Enhancing Pupils' Performance in Mathematics through the Use of Concrete-Pictorial-Abstract Approach

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ABSTRACT

One of the main issues discussed in the field of mathematics education is how students are able to possess mathematical abilities at every level of education. This study examined the effectiveness of using concrete-pictorial-abstract approach to enhance pupils' performance in Mathematics. A classroom-based action research design was used in this study. Participants of the study were the grade 3 pupils in Ozamiz City Central School for the school year 2022-2023. It was participated by 37 grade 3 pupils through a purposive sampling technique. A classroom-based action research design was utilized to evaluate the effectiveness of using concrete-pictorial-abstract approach and their effects on the pupils' performance in Mathematics. It utilized lesson plan, concrete materials, pictures, and interview questions as research instruments. The researcher computed descriptive statistics to determine the mean and standard deviations of the level of performance before and after the intervention. At the same time, qualitative analysis of the interview data was conducted using Hype research. Results showed that using concrete-pictorial-abstract approach as an intervention improved outcomes in the measured variable. It is recommended that educators integrate the CPA approach into their teaching practices to enhance mathematical learning outcomes.

Keywords: abstract, concrete, intervention, performance, pictorial,

CONTEXT AND RATIONALE

One of the main issues discussed in the field of mathematics education is how students are able to possess mathematical abilities at every level of education. The ability to think mathematically becomes guidance for all learners to solve life problems (Sumartini and Priatna, 2018). There are many kinds of mathematics abilities that needed to be developed in order to improve the quality of learning achievement, and foster students' mindset to face the challenges of the times. Bernard and Senjayawati (2019) said that a human being can develop logical, analytical, systematic, critical, and creative thinking skills, and cooperative abilities applied in daily inhalation through mathematics.

Studies have shown that many people's images of mathematics are negatively and is perceived as difficult in many cultures and largely masculine. Some societal views about Mathematics such as mathematical problems have one answer and can be solved in a particular way and its solitary activity done by individuals in isolation requires good memory and is for clever ones. People view it as a difficult subject and as such their performance is affected. Pupils seem not to have encouragement from people outside the school system. Teaching experience contributes to poor academic performance in Mathematics at Ordinary Level (Makondo, 2020). Mathematics contributes significantly to a country's social, economic, and technological development. To build global competency, students must have a good foundation in mathematics. The younger learners can put these talents into practice, the more likely it is that our society and economy will remain inventive. Many primary mathematics teachers are currently concerned about a number of issues. They are changing their roles for a variety of reasons,

including the push for higher achievement in mathematics back to basics, state and federal education legislation, and increased pressure on students and teachers (Reisman, 2017).

A part of the vision of the Department of Education is to continuously improve itself to better serve its stakeholders. From traditional way to more effective teaching strategies and approach, and every possible means were used by the institution just to improve the performance of the students. However, despite the dream of the Filipinos to enhance the curriculum; the students still fail to achieve the competencies in the curriculum guide. In fact, the National Achievement test (NAT) result of Bukidnon National High School (BNHS) in Math for School Years 2012-2013, 2013-2014 and 2014-2015 are 52.17, 63.17 and 44.47, respectively (NETRC, 2015). For School Year 2014-2015, Mathematics NAT result in BNHS is the lowest of all the other fields. A low mean percentage score in NAT exam indicates that students have low performance and retention level in Mathematics. One factor that may affect the performance of the students is how the teacher provides meaningful representations and situations to the students (Kang, 2017). Thus, a challenge given to the teachers is to provide quality experience to help students perform better and even retain the knowledge given to them. The book of Corpus and Salandanan (2013) stated that researchers found out that the most effective approaches resulting in 75 percent and 90 percent retention rate are learning by doing and learning by teaching others, respectively. This means that students want to be part of their learning and need to be given a meaningful learning experience on the topic given to them. A good learning experience will also improve the attitude level of the student. The positive attitude of the students towards Mathematics is governed by their experiences. The more they appreciate their learning experience, the more that a positive attitude will follow. Thus, students should be given meaningful experience on every topic given to them to ensure a positive response on their attitude. (Durmus and Karakirik, 2016).

PROPOSED INTERVENTION

The Concrete-Pictorial-Abstract (CPA) is an approach based on heuristic Bruner's conception of the enactive, iconic, and symbolic modes of representation is a well-known instructional advocated by the Singapore Ministry of Education since early 1980's. The Concrete-Pictorial-Abstract approach support the understanding mathematical concept before learning rules, that is moving from the concrete or manipulative model of block or chips for multiplication toward the abstract representation such as 4 x 3 = 12 (Barmby et al., 2017).

Learning by the Concrete-Pictorial-Abstract approach give beneficial to students with difficulties in mathematics learning because this approach is started by using the concrete materials, followed by learning through pictorial or representations and ending with using the abstract notation (Ali, 2019). In the Concrete-Pictorial-Abstract approach, students learning begin from using a concrete object, pictorial representations, and then abstract numerals. The Concrete-Pictorial-Abstract approach is a three-stage learning process where students learn through physical manipulation of the concrete object, followed by learning through pictorial representations of the concrete materials or concrete manipulations and ending with solving the problem using abstract notation. The third stage is a unified whole that in practice interrelated and mutually support one another. Concrete components include manipulation (such as red and yellow pieces, cubes, and beams), the use of tools, or other objects that can be touched during the learning process. Pictorial components involve drawings, paintings, diagrams, or graphics created or provided for students to read and interpret. While the abstract refers to symbols, numbers or letters used to solve mathematical tasks.

The steps of learning at each stage of the approach outlined as follows:

a) Concrete Phase - Students are provided or create their own manipulative objects associated with the concept to be studied - Teachers give verbal explanations and questions with demonstrations - Students began tinkering with manipulative objects.

b) Pictorial Phase - Students make representations involving geometric drawings, graphs, charts or stake that could represent a previously used manipulative object - Students are given a series questions relating to the form of representation of objects manipulative.

c) Abstract Phase - Students find a rule form a concept learned using symbols or abstract mathematical language

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- Students are given the questions exercises to practice their math skills using abstract symbols in solving problems.

ACTION RESEARCH QUESTIONS

This action research aimed to address the performance of Grade 3 pupils in mathematics.

Specifically, this study sought answers to the following research questions:

1. What is the performance of the pupils before the use of concrete-pictorial-abstract approach as an intervention?
2. What is the performance of the pupils after the use of concrete-pictorial-abstract approach as an intervention?
3. Is there any significant difference between pupils' performance before and after using concrete-pictorial-abstract approach as an intervention?
4. What other developments are observed among the learners after the use of Concrete-Pictorial-Abstract Approach?

ACTION RESEARCH METHODS

Research Design. For this study, the researcher used a classroom-based action research approach. An excellent teacher invested a lot of time in learning about the requirements of the pupils. A teacher also pays attention to his or her surroundings, starts looking into the issues in the classroom, and considered what practices the pupils need. These methods were extended in classroom-based action research, which was conducted more methodically and was based on data rather than teacher comments (VanBaren, 2019). This approach was suitable since the researcher was particularly interested in improving the performance in Mathematics subject of the pupils.

Site. The study was conducted at the elementary school, specifically at the Grade 3 level, at a certain public elementary school in Ozamiz City.

Participants. The participants of the study were 37 Grade 3 pupils. The participants were selected using a purposive selection technique. The selection of the participants was based on the following criteria: (1) Pupils who were enrolled as Grade 3 pupils for the academic year 2023-2024; (2) Students who gave their full consent to serve as respondents of the study. The researcher ensured that all these conditions were met before conducting the survey.

Data Gathering Methods. This action research gathered quantitative data. The pupils' performance in mathematics among Grade 3 learners was assessed using a researcher-made instrument, such as test questions.

A. Pre-Implementation Phase. To collect data, the researcher will first seek permission from the Superintendent of the Division of Ozamiz City and authorization from the principal and cooperating teacher to conduct research at an elementary school in Ozamiz City. The actual data collection will begin once the necessary permits are obtained. The researcher will administer a pre-test that has (20) items. Assessment and activities will also be prepared based on the researchers' carefully crafted lesson plans and instructional materials.

B. Implementation Phase. The implementation stage included the collection of data, which involved conducting pre-tests on the participants, implementing the targeted intervention by the researcher to the respondents for a specific time frame, monitoring the participants' performance and attitude. It also encompassed the retrieval, tallying, analysis, and interpretation of data. This stage involved analyzing the data to determine whether the intervention was significantly effective or not.

C. Post-Implementation Phase. After implementing the intervention, a post-test will be administered to determine whether the pupil's performance in Mathematics has improved. In addition, this study will include observations and interviews.

Table 1. Matrix of Concrete-Pictorial-Abstract Approach in Mathematics

Objective	Activity	Time Allotment	Person/s Involved	Resources / Budget	Expected Output/ Target	Accomplishment Evidence	Actual Accomplishment & Remarks
1. **PRE-IMPLEMENTATION PHASE**							
1) Present the proposal to the school management	Presentation of research topic		Researchers and research adviser	Laptop/ Computer	Approved by the adviser	Approved the title research for action research.	
2) Accomplish the preliminary part of the research	Writing the introduction and objectives		Researchers	Laptop/ Computer	Fully accomplished the preliminary parts of the research	Accomplished preliminary parts of the study	
3) Diagnose pupil's reading skills	Conducting the Pre-test	1 day	Researchers and students	Laptop/ Computer	Fully accomplished in conducting the pre-test.	Documentation of the conduct of pre-test and pictures of the pupils answers.	
4) Craft a lesson plan wherein intervention is applied.	Lesson Planning	2 – 3 days	Researcher	Laptop/ Computer	Finished lesson plan	Revised lesson plan	
5) Prepare instructional materials of the lesson plan and activities.	Making and designing instructional material and activities.	2 – 3 days	Researcher	Laptop/ Computer	Finished and polished instructional materials.	Write activities and made instructional materials.	
1. **IMPLEMENTATION PHASE**							
1) Present the lesson, conduct and assess their learning with the use of concrete-pictorial-abstract approach as	Instructional delivery through the use of concrete materials, pictures, and numbers.	2 days	Researcher and students	Prepared materials	Fully accomplished delivery of the lesson	Documentation	

an intervention.							
2) Document the discussions using the mentioned intervention.	Take pictures of the conduct of the intervention.	2 days	Researcher	Mobile phone	Full collection of pictures.	Documentation	
3) Assess the impact of using concrete materials, pictures, and numbering the discussion to enhance pupils' performance in Mathematics.	Conducting a post-test.	1 day	Researcher and students	Answer sheets of post-test.	Copies of students' answer sheets in post-test.	Documentation and answered forms.	
4) Record and analyze the results.	Recording and analysis of data	1 week	Researcher	Paper and computer using Excel	Finished recording and analyzing test results	Report paper on the recorded and analyzed results	
1. **POST-IMPLEMENTATION PHASE**							
1) Present the result of the post test	Consultation regarding the results		Researcher and research adviser		Finished the consultation with the adviser	Documentation	
2) Tally and compute the data using the intended statistical tools	Statistical computation		Researcher		Finished tallying and computing the gathered data	Report on tallied data	
3) Prepare the remaining parts of the paper for completion	Preparing and writing the remaining parts of the paper		Researcher		Fully completed the paper	Whole paper	
4) Review entirely the work and submit for critiquing	Paper review and critiquing		Researchers and research adviser		Submitted paper for critiquing and evaluation	Paper with corrections and comments	

and evaluation							
5) Finalize the paper and ensure the complete parts	Preparation and submission of the completed paper		Researcher		Completed paper	Approved and completed paper	
6) Present the results to co-researchers and research adviser	Research defends		Researchers, co-researchers and research adviser		Accomplished presentation of the research	Documentation	

Ethical Issues. The protection of human subjects through the application of appropriate ethical principles is crucial in all research studies. In a qualitative study, ethical considerations hold particular significance due to the in-depth nature of the study process (Arifin, 2018). Official interviews with them are conducted after participants sign the informed permission. The "Data Privacy Act of 2012," also known as Republic Act No. 10173, is followed by the researcher. One of the most crucial components of the research is this research. A researcher is protecting the privacy of this study. The researcher will also provide the option of anonymity because they are aware that people's consciousness may alter their honesty and effectiveness while responding to the survey. It is crucial to ensure survey respondents that their answers will be kept completely private.

Confidentiality and anonymity were maintained in the study by refraining from mentioning the school and participant/respondent identity in any part of the paper. Copyright issues were addressed by citing the works of the original authors in the final report. Additionally, the final report underwent a plagiarism test before submission and publication to ensure 95 percent originality.

Data Analysis Plan. With the use of Anaconda, Jupyter, and Minitab statistical software, the following tools were utilized:

Frequency and Percentage were used to provide a descriptive overview of the various aspects related to the study.

Mean and Standard Deviation were used to determine the learners' performance before and after the use of Concrete-Pictorial-Abstract Approach.

T-test was used to explore the significant difference in learners' performance before and after using Concrete-Pictorial-Abstract Approach.

Thematic Analysis was used to explore other improvements observed among the learners after the use of Concrete-Pictorial-Abstract Approach.

RESULTS AND DISCUSSION

Learners' Performance Before Using Concrete-Pictorial-Abstract Approach

Data in table 1 presents the pupils' performance before implementing the Concrete-Pictorial-Abstract (CPA) approach. The overall performance (M = 12.48, SD = 1.88) shows an average understanding before the intervention. The highest percentage of pupils (35.14%) were "Fairly Satisfactory" (M = 11.62, SD = 0.51). This was followed by 24.32% being "Very Satisfactory" (M = 15.00, SD = 0.00), 21.62% "Satisfactory" (M = 13.38, SD = 0.52), and 18.92% not meeting expectations (M = 9.86, SD = 0.38). Most pupils were "Fairly Satisfactory," indicating some understanding but significant room for improvement.

The smaller groups in the "Very Satisfactory" and "Satisfactory" categories show some pupils performed well, but consistency was lacking. Nearly 19% who did not meet expectations are concerned and highlight the need for targeted support. These results suggest a need for differentiated instruction to support diverse learning needs and enhance overall comprehension. Implementing formative assessments and providing professional development for teachers on the CPA approach can help address these gaps. Engaging students in interactive and practical activities aligned with CPA principles may improve performance and retention.

Continuous professional development for teachers on the CPA approach and other effective teaching methodologies is crucial. Studies indicate that well-trained teachers are more effective in implementing instructional strategies that meet the diverse needs of their students (Darling-Hammond et. al., 2017).

Table 1: Learners' Performance Before Using Concrete-Pictorial-Abstract Approach

Retention Level	Frequency	Percentage	M	SD
Very Satisfactory	9	24.32	15.00	0.00
Satisfactory	8	21.62	13.38	0.52
Fairly Satisfactory	13	35.14	11.62	0.51
Did not Meet the Expectations	7	18.92	9.86	0.38
Overall Performance	37	100.00	12.48	1.88

Note Scale: 17-20 (Outstanding); 15-16 (Very Satisfactory);13-14 (Satisfactory); 11-12 (Fairly Satisfactory); 1-10 (Did not Meet the Expectations)

Learners' Performance After Using Concrete-Pictorial-Abstract Approach

Data in table 2 presents the performance of pupils after using the Concrete-Pictorial-Abstract (CPA) approach as an intervention. The overall mean (M) score was 19.32 with a standard deviation (SD) of 1.23. Pupils in the Outstanding category (17-20) had a mean score of 19.54 (SD = 0.82), representing 5.41% of the total. Most pupils, 94.59%, were in the Very Satisfactory category (15-16) with a mean score of 15.50 (SD = 0.71). The high mean scores and low standard deviations suggest consistent and effective outcomes from the intervention. These results imply that the CPA approach is beneficial in enhancing pupil performance. Educators should continue using this method and consider additional training and resources to help more pupils reach the Outstanding category. Regular assessment and support can further optimize the effectiveness of this intervention.

The CPA approach is particularly effective in promoting retention and comprehension of mathematical concepts. According to Jones and Tiller (2017), the use of concrete manipulatives helps students to physically manipulate objects, which enhances their understanding and retention of mathematical concepts. This understanding is further reinforced through pictorial representations and abstract thinking, leading to a deeper comprehension and long-term retention of the material.

Table 2: Learners' Performance After Using Concrete-Pictorial-Abstract Approach

Retention Level	Frequency	Percentage	M	SD
Outstanding	2	5.41	19.54	0.82
Very Satisfactory	35	94.59	15.50	0.71
Overall Performance	37	100.00	19.32	1.23

Note Scale: 17-20 (Outstanding); 15-16 (Very Satisfactory);13-14 (Satisfactory); 11-12 (Fairly Satisfactory); 1-10 (Did not Meet the Expectations)

Significant Difference in the Learners' Performance Before and After the Use of Concrete-Pictorial-Abstract Approach

Table 3 presents the significant difference in learners' performance before and after using the Concrete-Pictorial-Abstract Approach. The analysis revealed that the difference in performance before and after using the Phet Interactive Simulation was highly significant ($t = 22.87$, $p = 0.00$). Before using the Concrete-Pictorial-Abstract Approach the mean score of the pupils was 12.48. However, after using the intervention, the mean score increased to 19.32. The t-value of 22.87 and a p-value of 0.00 indicate that the observed difference in mean scores is statistically significant. Overall, these findings suggest that the Concrete-Pictorial-Abstract Approach had a substantial positive impact on learners' performance and significantly improved their learning outcomes. Nurjanah et al. (2020) conducted a study on the effectiveness of the CPA approach in teaching mathematics to primary school students. The study found that students who were taught using the CPA method showed significant improvement in their problem-solving skills and overall mathematical understanding compared to those who received traditional instruction.

Table 3: Significant Difference in the Performance of Learners Before and After the Use of Concrete-Pictorial-Abstract

Variables	M	SD	t-value	p-value	Decision
Before Using Concrete-Pictorial Abstract Approach	12.48	1.88	22.87	0.00	Reject Ho HHoHo
After Using Concrete-Pictorial Abstract	19.32	1.23			

Ho: There is no significant difference in pupils' performance before and after using concrete -pictorial-abstract approach as an intervention

Note: Probability Value Scale: **p<0.01 (Highly Significant); *p<0.05 (Significant); p>0.05 (Not Significant)

Other Developments Observed Among the Learners After the Use of Concrete-Pictorial-Abstract Approach

The study analyzed the distinguished effects upon the implementation of Concrete-Pictorial-Abstract Approach. Participants of the study have presented individual experiences and feelings on the implementation of this simulation.

Engagement

The teacher has seen that students are becoming more active in the discussions after integrating the intervention into the mathematics class. As opposed to earlier, when teaching Math was done conventionally, fewer learners take part since fewer learners can grasp information. Incorporating CPA Approach, it could have increased their motivation, interest, and active participation in the discussion, leading to improved performance. The approach involving concrete materials, pictures, and numbers have made the learning experience more engaging fo the pupils.

"The lesson was exciting!" (P3)

"It was amazing!" (P9)

"The discussion was fun!" (P5)

"It was not boring." (P7)

Increased Confidence

Engaging in the intervention, the learners were actively engaged. They were motivated, focused, and invested in the learning process. Through the process, it boosts confidence as it creates a low-stakes and non-threatening learning environment. It provides a sense of enjoyment and playfulness, which help reduce stress and anxiety associated with academic tasks. The relaxed atmosphere enhanced learners' willingness to take risks, explore new concepts, and engage in the intervention without fear of failure that contribute to the growth of pupils' confidence. The confidence gained from participating can extend beyond the setting and positively impact various aspects of pupils' academic and personal lives as reading is the primary way we access information in the modern world.

"I like to participate in the discussion." (P1)

"I love doing it!" (P10)

"I feel proud of myself when I can do it." (P4)

Positive Attitudes towards Learning

The intervention makes them curious and a willing to explore that allow growth. It fosters them a positive attitude towards learning because the learning was fun, engaging, and success, they develop a love for learning and a lifelong curiosity for acquiring new knowledge. These advantages contribute to more effective interventions and improved outcomes for learners.

"I want to do it again." (P2)

"I can do it all day because it was fun." (P6)

"I'm looking forward to doing it next time. (P8)

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study investigates the efficacy of the Concrete-Pictorial-Abstract (CPA) approach as an intervention to enhance Grade 3 pupils' performance in Mathematics at one of the elementary public schools in Ozamiz City. The study addresses the need for improved mathematical abilities among students and the challenges faced by educators in achieving this goal. Through a classroom-based action research approach, the researcher implements the CPA approach, which progresses from concrete manipulatives to pictorial representations and abstract symbols. Pre- and post-tests are administered to assess pupils' performance, revealing a significant improvement after the intervention.

Findings

The following were the key findings of the study:

1. All of the learners' performance before the use of Concrete-Pictorial- Abstract Approach fell in fairly satisfactory category.

2. The learners' performance improved significantly after using the Concrete-Pictorial-Abstract Approach, with the overall performance falling into the very satisfactory category.

3. The study revealed that the difference in performance before and after using the Concrete-Pictorial-Abstract Approach was highly significant.

4. After the use of Concrete-Pictorial-Abstract Approach, several developments among the learners were identified. CPA Approach helped increase pupils' engagement, increased motivation, and provide positive attitudes towards learning.

Conclusions

Based on the findings, the following conclusions are drawn:

1. The study confirms that the Concrete-Pictorial-Abstract approach is highly effective in enhancing the understanding and performance of Grade 3 pupils in Mathematics. Its structured progression from concrete manipulatives to abstract representations catered well to diverse learning needs.
2. Engaging instructional methods like CPA not only improve academic outcomes but also cultivate a supportive learning environment where pupils feel encouraged to explore and succeed in Mathematics.
3. Continuous training and support for teachers on effective instructional strategies such as CPA are crucial. This ensures sustained implementation fidelity and maximizes its benefits for students over time.
4. The success of CPA in this study suggests potential benefits for curriculum developers and educational policymakers. Integrating such evidence-based approaches into national curricula could improve overall educational outcomes.

Recommendations

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

1. Provide regular workshops and professional development opportunities for teachers on innovative teaching strategies like the CPA approach. This empowers educators to effectively implement these methods in the classroom.
2. Educators integrate the CPA approach into their teaching practices to enhance mathematical learning outcomes. Continuous professional development on effective instructional strategies, including the CPA approach, should be provided to teachers.
3. Foster collaboration between schools, parents, and communities to support students' learning experiences. Raise awareness about the benefits of innovative teaching methods and encourage involvement in educational initiatives.
4. Encourage further research on the long-term effects and scalability of CPA in diverse educational settings. Evaluate its impact on student learning outcomes across different grade levels and subjects.

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APPENDIX A

Pre-Test in Mathematics 3

Name: _____ Grade & Section: _____

School: _____ Date: _____

Teacher: _____

I. Multiple Choice

Directions: Read each statement carefully. Write the letter of the correct answer in the space provided at the right.

1. If you have 3 groups of 4 candy, how many candies do you have in total?
A. 7
B. 12
C. 15
D. 10
1. _____

2. You have 5 baskets, and each basket contains 2 oranges. How many oranges are there in total?
A. 10
B. 12
C. 8
D. 6
2. _____

3. There are 4 rows of lollipops with 3 lollipops in each row. How many lollipops are there in total?
A. 9
B. 12
C. 15
D. 16
3. _____

4. A rectangle is divided into 6 columns and 2 rows. How many squares are there in the rectangle?
A. 10

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B. 12
C. 14
D. 16
4. _____

5. What is 5 × 3?
A. 8
B. 12
C. 15
D. 18
5. _____

6. What is 7 × 9?
A. 56
B. 63
C. 72
D. 81
6. _____

7. What is 9 × 6?
A. 54
B. 56
C. 63
D. 72
7. _____

8. If You see 4 groups of 5 stars each, how many stars are there in total?
A. 15
B. 18
C. 20
D. 22
8. _____

9. There are 3 rows of chairs with 6 chairs in each row. How many chairs are there?
A. 12
B. 18
C. 20
D. 24
9. _____

10. There are 9 boxes with 4 pencils in each box. How many pencils are there?
A. 32
B. 35
C. 36
D. 40
10. _____

11. How many minutes are in an hour?
A. 30 minutes
B. 45 minutes
C. 60 minutes
D. 90 minutes
11. _____

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12. If a movie starts at 2:00 PM and ends at 3:30 PM, how long is the movie?
A. 1 hour
B. 1 hour and 30 minutes
C. 2 hours
D. 2 hours and 30 minutes
12. _____

13. How many seconds are in one minute?
A. 30 seconds
B. 60 seconds
C. 90 seconds
D. 120 seconds
13. _____

14. Tom spent 45 minutes on his homework. How many minutes is that in total?
A. 60 minutes
B. 45 minutes
C. 1 hour
D. 1 hour and 15 minutes
14. _____

15. Sarah practiced piano for 1 hour and 15 minutes. How many minutes did she practice?
A. 60 minutes
B. 75 minutes
C. 90 minutes
D. 105 minutes
15. _____

16. Which is longer: 90 seconds or 1 minute and 30 seconds?
A. 90 seconds
B. 1 minute and 30 seconds
C. They are the same length
D. 2 minutes
16. _____

17. How many hours are in one day?
A. 12 hours
B. 24 hours
C. 36 hours
D. 48 hours
17. _____

18. If school starts at 8:00 AM and ends at 3:00 PM, how many hours are students at school?
A. 5 hours
B. 6 hours
C. 7 hours
D. 8 hours
18. _____

19. If a TV show is 45 minutes long and starts at 7:15 PM, what time does it end?
A. 7:45 PM
B. 8:00 PM
C. 8:15 PM
D. 8:30 PM

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19. _____

20. How many minutes are in 2 hours?
A. 60 minutes
B. 90 minutes
C. 120 minutes
D. 150 minutes
20. _____

APPENDIX B

Transcript of Interview

A. Engaging Questions

1. How are you today?

B. Exploratory Questions

1. How do you feel manipulating concrete materials and pictures during lesson?

2. What are the advantages that you gain in the use of concrete materials and pictures?

C. Exit Questions

1. Do you look forward in using CPA approach during lesson?

CURRICULUM VITAE

PERSONAL DATA

Name : Jazel G. Leyson

Address : Gotocan Diot Ozamiz, Misamis Occidental

Date of Birth : November 06, 1997

Place of Birth : Ozamiz City, Misamis Occidental

Sex : Female

Civil Status : Single

Parents: Mr. Joveniano M. Leyson & Mrs. Marcializa G. Leyson

EDUCATION

College : Bachelor of Elementary Education

Misamis University

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