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Software-Based Supplementary Materials in MAPEH for Enhanced Learning Resource Management and Delivery System

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Abstract

The study aimed to determine the effectiveness of a software-based supplementary material in MAPEH in enhancing the learning resource management of the said subject and ultimately, enriching learners' performance in MAPEH. The respondents were 160 students from JHS in Pagbilao National High School, Division of Quezon, stratified sampling was used due to the existing classification per grade level. The study used mixed-method research and utilized experimental, descriptive-evaluative, and phenomenological research designs to come up with the findings and analyses of data. A set of assessment tools as well as a survey questionnaire were used to observe the effectiveness of software-based supplementary material in MAPEH. Data were analyzed using frequency, percentage, t-test, Pearson correlation coefficient, and phenomenological. The salient findings of the study are summarized as follows: Student's pre-test results were low while; the overall mean of post-test was high. The Test of correlation between the effectiveness of software-based supplementary materials and the perception of the respondents was found to be Very effective. There were significant differences between the pre and post-assessment test after the utilization of the software-based supplementary materials in MAPEH. The study recommends that the DepEd officials may help the teachers who intend to replicate the creation of software-based supplementary material to seek assistance from software creators.

Keywords: software-based supplementary materials, competency, learning resource management, delivery system

Introduction

Due to the changes brought by the pandemic caused by Corona Virus 2019 (COVID-19), the educational system hungers for teaching innovations that will help learners to continue learning during the pandemic. As such different modalities such as online learning, modular learning, digital-modular learning, and other distance learning were implemented to provide quality education and continuous learning for students. The delivery of learning in the new normal was through online classes, the utilization of google forms, online quizzes, interactive games, and self-learning modules. Encouraging self-paced learning among students is the primary goal of the new normal education. For this reason, teachers were encouraged to use various strategies and ICT instructional materials that will help students learn efficiently at home. One of the suggested strategies and tools that is timely and relevant to the new educational system is E-teaching and learning that utilize software-based.

Delivering instruction in MAPEH during this pandemic is a major concern for MAPEH teachers.

Students are struggling and encountering difficulty in understanding lessons in MAPEH. The absence of proper instruction on the important concepts in MAPEH is difficult on the part of the students. Because of this, the performance of the students in MAPEH will be affected. Modules are not enough in providing students with information and knowledge on the lessons in MAPEH, especially in distance learning, as their learning styles also changed in the new normal. With these, the use of digital materials to provide the lessons needed by the students was important. Drew (2018) suggested that teachers develop a computer-assisted tool where learners in rural and remote areas can easily access and promote self-paced lessons for mastery of content.

Objectives of the study

1. Categorize the profile of the respondents in terms of:
   1.1. Age
   1.2. Grade Level
   1.3. Socio-Economic Status
   1.4. Availability of Technological Tools
2. Discuss the mean pre- and post-assessment results of the respondents after the conduct of the software-based supplementary material in MAPEH?
3. Assess the level of effectiveness of the software-based supplementary material in MAPEH as perceived by the respondents in terms of:
   3.1. Appropriateness
   3.2. Content
   3.3. Language
   3.4. Presentation
   3.5. Usefulness
4. For each grade level, is there a significant difference between the pretest and post-test of respondents who used the software-based supplementary material in MAPEH?
5. Discuss the significant relationship between the perceived characteristics of the supplementary material and the post-test scores of the respondents?
6. Record their accounts, what are the insights of the respondents about software-based supplementary material in MAPEH?

Methodology

The study used both qualitative and quantitative approaches to develop the findings and implications. In line with this, three research designs were incorporated into the research: experimental, descriptive-evaluative, and phenomenological design. First, an experimental method was conducted. This research design was used to test the effectiveness of an intervention by comparing the pre-test and post-test results. For this study, assessments were given to all respondents and later compared to provide an idea of whether the software-based supplementary material is effective or not.

After the experimentation, the study employed a descriptive-evaluative research design. This method sought to determine a particular characteristic or perception of the respondents to evaluate a specific condition, environment, or program in the case of the study. The descriptive-evaluative design was used after the intervention to see the effectiveness of the software-based supplementary material based on the lens of the respondents. Using this research design, the gathered findings may help troubleshoot the supplemental material for any possible problems.

Lastly, the phenomenological design was incorporated into the research. This qualitative research design was intended to gather the experiences of the respondents.

Results and Discussion

This chapter aims to present the findings of the study based on the investigation undertaken.

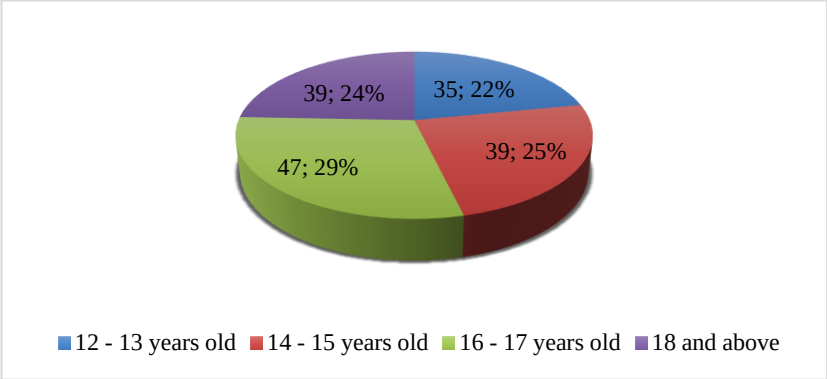

Figure 1. Distribution of the Respondents based on their Age

Figure 1 shows the distribution of the respondents according to their age. The chart shows that the respondents who fall under the age range of 16-17 years old have a slight difference compared with the other age groups with 29%. Other age groups have almost similar percentages with the respondents under the 12-13 age group having the lowest percentage of 24%. Despite the small differences among the percentages of the age groups involved, it could be concluded that the respondents were well-distributed and thus, each group was adequately represented.

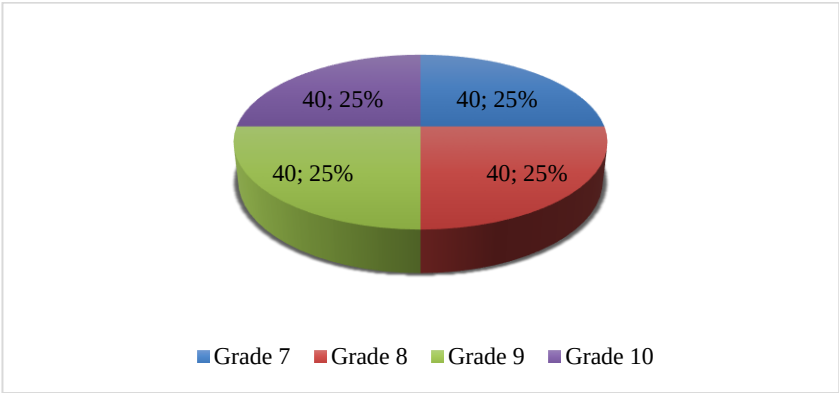

Figure 2. Distribution of the Respondents Based on Their Grade Level

Figure 2 displays the percentages of the respondents in terms of their grade level. Based on the graphic representation, it could be noted that all grade levels have an equal number of respondents. The equality of percentages across the grade levels provides a more precise representation for each level, making the study's findings more diverse and accurate.

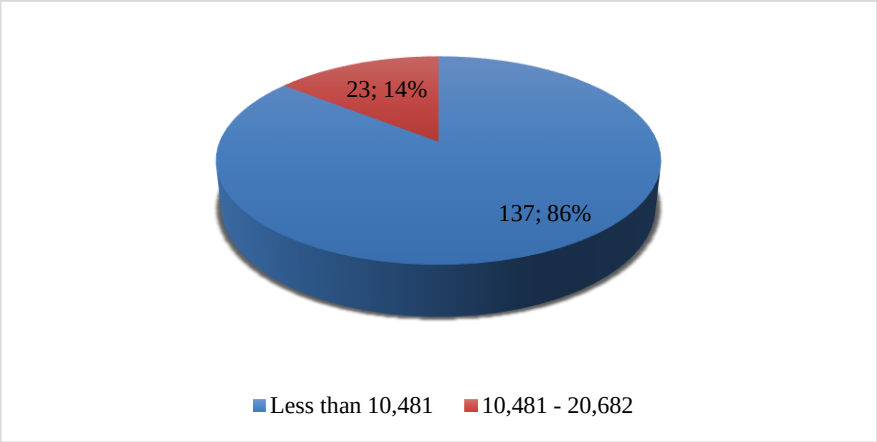

Figure 3. Profile of the Respondents in Terms of Their Socio-Economic Status (Family Monthly Income)

Figure 3 showcases the socio-economic status to which the respondents of this study belong. This displays the current situation of the learner respondents by whom the study was conducted and the population of the school in general. As shown by the said figure, it could be implied that the majority of the learners under the investigation fall under the lowest socio-economic group, where the monthly income is less than Php 10,481.

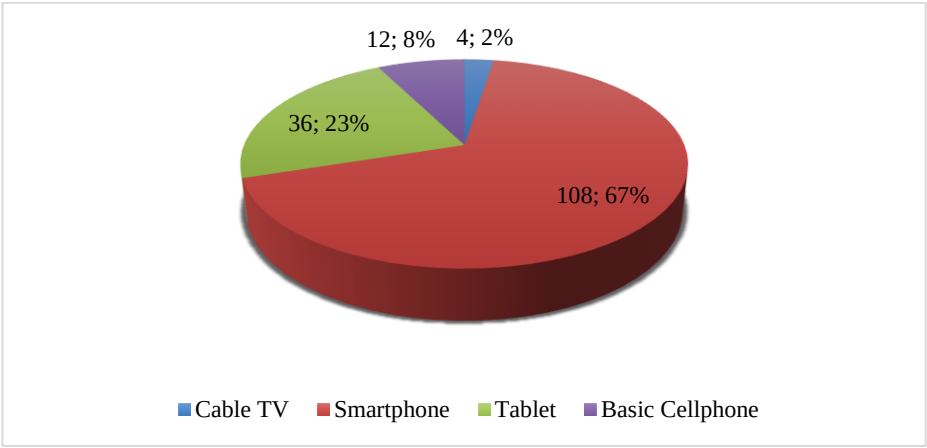

Figure 4. Profile of the Respondents in terms of Availability of Technological Tools

Figure 4 shows the availability of technological tools among the respondents in this study. Based on the data shown, most students possess smartphones as their primary means of gathering learning resources and accessing online classes. The findings prove that smartphones have become a staple among people since they can access information and communicate with other people more efficiently and conveniently.

2. Pre- and post-assessment results of the respondents after the conduct of the software-based supplementary material in MAPEH

Table 1
Posttest mean scores of the students after using the software-based supplementary material in MAPEH

Grade Level	Mean	Std. Dev.	Descriptive Interpretation
Grade 7	34.00	3.14	High
Grade 8	34.30	2.95	High
Grade 9	34.35	3.18	High
Grade 10	35.18	3.99	High

Legend: 36 – 40 = Very High; 30 – 35 = High; 20 – 29 = Average; 11 – 19 = Low; 1 – 10 = Very Low

Table 1 shows the students' results after the utilization of the software-based supplementary materials. The findings depict that the students in all grade levels garnered means that could be interpreted as "High." Noticeably, the Grade 10 students showcased the highest mean among the grade levels, with a mean of 35.18. The standard deviation also shows that the scores of the students have a narrower range compared with other grade levels. It could be indicated that the said students have utilized the supplementary materials well, resulting in their success towards such an increase in their scores.

On the other hand, the students from Grade 7 have the lowest mean of 34.00. The standard deviation of 3.14 suggests that the individual scores have proximity. It could be implied that they have the lowest results in their post-assessment test. It could be rooted in the fact that similar to the analysis provided in the preceded information, Grade 7 students still experience the transition from elementary to secondary. Thus, they were still in the period of adjustment in the cognitive level established by Junior High School.

Overall, the results were remarkable in their post-test since all the means could be interpreted as "High." At one point, it could be implied that due to the ease of access to the software-based supplementary material through smartphones, they could manipulate the material at any time and in every place possible. It could mean that they could recapitulate the lessons more than the more conventional review method, which is reading. Despite the commendable results, no grade level achieved a "Very High" mark. This could be the effect of a lack of physical interactions between the teacher and students. It was noted that face-to-face interaction between teachers and their students is still the most effective way of delivering education, as evident in the study of Maldonado and his associates (2017).

Table 2
Test of significant difference between the pretest and posttest mean scores of the students who used the software-based supplementary material in MAPEH

Grade Level	Test	Mean	Mean Difference	t-value
Grade 7	Pretest Post-test	14.58 34.00	19.43	23.156**
Grade 8	Pretest Post-test	17.30 34.30	17.00	14.610
Grade 9	Pretest Post-test	14.60 34.35	19.75	19.103
Grade 10	Pretest Post-test	16.53 35.18	18.65	14.806

*df = 39; **Significant at .01 level*

Table 2 displays the significant difference between the mean scores of the pre-test and post-test of the students before and after using software-based supplementary material in MAPEH. All the learners

across the four grade levels garnered a high t-value. It shows a significant difference between the pretest and post-test of the respondents regardless of their grade levels. Among the results, the t-value of learners under Grade 7 has the highest, with 23.156. Such development is significant at 0.01 level, therefore signifying that the software-based supplementary material in MAPEH is highly effective among the said students. Although their mean scores were the lowest, they also showed the most promising progress among the students in different grade levels.

Meanwhile, compared to the other grade levels, the learners under the Grade 8 level displayed the lowest mean difference with 17.00 and a t-value of 14.610. This is because the Grade 8 learners gained the highest mean score in their pretest, they already have prior knowledge about the topic during their first year in high school, thus lowering the mean difference. In conjunction with that, they also have similar results as compared to other grade levels. The statistical values do not imply that the material was ineffective among Grade 8 students.

Based on the findings, it could be implied that there is a significant difference between the pretest and post-test results of the students across the grade levels in line with the use of the software-based supplementary material in MAPEH, therefore rejecting the null hypothesis about certain research problems. It implies that the use of technology particularly software-based instructional material could boost the retention of the students in MAPEH. Nevertheless, the software-based supplementary materials could provide an authentic learning environment that could help students understand the topics more (Martin & Ertzberger, 2013).

3. Effectiveness of the software-based supplementary material in MAPEH

3.1. In terms of Appropriateness

Table 3
Level of the effectiveness of the software-based supplementary material in MAPEH as perceived by the respondents in terms of appropriateness

Indicative Statement	Mean	SD	Descriptive Interpretation
The objectives are…			
1. clearly explained.	3.68	0.47	Very Effective
2. attainable, measurable, and specific.	4.00	0.00	Very Effective
3. relevant to the subject matter.	3.95	0.22	Very Effective
4. in line with the needs of the students.	3.95	0.22	Very Effective
5. organized and planned properly.	3.88	0.33	Very Effective
Overall	3.89	0.14	Very Effective

3.50-4.00 Very Effective 2.50-3.49 Effective 1.50-2.49 Somewhat Effective 1.00-1.49 Not Effective

The next set of findings determines the respondents' perception regarding the level of effectiveness of the software-based supplementary material in MAPEH. Table 3 shows the appropriateness of the software-based supplementary material in MAPEH as perceived by the respondents. Based on the data, the indicative statement, which states the objectives as attainable, measurable, and specific, garnered a perfect mean score of 4.00. It indicates that the material effectively provides learning targets that the learners could easily achieve.

On the other hand, the indicator stating that the objectives are clearly explained has the lowest mean (3.68), though it still falls under the descriptive interpretation of "Very Effective." It may be implied that because the learners were too excited to manipulate the materials they didn't recognize the objective

being mentioned right before starting the software-based materials. Nevertheless, the material was deemed very effective, as seen from the mean of 3.89. All respondents had similar responses, as indicated by the low standard deviation. It means that the material could provide a clearcut set of objectives to the learners so that they could be guided in using it. A learning material that provides plausible and reachable objectives can get the learners oriented more with the lessons that they will engage in (Kelly, 2020).

3.2. In terms of Content

Table 4
Level of the effectiveness of the software-based supplementary material in MAPEH as perceived by the respondents in terms of content

Indicative Statement	Mean	SD	Descriptive Interpretation
1. The content of each lesson is in line with the given objectives.	4.00	0.00	Very Effective
2. The content is easy to understand.	4.00	0.00	Very Effective
3. The content of the lesson is completely discussed.	3.68	0.47	Very Effective
4. The content of the software-based supplementary material is tailored to the level of the students.	4.00	0.00	Very Effective
5. There is a balance the contents of each lesson in terms of emphasis.	3.83	0.38	Very Effective
Overall	3.90	0.11	Very Effective

3.50-4.00 Very Effective 2.50-3.49 Effective 1.50-2.49 Somewhat Effective 1.00-1.49 Not Effective

Next, Table 4 shows the level of effectiveness of the said supplementary material in terms of content. Noteworthy among the results are the following indicative statements: the alignment of the lessons to the objectives; the material being easy to understand; and its capability to parallel to the level of the students. The said indicators garnered a perfect score of 4.00, signifying that they are highly evident to the instructional material. Although it also received a "Very Effective" rating, the lowest mean could be seen from the indicative statement "The content of the lesson is completely discussed with a mean of "3.68". It may stem from the fact that most of the test items from the supplementary material were obtained from the least learning competencies in MAPEH from the previous school year, therefore some lessons were not included. Holistically, the interpretation of "Very Effective" was determined due to the overall mean of 3.90. The majority of supplementary instructional material, albeit software-based, was initially judged based on its information. More validated and concise content equates to a more effective learning tool. This could lead to a more improved performance from the learners (Torrefranca, 2017).

3.3. In terms of Format and Language used

Table 5
Level of the effectiveness of the software-based supplementary material in MAPEH as perceived by the respondents in terms of format and language used

Indicative Statement	Mean	SD	Descriptive Interpretation
1. The layout of the module makes the lesson more engaging.	4.00	0.00	Very Effective
2. The language used is understandable.	3.63	0.49	Very Effective
3. The language used is clear and concise.	4.00	0.00	Very Effective
4. The terms used in the module are defined precisely.	3.68	0.47	Very Effective
5. The instructions are easy to follow.	4.00	0.00	Very Effective
Overall	3.86	0.14	Very Effective

3.50-4.00 Very Effective 2.50-3.49 Effective 1.50-2.49 Somewhat Effective 1.00-1.49 Not Effective

Meanwhile, Table 5 showcases the perception of the respondents in terms of the supplementary

material's format and use of language.

The following indicators about language and format received a perfect mean of 4.00: the layout making the lesson more engaging, the clarity and precision of the language, and the easiness of instructions. All the indicators under this factor had a very high mean, reflecting the overall mean of 3.86, which could be interpreted as "Very effective." It implies that the software-based instructional tool is very effective in expressing its content through the utilization of language. On the other hand, the indicator with the lowest mean, even though it could be interpreted as "Very Effective," is the language being understandable with a mean of 3.63. It could be noted that since English is not the primary language used by the learners, a few students found it hard to understand some phrases. The proper use of language and organized formatting provide a better connection between the content the instructional materials want to connote and the understanding of the learners (Torrefranca, 2017).

3.4. In terms of Presentation

Table 6
Level of the effectiveness of the software-based supplementary material in MAPEH as perceived by the respondents in terms of presentation

Indicative Statement	Mean	SD	Descriptive Interpretation
1. The lessons are arranged logically and in sequence.	3.68	0.47	Very Effective
2. There is originality when it comes to the presentation of the lessons.	4.00	0.00	Very Effective
3. The activities included in the software-based supplementary material are presented.	3.90	0.30	Very Effective
4. The lessons in the software-based supplementary material are presented excitingly and engagingly.	3.80	0.41	Very Effective
5. The software-based supplementary material presents sufficient and relevant examples.	3.43	0.50	Very Effective
Overall	3.76	0.15	Very Effective

3.50-4.00 Very Effective 2.50-3.49 Effective 1.50-2.49 Somewhat Effective 1.00-1.49 Not Effective

Table 6 displays the perception of the students in terms of the level of effectiveness of the material based on its presentation.

The most prominent among the indicators is the originality of the instructional material, with a perfect mean score of 4.00. It indicates that the supplementary material is innovative based on the student's perception, which may stem from its software-based capability. On the other hand, although it could be interpreted as "Very Effective," the indicator "The software-based supplementary material presents sufficient and relevant examples" had the lowest mean score of 3.43. It implies that additional examples derived from the learners' context could improve the supplementary material in MAPEH. All in all, based on the respondent's perception, the overall mean of the indicator equates to "Very Effective." An adequately presented instructional tool, such as this software-based supplementary material, could make the learners more engaged in learning, thereby helping the modules attain their objectives (Torrefranca, 2017).

3.5. In terms of Usefulness

Table 7 shows the level of effectiveness of the software-based supplementary material in MAPEH as perceived by the respondents in terms of usefulness. The following indicative statements showcase a perfect mean score of 4.00: the ability of the software-based supplementary material to entice the students in learn MAPEH; its capacity to allow the students to learn the lessons at their own pace; and its capability to help the students reach the prescribed learning competencies. Then, the

indicator which targets the supplementary material's trait of supporting the development among learners in absorbing the lessons has the lowest mean of 3.73.

Table 7
Level of the effectiveness of the software-based supplementary material in MAPEH as perceived by the respondents in terms of usefulness

Indicative Statement	Mean	SD	Descriptive Interpretation
The software-based supplementary material…			
1. entices the students to learn more about MAPEH	4.00	0.00	Very Effective
2. allows the students to master the lessons about MAPEH at their pace.	4.00	0.00	Very Effective
3. provides necessary support to develop students' understanding of MAPEH	3.73	0.45	Very Effective
4. allows the students to use their time efficiently in learning the lessons.	3.83	0.38	Very Effective
5. Is sufficient to allow the learners to reach the learning competencies under MAPEH.	4.00	0.00	Very Effective
Overall	3.91	0.10	Very Effective

3.50-4.00 Very Effective 2.50-3.49 Effective 1.50-2.49 Somewhat Effective 1.00-1.49 Not Effective

Table 7 shows the level of effectiveness of the software-based supplementary material in MAPEH as perceived by the respondents in terms of usefulness. The following indicative statements showcase a perfect mean score of 4.00: the ability of the software-based supplementary material to entice the students in learn MAPEH; its capacity to allow the students to learn the lessons at their own pace; and its capability to help the students reach the prescribed learning competencies. Then, the indicator which targets the supplementary material's trait of supporting the development among learners in absorbing the lessons has the lowest mean of 3.73. It was analyzed that the instructional material is meant for reviewing the least mastered competencies and not the totality of the subject. Overall, the mean score for this factor is 3.91, and it is interpreted as "Very Effective." The usefulness of instructional material depends on its ability to be accessed and user-friendly to its users. In this case, the software-based supplementary material is deemed very useful in providing additional leverage to the retention of the students thanks to its accessibility features (Cingi, 2013).

4. Significant relationship between the assessment scores of the respondents and their overall perception regarding the effectiveness of software-based supplementary material in MAPEH

Table 8
Test of a significant relationship between the assessment scores of the respondents and their overall perception regarding the effectiveness of software-based supplementary material in MAPEH

Assessment Scores	Perception				
	Objectives	Content	Format and Language Used	Presentation	Usefulness
Pretest	.163	.239	-.128	.098	-.097
Posttest	.183	.265	.071	.086	.016

Table 8 presents the results of the test of a significant relationship between the assessment scores of the respondents and their overall perception of the effectiveness of software-based supplementary material in MAPEH. Based on the data, it could be gleaned that there is no significant relationship between the assessment scores of the respondents and their overall perception regarding the effectiveness of

software-based supplementary material in MAPEH. The findings accept the null hypothesis about this research problem.

In the preliminary data, all the factors under the students' overall perception could be interpreted as very effective, thus implying that the supplementary material successfully supported them in MAPEH. But despite the positive results in this manner, the material could be deemed insufficient to augment the student's knowledge and academic performance in MAPEH. The student's engagement in answering the self-learning modules, their attendance and participation in their online classes, and the accessibility of learning materials that could complement the lessons in MAPEH still hold the key to the development of learners in attaining the learning competencies in MAPEH. The supplementary material may aid them, but it could not suffice the direct facilitation of the teachers in delivering the lessons to the students, especially in the case wherein the health crisis brought by the COVID-19 pandemic compromised the teaching-learning process (Ozudogru, 2021).

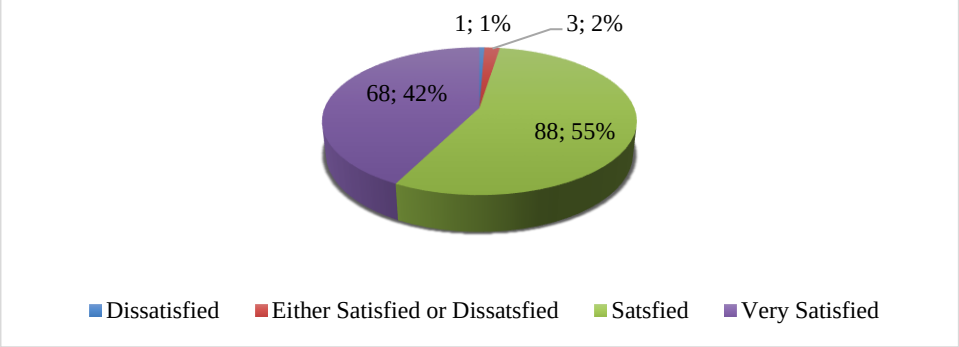

Figure 5. Percentage of Students in Terms of their Satisfaction towards the Software-based Supplementary Material in MAPEH

Figure 5 shows the distribution of students in terms of their satisfaction with using the software-based supplementary material in MAPEH.

Based on the responses, 55% of the respondents commented that the instructional material "Satisfied" them, while 42% of them responded that they were "Very Satisfied". The more significant number of responses that were satisfied with those who answered the highest descriptor suggests that although the material accomplished its objective, it is still not enough to provide the whole learning to the students. Their retention originates from their interaction with their teachers, primarily via online means, and the information they gather from the learning modules in consonance with distance learning (Ozudogru, 2021).

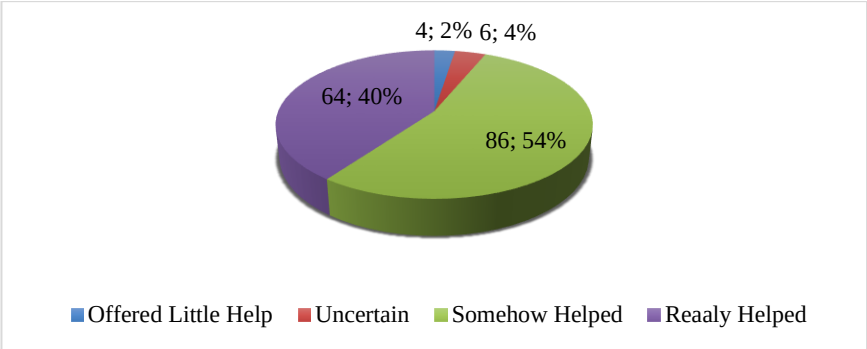

Figure 6. Responses of the Respondents in terms of the Help Provided by the Software-based Supplementary Material in MAPEH

In terms of the capacity of the software-based material for MAPEH, figure 6 shows their responses. Half of the respondents said that the material "somehow helped" them in understanding the lessons in MAPEH, and they outnumbered those who replied that the material "Really Helped". It means that as the supplementary material in some way supported the learners in studying the topics, it is not enough to provide a full learning experience. As stated from the previous analyses regarding the ability of the supplementary material to cater to learning, the material could not suffice the entirety of the teaching-learning process. It boils down to the teachers' capacity to provide lessons via different means taking into consideration that the new normal limited them in teaching through alternative means (Ozudogru, 2021).

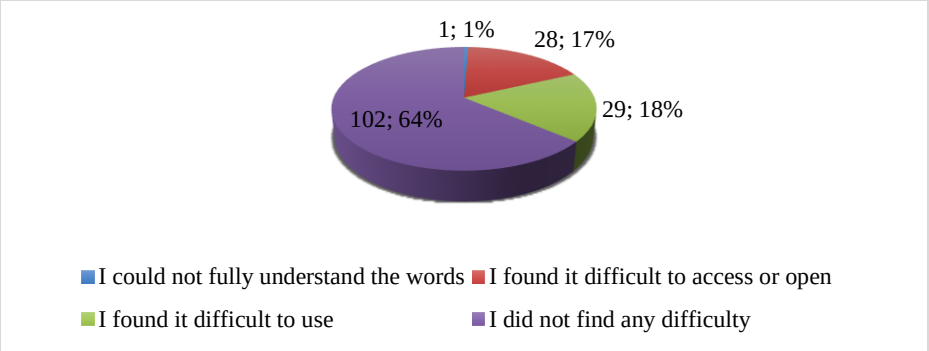

Figure 7. Respondents' accounts on the perceived difficulty in using the software-based supplementary material in MAPEH

Lastly, figure 7 shows the learners' responses based on the presence of difficulties in using the software-based supplementary material in MAPEH. The majority of the respondents replied that they did not find any difficulties in utilizing the material.

It may be implied that some students struggled to use the material because it may be their first time using it. On the other hand, some students encountered difficulty using and manipulating the material and accessing it. Aside from that, some learners found the material to have a large file size, as presented in the following statements.

5. Feedback from the Respondents on the Use of Software-based Supplementary Material in MAPEH

Table 9
Feedback from the Respondents on the Use of Software-based Supplementary Material in MAPEH

Positive Feedback	Areas Needing Improvement
1. I enjoyed the application; it made the lesson easier.	1. It's hard to open. The file is too large.
2. Very interesting. The visual images are motivating.	2. I hope for the improvement of the material and clear instructions.
3. It motivates me to study the lesson.	3. I found it hard to download the file.
4. The animation is very attractive to the user.	
5. It helps me a lot to understand the lesson.	
6. Answering quizzes and reviews is very exciting.	
7. I got high scores after reviewing the lesson.	
8. I understood the lesson.	
9. It's good to use because I can review it first.	
10. I will know the right and wrong answers after I answer.	

Table 9 shows both the positive and negative feedback of the students regarding the software-based supplementary material.

First, most positive feedback center on the ability of the instructional material to allow the students to understand the lessons more effectively. Because of the material's content and its enticing and user-friendly platform, the students absorbed the information in the lessons further. The feature of the material to show the correct answer after each question also helped the students to review their mistakes and identify their least mastered topics. Aside from that, the capacity of the feedback to motivate the learners and its engaging features were also commended. Due to its modern features that utilize technology, the students, primarily technologically literate, found the material engaging in nature. The success of software-based material relies on its ability to provide learning more accessible, its accessibility, and its aesthetic and enticing nature.

Conclusions

Based on the salient findings, the following conclusions were drawn:

1. Regarding the respondents' profile, the percentages of individuals concerning their age were almost similar, with learners aged 16-17 years old having the highest percentage with 29%. Moreover, the distribution of the respondents per grade level was equal. Subsequently, learners belonging to families earning less than P 10,481.00 monthly dominated the respondents regarding their socio-economic status. Lastly, the majority of the respondents used smartphones as their ICT tool for distance learning.
2. In connection to their assessment tests, the mean pre-test results of the respondents across the four grade levels can be interpreted as "Low." Meanwhile, the overall mean post-test results of the same respondents mean were interpreted as "High."
3. There was a significant difference between the pre-and post-assessment tests of the learners under Grades 7, 8, 9, and 10 after utilizing the software-based supplementary materials in MAPEH, thus rejecting the first null hypothesis.
4. All the factors about the effectiveness of the software-based-supplementary materials in MAPEH (Appropriateness, content, language, presentation, and usefulness) were interpreted as "Very Effective" as referred to the respondents' perception.
5. There is no significant relationship between the assessment scores of the respondents and their overall perception regarding the effectiveness of software-based supplementary material in MAPEH.
6. The following were their insights based on the respondents' accounts of their use of the software-based supplementary material in MAPEH. First, the majority of the respondents were satisfied with using the said instructional material. Then, most of them responded that the supplementary material somehow helped them in their lessons in MAPEH. Lastly, the majority of the respondents did not find any difficulty using the mentioned material.

Recommendations

Based on the conclusions drawn, the following recommendations were formulated:

1. In consonance with the respondents' perception, DepEd officials may help the teachers who

intend to replicate the creation of software-based supplementary material to seek assistance from software creators. This may transform the said material into a stand-alone, more minor, and engaging educational application accessible on smartphones.

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