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EDUCATION 5.0 PRACTICES AND USE OF INTERDISCIPLINARY APPROACHES IN TEACHING SCIENCE

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ABSTRACT

This survey-correlational research was conducted to determine the education 5.0 practices and the use of interdisciplinary approach in teaching science to basic education science teachers in the district of Sapian, school year 2025 – 2026. The participants of this study were the ninety-six (96) basic education science teachers from the total population of one hundred twenty-six (126) in the district of Sapian who were selected through stratified random sampling. The independent variable of the study was the Education 5.0 practices with factors encompassing technological connectivity, innovative pedagogy, and collaborative engagement. The dependent variable of the study was the use of interdisciplinary approach in teaching science with factors conceptual integration, collaborative learning, and applied synthesis. The data were gathered through the use of researcher-made questionnaires, these research instruments were the Education 5.0 practices questionnaire with 30-item statements, and the use of interdisciplinary approach in teaching science questionnaire with 30-item statements as well. The research instruments used underwent face and content validity and reliability testing. Frequency count, percentage, mean, and standard deviation were used for the descriptive analysis and Pearson r for the inferential analysis set at 0.05 level of significance. The following were the findings obtained: There was a "high" level of education 5.0 practices showed by the basic education science teachers as a whole, and "high" level of practice is determined as well in terms of technological connectivity, innovative pedagogy, and collaborative engagement. There was a "high" extent of use of interdisciplinary approach in teaching science determined from the basic education science teachers as a whole, and also, "high" extent of use was determined in conceptual integration, collaborative learning, and applied synthesis. There was a significant relationship with strong positive correlation between the education 5.0 practices and the use of interdisciplinary approach in teaching science of the basic education Science teachers.

KEYWORDS: *Education 5.0 Practices, Integration, Interdisciplinary Approaches, Science Teaching, Technology*

INTRODUCTION

New trends and practices are absorbed by the academic world to meet societal needs, which evolves corresponding to cultural, technological and economic scenarios. Today, education is being shaped by the challenges of the Fourth Industrial Revolution and the needs of the 21st century, which are dominated by fast-paced technological change, global interconnectivity and urgent social issues such as sustainability, pandemic threats and inequalities. These innovations have led to the concept of Education 5.0, formed around more than simply digitization of learning and making humanized education with technological innovation as well as total human being development (Rahayu and Mutiarani, 2022). Education 5.0 focuses on flexibility, creativity, empathy, ethical reasoning and sustainability to produce competent humans who will be prepared not only with technical knowledge but also the ability to engage thoughtfully with complex global problems (Sá and Serpa, 2020).

The job of Science education is to lay the groundwork for understanding processes that can be observed in day-to-day life. However, Traditional Science teaching has been often criticized as being fragmented, too much content heavy and rote based with less connection to authentic contexts of learning in the real world (Del Rosario, 2021). There is therefore an increasing demand for interdisciplinary teaching of Science, where the concepts, methods and perspectives of different disciplines are brought together in a cohesive manner in our educational system to promote more effective learning and reasoning (Zhou, 2020).

Subsequently, combines the intersections of biology, chemistry, physics and environmental science as well it does with technology, engineering and social issues fit this perspective to Education 5.0 (Lase et al., 2022), giving students an opportunity also to understand these connections in the world around them since some topics are interdisciplinary when integrated latter into life realities.

Worldwide, the drive to Education 5.0 and interdisciplinary Science education signals a critical necessity to reconsider education as preparation for life rather than work. Education is increasingly recognized as the wheel of sustainable development, innovation and social justice (UNESCO, 2021). Interdisciplinary Science education thus transforms not only as an instructional approach but also a prerequisite in preparing students to navigate and solve the complex world problems (Marques and Loureiro, 2021).

Fundamentally, Education 5.0 prioritizes humanization serving as counterbalance to innovation that works in accordance with moral citizens and environmentally conscious and socially responsible individuals (Rahayu and Mutiarani, 2022). The basic dimensions of Education 5.0 are: human-centric learning, interdisciplinary collaboration, digital literacy with emphasis on ethics and morals, creativity and innovation followed up by sustainability (Oke and Fernandes, 2020).

Interdisciplinary teaching approach has long been one of the calls upon inquiry in Science education, but has recently resounded at a higher pitch given global challenges which demand systemic understanding and collaborative problem solving. Cross-disciplinary team-teaching initiatives have been seen to enhance student engagement, critical inquiry and joint learning on an international scale (Zhou, 2020). An Indonesian study showed that integrating Science with technology and social content supported student problem solving and learner engagement (Lase et al., 2022). In Malaysia, it was indicated that the readers of Science were aware of environmental sustainability and used the knowledge for community projects (Mohammed et al., 2023). However, it has been reported that interdisciplinary teaching is faced with subject barrier, overloaded curriculum and teacher's confidence to incorporate subjects other than their field into the system (Rahayu et al., 2021).

Interdisciplinary approaches enable creativity, adaptability, and systems thinking, which were the three most important skills of the 21st-century learners, because they break down silos between, and forge links among, knowledge areas. This is right in line with the focus of Education 5.0 on holistic, people-centered learning that prepares students to learn for the rest of their lives and make positive contributions to society (Sá and Serpa, 2020).

In the Philippines, educational reforms during the past decade have aimed to bring the national system into line with international norms. In Science, the Kto12 Basic Education Curriculum promotes inquiry-based, contextualized, and spiral progression in learning (DepEd 2016). Moreover, the Commission on Higher Education (CHED) has also required outcomes-based education advocating HEIs to develop competencies and student-centered teaching (CHED, 2021).

Notwithstanding these policy orientations, research suggests substantial barriers to implementation. Teachers typically have high teaching loads, restricted laboratory facilities to use, and minimal professional development in interdisciplinary teaching pedagogy (Laguador 2021). Most Science classrooms are still teacher-centric with its tests concentrating on memorization rather than higher skills (Mabaquiao and Cruz, 2022). Despite the fact that policy discourse articulates Education 5.0 values, namely teamwork, creativity and sustainability (World Bank Group, 2017), its implementation continues to be uneven in schools with rural areas being at a disadvantage.

Research trends on Philippine Science Education New research studies in the Philippines concerning science education highlight the significant role of professional development for teachers to integrate interdisciplinary strategies (Laguador, 2021). There is also a recognition of the necessity of situating Science education based on local realities, including environmental sustainability, disaster preparedness and public health (Del Rosario, 2021). Nonetheless, only a few of the studies explored the practices that merge Education 5.0 with interdisciplinary teaching among Filipino Science teachers presenting an identified research gap in literature. Thus, the purpose of this study is to explore Education 5.0 Practices, and its role in utilizing interdisciplinary practices in teaching Science among teachers.

This study was anchored on the Connectivism Learning Theory by George Siemens (2005), which explains that learning occurs through the creation of connections among people, technology, and information. The emphasis of this theory is on the knowledge that is distributed across a network of nodes and that learning involves the ability to recognize and apply these connections to new situations.

For this study, Education 5.0 practices reflect connectivism principles through technological connectivity, innovative pedagogy, and collaborative engagement. Likewise, the use of interdisciplinary approaches in teaching science represents how teachers apply these connections by integrating concepts across disciplines through conceptual integration, collaborative learning, and applied synthesis.

Hence, guided by connectivism, this study assumed that teachers who demonstrated strong Education 5.0 practices were more likely to use interdisciplinary approaches that promote connected, relevant, and meaningful science learning.

Statement of the Problem

The main purpose of this study was to determine the Education 5.0 practices and the use of interdisciplinary approach in teaching science to basic education science teachers in the district of Sapian, school year 2025 – 2026.

Specifically, this study sought to answer the following questions:

1. What is the level of Education 5.0 practices of the basic education science teachers as a whole and in terms of technological connectivity, innovative pedagogy, and collaborative engagement?
2. What is the extent of the use of interdisciplinary approach in teaching science to basic education science teachers as a whole and in terms of conceptual integration, collaborative learning, and applied synthesis?
3. Is there a significant relationship between the Education 5.0 practices and the use of interdisciplinary approach in teaching science of the basic education science teachers?

Hypotheses

There is no significant relationship between the Education 5.0 practices and the use of interdisciplinary approach in teaching science of the basic education science teachers.

METHODOLOGY

This study aimed to determine the Education 5.0 practices and the use of interdisciplinary approach in teaching science to basic

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education science teachers in the district of Sapian, school year 2025 – 2026.

This study was designed for survey-correlational research where it involves a collection of data on phenomena that cannot be directly observed (Acuña, 2012) and investigates association between variables and the goal is to find out what variables may be related (David, 2015).

The independent variable in this study was the Education 5.0 Practices among basic education Science teachers with factors like technological connectivity, innovative pedagogy, and collaborative engagement and the dependent variable was the use of interdisciplinary approaches in teaching science with factors such as conceptual integration, collaborative learning, and applied synthesis.

The participants of the study were the 96 basic education science teachers from the total population of 126 in the district of Sapian for school year 2025 - 2026. The calculated sample size of 96 was determined by means of the sampling formula using 95% confidence level. The participants were chosen using stratified random sampling.

In determining the level of education 5.0 practices among the participants, the researcher used this 30-item researcher-made survey questionnaire. The questionnaire encompassed the factors; technological connectivity with 10 items, innovative pedagogy with 10 items, and collaborative engagement with 10 items. On the other hand, in determining the level of the Use of Interdisciplinary Approaches in Teaching Science of the respondents, the researcher used this 30-item researcher-made survey questionnaire. The questionnaire encompassed the factors; conceptual integration with 10 items, collaborative learning with 10 items, and applied synthesis with 10 items.

The instruments underwent face validation and subjected to reliability testing. In testing the reliability of the questionnaires, it was pilot-tested to thirty (30) basic education Science teachers who were not included as participants in the study. The Cronbach Alpha value of the education 5.0 practices instrument was 0.942, while the instrument for the use of Interdisciplinary Approaches in Teaching Science was 0.971. Hence the result of the pilot-test revealed that all items of the instruments were reliable.

The aforesaid instruments were responded by the participants using a 5-point scale where 5 was "Strongly Agree," 4 was "Agree," 3 was "Neutral," 2 was "Disagree," and 1 was "Strongly Disagree." Further, the mean was arbitrarily categorized as 4.21-5.00 "Very High," 3.41-4.20 "High," 2.61-3.40 "Moderate," 1.81-2.60 "Low," and 1.00-1.80 "Very Low."

Approval was sought from the Department of Education (DepEd) – Schools Division Office of Capiz to conduct the study in the District of Sapian. Permission was also obtained from the School Heads or Principals in administering the researcher-made survey questionnaire among the participants.

Following the approval, the administration of the survey questionnaires commenced. Also, participants were thoroughly informed about the purpose, procedures, and their absolute right to voluntary participation and withdrawal without penalty. The data obtained from the survey questionnaires were encoded, processed, and analyzed.

All procedures employed in the study were in consonance to Republic Act No. 10173, known as the Data Privacy Act of 2012 of the Philippines. To safeguard privacy and ensure compliance to ethical research protocols, all collected information was stored, ensured confidentiality and anonymity where in no personally identifiable information was linked to responses.

This study used frequency count, percentage, mean and standard deviation for descriptive data analysis and Pearson-r for inferential data analysis which was set at 5% level of alpha.

RESULTS AND DISCUSSION

Level of Education 5.0 Practices

The table presents the level of education 5.0 practices of the basic education science teachers. The data reveal that basic education science teachers exhibit "high" (M = 4.15; SD = 0.74) level of education 5.0 practices in their classroom teaching. In terms of technological connectivity, a "high" (M = 4.13; SD = 0.80) level of practice is apparent, as for innovative pedagogy, it reveals a "high" (M = 4.16; SD = 0.74) level of practice as well. Lasty, in terms of collaborative engagement, the result shows that the basic education science teachers have a "high" (M = 4.15; SD = 0.74) level of practice.

Table 1

Mean and Standard Deviation of Education 5.0 Practices

Variable	Mean	Description	SD
Education 5.0 Practices	4.15	High	0.74
Technological Connectivity	4.13	High	0.80
Innovative Pedagogy	4.16	High	0.74
Collaborative Engagement	4.16	High	0.76

The high level of education 5.0 practices exhibited by most of the basic education science teachers suggest that they are actively embracing technological connectivity, innovative pedagogy, and collaborative engagement in their classroom teaching. This implies that most of the basic education science teachers are not only aware of what education 5.0 is but are into its practice, with that, these teachers show readiness and remains compliant to support curricular reforms through the initiatives set forth by the Department of Education. More so, the result suggests that having a high level of education 5.0 practices of teachers ensures that the science subject is taught in a holistic way gearing towards transformative education focusing on the development of students in becoming creative problem-solvers, and responsible citizens as its emphasis deals with the development of 21st-century skills in consonance to the goal of Education 5.0 which is to cultivate human wisdom out of digital literacy.

In terms of technological connectivity, the high level of practice implies that most of the basic education science teachers are effectively integrating digital tools and other digital-based platforms into their classroom practice. Hence, these teachers are proactively using technological connectivity in enhancing their science teaching. This further implies that, most of these teachers have the ability in organizing learning activities through digital platforms, and they are able to integrate online simulations which is aligned to the implementation of transformative education campaign of the Department of Education. The result also suggests that these teachers possess openness to technology which attests that their digital competence can foster collaborative and innovative learning environments.

As to high level of practice of innovative pedagogy, majority of the basic education science teachers are consistently applying transformative teaching strategies in their classrooms. This implies that these teachers are designing learning experiences that connects science concepts to real-life topics, promote project-based learning, and encourage creativity and originality in student outputs addressing to students' learning needs. Moreover, this high level of practice ensures that reforms emphasizing learner-centered and inquiry-based strategies is implemented, making science teaching more meaningful and relevant to students. The result further implies that most of these basic education science teachers are already shifting their teaching strategies to respond to the diverse learning needs by exploring new teaching methods through digital platform which position to transformative education where teachers are reshaping the learning environment into one that is learner-centered, inquiry-driven, and future-oriented which ensures that students are prepared to thrive in the complexities of modern society.

The collaborative engagement of the basic education science teachers reveals high level of practice which implies that most of these teachers provide opportunities for task collaboration where students work together and participate in group-based learning activities. Further, this suggests that majority of these teachers are fostering environments where cooperation, shared responsibility, and peer mentoring becomes integral in the class and these practices direct to education 5.0 and transformative education of the Department of Education. Supplementary to the aforesaid implications, it further reflects that most of the basic education science teachers work hand-in-hand in designing and sharing science learning materials which demonstrates a culture of professional collaboration that strengthens the quality of education and promotes consistency across classrooms. This collaborative engagement among teachers aligns as well with the goal of education 5.0 and transformative education which is building relationships, fostering inclusivity, and preparing an individual to contribute meaningfully to society.

The result of this study corroborates with the findings of Gamad et al., (2024) positing that teachers in the Philippines demonstrate strong readiness for Education 5.0 as the number teachers and frequency of integrating digital technologies into teaching drastically increase which further highlights their adaptability to global challenges. While the findings of Colegado (2025) which reveals that innovative teaching strategies and materials via integration of digital technology makes classroom teaching more meaningful and responsive in todays' generation of students corroborates to the findings of this study. Also, the result of this study conforms with the findings of Ibon, Pagayonan, and Galay-Limos (2025) revealing that the increase of creativity and originality in student outputs is influenced by teachers' competence in utilizing various strategies overarching 21^{st} century skills. Moreover, the findings of Mendoza and Ramos (2024) affirm the result this study as it highlighted that teachers who encourage collaboration and shared responsibility among students through peer mentoring creates more supportive learning environments improves both academic performance and social skills of students.

On the other hand, the findings of Santos and Lee (2021) contradict the findings of this study as it reveals that unequal participation is highly evident in collaborative learning where dominant students overshadow quieter ones. Also, negating the result this study is the findings of Ortega (2020) revealing that there are inefficiencies when it comes group discussions and project-based tasks in large classes without strong facilitation.

Extent of the Use of Interdisciplinary Approach in Teaching Science

The table shows the extent of the use of an interdisciplinary approach in teaching science to basic education science teachers. The data reveals that basic education science teachers exhibit "high" (M = 4.18; SD = 0.70) extent of use of interdisciplinary approach in teaching science. In terms of conceptual integration, a "high" (M = 4.20; SD = 0.70) extent of use is evident, as for collaborative learning, it likewise reveals a "high" (M = 4.15; SD = 0.72) extent of use. Lasty, in terms of applied synthesis, the result shows that the basic education science teachers have a "high" (M = 4.18; SD = 0.72) extent of use.

Table 2
Mean and Standard Deviation of the Use of Interdisciplinary Approaches in Teaching Science

Variable	Mean	Description	SD
Use of Interdisciplinary Approaches in Teaching Science	4.18	High	0.70
Conceptual Integration	4.20	High	0.70
Collaborative Learning	4.15	High	0.72
Applied Synthesis	4.18	High	0.72

The result that shows there is a high extent of use of the interdisciplinary approach in teaching science implies that most of the basic education science teachers are integrating concepts of other subject areas in their science class to enriched connections to other subjects promoting holistic understanding and relevance to real-world contexts. Also, the result further implies that most of the basic education science teachers address the demands of 21st-century education, equipping learners with skills in critical thinking, problem-solving, and collaboration. Hence, this result underscores the readiness of the basic education science teachers to transformative education by integrating interdisciplinary strategies into their teaching.

As to conceptual integration, the result shows a high extent of use that implies majority of the basic education science teachers connect science concepts with ideas from other subject areas. This practice supplements classroom teaching by providing deeper connections across disciplines, allowing students to see a clearer view of science as a broader network of knowledge as it strengthens the relevance of science to daily life. This also encourages students to apply scientific concepts in varied contexts. This further reflects that most of the basic education science teachers are effectively bridging disciplinary boundaries by providing an interconnected learning experiences among students.

In view of the result where collaborative learning exhibited a high extent of use, it suggests that majority of the basic education science teachers embed student collaborative tasks into their teaching practices. This reflects that teachers create performance-based tasks where students learn from each another, and promote cooperation and exchange of ideas. Furthermore, the result implies that most of these teachers harmonize learning plans with fellow teachers in integrated lessons which encourage learners to become proactive by sharing experiences or perspectives which engage students in interdisciplinary collaboration. These practices underscore that collaboration is a means of strengthening understanding of science across disciplines.

The high extent of use of applied synthesis implies that most of the basic education science teachers guide learners in applying scientific knowledge to authentic and practical contexts which lead students to link science learning to real-life situations. More so, this high extent of use of applied synthesis reflects that these teacher gives weight on performance tasks that is grounded to current societal problems which drive the students in designing solutions requiring them to associate their perspectives from various fields. Hence, these practices let the students create outputs that reflect authentic experiences and emphasize the usefulness of integrated knowledge in solving complex problems, and highlight that science teaching extends to meaningful application, thereby cultivating learners' capacity for problem-solving, innovation, and relevance to everyday life.

The result of this study is in conformity of the findings of Cruz and Javier (2023) where they emphasized that integrating science with social and environmental issues enhances student engagement and strengthens relevance to daily life. Similarly, Manalo and De Guzman (2022) found that collaborative learning strategies in science classrooms foster teamwork and communication skills which affirms to the findings of this study. Moreover, the findings of Reyes (2021) revealing that performance-based science tasks requiring synthesis across disciplines cultivate problem-solving and innovation among students which conforms with the result of this study. On the contrary, in the study of Lopez (2020), it underscored that interdisciplinary projects in overcrowded classrooms often face logistical challenges which negates the findings of this study.

Relationship Between Education 5.0 Practices and the Use of Interdisciplinary Approach in Teaching Science

Result in table 3 shows that there is a significant relationship between education 5.0 practices and use of interdisciplinary approaches in teaching science ($p_{val} = 0.000$) since the p value is less that 0.05 level of significance. Also, the result further reveals that between education 5.0 practices and use of interdisciplinary approaches in teaching science, a strong positive correlation is evident ($r = 0.935$).

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Table 3
Pearson r Between Education 5.0 Practices and Use of Interdisciplinary Approaches in Teaching Science

Variables	r	Sig
Education 5.0 Practices and Use of Interdisciplinary Approaches in Teaching Science	0.935*	0.000

* p<0.05 significant @ 5% alpha level; ns p>0.05 not significant @ 5% alpha level

The significant relationship with strong positive correlation between Education 5.0 practices and the use of interdisciplinary approaches in teaching science implies that teachers who practice Education 5.0 principles are more likely to integrate science concepts across disciplines and this further reflects that science teachers who emphasize learner-centeredness, innovation, and relevance to real-life contexts are effectively bridging disciplinary boundaries, fostering collaboration, and promoting applied synthesis. More so, Education 5.0 practices serve as a catalyst in strengthening interdisciplinary approaches. Thus, connecting science learning with authentic personal experiences foster students' 21st century skills.

The result of this study affirms the finding of Garcia (2022) revealing that interdisciplinary teaching in science classrooms enhances students' ability to connect theoretical knowledge with practical applications, particularly when lessons are designed around real-world issues. Likewise, with the findings of Domingo and Ramos (2021) that collaborative and project-based learning strategies in science education foster creativity and critical thinking, especially when teachers integrate concepts across disciplines affirms to the result of this study as well.

Therefore, the hypothesis stating that there is no significant relationship between the education 5.0 practices and the use of an interdisciplinary approach in teaching science of the basic education science teachers is rejected.

CONCLUSIONS

1. There is a "high" level of education 5.0 practices showed by the basic education science teachers as a whole, and "high" level of practice is determined as well in terms of technological connectivity, innovative pedagogy, and collaborative engagement. The high level of education 5.0 practices among basic education science teachers indicated that they embody innovation, adaptability, and collaboration. They were teachers who were learner-centered, designing transformative and real-world learning experiences that cultivate curiosity, creativity, and critical thinking. They were also technologically proficient, which enabled them to maximizes the use of digital platforms, simulations, and online resources in connecting classroom teaching with the global trends. At the same time, having a high level of technological connectivity, innovative pedagogy, and collaborative engagement practices, these teachers foster teamwork, peer mentoring, and cooperative inquiry, ensuring that students develop the collaborative skills needed to thrive in diverse contexts. Thus, these teachers produce students who are proactive problem-solvers, transforming scientific knowledge into actionable solutions for community and societal challenges.

2. There is a "high" extent of use of interdisciplinary approach in teaching science determined from the basic education science teachers as a whole, and also, "high" extent of use is determined in conceptual integration, collaborative learning, and applied synthesis. The high extent of use of the interdisciplinary approach in teaching science among basic education science teachers led them as a proficient integrative thinker in which they efficiently connected science concepts with other disciplines through conceptual integration, showing the ability to design lessons that highlights the interconnectedness of knowledge. They also promoted collaborative learning by encouraging peer mentoring, group inquiry, and shared responsibility among students. Moreover, these teachers practiced applied synthesis by guiding learners in transforming theoretical knowledge into practical application. Therefore, these teachers created the learning environment that was enriched with viable experiences that bridge disciplinary boundaries, promoted shared understanding, and encouraged innovation, to produce students who were academically competent and socially responsive.

3. There is a significant relationship with strong positive correlation between the education 5.0 practices and the use of interdisciplinary approach in teaching science of the basic education science teachers. The significant relationship with strong positive correlation between Education 5.0 practices and the use of interdisciplinary approaches in teaching science led to a synergistic effect where one reinforces the other. Teachers putting into teaching practice the education 5.0 principles were actively integrating science concepts across disciplines. This means that the more frequent teachers practiced Education 5.0 principles, the more effectively they employed interdisciplinary approaches, leading to classrooms that were technologically enriched, conceptually integrated, and socially collaborative. Therefore, students can benefit more as they develop 21st-century skills while learning to connect scientific knowledge with authentic personal and societal experiences.

RECOMMENDATIONS

1. It is recommended that students may be equipped with education 5.0 practices by actively engaging in collaborative inquiry, and reflective learning activities. They may be trained to use digital platforms responsibly and creatively, applying technology to explore scientific concepts and solve real-world problems.

Also, teachers may strengthen their Education 5.0 practices through continuous self-development, such as attending workshops, online courses, and peer mentoring sessions. They may develop adaptability by experimenting with new pedagogical strategies, integrating simulations and digital tools into lessons, and designing interdisciplinary projects.

As to curriculum implementers, they may equip themselves with Education 5.0 practices by revisiting and redesigning curriculum guides and instructional materials taking into consideration the technological connectivity, innovative pedagogy, and collaborative engagement.

School heads as well may embody Education 5.0 by taking initiative in supporting teachers with resources, encouraging experimentation with digital platforms, and fostering a culture of teamwork within the school. By modeling adaptability and openness to change, they may set the tone for Education 5.0 practices to thrive.

For the parents, they may encourage responsible technology use, and engage in conversations that connect science learning to everyday life. Their active involvement reinforces the collaborative and innovative mindset that students develop in school.

2. It is recommended that students may be engaged in interdisciplinary activities by encouraging them to join to co-curricular and extra-curricular activities that connect science with other subjects, to experience and understand interconnected knowledge, which strengthen collaboration and help them apply theoretical concepts to real-world problems.

Moreover, teachers may enhance their interdisciplinary practice by continuously designing lessons that integrate science with other disciplines. They may enhance their skills in conceptual integration, collaborative learning environments, and practice applied synthesis by linking classroom concepts to practical applications.

As for curriculum implementers, they may equip themselves by revisiting instructional materials to integrate interdisciplinary connections. They may enhance science curricula by highlighting conceptual integration, collaborative learning, and applied synthesis, to craft lessons that is more holistic and future-ready.

For the school heads, they may provide in-service training to redefine the integration practices and direct support and recognition for teachers who successfully bridge disciplinary boundaries and promote innovation in science classrooms.

On the other hand, parents may reinforce interdisciplinary learning at home by encouraging children to connect science with everyday experiences and other subjects. They may support group projects, nurture curiosity, and provide opportunities through practical activities that link theory to real-world contexts.

3. It recommended that students may be encouraged to actively participate in technologically enriched and interdisciplinary learning tasks where they can be guided to connect science concepts with authentic personal and societal experiences, to strengthening their creativity, collaboration, and problem-solving skills.

For the teachers, it is recommended to consistently integrate Education 5.0 principles with interdisciplinary approaches in their daily practice. They may design lessons that combine digital platforms, conceptual integration, and collaborative inquiry, ensuring that students experience holistic and future-oriented learning.

Curriculum implementers may integrate both Education 5.0 practices and interdisciplinary strategies into science curricula. They may provide instructional materials and frameworks that highlight conceptual integration, collaborative learning, and applied synthesis, ensuring that teachers have the tools to sustain this synergy.

School heads are encouraged to support teachers by providing access to technological resources, encouraging interdisciplinary lesson designs, and fostering a collaborative school culture. Their leadership can ensure that classrooms remain innovative, globally connected, and socially responsive.

As to the parents, they may reinforce collaborative and problem-solving skills that students develop in school at home. They are encouraged to actively take part in building their children's foundational knowledge by connecting science-based knowledge with everyday experiences.

For future researchers, they may investigate how the synergy between Education 5.0 practices and interdisciplinary approaches impacts long-term student outcomes. They may as well explore challenges in sustaining this integration and propose scalable models that strengthen the link between transformative pedagogy and interdisciplinary science teaching.

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