

K to 12 Based Instructional Material In Chemistry for Grade 11 Learners

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Abstract:

This study aimed to develop and validate the K to 12 based instructional material in chemistry for Grade 11 learners. The study was conducted to supplement the learning materials General Chemistry for Senior High School learners of Taytay Senior High School. A descriptive-evaluative method and qualitative approach are used in the study. Through random sampling, ten teacher-respondents from the different secondary schools in the Division of Rizal served as experts. These experts evaluated the instructional material through a Focus Group Discussion (FGD). Fifteen (15) grade 11 learner-respondents were asked to assess the instructional material to determine the level of its acceptability in terms of objectives, contents, language and style, usefulness and organization, and presentation based on their perception. The evaluation happened after the exposure of the learner-respondents from the material. The experts evaluated the instructional material in the qualitative discussion. To discuss how the learner-respondents and teacher-respondents perceived the developed material, a qualitative discussion was applied. The instructional material is 'Very Highly Acceptable' as perceived by the learner-respondents in terms of objectives, content, language and style, usefulness, and organization and presentation upon utilizing it for one semester. Based on the semi-structured interview, learners and teachers perceived the instructional material as a helpful teaching tool. The instructional materials in chemistry possess excellent material characteristics since the experts and learners perceived it as a helpful tool. Hence, the developed material can be used in teaching chemistry for grade 11 learners to achieve a higher learning outcome.

Keywords —K-12, Instructional Material, General Chemistry, STEM, Grade 11

I. INTRODUCTION

Education has a pivotal role in the human being in particular and in society in general. According to (Turkkahraman, 2012), human beings are to educate and to be educated. The primary aim of education is to sustain individual and societal improvement. This process contains both actual and moral dimensions. Moreover, social progress indicates a general development in the community regarding economic, social, and cultural aspects. Also, education is the process of training and developing the knowledge, skill, mind, and character of an individual by formal schooling, teaching, and training. Teachers are the

key persons to attain the general objectives of education. The most common role a teacher plays in the classroom is to teach knowledge to learners. Teachers teach in many ways, including lectures, small group activities, hands-on learning activities, and even use different appropriate instructional materials to effectively enhance the learners' performance.

Limitations such as lack of multimedia aligned with the present curriculum limit schools' capacity to utilize multimedia in teaching and learning. Furthermore, the senior high school curriculum lacks resources for use in the classroom. Therefore, senior high school teachers

are responsible for preparing relevant instructional materials suited to their learners' needs.

One of the challenges incurred during the K to 12 curriculum implementation is the lack of instructional materials, particularly for chemistry subjects. These instructional materials might be of immense help in realizing the general objectives of the said subject. Thus, the cited problem proved a need to initiate a study to fortify one of STEM learners' required topics. By developing K to 12 based instructional material in chemistry that focuses on the least mastered skills, the researcher hopes that this study would be an excellent contribution to the benefit of 21st-century learners.

As the implementation of the SHS program started, teachers have experienced several issues, such as lack of learning resources, which they can use in delivering quality education that helps attain the curriculum's general objectives.

An observation that sometimes repels learners from continuing with studies on the subject is that chemistry is a tricky subject. Chemistry is part of the topics being taught in science on the K to 12 curricula. Teachers must use creative teaching methods and be prepared to respond to questions and explain concepts in a unique way, Nbina (2012). Furthermore, he pointed out that the poor performance and negative attitude towards chemistry from secondary school learners lack proper teaching methods.

OBJECTIVES OF THE STUDY

The study aims to develop, validate, and determine the level of acceptability of the K to 12 based instructional material in chemistry. Specifically, this study aims to (1) develop K to 12 based instructional materials in teaching chemistry, (2) evaluate the developed K to 12 based instructional material in chemistry, (3) evaluate the level of acceptability of the developed K to 12 based instructional material in chemistry as perceived by the learner-respondents (4) determine perception of learners and teachers on the developed K to 12 based instructional material.

METHODS

A qualitative research methodology was used in collecting and analyzing information. The

qualitative process was used to collect all information at a particular time and period. The data were collected from the interviewing session and focus group discussion is hence fall onto the primary data in this study.

An adapted and modified questionnaire checklist was used to determine the level of acceptability of the K to 12 based instructional material. The experts conducted content and face validation to ensure the reliability and validity of the said instrument. The questionnaire checklist contains five variables: objectives, content, language and style, usefulness, presentation, and organization. The Likert scale with the corresponding range and verbal interpretation below was used to determine the material's acceptability.

	Scale	Range	Verbal Interpretation
	5	4.20 – 5.00	Very Highly Accepted
	4	3.40 – 4.19	Very Accepted
	3	2.60 – 3.39	Moderately Accepted
	2	1.80 – 2.59	Least Accepted
	1	1.00 – 1.79	Not Accepted

A validated questionnaire checklist was administered to determine the level of acceptability of the K to 12 based instructional material in terms of objectives, contents, language and style, usefulness and organization, and presentation. Fifteen (15) science teachers were selected purposively from different secondary schools in the Division of Rizal. They are experts in the field who evaluated the level of acceptability of the K to 12 based instructional material.

More so, fifteen (15) learners were randomly selected utilizing the fishbowl technique. They also served as respondents to evaluate the K to 12 based instructional material. The respondents determine the level of its acceptability in terms of the aspects mentioned above. This was done after implementing the K to 12 based instructional material where learners are provided with individual IM's during instruction. Also, there was no attempt to consider the multiple intelligence of grade 11 learners. Hence, learners'

individual needs are not considered in the selection process of the respondents of the study.

The initial phase of the study was to determine the least mastered competencies in General Chemistry. The documentary analysis of data did this. The least mastered skills were identified through the analysis of diagnostic test results administered to the stem students during the SY 2018- 2019. The diagnostic test result was the basis of the topics covered in the development of the K to 12 based instructional material. Five (5) major topics were included in the material. Afterward, the K to 12 based instructional material was subjected to content validation by experts. The comments and suggestions were incorporated in the finalization of the K to 12 based instructional material in chemistry.

A Focus Group Discussion (FGD) was conducted to determine the qualitative evaluation of the instructional material. An adapted and modified questionnaire checklist was administered to student- respondents to assess the level of acceptability of the K to 12 based instructional material in chemistry. More so, the learner-respondents' evaluation on the level of acceptability of the K to 12 based instructional material in chemistry was tallied, analyzed, and statistically treated with the assistance of the University of Rizal System Statistics Center to ensure the accuracy of the results. This was done to determine the level of acceptability of the developed instructional material as perceived by learner-respondents. A semi-structured interview was conducted with chemistry teachers and student participants to determine their K- 12 instructional material perception.

RESULTS AND DISCUSSION

Prior to developing the instructional materials, a documentary analysis of the least mastered skills identified the topics included in the materials. The researcher identified the topics from the analysis, such as the electronic structure of atoms, electronic structure and periodicity, ionic bonding, covalent bonding, and organic chemistry. The instructional material is a more

individualized approach that allows the students to progress at their own rate and select their own time and learning location. This contrasts with the regular class where students are commonly treated as a group and much of their time is spent in the classroom while the teacher lectures. If the instructional materials are to be effective, they must be well written, only then are students enthusiastic about using them. They need to be personalized or written especially for the individual.

The researcher's developed instructional materials were checked, improved, critiqued and validated by the specialists in field of chemistry. The researcher sought for a series of improvement and validation of the material.

The researcher conducted a Focus Group Discussion (FGD) with the experts to evaluate the developed K to 12 based instructional material in chemistry. Using focus groups to assess publications, slide shows, and videos allows participants to view and react to materials, making it possible to obtain insights that would not have surfaced in other research forms (Sevier, 1989).

The experts evaluated that the instructional material is aligned in terms of objectives of K- 12. According to experts, the objectives of the activities are based on the level of the student's capacity to learn. This only means that the K to 12 learning competencies are relevant to the learners' needs since the objectives presented are based on the curriculum guide of general chemistry I of the senior high school curriculum.

Along with this, experts evaluated the content of the developed K to 12 based instructional material. The instructional material is coherent, consistent, and coordinated with the curriculum standards. The content is well-thought-out, coordinated, and conceptually, procedurally, and coherently organized. The content has an organized and systematic approach to instruction. The instructional material allows adequate time and opportunities for students to acquire knowledge, skills, and attitudes.

Additionally, the developed K to 12 based instructional material is clear enough for the

respondents to quickly understand the concepts according to the experts' evaluation. Hence, The language used in the instructional material is suitable for the target learners, and it avoids misinterpretation of ideas. The instructional material was organized clearly to the learners as it links prior knowledge with the new topic being introduced. The directions and objectives, as well as the discussions, are clearly stated. The transition between main ideas are smooth and well-integrated and the writing is not vague. Sufficient examples are provided, and new terms are clearly defined. Adequate practice exercises are also present to reinforce the acquisition of new knowledge.

The experts also approved that the K to 12 based instructional material in chemistry is useable in terms of ease of students learning, efficiency in learning, and the concepts are easy to remember. The instructional materials help the learners perform exercises correctly. The focus group believed that the instructional materials allow learners to work efficiently at their own pace and are very useful in enhancing their interest in chemistry.

Furthermore, in terms of organization and presentation, the focus group described that the materials' arrangement provides continuous and cumulative learning where complex concepts are taken only after prerequisite skills and concepts have been mastered. The experts settled that the instructional materials were presented in a clear and organized manner to transfer clear information to learners. They also believe that the lessons were arranged adequately since it was based on the K to12 curriculum.

It can be gleaned on the Table that learner-respondents Highly Accepted the developed k to12 based instructional material in chemistry with a grand mean of 4.84. This shows that the learners acknowledged the different aspects. This implies that the instructional material is a great help for all the teachers who are teaching chemistry and could give an increase to the performance of the learners.

Perception of the Learners and Teachers on the Developed Materials K to 12 Based on the Semi-Structured Interview

A semi-structured interview with both learners and teachers who utilized the K- 12 based revealed the evaluated quality of the K to 12 based instructional material in chemistry.

Table 1

Composite Table on the Level of Acceptability of the Developed K to12 Based Instructional Material in Chemistry as Evaluated by the Learner-respondents

Aspect	Mean	VI
Objectives	4.84	VHA
Content	4.86	VHA
Language and Style	4.92	VHA
Usefulness	4.80	VHA
Organization and Presentation	4.80	VHA
Grand	4.84	VHA

Legend: VHA= 'Very Highly Acceptable'

The students responded that the K- 12 based instructional materials helped them better understand the lesson rather than the use of slide presentations due to visual constraints, while the K- 12 based instructional materials are handed to the students individually so that they can read and understand the content of the curriculum. The students were to study the examples carefully and used them as a guide in the succeeding exercises. According to Kwarteng (2014), the use of instructional resources makes teaching and learning less arduous. It enhances learners' ability to grasp what is taught with ease.

A student participant stated, "in my opinion,, the use of the K- 12 based instructional material is an effective method to facilitate students' understanding of the topic of the subject. For me, this instructional material can help improve critical thinking among students. So indirectly, when students were able to complete tasks on the instructional materials, students will understand a topic of study for that better. Furthermore, with the availability of the instructional materials, teachers can encourage the students to find their information related to the content being discussed". Ultimately, whenever the students comprehend the lessons and can answer the assessment, they enhance their level of understanding of the content learned to a higher level.

Teachers in the senior high school had applied several methods of teaching. However, curriculum-based instructional materials help students better because learning activities are aligned with the student's abilities. The teachers approached the students to learn based on the curriculum's contents when they are not in the class. The teacher also had other sources being used, such as the quipperschools platform; however, there is a context not suited for the students.

The findings showed that the study participants recommended utilizing the K- 12 based instructional material in chemistry. Some teachers suggested that it could enhance the school performance if most students are allowed to use the instructional material. High-quality instructional materials could be used by the teachers and students and make learning exciting and engaging rather than other methods. One of the participants stated that "the school must keep abreast of effective instructional materials because it can diversify the teaching aids. And, invariably, it is also able to diversify teaching methods or techniques. So, with this variety of teaching aids, teachers can work together and strive to enhance the teaching of chemistry subject."

With the discussion analysis, generally, the study participants were very satisfied with the K- 12 based instructional materials. The use of teaching tools as teaching aid and learning materials should give the educators space and time for them to find another option in producing the high quality materials of teaching and learning. The finding of the study shows that the school should necessarily take a new approach to ensure a variety of learning experiences for the students to learn the subject.

CONCLUSION

Based on the summary of findings, it was concluded that the developed instructional material can give effective means of instruction to the learners. The K- 12 based instructional material in chemistry has good quality as evaluated by experts. The K- 12 based

instructional material in chemistry is an acceptable mode of instruction and could develop learners' interest in chemistry. The K- 12 based instructional material in chemistry has good qualities and may help students and teachers improve the teaching-learning process.

RECOMMENDATIONS

Based on the findings and conclusions, the following recommendations are offered. The developed K to 12 based instructional material in chemistry may be used as an alternative support material to the traditional teaching method in chemistry for grade 11 learners. Educators may be encouraged to produce validated instructional materials to enhance learners' performance in chemistry hence it can contribute to improving the overall academic performance of the school. The developed instructional materials by chemistry teachers may be produced, validated, copyrighted, and commercialized. The developed K to 12 based instructional materials may be tested for its effectiveness. A parallel study may be conducted to develop more instructional materials that are K to 12 curriculum compliant considering other variables.

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