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Research Article

Evaluation of the Developed and Produced Computer Generated Instructional Materials (CGIM) for College Geometry

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ABSTRACT

The tripartite function of faculty members in higher education includes instruction, research, and extension. Built-in into this function was to produce of instructional materials for students' and teachers' consumption. The objective of this study was to evaluate computer-generated instructional materials (CGIMs) used in college geometry courses. To attain this, the researchers used descriptive-evaluative design. The respondents were the twenty (20) teachers teaching Geometry and Curriculum Development. The instruments used were the worktext and multimedia efficiency rating scale, usefulness, accuracy, completeness, and appropriateness rating scale. The result shows that in terms of physical attributes, objectives, content, exercises, and evaluation, the worktext has a "very high" efficiency level while in terms of content, physical attributes, and visual clarity the multimedia presentation achieved a "very high" efficiency level. It was also found that in terms of usefulness, accuracy, completeness, and appropriateness, the developed CGIM has attained a "very high" level. This means that the developed CGIM achieved an excellent level of instructional material development. CGIM is recommended as a way to improve the achievement, mental habits, and problem-solving skills of Geometry students.

Keywords: *CGIM, College Geometry, Evaluation, Multimedia Instruction, Worktext*

Introduction

In the Philippines, the Commission on Higher Education (CHED) mandated the following functions for State Universities and Colleges: Instruction, Research, and Extension. The Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACCUP) gave definitions of the tri-fold functions namely: An educational program's primary objective is to impart knowledge. By conducting research, one discovers, applies, or verifies novel knowledge, and develops appropriate technology. The extension involves using cutting-edge knowledge and technology

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generated by the institution to improve the community's quality of life. (Ilupa, 2009).

As an additional mandate, production falls under each of these three functions. The production process involves the transformation of inputs into outputs in order to create goods and services (Medina, 2014). As well as contributing to the other three functions enumerated, the production helps to put the learned theories, skills, and knowledge into practice. (Wrenn & Wrenn, 2009).

West Visayas State University created the University Publishing House and Bookstore (UPHB) in accordance with this directive because they believe that the book publishing sector plays a vital part in national development because books are essential for the intellectual, technical, and cultural growth of the populace.

Understanding what students already know and still need to learn is essential for effective mathematics instruction, as is motivating and encouraging pupils to acquire the material successfully. Teachers must be skilled in selecting and utilizing a variety of pedagogical tactics and learning materials in addition to understanding and being devoted to their students as math learners and as people. With the use of text and diagrammatic representations, instructional materials frame classroom activity and assist teachers in reaching objectives that they probably could not or would not achieve on their own. (Joy, Tan-Espinar, & Ballado, 2017). Because students can work directly on their books, Anderson (2003 in Joy et al., 2017) claims that workbooks/worktexts are popular and frequently utilized in classrooms.

Currently, textbook, workbook, modules, or other specific materials that would cater to the development of mathematical skills are not yet available. The majority of textbooks on the market are produced by foreign writers, and the content is inappropriate for Filipino students, the new teacher education curriculum, and improving the teaching abilities required for the K–12 curriculum. (Bacio & Sagge, 2019b).

The CGIM for college geometry may provide the much-needed information, illustrations, and performance task for easy understanding of the concepts in geometry. This will not replace the lessons to be prepared by the teachers but is designed to supplement and suggest uniformity of instructions (Sagge & Bacio, 2019a).

Because they encourage a good human mentor to teach effectively and efficiently, textbooks and other printed materials are still regarded as the ideal tool for increasing the positive transfer of learning, (Westbury, 1998 in Cruz, 2015). By providing appropriate materials that serve as the primary tool and repository of common knowledge that schools communicate as a fundamental tool for organizing curricula and a fundamental tool for teaching and learning, such instructional materials enhance quality instruction and thereby guarantee quality education.

Moreover, according to Bacio and Sagge (2022), learning materials are essential for gaining knowledge and mastering particular abilities. They contend that educational materials are intended to support the teaching process rather than serve as a stand-in for an excellent teacher or a textbook.

The efficiency of instructional materials has been demonstrated in numerous research, one of which was conducted by Ghazi, Khan, Hussain, and Faitma (2010). According to his research, a learning module is a self-study bundle that covers one particular subject matter unit. It is designed so that the learner can choose the relevant content, follow a learning sequence by choosing from a number of presenting techniques, and assess his or her progress.

The research conducted by Cabiles (2022) also suggests that the instructional material package is a useful tool for achieving the course's goals and targeting the students' least-mastered competencies. Finally, Selga (2011)'s study demonstrates that worktext supports the attainment of the subject's specific objectives, allows for the development of higher cognitive skills, is well-organized and well-designed, and is appropriate for the students' abilities.

The demands placed on students to photocopy discussions, book pages, and worksheets—many of which are excessive, occasionally unrelated to the subjects under discussion, and not even necessary—are incredibly onerous and do not serve as a direct

complement to the teacher's lectures and demonstrations. Similarly, spending a significant amount of class time replicating intricately difficult tasks like definitions, theorems, postulates, conjectures, or assignments is not recommended. Since it was taught in junior high school and even in elementary school, college geometry is one of the disciplines that students need to be proficient in. Therefore, the students need to be given both instructional materials they may use in class and materials they can refer to when they are already teaching. The researchers focus on this study specifically to give evaluated teaching resources and maybe implement modifications to improve college geometry.

Research Objectives

This research specifically aimed to respond to the following questions:

1. What is the experts' evaluation of the developed and produced worktext in terms of (a) physical attributes; (b) objectives; (c) content; (e) exercises; and (f) evaluation?
2. What are the experts' evaluations of the efficiency level of the developed and produced multimedia presentation in terms of (a) Content; (b) Physical Attributes; and (c) Visual Clarity?
3. What is the assessment of the evaluators of the developed and produced CGIM in terms of (a) usefulness (b) accuracy; (c) completeness; and (d) appropriateness?
4. What analysis can be made based on the dimensions of curriculum design BASICS: Balance, Articulation, Scope, Integration, Continuity, and Sequence?

Materials and Methods

Research Design

This study was conducted to assess how well the CGIM for college geometry was produced. To attain this purpose, it needs a research approach that highlights an effort to evaluate the produced CGIM. Therefore, in evaluating the CGIM, the researchers used a descriptive-evaluative design.

According to Calmorin & Calmorin (2007), the descriptive-evaluative survey approach is intended to carefully assess the value of the current study. It required gathering information to address inquiries about the study's current state. The researchers also thought that it is the most appropriate to be utilized as the foundation for constructing and evaluating the CGIM in College Geometry because the nature of the study entails acquiring and interpreting extensive information.

Respondents

The respondents involved in the study are sixteen (16) teachers teaching Geometry in the various schools in Western Visayas and four (4) teachers in Curriculum and Development in a certain university in Iloilo City. Thus, there were a total of twenty (20) evaluators who evaluated the developed and produced CGIM for College Geometry.

Instruments

The tool for acquiring the required data was a questionnaire and checklist. The usefulness of the worktext and multimedia presentation for college geometry was evaluated using this. The researchers specifically created the questionnaire and checklist for this study. Research evaluators then validated it and later were pilot tested. The instrument underwent internal consistency or reliability test using Chronbach Alpha. The alpha value of the instruments was as follows: Worktext Efficiency Rating Scale - 0.895, Multimedia Efficiency Rating Scale - 0.887, Usefulness Rating Scale - 0.772, Accuracy Rating Scale - 0.734, Completeness Rating Scale - 0.741, and Appropriateness Rating Scale - 0.764. Indicating that all the instruments were reliable.

The CGIM was assessed by the assessors using a 4-point Likert scale. Strongly disagree (1), disagree (2), agree (3), and strongly agree were the four responses on the 4-point scale (4).

The following ranges were used to interpret the mean scores for the text and multimedia efficiency: 4.00 - 3.51 for "Very High," 3.50 - 2.51 for "High," 2.50 - 1.51 for "Low," and 1.50 - 1.00 for "Very Low." The usefulness, accuracy, completeness, and appropriateness of CGIM were all evaluated using the same scale.

Procedure

The study was carried out at West Visayas State University throughout the academic year

2017–2018. Letters were obtained and the questionnaire checklist was distributed to teachers teaching geometry in the various schools in Western Visayas and teachers in Curriculum and Development at a particular university in Iloilo City following the completion of Study 1: Development and Production of CGIM for College Geometry. The answers were added together, calculated, examined, and interpreted. The overview of the results, the conclusions, and the suggestions was then given.

Results and Discussion

Evaluation of the Developed and Produced Worktext

As can be seen in Table 1, evaluators believed that "the worktext is straightforward to use," as seen by its top ranking of 4.00 (SD = 0.00) and "very high" interpretation. "The material has an engaging arrangement" came in last with a mean of 3.80 (SD = 0.41), yet it was still considered to be "extremely high." The remaining physical aspect items received "very high" ratings from the evaluators as well.

Table 1. Evaluation of Developed and Produced Worktext in Terms of Physical Aspect

Physical Aspect	*SD*	*M*	Interpretation	Rank
The product comes attractively packaged.	0.31	3.90	Very High	6.5
The worktext is easy to use.	0.00	4.00	Very High	1
The worktext was easy to read and follow.	0.22	3.95	Very High	3
The use of color in the worktext adds to the effectiveness of the content, such as illustrations and diagrams.	0.31	3.90	Very High	6.5
The worktext stimulates appeal to the senses and imagination.	0.22	3.95	Very High	3
The appearance of the material facilitates learning.	0.31	3.90	Very High	6.5
The material has an engaging layout.	0.41	3.80	Very High	9
The material is easily readable (type style, bold print, color, etc.)	0.22	3.95	Very High	3
Illustrations and matching concepts are on the same or adjoining page.	0.31	3.90	Very High	6.5
Area Mean	0.08	3.92	Very High	

It can be seen that the physical aspect's area means were 3.92 (SD = 0.08), which was orally evaluated as "extremely high." It suggests that the written and generated worktext was well organized, attractively displayed and illustrated, and simple to use. The study of Cruz provided evidence to corroborate the findings of the current investigation (2014). Because of the manner and presentation used in his Developed Worktext in Drawing 2, students could readily follow the system of instruction.

In Table 2, "objectives sequenced in the right order" came at the top with a mean of 3.95 (SD = 0.22) and was rated as "extremely high" by the assessors. "Objectives cover all areas of the content" came in last place with a mean of 3.80 (SD = 0.41), although it was nevertheless considered to be "extremely high." The remaining objectives' components also received “very high" ratings from the evaluators.

The overall area means for the objectives were 3.87 (SD = 0.18) and were considered to be "extremely high." This suggests that the goals were appropriate for the student’s requirements, practical, explicit, and reachable. The study by Laroza (2015), which found that goals that are clearly expressed are far more helpful to students in having a thorough comprehension of the subjects to be presented, accessible, and feasible, corroborated the findings that were made above.

Table 2. Evaluation of Developed and Produced Worktext in Terms of Objectives

Objectives	*SD*	*M*	Interpretation	Rank
Objectives are stated in performance terminology.	0.37	3.85	Very High	4
Objectives are sequenced in proper order.	0.22	3.95	Very High	1
Objectives cover all aspects of the content.	0.41	3.80	Very High	6
The objectives are SMART.	0.37	3.85	Very High	4
The objectives cover the cognitive, affective, and psychomotor domains.	0.37	3.85	Very High	4
Objectives are relevant to the topic of College Geometry	0.31	3.90	Very High	2
Area Mean	0.18	3.87	Very High	

As shown in Table 3, evaluators gave "the content match with the course curriculum" a rank one rating, interpreting it as "very high" with a mean of 4.00 (SD = 0.00). "The information is factually correct" came in last with a mean of 3.85 (SD = 0.37) but was still considered to be "extremely high". The remaining content components were also given a "very high" rating by the evaluators.

Table 3 further reveals that the content averages were 3.93 (SD = 0.09), which was considered to be "extremely high." This indicates that the worktext's extensive material covered all lessons and the entire curriculum in order to build the necessary and essential information and abilities. Even though they came across a few typos, the errors didn't significantly impair the evaluators' evaluations. The study's findings are consistent with those of Maranan (2004 in Cruz, 2014), who found that the respondents favored criteria like content, clarity of presentation, and usability as the most crucial elements when deciding what constitutes appropriate learning material.

Table 3. Evaluation of Developed and Produced Worktext in Terms of Content

Content	*SD*	*M*	Interpretation	Rank
The content matches the course syllabus.	0.00	4.00	Very High	1
The content meets the stated goal and objectives.	0.22	3.95	Very High	3.5
The content was appropriately sequenced.	0.23	3.95	Very High	3.5
The content is appropriate for the intended audience.	0.24	3.95	Very High	3.5
The content was sufficient in quantity to cover the stated objectives adequately.	0.24	3.90	Very High	6.5
The content was sufficient in quality to cover the stated objective adequately.	0.25	3.95	Very High	3.5
The content is factually correct.	0.37	3.85	Very High	8
The information placed is unique.	0.31	3.90	Very High	6.5
Area Mean	0.09	3.93	Very High	

According to Table 4, evaluators gave "varieties of learning activities are included" a rank one rating, interpreting it as "very high" with a mean of 4.00 (SD = 0.00). "Summaries are included in each unit/chapter" came in last place with a mean of 3.70 (SD = 0.47), yet it was still considered to be "extremely high." The remaining exercise elements also received “very high" ratings from the evaluators.

Table 4. Evaluation of Developed and Produced Worktext in Terms of Exercises

Exercises	*SD*	*M*	Interpretation	Rank
Exercises follow an instructional sequence from simple to complex.	0.37	3.85	Very High	11

Exercises	*SD*	*M*	Interpretation	Rank
The exercises are suited for meaningful learning of the students.	0.31	3.90	Very High	7.5
The exercises are congruent with the objectives.	0.41	3.80	Very High	12
Exercises are chronologically arranged.	0.31	3.90	Very High	7.5
Worktext provides a variety of learners' activities.	0.22	3.95	Very High	3
Varieties of learning activities are included.	0.00	4.00	Very High	1
The exercises are appropriate to the level and needs of the students.	0.31	3.90	Very High	7.5
Directions, explanations, and examples are clear.	0.22	3.95	Very High	3
Relationship between new information to previously learned information is established.	0.31	3.90	Very High	7.5
Information is presented in an instructional sequence from simple to complex.	0.22	3.95	Very High	3
Summaries are included in each unit/ chapter.	0.47	3.70	Very High	13
Practice activities parallel the content/ skills and test items.	0.31	3.90	Very High	7.5
Activities for enrichment are included.	0.31	3.90	Very High	7.5
Area Mean	0.10	3.89	Very High	

Table 4 further shows that the area mean for exercises was 3.89 (SD = 0.10), which is considered to be "extremely high." The results suggest that the created worktext offers the students sufficient, acceptable, and suitable tasks. The aforementioned finding was supported by Gray's 2007 study. In his research, he came to the conclusion that using workbooks and worktexts is advantageous due to the variety of activities offered, leading to not only higher test scores but also an increase in the power of self-direction, aids in retention, skills in fundamental processes, reasoning ability, and problem-solving abilities.

As shown in Table 5, the evaluator gave "there are sufficient talks in each class" a rank one rating, interpreting it as "very high" with a mean of 4.00 (SD = 0.00). With a mean of 3.80 (SD = 0.41), last on the list was "the self-tests serve to aid a better understanding of the topic covered," which was still considered to be "extremely high." The remaining evaluation items were similarly given "very high" ratings by the evaluators.

Table 5 further shows that the evaluation area mean was 3.90 (SD = 0.10), which was considered to be "extremely high." It implies that the evaluation contained in the created worktext matched the students' skills and abilities. Cruz's (2014) results that evaluation must give teachers information that will serve as the foundation for decisions linked to any parts of the instructional materials, and thus, if necessary, for revamping the instructional materials, further supported the result.

Table 5. Evaluation of Developed and Produced Worktext in Terms of Evaluation

Evaluation	*SD*	*M*	Interpretation	Rank
There are sufficient discussions in each lesson.	0.00	4.00	Very High	1
The self-tests serve to facilitate a better understanding of the lesson discussed.	0.41	3.80	Very High	5
The lessons and self-tests are suited to the level of the students.	0.31	3.90	Very High	3
The discussion and self-tests are in line with the lessons presented.	0.22	3.95	Very High	2
The activities and tests stimulate critical thinking.	0.37	3.85	Very High	4
Area Mean	0.10	3.90	Very High	

According to Table 6, "content" was rated as the most important part evaluated by respondents, with a mean of 3.93 (SD = 0.09) and a "very high" interpretation. The physical aspect came in second with a mean of 3.91 (SD = 0.09), which was considered to be "very high." Following this, "evaluation" had a mean score of 3.90 (SD = 0.10) and "exercises" had a mean score of 3.89 (SD = 0.10), both of which were considered to be "very high." "Objectives" came in last place with a mean of 3.87 (SD = 0.18), which was considered to be "very high." The grand mean, which was generally viewed as "very high," with a mean of 3.90 (SD = 0.04). It suggests that the worktext for college geometry that was developed and produced was regarded as a valuable instructional resource by the evaluators. The worktext also has the attributes and features of a reliable and valuable learning resource that will help students get the knowledge and skills they need.

Table 6. Assessment of Evaluators as to the Efficiency Level of the Developed and Produced Worktext in Terms of Different Areas

	M	*SD*	Interpretation
Physical Aspect	3.91	0.09	Very High
Objectives	3.87	0.18	Very High
Content	3.93	0.09	Very High
Exercises	3.89	0.10	Very High
Evaluation	3.90	0.10	Very High
Grand Mean	3.90	0.04	Very High

Evaluation of the Developed and Produced Multimedia Presentation

According to Table 7, "content is the same with the worktext" was rated as the highest, with a mean of 4.00 (SD = 0.00), and was considered to be "very high." The item "the terminology is accurate" came in last with a mean of 3.75 (SD = 0.44), although it was yet considered to be "very high." The remaining components in the multimedia presentation's content were similarly given "very high" ratings by the evaluators.

Table 7 further reveals that the content area mean was 3.91 (SD = 0.12) and was considered to be "very high." This indicates that evaluators observed that the developed multimedia presentation's contents matched the worktext that was developed. The use of animation, graphics, and images made the content dynamic and appealing and went beyond the 2D drawings included in the worktext's pages. The research by Osman Ilhan and Oruç (2016) supported the aforementioned finding. According to their study, students can learn things through multimedia that are otherwise impossible to learn through more conventional means. They can also use multimedia to develop their products.

Table 7. Evaluation of Developed and Produced Multimedia Presentation in Terms of Content

Content	*SD*	*M*	*Interpretation*	Rank
Appropriateness of statement or information in every presentation	0.31	3.90	Very High	6
Correctness the grammar and equations are written appropriately	0.37	3.85	Very High	8
Proper order of statement/ideas in every sample text and equation	0.22	3.95	Very High	3
The graphic organizer shows clear and appropriate information. Diagrams, graphs, and figures are correct	0.31	3.90	Very High	6
The content is comprehensive	0.31	3.90	Very High	6
Develops higher-level thinking skills.	0.22	3.95	Very High	3

Content	*SD*	*M*	*Interpretation*	Rank
The terminology is accurate	0.44	3.75	Very High	9
Information is factually stated: conclusions are based on evidence derived from the text.	0.22	3.95	Very High	3
Content is the same with the worktext	0.00	4.00	Very High	1
Area Mean	0.12	3.91	Very High	

According to Table 8, evaluations indicated that "graphics/color adds to, rather than distracts from, instruction" was the most important factor because it came in first place with a mean of 4.00 (SD = 0.00) and was rated as "very high". "Special effects are motivating for students" came in last with a mean of 3.70 (SD = 0.47), yet it was still considered to be "very high." The remaining physical aspect items received "very high" ratings from the evaluators as well.

It was easy to see that the physical aspect's area means were 3.91 (SD = 0.09), which was orally evaluated as "very high." It suggests that the generated multimedia is made artistically and that the visual information, colors, animation, and graphics would stimulate and captivate the students' attention. According to Cakir's (2006) study, the contents being taught might be communicated to the students in a way that could not be taught in classrooms authentically by using other methodologies such as web-based audio, images, video, and animations. Comprehensive learning might be accomplished and closeness to reality could be offered.

Table 8. Evaluation of Developed and Produced Multimedia Presentation in Terms of Physical Aspect

Physical Aspect	*SD*	*M*	Interpretation	Rank
Font type, font size, and color are standard and consistent in every slide.	0.22	3.95	Very High	3.5
The slides are orderly and have an appropriate layout.	0.31	3.90	Very High	7
The slides are creatively and artistically done.	0.22	3.95	Very High	3.5
The text in each slide does not exceed ten lines.	0.22	3.95	Very High	3.5
Slides can motivate students to learn.	0.31	3.90	Very High	7
Sound, when present, can be controlled and/or shut off.	0.31	3.90	Very High	7
Graphics/ color adds to, rather than, distracts from instruction.	0.00	4.00	Very High	1
Special effects are motivational for students.	0.47	3.70	Very High	9
The animation is appropriate and not distracting.	0.22	3.95	Very High	3.5
Area Mean	0.09	3.91	Very High	

The phrase "the screen is fully clear before a new slide" received the highest rank in Table 9 with a mean of 4.00 (SD = 0.00) and was understood as "extremely high." "Illustrations and figures aid in understanding the claims" came in last place with a mean of 3.75 (SD = 0.44) and was nonetheless considered to be "extremely high." The remaining components of the multimedia presentation's visual clarity received "very high" ratings from the evaluators as well.

Table 9 also shows that the area mean for visual clarity was 3.88 (SD = 0.10), which is considered to be "very high." This implies that the contrast between a slide's background and the numerous items on the slide, including space and the amount of text in the slides, determines visual clarity. Gilakjani (2012) found that multimedia presentations work best when the various media complement one another rather than when unnecessary extra sounds or images are presented purely for entertainment value, which may cause distraction and cognitive overload and hinder rather than facilitate learning.

Table 9. Evaluation of Developed and Produced Multimedia Presentation in Terms of Visual Clarity

Visual Clarity	*SD*	*M*	Interpretation	Rank
The statements and equations are clear and smoothly written	0.31	3.90	Very High	4
Students at the back can still read the font type and size on every slide	0.37	3.85	Very High	5.6
Appropriate color for the font and background is used	0.37	3.85	Very High	5.6
Illustrations and figures aid in understanding the statements	0.44	3.75	Very High	8
Illustrations and figures do not interrupt the physical aspect of the presentation	0.22	3.95	Very High	2.5
Lines of text have adequate space between them.	0.22	3.95	Very High	2.5
The text is formatted for easy reading.	0.41	3.80	Very High	7
The screen is completely clear before a new slide.	0.00	4.00	Very High	1
Area Mean	0.10	3.88	Very High	

According to Table 10, "content" and "physical aspect" shared first place among the respondents' top evaluations with a mean of 3.91 (SD = 0.011; SD =.09, respectively), which was interpreted as "very high." With a mean of 3.88 (SD = 0.10), "visual clarity" came in last place and but was considered to be "very high." The grand mean, which was 3.90 (SD = 0.01) overall, was considered to be "very high." This suggests that, in comparison to "conventional" lectures or classes that don't employ multimedia, the developed and produced multimedia presentation, if used in the classroom, could boost learning and retention among students. Additionally, it uses both visual and audio coding for the content presentation, which increases student comprehension.

Table 10. Assessment of Evaluators as to the Efficiency Level of the Developed and Produced Multimedia Presentation in Terms of Different Areas

	M	*SD*	*Interpretation*
Content	3.91	0.11	Very High
Physical Aspect	3.91	0.09	Very High
Visual Clarity	3.88	0.10	Very High
Grand Mean	3.90	0.01	Very High

Usefulness, Accuracy, Completeness, and Appropriateness of the CGIM

As shown in Table 11, the evaluators gave the categories "the teachers can use it as teaching materials" and "helpful to those whose study is about instructional materials" both a rank one rating with a mean of 3.95 (SD = 0.22) and interpreted as "very high." With a mean of 3.85 (SD = 0.37) and still considered to be "very high," the last three items in rank were "a relevant reference to the conversation," "help the teachers deliver more drills and exercises for students," and "addresses the speed of learning of the students." The rest of the items were similarly given "very high" ratings by the evaluators for usefulness.

Table 11 further reveals that the usefulness area mean was 3.90 (SD = 0.12) and was considered to be "very high." This signifies that as shown by the evaluators' ratings, the developed and produced CGIM is extremely useful. The results further show that evaluators thought the CGIM was a useful teaching tool for the teaching-learning process. Again, the study's findings are consistent with those of Maranan (2004 in Cruz, 2014), who found that respondents favored qualities like usability, content, and clarity of presentation as the most crucial elements in appropriate learning material.

Table 11. The Usefulness of Developed and Produced CGIM for College Geometry

Usefulness	*SD*	*M*	Interpretation	Rank
Numerous contributions in teaching College Geometry	0.31	3.90	Very High	5
Meaningful reference to the discussion	0.37	3.85	Very High	9
The teachers can use it as instructional materials	0.22	3.95	Very High	1.5
Help the curriculum implementers address the needs in instructional materials in teaching.	0.31	3.90	Very High	5
Help the teachers give more drills and exercises for students	0.37	3.85	Very High	9
Useful to teachers in basic education.	0.31	3.90	Very High	5
Addresses the pace of learning of the students.	0.37	3.85	Very High	9
Gives meaningful learning in solving mathematical problems.	0.31	3.90	Very High	5
Expounds the interest of the teachers and students in mathematics.	0.31	3.90	Very High	5
Useful to those whose research is about instructional materials.	0.22	3.95	Very High	1.5
Area Mean	0.11	3.90	Very High	

According to Table 12, "practice appropriate skills" and "diagnostic measurement" tied for first place with a mean of 3.90 (SD = 0.31), which is considered to be "very high." Explanations and presentation of contents came in last with a mean of 3.80 (SD = 0.41), although it was still rated as "extremely high."

Table 12 further reveals that the accuracy area means were 3.87 (SD = 0.17), which is considered to be "very high."This means that CGIM was able to attain its purpose as instructional material. The knowledge, skills, and creativity that it intends to measure were achieved due to a very high rating for accuracy done by the evaluators.

Table 12. Accuracy of Developed and Produced CGIM for College Geometry

Accuracy	*SD*	*M*	Interpretation	Rank
1. Explanations and presentation of contents.	0.41	3.80	Very High	3
2. Practice appropriate skills	0.31	3.90	Very High	1.5
3. Diagnosis measurement	0.31	3.90	Very High	1.5
Area Mean	0.17	3.87	Very High	

Table 13 shows that "memory" and "adult and general learning theory" are tied for the top spot with mean scores of 3.90 (SD = 0.31), which are both considered to be "extremely high." "Visual literacy and design" came in last place with a mean of 3.60 (SD = 0.50) yet was nevertheless considered to be "very high." The remaining elements received a "very high" rating from the evaluators for completeness.

Table 13 further reveals that the completeness area mean was 3.82 (SD = 0.16), which was considered to be "very high." The conclusion that the developed CGIM have completely covered all the requirements for instructional content can be drawn from the results. Even though some of the figures or illustrations need to be enhanced, it was done exhaustively to cover all of the topics listed in the College Geometry syllabus.

Table 13. *Completeness of Developed and Produced CGIM for College Geometry*

Completeness	*SD*	*M*	Interpretation	Rank
1. Perception	0.41	3.80	Very High	5
2. Visual literacy and design	0.50	3.60	Very High	6
3. Text design and readability level	0.37	3.85	Very High	3.5
4. Memory	0.31	3.90	Very High	1.5
5. Cognitive and behavioral psychology	0.37	3.85	Very High	3.5
6. Adult and general learning theory	0.31	3.90	Very High	1.5
Area Mean	0.16	3.82	Very High	

Table 14 shows that the evaluators gave "performance measurement" highest rating with a mean of 4.00 (SD = 0.00) and a "very high" interpretation. "Instructional tactics" came in last place with a mean of 3.60 (SD = 0.50) and was nevertheless considered to be "extremely high." The remaining items were similarly given a "very high" rating for appropriateness by the evaluators.

Additionally, Table 14 shows that the appropriateness area mean was 3.90 (SD = 0.11) and was considered to be "very high." It suggests that both the teacher and the students can use the CGIM effectively. Because the CGIM was built as a package, the developed instructional material is also advantageous to the teachers teaching the subject. Other than their intended use as practice exercises for the students, the given activities can be used as tests, assignments, or even problem sets.

Table 14. Appropriateness of Developed and Produced CGIM for College Geometry

Appropriateness	*SD*	*M*	*Interpretation*	Rank
1. Learner and trainee characteristics	0.37	3.85	Very High	4.5
2. Setting resources and constraints	0.22	3.95	Very High	2.5
3. Analysis of job, task, and contents	0.22	3.95	Very High	2.5
4. Sequenced statements of performance objectives	0.37	3.85	Very High	4.5
5. Performance measurement	0.00	4.00	Very High	1
6. Instructional strategies	0.41	3.80	Very High	6
Area Mean	0.11	3.90	Very High	

As can be seen in Table 15, with a mean of 3.90 (SD = 0.011) and being rated as "very high," "usefulness" and "appropriateness" were tied for the top area that the respondents evaluated. Accuracy came in second with a mean of 3.87 (SD = 0.17), and completeness came in last with a mean of 3.82 (SD = 0.16), both of which were rated as "very high". The grand mean was 3.87 (SD = 0.01), which was considered to be "very high" in general. In conclusion, according to the respondents' assessments, the CGIM is suitable for use as a teaching and learning tool in college geometry. Even though there are a number of classes that may be improved, this does not prevent pupils from achieving the highest level of competence expected of them.

Table 15. *Assessment of Evaluators as to the Usefulness, Accuracy, Completeness, and Appropriateness of the Developed and Produced CGIM*

	M	*SD*	*Interpretation*
Usefulness	3.90	0.11	Very High
Accuracy	3.87	0.17	Very High
Completeness	3.82	0.16	Very High
Appropriateness	3.90	0.11	Very High
Grand Mean	3.87	0.03	Very High

Analysis Based on the Dimension of Curriculum Design BASICS: Balance, Articulation, Scope, Integration, Continuity, and Sequence

Of the many types of geometry, Euclidean geometry is the one covered in college geometry. Deductive and inductive techniques were used to discuss the subjects (CMO 75 s. 2017). Moreover, this course enhances students' mathematical skills to strengthen their working knowledge in reasoning and proving theorems. The researcher also tried to relate Geometry to student's daily life and in the context of the Philippine setting. Finally, it allows every student to appreciate further the natural world where various figures and spaces come in contact. The following were the analysis of the CGIM based on the following criteria:

Balance. To achieve the educational goals, there should be a balance in the scope and the sequence placed in the developed and produced CGIM. That is why the topics placed in the CGIM were carefully planned and the number of exercises was controlled so that it will not exceed the time allotted. Also, the exercises were reviewed to if it is effective and relevant to the student's needs. Revisions were made to those activities that are off tangent with the topics.

Articulation. The content in the CGIM follows vertical articulation. That is the knowledge and skills gained from geometry in elementary were used for high school geometry. The prior knowledge and skills of the students in high school geometry were used in college geometry since the content is just a bit higher in form and advanced than what students learned in high school. Thus, if the students taking this subject become teachers in the future, be it in elementary, secondary, or college, they can make use of the CGIM as well as the knowledge and skills they learned.

Scope. The scope of this subject for one semester is very attainable. It comprises different topics that help students develop their skills in writing proof, solving geometric problems, and performing a task related to the topic discussed. There are eight chapters on the Developed CGIM based on the syllabus used. The first four chapters will be covered for the midterm and the rest was for the finals. The last column of the course syllabus is intended for time allotment. The researchers make sure that the 54 hours intended for one semester were properly allocated for each topic so that the teachers who will use the CGIM will be guided and no topics will be left untaught.

Integration. One of the unique features of the CGIM is that it has a performance task at the end of every chapter. This performance task requires students to create, analyze, and evaluate their works. The task prepared not only covers skills in mathematics but also the arts, engineering, and photography. The proving part of the topic already requires the students to write statements and proofs that are grammatically correct. Also, since the medium of instruction is English, there are terms in the CGIM that they were taught how to pronounce correctly. Values were also integrated into the activities provided during group activities, students need to cooperate with their members, and maintain the cleanliness and orderliness of the classroom before and after the activity.

Continuity. The topics were arranged so that they would follow a spiral manner. Since habits of mind and problem-solving skills are the main objectives, these skills are recurring in other topics so that students could practice and develop these skills. But as the lesson progressed, the activities becomes more challenging and complicated. This process enables the students to strengthen the permanency of their habits of mind and problem-solving skills.

Sequence. Before the study was conducted, a syllabus for College Geometry already exists. But after a thorough analysis and review, it was found that the sequence of the topics was not arranged properly and does not align with the K to 12 curriculum and skills required for 21st-century learners. As a result, the researchers revised the topics' order and created a new syllabus, which served as the foundation for the topics' order in the developed and produced CGIM for College Geometry. The topics were arranged from simple to complex. Basic concepts were discussed first for these were prerequisites for the latter chapters. Even the exercises were arranged from easy to difficult.

Every topic also included a challenge activity to help students develop their habits of mind and problem-solving abilities.

Conclusion

It may be inferred from the study's findings that the objectives, content, exercises, and evaluation were enough, sufficient, and suitable for the intended users. As a result, the created and generated CGIM will aid in improving their mental habits, critical thinking, and problem-solving abilities. Additionally, the developed and produced CGIM met the criteria for efficiency level, usefulness, accuracy, completeness, and appropriateness; as a result, it can be used in the classroom to support teaching and learning and help students get the necessary knowledge and skills. By analyzing the characteristics of curriculum design, a well-functioning sequence was eventually discovered, proving that the researchers had succeeded in creating a curriculum with ready-to-use instructional resources.

Recommendations

In order to facilitate teaching and learning, the school administrator should encourage its teachers to try using CGIM. This will also give the administrators an idea for how to finance or invest in the creation and development of CGIM for their instructors.

To ensure that the content meets the needs of their students, teachers are urged to create their own contextualized instructional resources. For the generated teaching materials to be correct and valid, the teachers only need to ensure that professionals will assess them. Additionally, this will assist them in fulfilling out CHED's additional mandate for production. In order to adapt the teaching materials to the students' learning requirements and skills, it is also advised that teachers to modify instructional materials on a frequent basis.

It is strongly advised to do additional research utilizing different evaluation criteria and variables.

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