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Renewable Quantum Learning Technology as an Effort to Increase Confidence and Learning Outcomes in Elementary School

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ABSTRACT:*The provision of facilities for learning is very necessary for the continuity of education. Through the latest technology in learning, especially quantum learning can increase students' confidence and learning outcomes. This study aims to describe the process of increasing self-confidence and learning outcomes through the implementation of quantum learning. Furthermore, knowing the increase in self-confidence and student learning outcomes through quantum learning. This research was conducted through 2 cycles, including planning, implementation, evaluation, and reflection. Data collection was done through interviews, observations, and tests. A total of 20 elementary school students who became the subject of the study. 2 types of data analysis techniques, namely quantitative data analysis and qualitative data analysis. The results showed an increase in self-confidence and student learning outcomes through the application of quantum learning. The stages of quantum learning include: grow, experience, name, describe, repeat, and celebrate. The application of quantum learning can increase student's self-confidence from 51% to 70% in cycle 1, and increased to 95% in cycle 2. While the average value of learning outcomes in the initial condition is 78.05, increasing to 83.5 in cycle 1, and increased to 90.5 in cycle 2.*

KEYWORDS *-renewable; quantum learning; confidence; learning outcomes*

I. INTRODUCTION

The contents of each section may be provided to understand easily about the paperElementary School is one of the institutions that organize formal education to achieve national education goals. Education in schools is carried out in the form of a teaching and learning process based on the curriculum used by the school. The current curriculum is generally the 2013 curriculum, by applying thematic learning. Thematic learning is a learning approach that combines several learning materials from various basic competencies of one or several subjects in a theme. The achievement of the learning process experienced by students at school can be seen from the learning outcomes obtained by students. States that student learning outcomes are changes in behavior as a wider learning outcome covering the affective, cognitive, and psychomotor domains[1]. The affective domain is related to attitudes and values[2]. The cognitive domain contains behaviors that emphasize intellectual aspects, such as knowledge and thinking skills[3]. The psychomotor domain contains behaviors that emphasize manipulative functions and motor skills/physical abilities[4].

One of the important affective aspects of learning activities is self-confidence. States that self-confidence is an attitude of confidence in one's own ability to fulfill every desire and hope[5]. Confidence is importantly instilled in students to achieve optimal learning outcomes. In learning activities, students are often directed to activities that require an attitude of confidence, such as speaking out opinions, answering teacher questions, making presentations, working on questions or assignments independently[6]. Some of these activities cannot be done if students do not have confidence in their abilities[7]. Inferior attitude, low self-esteem can hinder the progress of students in learning material. Strong self-confidence is expected not only to motivate yourself to move forward.

However, with confidence, students are expected to be able to face various learning problems with their abilities (not depending on friends). Self-confidence is also closely related to the character of independence. For example, students who believe in their abilities will usually try to do assignments or questions during exams according to their own beliefs, will not ask here and there, or cheat which means they have independence based on their self-confidence[8]. Furthermore, states that self-confidence is the basic capital for success in all fields. So, self-confidence is one of the keys to student success in learning[9]. Without self-confidence, students will not be successful in interacting with their friends. In addition, without self-confidence, students will hesitate in working on questions, and in the end, they will not get maximum results. Based on this description, self-confidence is an attitude of courage and confidence in oneself in one's ability to fulfill every wish and hope.

States that cognitive learning outcomes are behavioral changes that occur in the area of cognition[10]. The learning process in the cognition area includes activities starting from the reception of external stimuli by sensory, storage, and processing in the brain into information to recalling information when needed to solve problems[11]. The cognitive domain ranks thinking skills according to the expected goals. The thinking process describes the stages of thinking that must be mastered by students to be able to apply theory to action.

Cognitive learning outcomes are a description of the level of student mastery of the subjects they take or students' mastery of something to know whether students have achieved the specified competencies[12]. However, at this time there are still problems related to student learning outcomes, namely student learning outcomes that are low or do not reach the specified minimum completeness criteria (MCC). States that low learning outcomes are influenced by several things such as the use of inappropriate learning models, the use of monotonous methods, and less contextual presentation of material.

Therefore, teachers should be able to innovate and know the characteristics of their students to guide students in achieving the competencies learned. This will enable student learning outcomes in the form of grades to reach the MCC. Thus, students can be categorized as complete in mastering a competency, and in the end, it will be easier to accept competencies at the next level.

Based on the results of interviews with third-grade teachers at SD Negeri 5 Parepare, there were several problems in the learning that took place, such as most students who were still shy when answering the teacher's questions or taking directions from the teacher, there were students who did not dare to convey the results of their work, and some students get low learning outcomes. Starting from this problem, the researcher then dug deeper data regarding the low self-confidence of students and student learning outcomes. Initial data on students' self-confidence was obtained through observations during learning activities. There are 5 indicators of self-confidence that are used as a reference for observation. From as many as 20 students observed, it is known that the average self-confidence of students is 51% in the low category. Next, the researcher observed the student's test scores document, and it was known that the student's mean score was 78.5 with a sufficient predicate. In addition, it is known that from as many as 20 students 11 students achieve a score of 70 or reach the minimum completeness criteria (MCC).

These problems encourage researchers to increase self-confidence and student learning outcomes by applying a quantum learning model. State that quantum learning is a set of philosophical approaches to learning that have been proven effective in schools and businesses for all types and all ages[13]. Quantum Learning is defined as "interactions that convert energy into the light". All life is energy. The well-known formula in quantum physics is that mass times the speed of light squared equals energy ($E = mc^2$).

Our bodies are materially likened to matter, as learners our goal is to reach as much light as possible; interactions, relationships, inspiration to produce light energy. Furthermore, states that quantum learning is a learning model that combines several methods, namely positive suggestion, understanding acceleration techniques, and positive language delivery[14]. Suggestology or suggestopedia emphasizes that suggestions can and affect the outcome as well as the learning situation. Some of the techniques used to provide positive suggestions include seating students comfortably, putting on class background music, using posters, and providing trained teachers.

Accelerated learning is changing habits by increasing speed, for example, being able to understand mathematical concepts quickly and easily. While the neurolinguistics program (NLP) is a program about how the brain organizes information, such as how to use positive language to increase positive actions that stimulate the brain to be stimulated to actively learn.

[15] states that the stages of the quantum learning model are: (1) Grow; namely to foster interest and motivation of students, (2) Natural; namely using students' knowledge to answer questions or explore the material being studied, (3) Name; namely naming by providing keywords or showing concepts. (4) Demonstrating is students demonstrating teaching materials or practice opportunities, (5) Repeat; namely repeating the lesson or concluding the material, (6) Celebrate; namely giving recognition/appreciation to students. From some of these descriptions, it can be concluded that the quantum learning model is a learning model that emphasizes the application of positive suggestions that affect the results as well as the learning situation, accelerating understanding easily or simply, and delivering positive language to increase positive

actions and stimulate the brain to learn. The Quantum learning stage is CENDRC (Cultivate Interest, Experience, Name, Demonstrate, Repeat, and Celebrate).

The reason researchers chose the quantum learning model is that the quantum learning model can be applied at all ages, and is more flexible when applied to online or offline learning. The application of the quantum learning model will allow teachers to combine various positive suggestions and their interactions with the environment that can affect a person's learning process and outcomes. Therefore, students will be invited to study in a more comfortable and pleasant atmosphere, so that students will be freer to find new experiences in their learning. This innovative learning model tends to be more student-centered (student-centered learning) so that it allows students to be more active. Through the interactions that occur in the learning process, it is possible to increase students' self-confidence. In addition, quantum learning first deployed at SuperCamp California shows that students get better grades, participate more, and are more proud of themselves. So, quantum learning that will be applied will make it possible to improve student learning outcomes, especially in thematic learning.

The objectives of this study are: (1) to describe efforts to increase students' self-confidence and learning outcomes through the application of the quantum learning model, (2) to increase student's confidence through the application of the quantum learning model, (3) to improve student learning outcomes through the application of the quantum learning model. Several previous studies use the quantum learning model. This is because the quantum learning model can provide an increase in self-confidence and learning outcomes.

Concludes that the use of the quantum learning model can increase students' self-confidence and science learning outcomes[1]. The increase in self-confidence was proven by the results of the questionnaire, the percentage of trust in the first cycle was 73.48% insufficient criteria then increased in the second cycle to 77.28% in good criteria. The increase in learning outcomes is shown by the percentage of students who complete the MCC, namely in the first cycle of 78.27% and increase in the second cycle to 86.96%.

The research was conducted in two cycles, and each cycle consisted of two meetings. The researcher revealed that teachers should make good use of time so that the implementation of the quantum learning model can be carried out optimally, besides that teachers also need to be more active in helping and observing students during learning. Concluded that the application of quantum learning can have a significant effect on students' self-confidence[3].

This is evidenced by the confidence instrument which shows t count (15.777) > t table (1.68). The research applies quantum learning in stages, namely CENDRC. However, in practice, teachers need to motivate students more, supervise classes, and guide students individually or in groups. In addition, the research conducted by [5]concluded that the learning outcomes of fifth grade students who were taught using the quantum learning model were higher than the fifth grade students' learning outcomes who were taught using the direct instruction model.

The average test score of students who were taught using the quantum learning model was 92, while students who were taught using the direct instruction model were 79[7]. The quantum learning applied in this study paid attention to the elements of the quantum model so that it also showed the relative time spent by students studying and doing assignments. However, in this study, teachers need to pay more attention to time, focus on the academic process, supervise, and condition their students.

Next up, [8]concludes that the application of a quantum learning model assisted by microsoft powerpoint media can increase the average value of science learning outcomes in fourth-grade students. The average percentage of student learning outcomes in the first cycle is 67.28%, increasing in the second cycle to 76.6%.

This research was carried out collaboratively between teachers and researchers. The quantum learning model in this study was applied with the help of Microsoft PowerPoint media, and applied things such as (1) conditioning the classroom atmosphere and classroom environment well, (2) directing students to follow the learning process well, (3) guidance during the process, (4) giving a test to determine students' understanding during the learning process, (5) providing follow-up as an independent exercise.

Research conducted by [9]concluded that the quantum learning model can improve science learning outcomes in terms of cognitive, affective, and psychomotor aspects of fourth-grade students, Dharmasraya Regency. This is evident from the increase in the percentage of students who complete. The percentage of students who completed the initial condition was 17%, then in the first cycle increased to 53%, and in the second cycle increased to 87%. This research applies quantum learning with the steps of collision, natural, name, demonstrate, repeat and celebrate. Some things need to be considered in this study, namely to explore students' opinions or responses, it is better to use sentences that are more directed to the learning process with the quantum learning model.

This study focuses on increasing students' self-confidence and learning outcomes in the subject matter of Theme 6: Energy and Its Changes, Subtheme 2: Energy Changes. The hypotheses formulated by the researchers are: (1) increasing self-confidence and student learning outcomes can be done by applying the quantum learning model, with collision steps; natural, name; demonstrate; repeat; and celebrate, (2) the application of the quantum learning model can increase students' self-confidence, and (3) the application of the quantum learning model can improve student learning outcomes.

II. METHOD

This type of research is classroom action research (CAR) adapted from [13]with a cycle that includes the stages of planning, implementing, observing, and reflecting. The subjects of this study were 20 students consisting of 11 male students and 9 female students. The data analysis technique used is the quantitative analysis and qualitative analysis.

Data collection techniques used in this study were interviews, observations, and tests. Interview activities were carried out by referring to the interview sheet to find initial data related to class conditions and the variables to be studied, namely self-confidence and student learning outcomes. Observation/observation activities in this study were carried out during the learning process. Observations were made based on the observation sheet to get confident data before the study (initial conditions) to data in each cycle.

Then, the data collection technique was in the form of a test using 10 multiplechoice type evaluation questions for each cycle. This question is used to obtain data on learning outcomes in each cycle. The instruments used in this study were validated first by being validated by experts (expert judgment), namely 2 class teachers. Then, the instrument was improved based on expert advice. The following are the eligibility criteria for the instruments used.

Table Instrument assessment criteria

Average score	category
3,25-4,0	Very good
2,50-3,25	good
1,75-2,50	Well
1,00-1,75	Not good

In the evaluation question instrument, which has been validated by experts and improved, then construct validity is carried out. The construct validity test was carried out by testing the evaluation questions for first to fourth-grade students. After the questions are tested, the results of the test questions or answers from students will be obtained, then processed using the SPSS 21 application. The questions/instrument items are considered valid if r count > r table, and conversely instrument items are considered invalid if r count < r table.

Preliminary survey

1. Confident

Initial data on self-confidence was obtained through observation before the research/action took place. Based on the initial observations, it is known that the average self-confidence of 20 students is 51% in the low category.

2. Learning Outcomes

Initial data on student learning outcomes were obtained from the average test scores and the percentage of students who had reached the minimum criteria (MCC). The average test score of 20 students in the initial condition was 78.05 in the predicate enough. In addition, it is known that students who reach the MCC are 11 students (55%),while as many as 9 students (45%) have not yet reached the MCC.

Making measurement plots of observations

Data on students' self-confidence were obtained through observations made by researchers before the research took place and during the research (during learning/action). The observation sheet used is filled in by putting a tick (√) on the indicator of self-confidence following the circumstances that occur or the indicators of the students that appear. The steps used by the researcher in calculating the attitude of self-confidence are: (a) counting the number of ticks (√) from each indicator of self-confidence, each tick is given a score of 1, (b) calculating the percentage of each indicator (indicator 1 – 5) self-confidence,(c) Calculate the average percentage of students' self-confidence, (d) Determine the category of the average percentage of self-confidence using a value conversion table. The following table of categories of self-confidence.

Table Category of student confidence

Persentase	category
85 – 100	Very high
70 – 84	high
55 – 69	Currently
40- 54	Low
0- 39	Very low

Learning outcomes data were obtained through tests with multiple choice questions as instruments. The test is given to students at the end of cycle 1 and cycle 2. The data processing of learning outcomes from the answers to test questions done by students is processed in the following way: (a) scoring the answers to each question that is done by students. The correct answer is given a score of 1; while the wrong answers are given a score of 0, (b) calculate the value of each student, (c) calculate the average student score, (d) calculate the percentage of students who reach the MCC, (e) compare student learning outcomes from the initial condition with after the action on every cycle. If the results increase, then student learning outcomes can be said to increase.

Indicators of success from this research can be seen from the achievement of the target of each indicator that has been determined. The initial condition is confident with an average of 51%, targeted to increase to 60% in the first cycle, and 80% in the second cycle. The initial condition of student learning outcomes with an average value of 78.05, is targeted to increase to 80 in the first cycle, and increase to 85 in the second cycle.

Measured Variables

1. Confident

Students' self-confidence was observed using the observation sheet instrument compiled by the researcher. The indicators of self-confidence as a reference for observations are: (a) answering questions without hesitation, (b) daring to express opinions on a topic, (c) not being awkward in acting, (d) daring to do the given task, (e) daring to display results. profession.

2. Learning Outcomes

The observed student learning outcomes are cognitive. Learning outcomes data are based on test scores (evaluation questions) that are done by students in each cycle. The test questions used are in the form of10 multiple choice objective questions. The preparation of these questions refers to the class III material for civics, Indonesian, and mathematics lessons contained in theme 6: Energy and Its changes, subtheme 2: energy changes.

Comparison of Response Stages of Implementation/Research Design

This action research was carried out in two cycles. Each cycle lasts for two meetings/learning conducted online/online. This is because this research was carried out during a pandemic. Each learning lasts for 1 day, while the activities are virtual meetings through the zoom meeting application, then students carry out learning activities at home independently or accompanied by parents. In student independent activities, the teacher always monitors through the WhatsApp application to ensure learning activities take place according to the planned scenario. The learning model applied to each learning is a quantum learning model. The following is the stage plan for each cycle that will be carried out by the researcher:

1. Cycle 1

a. Planning

The researcher prepared the lesson plan (LP), mediastudent activity sheet (SAS), and the first cycle evaluation instrument, along with the first cycle observation sheet instrument.

b. Implementation

Carry out learning by referring to the devices that have been prepared and using the prepared media. Learning is carried out online/online twice and applies quantum learning stages consisting of: grow, experience, name, demonstrate, repeat, and celebrate.

c. Observation

Carry out observations to obtain self-confidence data in cycle I. While student learning data are obtained from test scores using evaluation questions in cycle I.

d. Reflection

Evaluate the results achieved during the first cycle and make comparisons of the initial conditions and the results of the first cycle. The researcher also evaluates the obstacles, then plans improvements to be applied in the second cycle.

2. Cycle 2

a. Planning

Prepare lesson plans, media, SAS, and the second cycle evaluation instrument, along with the second cycle observation sheet instrument.

b. Implementation

Carry out learning by referring to the devices that have been prepared and using the prepared media. Learning is carried out online/online twice and applies quantum learning stages, namely: grow, experience, name, demonstrate, repeat, and celebrate.

c. Observation

Carry out observations to obtain confidence data in cycle II. While student learning data was obtained from test scores using evaluation questions in cycle II.

d. Reflection

Evaluating the results achieved during the second cycle and making comparisons of the results of the first cycle and the results of the second cycle.

III. RESULT AND DISCUSSION

The activity of observing students' self-confidence was carried out during the learning activities. This observation is carried out at the end of each cycle and refers to the five confidence indicators. The following are the results of self-confidence observations in each cycle.

Table The results of the observation of students' self-confidence in the initial conditions, cycle I, and cycle II.

confidence indicator	Initial conditions		cycle I		cycle II	
	f	%	f	%	f	%
Answer questions without hesitation	11	55	14	70	19	95
Dare to express opinions on a topic	10	50	13	65	18	90
Not awkward in action	10	50	13	70	20	100
Dare to do the given task	9	45	14	70	18	90
Dare to show the results of the work	11	55	15	75	17	85
The average percentage of students' confidence		51		70		92

Data on student learning outcomes were obtained through tests carried out by students at the end of each cycle. The test instrument is in the form of 10 multiple-choice questions. The question material is in Class III, Theme 6 Sub-theme 2, which includes energy changes, determining the length of time for an activity, and obligations for energy use.

Table The following are the test scores obtained by students at the end of each cycle.

Student learning outcomes	Initial conditions	Cycle I	Cycle II
Average student scores	78,05	83,5	90,5
Many students complete	11	16	19
Percentage of students completed	55%	80%	95%

Classroom action research in class III thematic learning by applying the deep quantum learning model consists of two cycles. Cycle I begins with preparing learning tools, learning media, and observation instruments, as well as test instruments. Furthermore, the implementation of the first cycle activities was carried out by the researcher by teaching as a teacher. Researchers work together with colleagues to make observations when learning takes place. Learning is done online using the whatsapp, zoom, google classroom, and google forms applications. In general, there are three parts of activities, namely initial activities, core activities, and closing activities.

The learning activities carried out refer to the steps of the quantum learning model, namely: grow, experience, name, demonstrate, repeat, and celebrate. At the growth stage, the thing to do is to motivate students by singing songs related to the material being taught. In the natural stage, students listen to simple explanations of material related to everday life through video illustrations, pictures, and short descriptions. At the naming stage, students are directed to find and record important terms. At the demonstration stage, students carry out learning activities according to the material such as making sentences, counting time, drawing, or making tables. In the repeat stage, students convey the results of their work, they are given feedback by the teacher.

At the celebration stage, students get an appreciation for the learning that has been done. The stages of observation in this study were carried out with the help of research colleagues who acted as observers. In the learning that took place, the observer said that it was starting to appear that more students were answering questions from the teacher, the students were not shy when doing the directions from the teacher, and the students were also brave to show the results of their work.

Through these observations and tests carried out by students in the first cycle, it was found that students' self-confidence and learning outcomes increased compared to the initial conditions and had reached the target of the first cycle, but had not yet reached the final target. The initial condition of the average percentage of student confidence is 51%, increasing to 70%. The initial condition of student learning outcomes with an average value of 78,05 in the predicate enough, increased to 83.05 in the predicate good. The number of students who completed the initial conditions was 11 students with a percentage of 55%, increasing in the second cycle to 16 students with a percentage of 80%.

Based on the reflection and evaluation of the first cycle of learning activities, the researchers encountered several obstacles and obstacles so that learning was felt to be not optimal. Constraints and shortcomings in cycle I, namely: (a) internet connection that is less stable, (b) delivery of material that has not been balanced, (c) less able to control the classroom atmosphere. These things will be improved by researchers in the implementation of learning in cycle II, so it is hoped that the implementation of cycle II will take place better.

From the various things that were carried out in the first cycle, it became the researcher's reference in carrying out the second cycle. In the preparation in cycle II, it is almost the same as in cycle I. Furthermore, in the implementation of learning, there are several activities that are more varied in the stages of quantum learning compared to activities carried out in cycle I. In the growing stage, the teacher invites students to cheer up with the aim of arousing students' interest in learning.

At the natural stage, the explanation of the material presented by the teacher can be balanced and not dominant in a material. At the naming stage, students are encouraged to interact with each other in finding the concepts of the material being studied. At the demonstration stage, students are directed to carry out independent learning activities, such as making videos and drawing analog clocks. In the repeat stage, students convey the results of their work and get feedback from the teacher. At the celebration stage, students are invited to clap three seconds as a celebration of learning that has been done well.

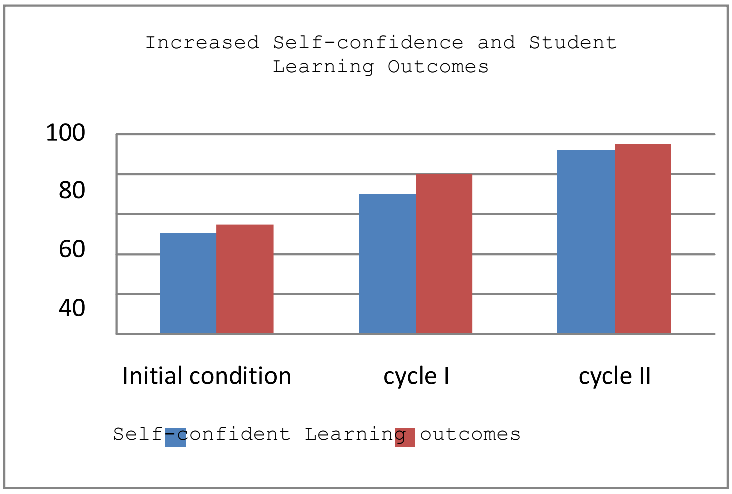
Observation activities in cycle II were carried out by the researcher asking for the help of colleagues as observers. Some of the comments made by the observers were that the learning took place better than the previous cycle, the students seemed enthusiastic in participating in the lesson with many answering questions or commenting on what the teacher said correctly, the students dared to do something assigned by the teacher, and the students were brave. to show the results of their work.

Through the observations in the second cycle, confidence data was obtained. Through the test questions that are held by students at the end of the second cycle, the data on learning outcomes is obtained. In working on the questions, most students seem to master the material that has been taught, the students do not show difficulties when working on them, and the students can work on the questions well.

The students' self-confidence and learning outcomes increased from the results of the first cycle. The data obtained had reached the final target. The average result of the percentage of students' self-confidence in the first cycle was 70%, increasing to 92% in the very high category. The average value of student learning outcomes in the first cycle was 83,05 in the good predicate, increasing to 90.5 in the very good predicate. The percentage of students who completed the first cycle was 80%, increased in the second cycle to 95%.

The implementation of the second cycle of learning tends to be smoother than the first cycle. This is because the shortcomings and obstacles experienced can be overcome. Researchers as teachers try to carry out online learning by utilizing a more stable internet connection. In delivering material, researchers who act as teachers pay more attention to the duration of time, so that delivery can be balanced. In addition, researchers also tried to be able to control the atmosphere of the class.

The variables in this study were self-confidence and student learning outcomes. Data on self-confidence and student learning outcomes were obtained in the initial conditions, cycle I, and cycle II. After the data obtained are compared, it can then be stated that students' self-confidence and learning outcomes have increased in the initial conditions and in each cycle. The following is a graph of increasing self-confidence and student learning outcomes



Graph of increasing self-confidence and student learning outcomes

The results of this study are following previous research, namely research conducted by[1] the results showed that the application of the quantum learning model could increase the self-confidence and science learning outcomes of fourth grade students.

These results are evidenced by the average percentage of trust in the first cycle of 73,48% in sufficient criteria then increased in the second cycle to 77,28% in good criteria. Then, the increase in learning outcomes is shown by the percentage of students who complete the first cycle by 78,27% and increases in the second cycle to 86,96%. There are similarities in previous research and this research, namely the use of research methods and the use of applied learning models[16], [17].

In general, the conclusions obtained are the same, namely self-confidence and student learning outcomes can be increased through the application of the quantum learning model[18], [19]. However, in the acquisition of research data, it appears that the increase in self-confidence in each cycle in this study tends to be more significant. Meanwhile, the difference in the increase in the percentage of students who complete is more significant in previous studies. Another difference is, if the previous research did not discuss the data on the initial conditions of the study, while in this study it contained conditions in the initial conditions or pre-cycle.

The success of increasing self-confidence and student learning outcomes cannot be separated from the advantages of the quantum learning model [20], [21]. Through the application of quantum learning, it is more possible to create a positive learning atmosphere, deliver material easily, with simple things or examples that are often encountered in everyday life. In addition, this model emphasizes the use of positive language to encourage increased positive actions.

IV. CONCLUSION

Based on the research results obtained, it can be concluded that efforts to increase students' self-confidence and learning outcomes through the application of the quantum learning model are carried out in six stages, namely: grow, experience, celebrate, name, demonstrate, and repeat. The application of the quantum learning model can increase students' self-confidence. The average percentage of students' self-confidence was 51% in the low category, then in the first cycle it increased to 70% in the high category, and in the second cycle it increased again to 92% in the very high category. The use of quantum learning models can improve student learning outcomes. The average value of learning outcomes in the initial conditions was 78,05 and the percentage of students who completed was 55%, then increased in the first cycle to 83,5 with the percentage of students completed by 80%, then in the second cycle it increased again to 90,5 with the percentage of students who complete is 95%.

The suggestion in this research is the quantum learning model which is one of the innovative learning models that can be applied by teachers in learning as a variation. However, if the learning carried out is thematic learning by combining several or subject matter, the teacher should map the material and take into account the content to be delivered first. It is intended that some of the material in a series of learning can be delivered with a balanced portion.

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REFERENCES

[1] R. A. Mashami and G. Gunawan, "The Influence of Sub-Microscopic Media Animation on Students' Critical Thinking Skills Based on Gender," *J. Phys. Conf. Ser.*, vol. 1108, no. 1, 2018, doi: 10.1088/1742-6596/1108/1/012106.

[2] H. Cahyati, A. Muin, and E. Musyrifah, "Efektivitas Teknik SCAMPER dalam Mengembangkan Kemampuan Berpikir Kreatif Matematis Siswa," *J. Medives J. Math. Educ. IKIP Veteran Semarang*, vol. 2, no. 2, p. 173, 2018, doi: 10.31331/medives.v2i2.641.

[3] S. C. Kim, A. S. Arun, M. E. Ahsen, R. Vogel, and G. Stolovitzky, "The Fermi–Dirac distribution provides a calibrated probabilistic output for binary classifiers," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 118, no. 34, 2021, doi: 10.1073/pnas.2100761118.

[4] D. Dharminder and K. P. Chandran, "LWESM: learning with error based secure communication in mobile devices using fuzzy extractor," *J. Ambient Intell. Humaniz. Comput.*, vol. 11, no. 10, 2020, doi: 10.1007/s12652-019-01675-7.

[5] Imran, S. Ahmad, and D. H. Kim, "Quantum GIS Based Descriptive and Predictive Data Analysis for Effective Planning of Waste Management," *IEEE Access*, vol. 8, 2020, doi: 10.1109/ACCESS.2020.2979015.

[6] J. Zhang, X. Zhu, and J. Bao, "Denoising Autoencoder Aided Spectrum Reconstruction for Colloidal Quantum Dot Spectrometers," *IEEE Sens. J.*, vol. 21, no. 5, 2021, doi: 10.1109/JSEN.2020.3039973.

[7] L. Lamata, "Quantum reinforcement learning with quantum photonics," *Photonics*, vol. 8, no. 2. 2021, doi: 10.3390/photonics8020033.

[8] M. Altın and A. S. Saracaloğlu, "The effect of Quantum learning model on foreign language speaking skills, speaking anxiety and self-efficacy of secondary school students," *J. Lang. Linguist. Stud.*, vol. 15, no. 3, 2019, doi: 10.17263/jlls.631550.

[9] J. Olivares-Sánchez, J. Casanova, E. Solano, and L. Lamata, "Measurement-based adaptation protocol with quantum reinforcement learning in a rigetti quantum computer," *Quantum Reports*, vol. 2, no. 2, 2020, doi: 10.3390/quantum2020019.

[10] T. M. Khan and A. Robles-Kelly, "Machine Learning: Quantum vs Classical," *IEEE Access*, vol. 8, 2020, doi: 10.1109/ACCESS.2020.3041719.

[11] S. Y. C. Chen and S. Yoo, "Federated quantum machine learning," *Entropy*, vol. 23, no. 4, 2021, doi: 10.3390/e23040460.

[12] P. Hunt, L. Hosseini-Gerami, T. Chrien, J. Plante, D. J. Ponting, and M. Segall, "Predicting p KaUsing a Combination of Semi-Empirical Quantum Mechanics and Radial Basis Function Methods," *J. Chem. Inf. Model.*, vol. 60, no. 6, 2020, doi: 10.1021/acs.jcim.0c00105.

[13] Y. Li, M. Tian, G. Liu, C. Peng, and L. Jiao, "Quantum optimization and quantum learning: A survey," *IEEE Access*, vol. 8. 2020, doi: 10.1109/ACCESS.2020.2970105.

[14] S. Feng, H. Zhou, and H. Dong, "Application of deep transfer learning to predicting crystal structures of inorganic substances," *Comput. Mater. Sci.*, vol. 195, 2021, doi: 10.1016/j.commatsci.2021.110476.

[15] L. Lamata, "Quantum machine learning and quantum biomimetics: A perspective," *Mach. Learn. Sci. Technol.*, vol. 1, no. 3, 2020, doi: 10.1088/2632-2153/ab9803.

[16] S. N. Kane, A. Mishra, and A. K. Dutta, "Preface: International Conference on Recent Trends in Physics (ICRTP 2016)," *J. Phys. Conf. Ser.*, vol. 755, no. 1, 2016, doi: 10.1088/1742-6596/755/1/011001.

[17] T. Hadinugrahaningsih, Y. Rahmawati, and A. Ridwan, "Developing 21st century skills in chemistry classrooms: Opportunities and challenges of STEAM integration," *AIP Conf. Proc.*, vol. 1868, no. August, 2017, doi: 10.1063/1.4995107.

[18] J. Urbani, S. Roshandel, R. Michaels, and E. Truesdell, "Developing and Modeling 21st-Century Skills with Preservice Teachers," *Teach. Educ. Q.*, vol. 44, no. 4, pp. 27–50, 2017.

[19] S. Cenberci, "The Investigation of the Creative Thinking Tendency of Prospective Mathematics Teachers in Terms of Different Variables," *J. Educ. Train. Stud.*, vol. 6, no. 9, p. 78, 2018, doi: 10.11114/jets.v6i9.3434.

[20] W. Wartono, M. N. Hudha, and J. R. Batlolona, "How are the physics critical thinking skills of the students taught by using inquiry-discovery through empirical and theorethical overview?," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 14, no. 2, pp. 691–697, 2018, doi: 10.12973/ejmste/80632.

[21] J. Jose M Ocampo, "Effecting Change on Students?? Critical Thinking in Problem Solving," *Educare*, vol. 10, no. 2, pp. 109–118, 2018.