration. Salud, Ciencia y Tecnología - Serie de Conferencias. 2024; 3:987. https://doi.org/10.56294/sctconf2024987

Submitted: 03-02-2024 **Revised:** 30-04-2024 **Accepted:** 02-07-2024 **Published:** 03-07-2024

Editor: Dr. William Castillo-González

ABSTRACT

Higher standards for elementary and secondary school students' education have emerged in response to the expansion of the education sector, which has intensified educational competitiveness. Once implemented, the "double reduction" program successfully manages macro society as a whole and pushes for educational institution change. One of the biggest challenges that elementary and secondary school students have when trying to improve the quality of their education is determining whether or not the institutions that teach these subjects are being adequately transformed. A student's natural talent is only one of several contextual elements contributing to their scientific achievement. This article aimed to find high-achieving students' most salient contextual traits in scientific literacy. This article looks at how the "double reduction" strategy has affected educational institutions from both the student and parent points of view. According to the findings, schools will again be the centre of attention under the "double reduction" program, which aims to improve education. The expectations of schools, parents, and students continue to limit the transformation of elementary and secondary educational institutions even though the government and educational institutions have implemented some steps to alleviate the "double reduction" strategy. According to the research, the factors that were found to have the greatest impact on the target students' exceptional accomplishments in science were the following: the quality of teachers' educational materials practices, the disciplinary climate, the amount of time and effort put into learning; the resources available to students through school media; the number of teachers on staff; and students' belief in their abilities. The knowledge gained from this study may be useful in future research on students' scientific literacy abilities.

Keywords: Scientific Literacy; Double Reduction; Primary School; Educational Institutions.

RESUMEN

Han surgido estándares más altos para la educación de los estudiantes de escuelas primarias y secundarias en respuesta a la expansión del sector educativo, que ha intensificado la competitividad educativa. Una vez implementado, el programa de "doble reducción" gestiona con éxito la macrosociedad en su conjunto e impulsa el cambio de las instituciones educativas. Uno de los mayores desafíos que enfrentan los estudiantes de primaria y secundaria cuando intentan mejorar la calidad de su educación es determinar si las instituciones que imparten estas materias se están transformando adecuadamente. El talento natural de un estudiante es sólo uno de varios elementos contextuales que contribuyen a sus logros científicos. Este artículo tuvo como objetivo encontrar los rasgos contextuales más destacados de los estudiantes de alto rendimiento en

la alfabetización científica. Este artículo analiza cómo la estrategia de "doble reducción" ha afectado a las instituciones educativas tanto desde el punto de vista de los estudiantes como de los padres. Según los resultados, las escuelas volverán a ser el centro de atención en el marco del programa de "doble reducción", cuyo objetivo es mejorar la educación. Las expectativas de las escuelas, padres y estudiantes continúan limitando la transformación de las instituciones de educación primaria y secundaria a pesar de que el gobierno y las instituciones educativas han implementado algunas medidas para aliviar la estrategia de "doble reducción". Según la investigación, los factores que tuvieron el mayor impacto en los logros excepcionales en ciencias de los estudiantes objetivo fueron los siguientes: la calidad de las prácticas de los materiales educativos de los profesores, el clima disciplinario, la cantidad de tiempo y esfuerzo dedicado al aprendizaje. ; los recursos disponibles para los estudiantes a través de los medios escolares; el número de profesores en plantilla; y la confianza de los estudiantes en sus capacidades. El conocimiento adquirido a partir de este estudio puede ser útil en futuras investigaciones sobre las habilidades de alfabetización científica de los estudiantes.

Palabras clave: Alfabetización Científica; Doble Reducción; Escuela Primaria; Instituciones Educativas.

INTRODUCTION

One of the most sought-after skills in today's complex environment is articulating one's understanding of the scientific process. People can better navigate a world where science and technology are becoming more integral if they possess scientific literacy. Whether healthcare or environmental sustainability, the discussed subject is not important; this is the actual situation or state of affairs. Insufficient scientific literacy development, particularly among primary school pupils, is the problem.[1,2] This study investigates whether double reduction can teach science to primary school students innovatively and effectively. Put aside the world and focus on teaching the next generation to respect and apply science. According to twofold reduction, we must simplify complicated scientific ideas and make them more engaging and accessible.[3,4] Quality-oriented education (QOE) develops students' critical thinking, creativity, and responsibility for holistic growth. Science literacy is the capacity to understand complex scientific conversations, understand complex scientific ideas, and critically evaluate information. Scientific literacy in primary school fosters knowledge and environmental sensitivity. A child's brain is a storehouse of knowledge that's continually expanding. Using one's curiosity to study science may lead to a lifelong respect for science and its practical applications.[5,6] Although difficult, improving elementary school science literacy is worthwhile. Many students who take typical scientific courses only understand the material superficially because they concentrate on memorization rather than analysis and critical thinking. Insufficient finance, obsolete curriculum, and unprepared teachers may prevent elementary schools from providing a complete scientific education.[7,8]

Additionally, social and cultural variables might hinder students' scientific literacy participation and success. These differences may prevent participation and admittance. Educating people about scientific ideas and making science education more equitable and accessible are some solutions. Twofold reduction is novel in the framework. Its main goal is to explain complicated scientific concepts to improve literacy. The "double reduction" technique argues that students from varied backgrounds and skill levels should understand the practicality of scientific ideas.[9,10] Double reduction uses this idea. The process involves simplicity and reduction. It would benefit elementary school science teachers and students to simplify and break down complicated scientific issues. Examples, visuals, experiments, and analogies may help explain complex ideas. The second stage to removing obstacles is categorizing and eliminating scientific education course requirements. Teachers may inspire young children to love science by simplifying complicated concepts and showing their practical applications.[11,12] All students may need equitable access to lab space, scientific equipment, and technology to encourage hands-on learning. Some specific interventions suggested to help reduce the achievement gap and increase attendance in science courses include scholarships, after-school programs, and community collaborations.[13] With these changes implemented, students will be more likely to participate in scientific education. Using double reduction is a tried-and-true way to help primary school students become more scientifically literate. In addition to being thorough, it is also quite useful. This tactic combines elements of both methods. With the double reduction approach, scientific literacy is not seen as a luxury enjoyed by a select few but as an essential ability that all students should have from the very beginning of their educational journey. In the following sections, we will examine specific strategies, case studies, and suggestions that illustrate the game-changing potential of a double reduction in primary science curricula. By working together and thinking outside the box, they can motivate the youth of today and tomorrow to solve the challenges of this and future generations.[14,15]

The Main Contribution of this Paper:

- The research supports the importance of fostering SL throughout formal education by demonstrating the link between SL and EfS. Every individual must have the liberty and capacity to

assess the moral implications of technical and scientific matters.

- This study aims to improve scientific literacy in primary and middle schools, especially among second-language learners, by focusing on the three skills of speaking, writing, and reasoning that are devised to implement these goals.
- This research offers more thorough information for future academics and focuses on the enormous influence of excellent education in science literacy under the proposed double reduction strategy.

The rest of this paper is organized as follows: Section 2 reviews the related work. Next, the proposed Double reduction is introduced in Section 3. After describing the proposed approach, the experimental results are shown in Section 4. Finally, conclusions and future work are made in Section 5.

Literature Survey

To foster a more scientifically literate society, Li Ke et al.[16] advocated that students study socio-scientific problems (SSIs) to help them understand how scientific principles apply to their daily lives. According to this position paper, students are better prepared to handle complicated circumstances when they create and use various models. Using research in scientific education and philosophical analyses of science, we provide a theoretical case for why and how SSI students may gain by making and using different types of models in their science classes. We discuss the pedagogical aspects of the proposed modelling approach for SSI-based teaching and provide some suggestions for future research as the paper comes to a close.

Wahyu et al.[17] proposed the effect of STEM-based learning using Mobile Augmented Reality (MAR) on students' scientific literacy and accomplishment: One effective method of increasing students' scientific literacy is to use mobile augmented reality in STEM instruction. The findings proved that: 1) Students' scientific literacy is greatly improved by using mobile augmented reality in STEM-based lessons. When STEM-based classes are enhanced with mobile augmented reality, students' academic performance noticeably increases.[3] Compared to students taught using more traditional techniques, students whose STEM classes include mobile augmented reality show significant improvements in scientific literacy and performance.

The research conducted by Winarni et al.[18] aimed to evaluate the effect of discovery learning via the use of ICT on students' scientific literacy and language skills within the framework of bamboo conservation courses. Different from multiple-choice questions, which are utilized for scientific literacy, essay questions are used for language literacy study. A T-test was used to analyze the data. The impacts on students' linguistic and scientific literacy were shown to be varied between conventional visual media and exploratory learning utilizing ICT media.

Aiman et al.[19] presented the "Process Oriented Guided Inquiry Learning" (POGIL) paradigm, which makes use of real media to help students improve their scientific literacy and critical thinking skills, especially concerning energy-related subjects. The main takeaways from the study are as follows: (1) students in POGIL programs that use realia as a media resource outperform their expository learning peers in scientific literacy, and (2) students in POGIL programs that use realia as a media resource outperform their expository learning peers in critical thinking.

In addition to a quasi-experimental research strategy, Citra et al.[20] recommended a pre-experimental design with pre- and post-tests given to a single group. Through the use of contextualized cooperative learning that is based on ethnoscience, the purpose of this study is to improve the scientific literacy skills of students. In the medium category, the findings demonstrated that there had been an overall improvement in the level of success of students in terms of content, process, and scientific attitudes.

Proposed Framework

A new movement known as "Education for Sustainability" (EfS) has recently surfaced in discussions around environmental education. Sustainable development (SD) has been gaining global attention rapidly, and the Earth Summit spelt out the first steps toward international collaboration on environmental and developmental concerns. Environmental Education for Sustainability (EfS) proposes broader goals than Environment Education (EE) and diverges substantially from most nature research projects funded by EE. Environmental and developmental issues are closely linked. SD tackles problems like widening income and wealth gaps, rising rates of poverty, hunger, poor health, illiteracy, and the ongoing degradation of the environment that supports all of humanity.

These societal shifts in the last several years have also posed problems for science education. To foster an independent citizenry in a post-industrial society, scientific literacy (SL) is essential. Everyone should be able to form their own opinions on the moral implications of technical and scientific developments since we are in the process of renegotiating the relationship between society and science. The research supports the importance of fostering SL throughout formal education by demonstrating the link between SL and EfS. Based on the premise that SL serves as a model for bridging gaps in knowledge across disciplines, we provide a theoretical framework that elucidates the epistemological significance of SL in EfS (see Figure 1).

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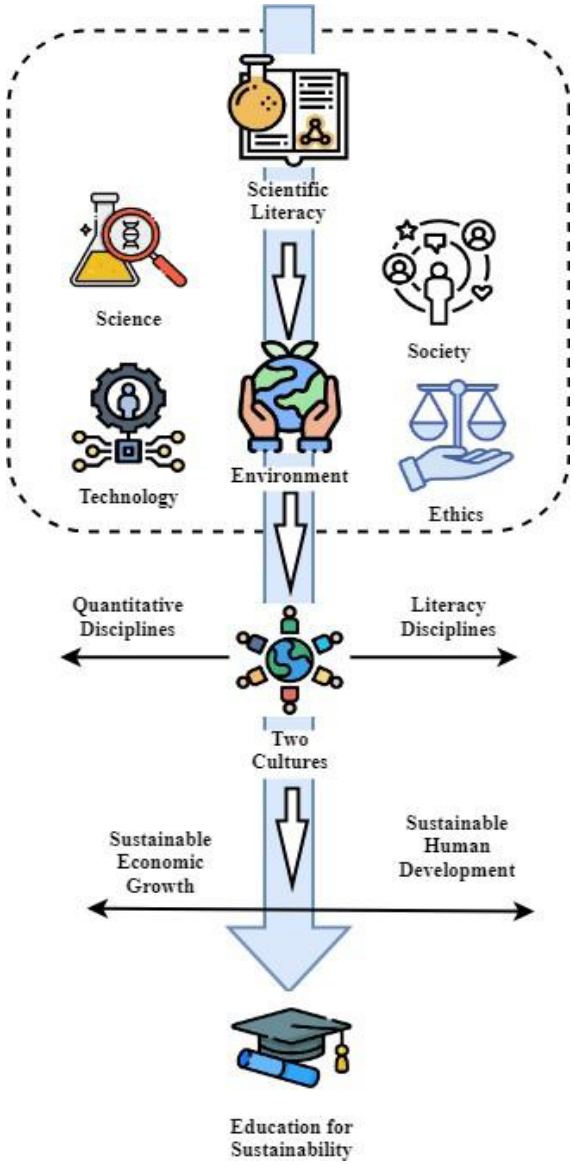

Figure 1. Scientific Literacy (SL) in Environmental Education for Sustainability (EfS)

Snow, the suggested categories may group the five SL-related ideas. Snow showed how knowledge has been divided into quantitative and literary fields. Even if Snow is trying to start a debate, his "two cultures" approach helps us understand how most universities organize their departments. Also, because we're talking about the two ends of the spectrum in figure 1, its binary aspect could help describe the suggested framework. On the one hand, we have the quantitative fields, which include science and technology, and on the other, we have the literary fields, which include society and ethics. The parameters of EfS need a thorough understanding of the relationship between various academic categories, of which environmental studies may be seen as a bridge. For educational communities to bridge the divide that separates the "two cultures," it is essential that techno-scientific and humanistic viewpoints be taken into account simultaneously and in equal measure. Since our models are based on long-term human development and sustainable economic growth, we are in a prime position to assess the most popular EfS perspectives (Figure 1).

The critical distinctions between sustainable human development and economic growth centre on future growth assumptions, economic activity scale, technology types, the relationship between communities and larger political and economic structures, and the balance between grassroots and top-down activism. The first strategy, which emphasizes long-term economic expansion, helps to solidify a trend toward global technocracy and keeps us on our current trajectory of progress, but with more efficiency. Sustainable human growth, on the other hand, calls for a resuscitation of civic culture and the emergence of an environmentally knowledgeable, globally aware populace. The arrow in figure 1's centre represents the middle ground between these two extremes; to reach this point, three things must happen: (1) SL must be used to show how scientific and technological advances affect society and the environment ethically; (2) both cultures must be considered at the same time to understand the complicated modern environmental challenges; and (3) every citizen must

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critically evaluate their views on SD.

Integrating Pedagogical Practice to Develop Scientific Literacy

Hence, a plan was devised that not only emphasizes the importance of writing, class discussion, and argumentation in scientific education but also equips educators with resources (such as reading lists) to inspire their students to think critically, formulate their own research questions, conduct in-class investigations, and present their results to real-life stakeholders. This method was created to address the requirements of the educational system. Scientists model their process after reading, speaking, identifying a problem, designing an inquiry, conducting tests, reading more, defending their findings, and presenting them in different ways depending on the audience. To rephrase, the strategy's end goal is:

- Improving scientific literacy via reading and science literacy through reading.
- Raising the quality of classroom discourse and exploratory speaking in pursuit of researchable issues.
- Assisting students with classroom research and preparation.
- Using writing as a scaffold to understand science.
- Providing a framework for logical reasoning and analysis, figure 2 depicts the fundamental principles of the model.

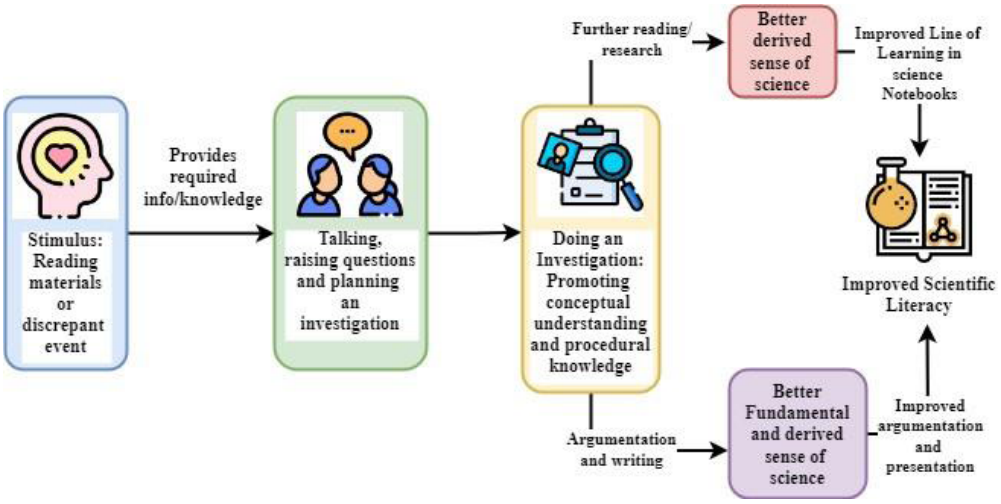

Figure 2. Improving scientific literacy through integrated teaching methods

Figure 2 shows that whatever prompts discussion—reading material, a contradictory event, a concept cartoon, etc.—also makes it easier to get part of the background information needed for productive argument, ultimately leading to researchable issues. The following discussion that are thought to be investigate able pave the way for the inquiry to be planned and carried out. Students are encouraged to read and research beyond the topic of their initial question after finishing their classroom investigation and collecting all pertinent data in their scientific notebooks. This suggests they could go farther than previously thought to solve the mysteries surrounding the non-investigable but researchable subjects. Finally, students improve their argumentation skills, learn more about scientific concepts, methods, and processes, and understand the significance of considering their audience and meeting presentation expectations when they document their arguments in a writing framework. There are several issues and consequences for teacher education programs and classroom teachers when using integrated learning strategies to promote scientific literacy. To start, science teachers may have extra difficulties helping their students with reading methods if they are ESL students. Educators and instructors in the scientific disciplines have a shared obligation to stay abreast of research in their fields so they can equip their students with the most current and relevant literacy and language skills. Second, teachers should work on their self-assurance to better lead class discussions and ensure their pupils have adequate reading materials to help them succeed in primary school. Lastly, instructors must have a solid grasp of the scientific method and the specific techniques and information their pupils need to become scientifically literate.

The processes for calculating the weights of the components impacting "Double Reduction" satisfaction are presented below. The research used the Entropy-weighted Gray Relational Degree model (EGRA) to do this.

Step 1: to begin, choose a reference series to use as the dependent and independent variables to assess it. If we take the mean score on the "Double Reduction" satisfaction survey as for all students, we get the reference series. The whole dataset consists of m rows and n columns, where the total number of surveys and n is the total number of variables that had an impact. Presently m=441,n=19. Here is the series to refer to the following equations 1 and 2, which may be used to represent the material quality vs Student Achievements.

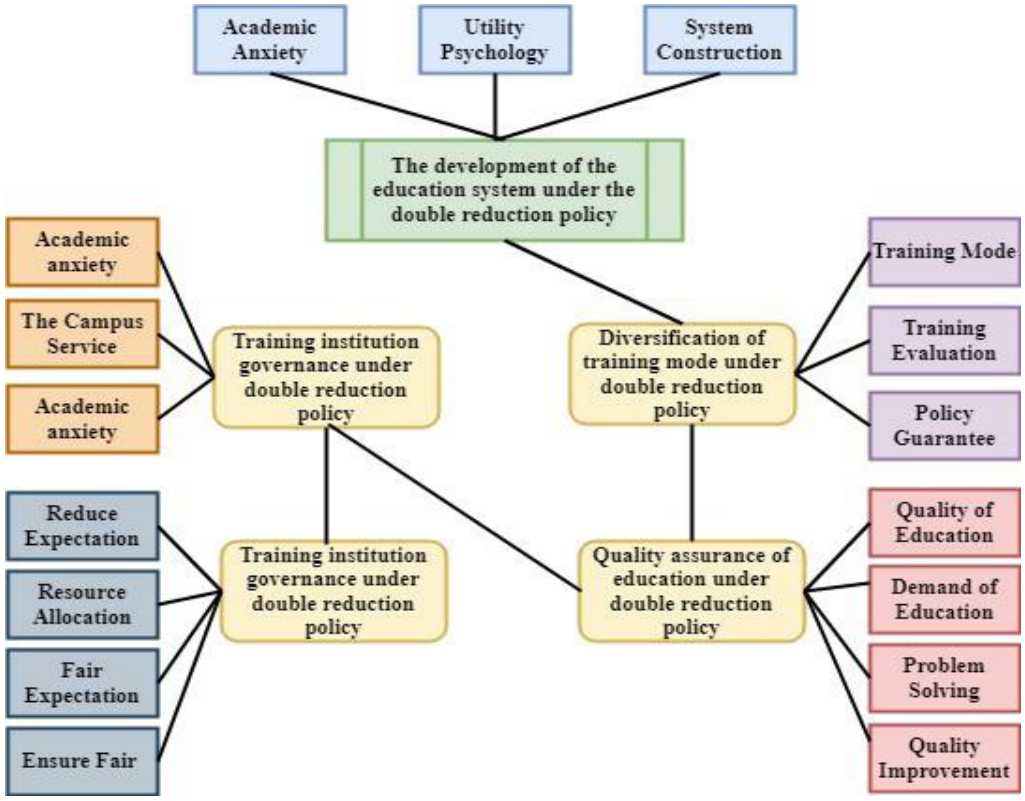

Figure 3. Double reduction policy to promote quality of education

Research strategy and execution

$$Y_0 = (Y_{01}, Y_{02}, Y_{03}, \dots, Y_{0n}) \quad (1)$$

Here is the series for comparison:

$$Y = [y_{11}y_{12} \cdots y_{1n}\, y_{21}y_{22} \cdots y_{2n} \;\cdots . y_{m1}y_{m2} \cdots y_{mn}\,] \quad (2)$$

Step 2: data processing without dimensions. With j ranging from 0 to m and n from 0 ton, we divide the numbers in each by the data in the following Equations 3 and 4 used to student grade level.

$$A_{jk} = \frac{y_{jk}}{y_{j1}} \quad (3)$$

Once the initial questionnaire data has been initialized, the outcome is A. Additionally, initialization of the reference sequence is required.

$$A = [a_{00}a_{01} \cdots a_{0n}\, a_{10}a_{11} \cdots a_{1n} \;\cdots . a_{m0}a_{m1} \cdots a_{mn}\,] \quad (4)$$

Step 3: find the correlation coefficients for all the variables that could have an impact. The reference sequence was the homogenized A_0, and the comparative sequence was the A_k, whereas the ρ=0,5 by following Equations 5 and 6 may be used to represent the Academic Performance with student's efforts

$$\xi_{jk} = \frac{|\,A_{0j} - A_{jk}| + \rho|A_{0j} - A_{jk}|}{|A_{0j} - A_{jk}| + \rho|A_{0j} - A_{jk}|} \quad (5)$$

Step 4: factor weights and gray relational degrees (GRDs) should be computed. Taking the mean of all the column correlation coefficients yields the GRD, which measures students' satisfaction with the policy.

$$u_k = \frac{1}{m}\sum_{j=1}^{m} \square\, \xi_{jk} \quad (6)$$

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Step 5: the weight is computed using the Entropy Weight Method. Find the f_k and x_k. Entropy weights of each component of the following equations 7 and 8:

$$f_k = \frac{1}{1n\,n}\sum_{j=1}^{m} \frac{Y_{jk}}{\sum_{j=1}^{m} Y_{jk}} 1n\left(\frac{Y_{jk}}{\sum_{j=1}^{m} Y_{jk}}\right) \quad (7)$$

$$x_k = \frac{1-f_k}{\sum_{k=1}^{n} 1-f_k} \quad (8)$$

Step 6: decide on the EGRD or Entropy-weighted Gray Relational Degree. Equation 9 represents the belief level.

$$s_k = x_k u_k \quad (9)$$

In a "double reduction" strategy, the roles of families and other non-schooling educational institutions are reconstructed. The success of the 'double reduction' strategy hinges on several factors, including the primary school's ability to implement it quickly and successfully, the scientific management of off-campus training, and the reaction of society at large. This section will provide recommendations after a discussion and summary of the policy's effects. The government should adequately distribute educational resources and diligently implement the policy. Management and supervision of off-campus training institutes need improvement, and their conduct needs regulation. First, legislation must be in place to support the constructive and active transformation of off-campus training institutions. To fill the void in primary education, educational institutions may be adequately funded and guided to launch several non-profit, science-based training programs. In contrast, off-campus training institutions should be subject to specific regulations set forth by local governments. These regulations should include a framework for long-term management and implementing standard and classified governance practices. Equal distribution of public funds for primary schools is another important policy goal. To make education more equitable, for instance, they might work to strengthen the system for managing teachers and advocate for more regular teacher rotations.

Educational paradigms must be shifted, and parents must establish reasonable expectations for their children. Simply said, parents' expectations might sometimes be too subjective and emotional. Find out that the expectations of parents and their children's educational levels are often quite different. Consequently, parents should approach education with a scientific mindset. The first step is for parents to fully grasp the 'double reduction' idea and prioritize their children's personal growth over academic achievement. Second, they must stop encouraging uniformity and blind comparisons by recognizing that each kid is unique. They genuinely want to help kids reach their full potential, and we need to ensure that their educational expectations are realistic and based on their current academic standing. Educational institutions must fortify their central role. Developing students' character, artistic sensibilities, and practical skills should be the primary goals of formal education. Secondly, to reestablish students as the primary focus of the classroom, instructors should revisit more conventional methods of instruction. Teachers should also make it a priority to help their pupils grow as individuals by encouraging their imaginations, critical thinking skills, and self-reliance in the classroom. Third, expanding the different assessment forms and establishing numerous assessment systems, such as portfolio evaluation, is essential to fostering students' holistic development. Additionally, in order to accommodate kids' varied educational requirements, after-primary school programs should be enhanced, and the structure of the service system should be rethought.

By talking to experts in the subject of scientific education and inquiry, studying pertinent literature, and conferring with the instructors they polled, the researchers were able to verify the validity of their theoretical model. As per most specialists, scientific literacy impacts students' and instructors' research abilities. Researchers have shown that students in the scientific teaching group outperform students in the other groups when establishing research processes, logical mindsets, and research talents.

Figure 4 also illustrates that some experts have said that teachers need to know scientific literacy to help their pupils become scientifically literate. In order to provide a good example for their students, teachers should work on improving their own cognitive abilities before advising their pupils to do the same. As part of their professional development, teachers should keep a reflective notebook to record their teaching practices, analyze them and find ways to improve them. Teachers have a key role in helping students acquire scientific literacy, and one crucial mechanism is the pursuit of successful pedagogical approaches in the classroom.

When asked what factors influence students' level of scientific literacy, the majority of teachers and experts in the area cited students' comfort with technology and the internet. The ability to utilize the internet for independent research and the development of systematic thinking skills are key outcomes for students in this course. Having pupils access to computers without adequate learning, verification, supervision, and monitoring of their learning process would not boost the variable mentioned before. On top of that, teachers also need that variable, according to the majority of specialists. Teachers have a responsibility to provide their pupils with

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resources that foster scientific literacy. Also, by studying subjects, checking sources (including the authenticity of the source), and assessing the findings, they should be able to teach students more effectively and accurately than what is required by the current situation.

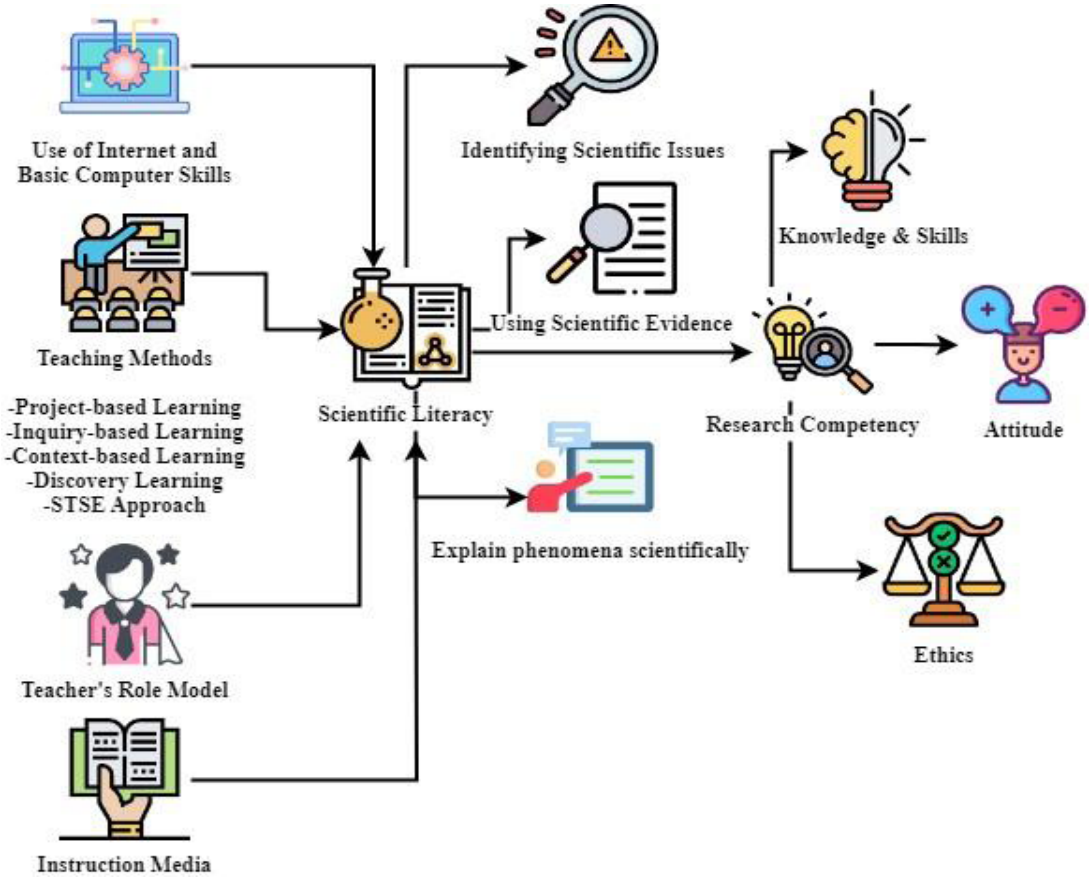

Figure 4. Enhancing Research Skills through Scientific Literacy

In order to improve students' research skills and increase their scientific literacy, most experts agree that instructors play a vital role. An important part, in their view, is the instructional approach of teachers. When it comes to helping their pupils develop their scientific talents, most teachers turn to scientific project-based learning. Rather than that, educators should consider other methods of instruction. Most experts agree that the best age group to focus on when trying to increase scientific literacy is kids in upper elementary and lower secondary school. Children at this age have a natural curiosity for the world around them and may pick up scientific concepts quickly.

RESULTS AND DISCUSSION

The double reduction strategy greatly enhanced primary and secondary school students' scientific literacy. Student grasp of scientific ideas improved via hands-on and participatory learning. Post-intervention test scores increased, demonstrating better scientific understanding and application. Researchers found that the double reduction method improves primary school pupils' scientific literacy. By simplifying and encouraging practical application, pupils learned basic scientific ideas. This method improves information retention and critical thinking for academic performance. The findings show that creative teaching methods improve primary scientific education.

Dataset: monoterpene (S)-(−)-perillyl alcohol was used to synthesize (+)-mesembrine (1) and (+)-mesembranol (2). To get the cis-3a-aryloctahydroindole skeleton, a diastereo- and regioselective Pd-mediated intramolecular Heck reaction and a double reduction of the cyclic sulfonamide are necessary.(21)

Material quality vs Students achievement

Figure 5 shows that the material quality as its student's achievement is measured using Equations 1 and 2. Everything a teacher or student uses to teach or learn is called "learning material." This includes literature, resources, and information. A few examples include the following: attitude, values, and knowledge (including facts, ideas, principles, and methods). By inspiring them, stimulating their imaginations, drawing on their existing knowledge, fostering comprehension, logical reasoning, communication, interaction, and skill development, learning materials help students study more effectively. The tangible resources and instruments

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accessible to support and improve learning outcomes make up the material quality of student accomplishment. Anything from textbooks to study materials to technology gadgets to laboratory equipment and anything else given to students falls under this category. With high-quality materials, students can access current knowledge, are more likely to participate, and have more fruitful educational experiences. Ensuring equal access to resources for all students, regardless of their background or socioeconomic situation, promotes equality and fosters an atmosphere favourable to academic achievement and holistic development. By facilitating learning, instructional materials have the potential to raise students' levels of accomplishment dramatically. Students may get fresh perspectives from an instructional film and find more opportunities to put what they've learned into practice with an engaging assignment.

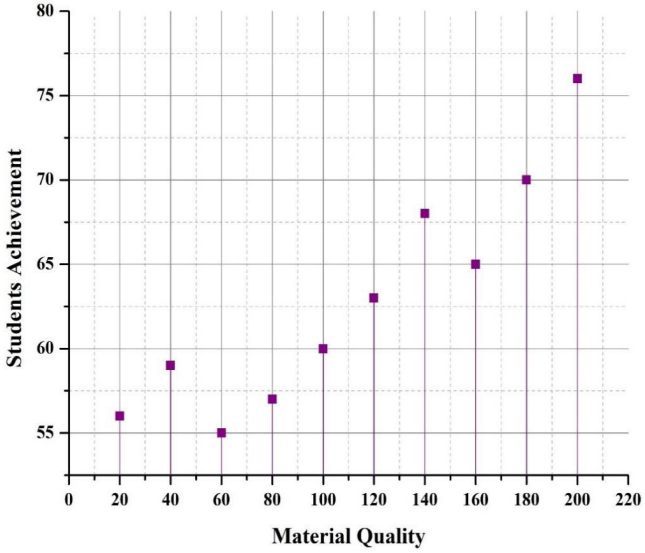

Figure 5. Material quality vs Student achievement

Grade Achievement in School

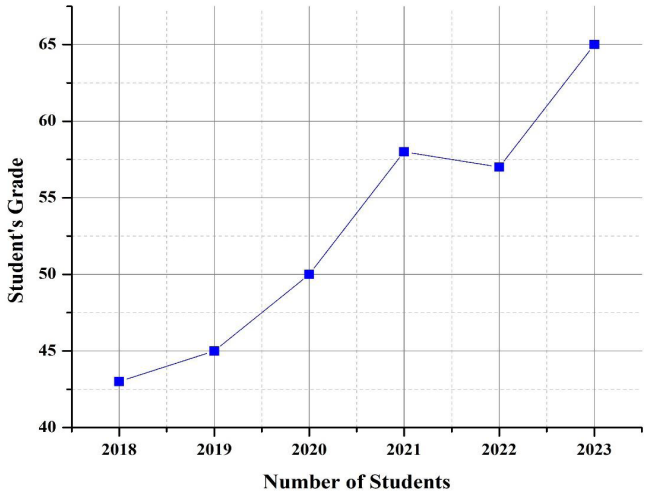

Figure 6. Grade Achievement in School

Figure 6 shows that the Scientific Literacy of material, referred to as its student's grade, is measured using Equations 3 and 4. Their parents always hold children to a higher standard. The expectation is based on two key points. The first is the widespread perception among parents that their children's future prosperity and happiness are directly tied to the quality of their education. Students in the present secondary education system are defined by their test results; those who pass attend either a regular high school or a secondary primary school. Many parents hope that their children will go on to get advanced degrees. These years

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determine whether a kid gets into a prestigious high school, elementary school, or middle school, profoundly impacting a pupil's educational trajectory. No one pays more attention to their kids' schoolwork, grades, and accomplishments than their own. Most parents sign their kids up for multiple-topic after-school tutoring programs in the hopes that they will do better in primary school. The study found that many elementary school kids had never participated in extracurricular activities before the double reduction policy was implemented.

Academic Performance with Student's Efforts

Figure 7 illustrates the Academic performance with student's efforts curves of the modified double reduction composites which are measured using Equations 5 and 6. The research found that students' academic performance improved in direct correlation to the amount of time they spent studying; however, it took much more time to raise their scores by one letter grade. According to the research, students' grades improve significantly when they devote more time to studying. Academic success requires dedication of both time and energy. To succeed academically, one must devote one's time and energy consistently and study intently for a long time. Test results are proportional to the amount of effort put into grasping material, doing homework, and studying for exams.

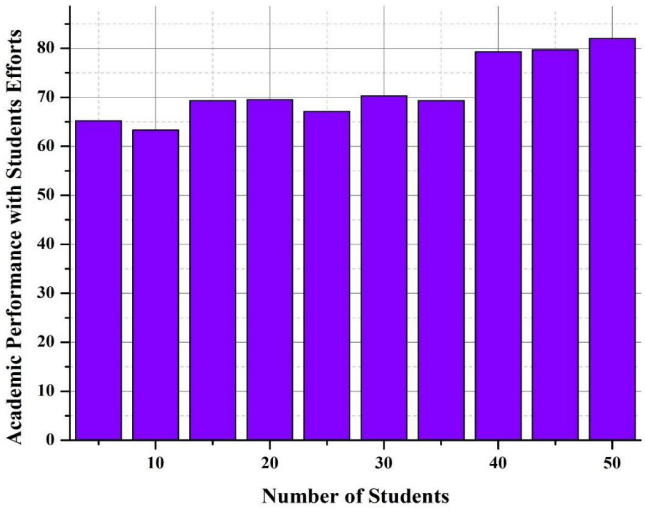

Figure 7. Academic Performance with Students Efforts

Students' academic performance is greatly enhanced when they consistently attend courses, ask for help when needed, and actively participate in self-directed learning. Furthermore, in order to maximize performance, it is essential to manage time efficiently, establish objectives, and maintain a balanced approach to academics and other obligations. In most cases, being a good student comes down to managing your time well and putting in a lot of hard work. Students with these abilities can better organize their time and make the most of forthcoming tasks and activities. Having this in place helps students stay organized, which in turn reduces the likelihood of procrastination and increases the likelihood of academic achievement. For students with packed schedules, learning to manage their time wisely is essential.

Students Academic Satisfaction

Figure 8 illustrates the academic success curves of the modified scientific literacy composites and double reduction composites, measured using Equation 9. The student's academic self-efficacy may be defined as their confidence in their own skills to do well in primary school, including their trust in their own capacity to complete assignments and absorb course content. The degree to which a person believes in their own abilities to succeed academically is a measure of their belief level in academic achievement. A student's accomplishment level, often their performance level, is a numeric score.

The four performance tiers are basic, Below Basic, Proficient, and Advanced. This concept includes self-efficacy, which is the conviction that one can achieve success in academic pursuits, belief in the worth of education, and belief in the significance of working hard and being committed to one's objectives. Confident students often take the initiative to learn new things, have more intrinsic motivation, and keep going even when things get tough. Cultivating a strong commitment to academic success may help one overcome hurdles and attain academic performance. People who believe in themselves and their skills to accomplish goals tend to have high levels of self-efficacy.

https://doi.org/10.56294/sctconf2024987

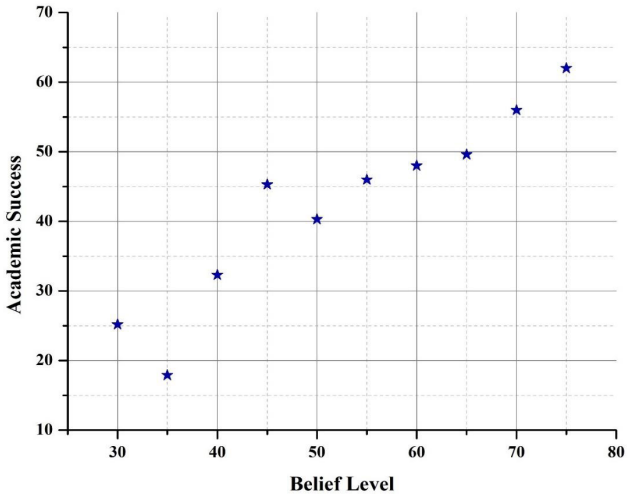

Figure 8. Student's Academic Satisfaction

CONCLUSIONS

The 'double reduction' strategy is a game-changer regarding the battle for educational reform. This article primarily focuses on the benefits of the 'double reduction' approach while also exploring its possible drawbacks and new problems that may emerge. If governments, schools, and parents implement these extra recommendations, the 'double reduction' plan will have a better chance of succeeding. The first step for governments should be to set standards for the fair allocation of school funding and the administration of off-campus education. Second, the foundation of a well-rounded education should be a primary school, where students learn to be authentic, develop strong moral principles, and develop their analytical and problem-solving skills. It is essential that elementary school curricula include after-class service. Thirdly, parents must set appropriate expectations for their kids and modify their educational conceptions. In addition, everyone, from parents to students to the larger community, should work together to create a first-rate ecological learning environment. Efforts should be made consistently, even when the 'double reduction' policy enforcement may not have resulted in improvements in schooling.

Classroom education is the primary means students acquire knowledge, competence, and character. Instruction in the classroom, according to the "double reduction" idea, should focus on subject-matter literacy, value students' subjective involvement, and set them up for success in autonomous, in-depth study. Encouraging students to actively explore and seek truth through facts may be achieved by focusing on enhancing their foundational science literacy in elementary school. This, in turn, may help them become more creative, which is great for their academic and professional growth in the future. Teaching children to think creatively from an early age has the potential to have a positive impact on society. Educators are morally obligated to guide their elementary school students toward a life of innovation by providing them with the tools they need to think creatively and solve problems. This research suggests that by evaluating literature and undertaking field studies, elementary and secondary school students might improve their inventive talents. It continues by outlining a strategy to construct a diverse curriculum utilizing a variety of resources, developing an evaluation index system to track students' creative growth over time, and finally, integrating the needs of science core literacy with those of other subjects to build a curriculum training system that is both effective and efficient. It is important to continue working to enhance the execution of the 'double reduction' strategy despite these constraints. Developing diverse curricular materials to encourage students' inventive ability, enhancing kids' creative talents in elementary school, and finding ways to incorporate off-campus resources into the on-campus curriculum are all significant and applicable areas of research.

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FINANCING

The authors did not receive financing for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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