EduLine: Journal of Education and Learning Innovation *ISSN: 2775-6173 (online)*
Vol. 5 No. 1 (2025)
https://doi.org/10.35877/454RI.eduline3010

The Impact of Science Workstation Strategy on Enhancing Student Engagement in Science Classes

Alle Mediha C. Canonio[a,*], Angelyn T. Caylan[b], & Genelyn R. Baluyos[b]

[a]*Ozamiz City National High School, Ozamiz City, 7200, Philippines*
[b]*Misamis University, Ozamiz City, 7200,Philippines*

Abstract

Student engagement stands as a critical determinant of academic success and learning outcomes, particularly in the realm of science education, where active participation and enthusiasm significantly impact knowledge acquisition and retention. This study aimed to enhance the engagement of Grade 7 students in science classes using the Science Workstation Strategy in one of the public schools in Ozamiz City during the academic year 2023-2024. The study utilized a classroom-based action research design. Thirty - five participants were selected through purposive sampling during the A.Y. 2023-2024 in a public school in Ozamiz City. The study used a researcher-made test and Minitab statistical software, utilizing tools such as mean, standard deviation, and t-test. The study yielded the following findings: (1) On the average, students' engagement displayed a high level of engagement before using the workstation strategy; (2) The students' engagement after using the Science Workstation Strategy improved significantly. They performed within the Moderately High range; (3) There was a significant difference in students' engagement before and after using the Science Workstation Strategy; and (4) There are other observed improvements among the students after the use of the Science Workstation Strategy. In conclusion, using the science workstation strategy effectively improved students' engagement in science and enhance learning experiences. This supports a recommendation in adopting this strategy as teaching method to improve student engagement in science classes.

Keywords: student engagement, science workstation strategy, experiential learning.

1. Introduction

Student engagement is a multifaceted and flexible construct that integrates behavioral, emotional, and cognitive involvement (Pedler et al. 2020). The problem of keeping students engaged in the context of modern education has grown increasingly urgent. In particular, low student engagement has become a serious issue in scientific classrooms that requires attention and thoughtful approaches. Studies conducted both domestically and internationally have shown a steep drop in middle school students' interest in Science.

There needs to be more evidence indicating that scientific student involvement in Aotearoa, New Zealand, is lower in high school and higher in elementary school despite over two decades of cross-sectional research demonstrating this pattern (Martin et al., 2021). Variations in student engagement are common in classrooms; some students seem uninterested or unconnected to the learning process. Participation in an educational setting results in engagement when students appreciate and apply what they have learned (Attard & Holmes, 2021).

The Philippines came in third out of the ten nations with the lowest scores in the 2022 Programme for International Student Assessment (PISA) rankings for Science. Engaging students in science learning has proven to be one of the biggest challenges facing science education teachers (Juuti et al., 2021). Numerous studies demonstrate that traditional methods like memorization only sometimes spark science education. Since Science always evolves, educators must adjust to new pedagogical approaches. Teachers must exercise caution when using technology to ensure students fi nd learning engaging and enjoyable. For students to learn,they must participate (Bergdahl et al., 2020). Learning requires student engagement fueled by motivation, as elucidated by self-determination theory (SDT) (Chiu, T. K., 2022).

* Corresponding author.
E-mail address: allemediha.canonio@deped.gov.ph

The quality of students' participation or connection with the educational endeavor is what is meant to be understood by student academic engagement (Zhou, 2021). Active participation in class activities, a love of learning, and dedication to academic work are traits of high levels of engagement. Academic study scholarly research school study scholarly work academia schoolwork academic tasks academic research course subjects university tasks classwork scientific writing learning process coursework theoretical career academic class activities classroom activities written studies academic writing exams school work online classes education learning original.

Engaged students tend to display certain behaviors, like curiosity, joining discussions, and working hard on their assignments. This kind of engagement, which shows a student's commitment to their education, is essential for deep learning and understanding. On the other hand, low engagement can cause a person to disengage from the learning process, hurting educational outcomes and academic performance. As a result, encouraging student engagement is crucial to advancing academic success and positive educational experiences.

All learning is defined by engagement. Learners must take action to learn, which is what engages a student. Meaningful learning is only possible with engagement. An engaged learner is dedicated to and actively participates in

their own education (Hiver et al., 2020). Encouraging and successful learning is greatly dependent on student engagement. Students actively involved in the material are more likely to understand and remember it. When motivated to learn, students are more likely to investigate subjects, pose questions, participate in debates, understand difficult ideas, and put their knowledge to use.

For K–12 educators,fostering and sustaining student engagement and expanding opportunities for students to acquire 21st-century and instructional technology skills are critical factors to consider (Bond, 2020). The extent to which this is accomplished can significantly impact students' cognitive growth and learning outcomes since disengagement from learning is a risk factor for dropout. Active learning has been much more successful in keeping students' attention than traditional lectures (Pompano & Venton, 2021).

The impact of the science workstation strategy on increasing student engagement was found to have a knowledge gap in earlier research, according to the researcher. Furthermore, science education should have been covered in the earlier research. This covers several unexplored dimensions that recently garnered interest for further study in related fi elds (cite two to three pertinent articles). Successful research involves collaboration and teamwork; more research should be done on the impact of science workstation strategy on improving student engagement [Miles, 2017].

This research aims to investigate and implement a targeted intervention to address the persistent problem of low student engagement in science classes. The study concentrates on the actual implementation of the Science Workstation Strategy because it acknowledges the vital role that curiosity and active engagement play in effective learning.

This study is,therefore, grounded in John Dewey's theory of learning, which highlights the significance of experiential learning. Students learn best when they engage in an action-refl ection cycle. Learners can gain a deeper understanding by connecting their experiences to their prior knowledge through active engagement in activities and establishing interactive, hands-on learning stations in one of Ozamiz City's public schools for the 2023–2024 school year to help students improve their engagement in science classes by utilizing the Science Workstation Strategy. It was created with students in mind, giving scientific ideas greater substance and interest. Action research was carried out using the science workstation strategy to improve student engagement in science classes.

2. Research Methods

2.1. Research Design

This study used a classroom-based action research design to assess the effectiveness of the science workstation strategy and its possible effects on improving student engagement in junior high school students. The study aims to find out how science workstation strategies affect students' engagement levels.

With the help of this strategy, educators could examine their methods and determine what strategies and tactics worked best for the students in their classes. Through a systematic and reflective process known as "classroom

based action research," educators examine and resolve particular classroom problems or difficulties. It is an approach to inquiry that seeks to enhance instruction by incorporating research into teachers' regular routines. Action

research was utilized to tailor teachers' professional development after improvement goals were established, allowing for a more significant approach to professional development (Mertler, 2013).

2.2. Research Setting

The study was conducted at a junior high school in Ozamiz City, more precisely at the grade 7 level in one of the secondary schools. The school offers a variety of curricula, including the Open High School Program,the Strengthen Technology Vocational Education Program,the Special Science Curriculum,the Regular Curriculum, and the Special Program of the Arts. The school's mission has been to provide the neighborhood with curriculum-based, excellent, reasonably priced education

2.3. Respondents of the Study

Thirty-six junior high school students in grade 7 participated in the study. The technique of purposive sampling was employed in the selection of participants. The criteria used to select the participants were: 1. Students enrolled in grade 7 at Ozamiz City National High School for the academic year 2023–2024; 2. Students from sections that were observed to have low student engagement; 3. Students who provided their full consent to participate in the

study as respondents; (4). Because the researcher teaches in the Mt. Makiling section, only students from that section were selected. Before starting the survey,the researcher ensured these requirements were satisfied.

2.4. Data Collection

Data Gathering Methods. Quantitative data will be gathered for this action research. The researcher will create test questions and other tools to gauge seventh-grade students' interest in Science.

a. Pre-Implementation Phase. The researcher started crafting the research proposal, developing lesson plans, and creating researcher-made Likert scale survey questionnaires and a prototype strategy. Eventually,the researcher sought permission from the Superintendent of the Division of Ozamiz City and authorization from the principal and cooperating teacher to conduct research at a secondary school in Ozamiz City.

b. Implementation Phase. During the implementation stage, information was gathered by administering a pre-test to the respondents, having the researcher use the targeted strategy on them for a predetermined time, and keeping track of the participant's participation. Additionally, data analysis will be done so the researcher can assess whether or not the strategy is significantly effective.

c. Post-Implementation Phase. The post-implementation stage includes formulating a conclusion,formulating recommendations, editing, proofreading, and finalizing the research study. It also entails appropriately informing a certain group of people about the research findings.

2.5. Ethical Considerations

Every research project must prioritize the protection of human participants by adhering to the relevant ethical guidelines (Arifin, 2018).

The nature of their involvement in the study should be explained to the participants, and they will be asked to sign an informed consent form. All information will be treated in confidence. The paper will not in any way reveal the identities of the participants. Before the participants answered the surveys, their informed consent was obtained to uphold the study's ethical standards. Throughout the survey,respondents were informed about the research objectives, potential benefi ts to them and others,the data's confi dentiality, and anonymity. All conversations regarding the study were entirely truthful and open;false information, coaching, and misinterpretation of the primary data were avoided.

2.6. Data Analysis

The following tools were used with MiniTab and HyperResearch statistical software:

a. *Mean and Standard Deviation* were used to determine the learners' level of involvement before and after the Science Workstation Strategy was implemented.

b. *T-test* was used to investigate the significant difference in student engagement before and after the application of the Science Workstation Strategy.

c. *Thematic analysis* was used to explore other improvements observed among the learners after the use of Science Workstation Strategy with the aid of HyperReseacrh software.

3. Results and Discussion

3.1. Learners' Engagement Before Using Science Workstation Strategy

Table 1 presents students' Engagement Before the Use of the Science Workstation Strategy Students' participation before applying the Science Workstation Strategy. With an overall mean (M) of 3.44 and a standard deviation (SD) of 0.21,the student's level of engagement was classified as high.

The results show that, before the implementation of the workstation method, students' level of participation in science activities was, on average,fairly high. The comparatively low standard deviation (SD = 0.21), which indicates consistency in engagement levels, suggests that most students had similar levels of engagement.

The research shows that students were already highly involved with their science activities before the science workstation strategy was implemented. This high degree of engagement (M = 3.44, SD = 0.21) indicates a high level of student interest and involvement in the learning process. The low standard deviation further suggests that there was little variety in the students' high levels of involvement, making it a frequent experience.

The engagement level was categorized as high on the given scale (3.40–4.19), indicating that the students were significantly involved in their science learning activities even prior to the implementation of the workstation technique. Researchers in educational psychology have identified the conceptual haziness of student engagement as a multifaceted construct despite its critical role in supporting intended schooling outcomes (Wong et al., 2022). Behavioral, emotional, and cognitive engagement are the three components that make up the flexible, multifaceted construct known as student engagement. The literature, which is significant because it shows how teachers affect student engagement, emphasizes the importance of the teacher's role in ensuring that students can engage in meaningful activities (Pedler et al., 2020). Crucially, research indicates a strong comprehension of how educators affect students' participation. Studies show that teachers can considerably improve student involvement by creating a safe and encouraging learning environment, implementing successful teaching techniques, and upholding high standards.

The results imply that before the science workstation technique was implemented,the students were already very involved in their science-related learning activities. This high level of participation is a good sign for the current teaching strategies and classroom setting. To further increase engagement to the 4.20–5.00 range,there is still room for improvement. Teachers and school administrators can consider implementing learning strategies like the scientific workstation to close this engagement gap and raise student interest even more. By implementing these tactics,teachers may increase student engagement to an extremely high level and ensure every student gets the most out of their science education.

Table 1. Learners' Engagement Before Using Science Workstation Strategy

Learners' Engagement	M	SD
Moderate High	3.44	0.21

Note Scale: 4.20-5.00 (Very High); 3.40-4.19 (High); 2.60-3.39 (Moderately High); 1.80-2.59 (Low); 1.00-1.79 (Very Low)

3.2. Learners' Engagement After Using Science Workstation Strategy

Table 2 presents the student engagement levels following the Science Workstation Strategy deployment. The standard deviation (SD) is 0.23, and the mean (M) is 4.29, indicating a Very High degree of overall engagement. Based on the given scale,this score is in the "Very High" category (4.20-5.00), which suggests that the pupils are quite engaged.

The results indicate that the Science Workstation Strategy is a very successful way to get kids interested in learning. With a mean engagement score of 4.29, students demonstrated a very high degree of involvement on average. The very low standard deviation (0.23) indicates that student engagement levels are not highly variable, suggesting that the method consistently benefits various learners.

Given their high engagement level, students are probably highly engaged in and actively participating in the science workstation strategy's activities. This might be because the interactive and hands-on workstations support numerous modern educational philosophies emphasizing student-centered instruction and active learning

For there to be true engagement,there must be some joy and satisfaction in the act of learning the language, and the learner must find the process to be at least somewhat inspiring. However, it also entails getting value, meaning, and purpose from the educational experience (Hiver et al., 2020). Educational psychology research highlights the role that intrinsic motivation plays in promoting engagement. Activities that support learners' objectives, beliefs, and aspirations also give them a sense of direction and significance, strengthening their dedication to the learning process.

The results have several ramifications for administrators and teachers. The extremely high level of engagement suggests that the Science Workstation Strategy might be useful for raising students' curiosity and engagement in science courses. However,to keep this method effective, it is necessary to ensure that it is applied accurately and consistently.

It is advised that teachers continue to improve the Science Workstation approach in light of these findings, possibly with other cooperative learning strategies to boost further student comprehension and engagement. Further,

they could receive ongoing professional development from educators and administrators to ensure they have all they need to apply the Science Workstation Strategy successfully. Furthermore,frequent student feedback is important to comprehend their experiences and modify the workstations as needed. When allocating resources, it's critical to ensure enough resources are available to update and maintain the workstations, keeping them interesting and relevant for students. By concentrating on these aspects,teachers may maintain high levels of engagement and even raise them, guaranteeing that students will always gain from the dynamic and engaging learning environment that the Science Workstation Strategy offers.

Table 2. Learners' Engagement After Using Science Workstation Strategy

Learners' Engagement	M	SD
Very High	4.29	0.23

Note Scale: 4.20-5.00 (Very High); 3.40-4.19 (High); 2.60-3.39 (Moderately High); 1.80-2.59 (Low); 1.00-1.79 (Very Low)

3.3. Significant Difference in the Learners' Engagement Before and After the Use of Science Workstation Strategy

Table 3 presents the statistical study comparing the levels of student engagement before and after the Science Workstation Strategy was implemented. Before the integration,the Mean (M) engagement score was 3.44 (SD = 0.21);following the integration, it rose to 4.29 (SD = 0.23). The null hypothesis (Ho), which claimed no significant change in learners' involvement before and after integrating the Science Workstation Strategy, was rejected when the t-test produced a t-value of 16.55 with a p-value of 0.000.

The results show that after the Science Workstation Strategy was implemented, student engagement improved noticeably. The post implementation score was classified as "Very High" (4.29), whereas the mean engagement score before the method was classified as "High" (3.44). With a p value less than 0.01,this considerable rise ($t = 16.55$, $p = 0.000$) indicates a highly significant improvement in engagement, demonstrating the method's efficacy.

Students were significantly more engaged following the implementation of the Science Workstation Strategy, as evidenced by the rise in the Mean score from 3.44 to 4.29. The low Standard Deviations (0.21 before and 0.23 after)

suggest that student engagement levels were consistently high both before and after the method was implemented, with a discernible uptick following.

Effective teaching is the key to student involvement, and there is a wealth of research on this topic (Barkley & Major, 2020). The substantial body of literature on effective teaching covers a wide range of pedagogical approaches, instructional strategies, and classroom management techniques, including but instructional strategies, and classroom management techniques, including but not limited to differentiated instruction, active learning methodologies, formative assessment practices,teacher-student relationships, and technology integration. These domains provide significant perspectives on how educators establish captivating classrooms and enable substantial learning opportunities for their pupils. The multifaceted concept of student engagement can be divided into three groups: emotional, cognitive, and behavioral. Participation in academic or social activities is considered behavioral engagement; understanding new concepts and mastering intellectually demanding skills is regarded as cognitive engagement; and positive and negative emotional responses to peers,teachers, and oneself are considered emotional engagement (Wester et al., 2021).

The notable rise in student participation has substantial ramifications for teachers and school officials. According to the statistics, increasing student engagement in scientific courses can be accomplished through the use of the scientific Workstation Strategy. This can result in better learning outcomes, a stronger interest in Science, and increased general academic performance.

The following guidelines and activities are offered to take advantage of these findings and fi ll in any gaps: (1) Sustained Implementation: Make sure that the Science Workstation Strategy is continuously incorporated into the curriculum to sustain high levels of student involvement. (2) Continuous Improvement: To maintain the strategy's applicability and efficacy, update and modify the workstations regularly in response to student input and developments in educational technology. (3) Teacher Training: Continually provide teachers with professional development opportunities to support their innovative and successful implementation of the Science Workstation Strategy. (4) Monitoring and Assessment: Put in place a system to monitor student participation and assess how the workstations affect learning objectives. Make well-informed decisions regarding instructional approaches by using this data. Teachers may maintain and even improve student involvement by concentrating on these areas, which will help to optimize the advantages of the Science Workstation Strategy.

Table 3 Significant Difference in the Engagement of Learners Before and After the Use of Science Workstation Strategy

Variables	M	SD	t-value	p-value	Decision
Before Integrating Science Workstation Strategy	3.44	0.21	16.55	0.000	Reject Ho
After Integrating Science Workstation Strategy	4.29	0.23			

Ho: There is no significant difference the learners' engagement in probability before and after integrating science workstation strategy

*Note: **p<0.01 (Highly Significant); *p<0.05 (Significant); p>0.05 (Not significant)*

3.4. Other Developments Observed Among the Learners After the Use of Science Workstation Strategy

The impact of implementing the Science Workstation Strategy on improving the engagement of seventh-grade science students was examined in this study. Study participants shared their experiences and feelings regarding the implementation of this exercise. Ten participants provided responses, which the researchers used to classify the responses by analyzing the data for significant meaning and emerging themes. The study highlights three key themes that shed light on the experiences and emotions of participants when utilizing the Science Workstation Strategy. These themes are 1) heightened student involvement, 2) enhanced curiosity and inquiry, and 3) improved problem-solving and resilience. These results highlight how important a scientific workstation strategy is for increasing student interest in science classes.

3.5. Increased Student Engagement

The Science Workstation Strategy has increased student engagement in the science classroom. Through the use of interactive, diversified learning activities, students are engaged in the process of learning. They are now active contributors to their education rather than only passive consumers of knowledge. Pupils have observed a significant shift in how they participate in class,their heightened concentration during experiments, and their excitement for learning about scientific ideas. The ability to touch and investigate objects rather than listen has made learning more engaging and approachable for students thanks to workstation design. This tactic fosters a dynamic learning environment where students are inspired to take ownership of their education and feel empowered. 1, 2, 3, 5, and 7 of the participants made these claims.

> *"Before, I used just to sit back and watch during science class. But with the Science Workstation, I'm always eager to jump in and try out the experiments." (P1)*
>
> *"I'm more motivated to participate because I can see how the concepts we learn in class apply in real-life experiments at the Workstation." (P2)*
>
> *"I used to feel disconnected from science, but now I feel connected because I'm actively involved in the experiments." (P3)*
>
> *"The Science Workstation challenges me to think and explore. I feel like I'm learning more by doing rather than just listening." (P4)*
>
> *"I look forward to science class now because of the Science Workstation. It's a lot more engaging than just reading from a textbook." (P5)*

An engaged learner is dedicated to and actively participates in their education (Hiver et al., 2020). Students show initiative by looking for extra materials and delving into subjects outside the classroom. An engaged learner also has a strong sense of accountability for their educational path, continuously devoting time and energy to meeting their academic objectives. Key concerns for K–12 educators are fostering and sustaining student engagement and expanding chances for pupils to acquire 21st-century and instructional technology skills (Bond, 2020).

3.6. Enhance Curiosity and Inquiry

The Science Workstation Strategy increased students' curiosity and inquiry, which encouraged them to investigate and pose questions. They get to experiment and see how things function, which piques their interest in learning more. Their curiosity encourages them to explore and comprehend scientific concepts more fully. Students engage more actively in the scientific inquiry process as their curiosity grows, which results in greater learning and comprehension. Participants asserted these:

> *"I've noticed that we ask more questions now. We're curious about how things work and why certain outcomes happen." (P2)*
>
> *"We're more curious about the world around us now. The Science Workstation makes us wonder about the science behind everyday phenomena." (P3)*
>
> *"I've noticed that we're more curious about the world beyond the classroom. We want to learn about how science impacts our daily lives." (P4)*
>
> *"The Science Workstation has made us more curious about the natural world. We're always wondering why things happen the way they do." (P8)*
>
> *"We're more curious about science now because we can see how it applies in real-life situations. It's not just theoretical anymore." (P9)*
>
> *"The Science Workstation has made us more curious learners. We're always asking 'why?' and trying to fi nd the answers through experimentation." (P10)*

The process whereby knowledge is created through the transformation of experience" is the definition of experiential learning. Theorists of experiential learning specifically view learning as a cycle that entails experiencing,thinking about,reflecting on, and acting upon a circumstance or an experience (Carmeli et al., 2021). Critical thinking skills

are influenced by the knowledge that students have learned. One learning approach that can effectively help students improve their critical thinking abilities is inquiry (Rahmi et al., 2019).

Students can better analyze, assess, and synthesize material when they have a solid foundation of knowledge in a given subject. One pedagogical strategy that has demonstrated significant promise in developing students' critical thinking abilities is inquiry-based learning. One pedagogical strategy that has shown considerable promise in developing students' critical thinking abilities is inquiry-based learning. Students are encouraged to independently research issues, pose questions, and consider potential answers in an inquiry-based learning environment.

3.7. Improve Problem-Solving and Resilience

Students' capacity to manage difficult assignments has also increased due to the Science Workstation Strategy. They have grown more tenacious and resilient, seeing setbacks as chances to improve. They develop resilience and self-confidence as they learn to overcome these obstacles with tenacity and resolve. Additionally,the method helps pupils improve their problem-solving skills and boost their self-assurance in challenging circumstances.

Participants asserted these:

> *"We're more persistent now. Even when things get tough, we're determined to figure it out because we know we can learn from the challenge." (P1)*
>
> *"We're more focused on finding solutions to problems. Instead of giving up when things get hard, we're motivated to keep trying until we succeed." (P3)*
>
> *"We're more confident in our problem-solving abilities now. The Science Workstation has helped us develop critical thinking skills that we can apply to any challenge." (P6)*
>
> *"We're more resilient learners. The Science Workstation has shown us that setbacks are opportunities to learn and grow." (P7)*
>
> *" It boosts my confidence in learning on my own by providing a fun way to explore and understand new topics and lessons like having my personal science teacher." (P1)*
>
> *"We're better at asking for help when we need it. The Science Workstation has taught us that it's okay to seek support when facing difficult tasks." (P9)*

Access to knowledge and experiential learning will likely improve a team's ability to solve creative problems (Carmeli et al., 2021). Students can apply theoretical knowledge in real-world contexts through active interaction with real-world challenges and hands-on experiences. Through hands-on learning, students develop their problem-solving abilities and obtain important insights into the intricacies of real-life situations. Students gain the collaborative problem-solving skills required to handle challenging issues as a team as they participate in practical learning activities and draw from various knowledge sources.

4. Conclusion

4.1. Summary

During the academic year 2023–2024, a specific secondary public school in Ozamiz City undertook a study to improve the science engagement of its grade 7 students by implementing the Science Workstation Strategy. Purposive sampling was used to choose 35 students for the study, which employed an action research methodology centered in the classroom. The data were collected via a test that the researcher created, and the analysis involved t testing, standard deviation calculations, and mean determination. The study's specific goals were to (1) ascertain students' engagement before utilizing the Science Workstation Strategy, (2) ascertain students' engagement after the Science Workstation Strategy, and (3) identify any noteworthy differences in students' engagement between the Science Workstation Strategy and its implementation. and (4) investigate additional trends noticed in the students following the application of the Science Workstation Strategy.

4.2. Findings

The following were the key findings of the study:

1. Before the Science Workstation was implemented,the learners' engagement level was deemed to be high.
2. The students' general engagement level improved After the Science Workstation Strategy was incorporated into the teaching process.
3. The students' level of engagement before and after applying the Science Workstation Strategy differed significantly.
4. The pupils showed additional development after using the science workstation in science class. This entails raising student involvement,fostering inquiry and curiosity, and strengthening resilience and problem-solving skills.

4.3. Conclusions

Based on the findings, the following conclusions are drawn:

1. Student participation in science classes rose dramatically once the Science
1. Workstation Strategy was implemented.
2. High involvement indicates that the Science Workstation Strategy significantly improved students' comprehension of scientific concepts and ability to apply them in real-world situations.
3. Science Workstations promoted a cooperative learning atmosphere, motivating students to cooperate and assist one another. This collaborative approach enhanced students' participation and assisted them in acquiring
4. critical communication and cooperation skills.
5. The interactive aspect of the Science Workstation improved students' views about Science as a subject. Students were encouraged to engage more thoroughly with the curriculum because they found Science more engaging and exciting to learn because of the workstations' dynamic and interactive features.

4.4. Recommendations

Based on the finding and conclusions, it is recommended that:

1. Schools should consider using the Science Workstation Strategy in courses other than Science. This approach may prove advantageous across various subject areas, considering how well it fosters student involvement, curiosity, inquiry, problem-solving abilities, and resilience.
2. Given the study's effectiveness, educational institutions should support the development of collaborative learning spaces. Classroom layouts might be redesigned to support workstation configurations that encourage group work, conversation, and peer-to-peer learning.
3. Monitoring student engagement and learning outcomes through frequent evaluations is essential to maximizing the benefits of the Science Workstation Strategy. The input obtained from these evaluations can assist teachers in improving their methods,resolving issues, and ensuring the plan is still meeting the needs of the pupils.

Inquiry-based learning and curiosity should be valued and encouraged in schools. This can be accomplished by including more project-based learning activities, allowing students to delve deeply into subjects of interest, and promoting an inquiry-driven methodology within the framework of the Science Workstation. The involvement and excitement shown by the students in the study will be sustained with the support of this culture.

References

Arifin, S. R. M. (2018). Ethical considerations in qualitative study. International journal of care scholars, 1(2), 30-33.

Attard, C., & Holmes, K. (2020). “It gives you that sense of hope”: An exploration of technology use to mediate student engagement with mathematics. Heliyon, 6(1).

Barkley, E. F., & Major, C. H. (2020). Student engagement techniques: A handbook for college faculty. John Wiley & Sons.

Bedenlier, S., Bond, M., Buntins, K., Zawacki-Richter, O., & Kerres, M. (2020). Facilitating student engagement through educational technology in higher education: A systematic review in the field of arts and humanities. Australasian Journal of Educational Technology, 36(4), 126-150.

Bergdahl, N., Nouri, J., Fors, U., & Knutsson, O. (2020). Engagement, disengagement and performance when learning with technologies in upper secondary school. Computers & Education, 149, 103783.

Bond, M. (2020). Facilitating student engagement through the flipped learning approach in K-12: A systematic review. Computers & Education, 151, 103819.

Bond, M., & Bedenlier, S. (2019). Facilitating student engagement through the flipped learning approach in K-12: A systematic review. Computers & Education, 151, 103819.

Bond, M., & Bedenlier, S. (2019). Facilitating student engagement through educational technology: towards a conceptual framework. Journal of Interactive Media in Education, 2019(1).

Carmeli, A., Levi, A., & Peccei, R. (2021). Resilience and creative problem-solving capacities in project teams: A relational view. International Journal of Project Management, 39(5), 546-556.

Chiu, T. K. (2021). Digital support for student engagement in blended learning based on self-determination theory. Computers in Human Behavior, 124, 106909.

Chiu, T. K. (2022). Applying the self-determination theory (SDT) to explain student engagement in online learning during the COVID-19 pandemic. Journal of Research on Technology in Education, 54(sup1), S14-S30.

Cleary, P. W., Thomas, D., Hetherton, L., Bolger, M., Hilton, J. E., & Watkins, D. (2020). Workspace: A workflow platform for supporting development and deployment of modelling and simulation. Mathematics and Computers in Simulation, 175, 25-61.

El Kharki, K., Berrada, K., & Burgos, D. (2021). Design and implementation of a virtual laboratory for physics subjects in Moroccan universities. Sustainability, 13(7), 3711.

Harper, S. R. (2009). Student engagement in higher education (p. 1). S. J. Quaye (Ed.). New York and London: Routledge.

Hiver, P., Al-Hoorie, A. H., & Mercer, S. (Eds.). (2020). Student engagement in the language classroom (Vol. 11). Multilingual Matters.

Hiver, P., Al-Hoorie, A. H., & Mercer, S. (Eds.). (2020). Student engagement in the language classroom (Vol. 11). Multilingual Matters.

Juuti, K., Lavonen, J., Salonen, V., Salmela-Aro, K., Schneider, B., & Krajcik, J. (2021). A teacher–researcher partnership for professional learning: Co-designing project-based learning units to increase student engagement in science classes. Journal of Science Teacher Education, 32(6), 625-641.

Kahn, P. E. (2014). Theorising student engagement in higher education. British Educational Research Journal, 40(6), 1005-1018.

Kostoulas, A., & Lämmerer, A. (2015). Classroom-based research. Materials created for ELT Connect 2015.

Mertler, C. A. (2013). Classroom-based action research: Revisiting the process as customizable and meaningful professional development for educators.

Pedler, M., Hudson, S., & Yeigh, T. (2020). The teachers' role in student engagement: A review. Australian Journal of Teacher Education (Online), 45(3), 48-62.

Qureshi, M. A., Khaskheli, A., Qureshi, J. A., Raza, S. A., & Yousufi, S. Q. (2023). Factors affecting students' learning performance through collaborative learning and engagement. Interactive Learning Environments, 31(4), 2371-2391.

Rahmi, Y. L., Alberida, H., & Astuti, M. Y. (2019, October). Enhancing students' critical thinking skills through inquiry-based learning model. In Journal of Physics: Conference Series (Vol. 1317, No. 1, p. 012193). IOP Publishing.

Richards, S. (2023). Faculty Perception of Student Engagement in Online Anatomy Laboratory Courses During the COVID-19 Pandemic. Medical Science Educator, 1-16.

Sánchez, J., Andreu-Vázquez, C., Lesmes, M., García-Lecea, M., Rodríguez-Martín, I., Tutor, A. S., & Gal, B. (2020). Quantitative and qualitative evaluation of a learning model based on workstation activities. Plos one, 15(8), e0236940.

Shukri, M. S., Akif, Z. M., & Affendi, J. A. (2020). Workstation with Ergonomic Features for Universiti Kuala Lumpur MIDI Classroom. Malaysian Journal of Public Health Medicine, 20(Special1), 72-76.

Snijders, I., Wijnia, L., Rikers, R. M., & Loyens, S. M. (2020). Building bridges in higher education: Student-faculty relationship quality, student engagement, and student loyalty. International Journal of Educational Research, 100, 101538.

Sturm, H., & Bogner, F. X. (2010). Learning at workstations in two different environments: A museum and a classroom. Studies in Educational Evaluation, 36(1-2), 14-19.

Takala, S. (1994). Action Research in the Classroom.

Venton, B. J., & Pompano, R. R. (2021). Strategies for enhancing remote student engagement through active learning.

Wester, E. R., Walsh, L. L., Arango-Caro, S., & Callis-Duehl, K. L. (2021). Student engagement declines in STEM undergraduates during COVID-19–driven remote learning. Journal of microbiology & biology education, 22(1), 10-1128.

Wolf, R. (2023). Enhancing student engagement: Engaging the post-pandemic face-to-face prelicensure nursing student: A review of the literature. Teaching and Learning in Nursing.

Wolverton, C. C., Hollier, B. N. G., & Lanier, P. A. (2020). The impact of computer self -efficacy on student engagement and group satisfaction in online business courses. Electronic Journal of E-learning, 18(2), pp175-188.

Wong, Z. Y., & Liem, G. A. D. (2022). Student engagement: Current state of the construct, conceptual refinement, and future research directions. Educational Psychology Review, 34(1), 107-138.

Zhou, X. (2021). Toward the positive consequences of teacher-student rapport for students' academic engagement in the practical instruction classrooms. Frontiers in psychology, 12, 759785.

Zuber-Skerritt, O. (Ed.). (2021). Action research for change and development. Routledge.