

# Evaluation of a Textbook Entitled “Concepts in Inorganic and Organic Chemistry” Through Teacher-Users’ Assessment and Students’ Performance

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## Abstract

*This research centers on the evaluation of a textbook in chemistry. Specifically, it determined the characteristics of a good textbook and its effectiveness in enhancing the performance of the students in chemistry. The study made use of the descriptive and quasi-experimental methods of research. The book was evaluated and found to be effective in terms of the following identified characteristics: layout and design, activities, skills, language type, subject and content, and overall assessment. Results of the study also show a significant difference between the performance of the experimental and control groups. Students who used the textbook perform better.*

## 1. Introduction

The study of chemistry is essential if students are to understand the natural world. It is the key to success in a variety of careers both within and outside the chemical sciences. No groups recognize these facts better than the undergraduate chemistry professors who face an exciting challenge each term. This challenge is embodied in a diverse student population that has a broad range of preparative skills. A significant body of researches confirms that the first year college is the critical drop-off point in the number of students in mathematics as well as in science courses. A vast majority of chemistry students at all levels, including the graduate level, learn chemistry concepts of rote and solve chemistry problems by using algorithmic methods. Thus, producing students who do not possess the higher order thinking skills. Many times, students encounter misconceptions, making them resistant to instruction in learning the basic and more complex principles of chemical phenomena. “Their cup cannot be filled if their cup is full?” They find confusion when to apply effectively the knowledge gained from a chemical theory in a given situation. Teaching of the

subject chemistry is a challenging endeavor. Despite the various approaches, methods, techniques, and strategies suggested, it remains one of the most difficult tasks among chemistry teachers. This predicament has called for the adaptation and utilization of sensible instructional materials, such as books, for the learners as well as for the teachers. Creating a worktext for General Chemistry is an urgent need as the available books in this field are usually made by foreign authors who are not familiar with the science training at the secondary level in the local setting. The disparity in the secondary curriculum as well as in actual laboratory training here and abroad spells the apparent inability of the students to comprehend certain topics in General Chemistry and make full use of the resources given in foreign-authored books. Most of these books do not explain what models are for or why they are created.

The conceptual approach by the authors of the book under study was supposed to bridge the gap between the levels of discussion in foreign-authored books and that given in secondary chemistry course. The authors of the book attempted to simplify the discussions without sacrificing the continuity or coherence that a chemistry book is supposed to possess. Thus, it was suggested that an evaluation of the textbook be made to identify its strengths and weaknesses. The book was evaluated in terms of the following identified characteristics: layout and design, activities, skills, language type, subject and content, and overall assessment. The study was also conducted to determine whether the book responds to its task of improving the performance of the students. The study hypothesized that the experimental and control groups do not differ in their performance.

## 2. Literature review

### 2.1. Theories in Teaching-Learning Chemistry

According to Orna (cited by Prichard, K. and Sawyer, R., 1994) [15], Herron’s breakthrough paper

applies Piaget's theories on how people gain knowledge through chemistry. She made distinctions of Piaget's four stages of intellectual development: the sensor-motor, preoperational, concrete operational and formal-operational stages. The concrete-operational student structures and organizes activity in reference to concrete things and events in the immediate present. This kind of student does not think in terms of possibilities and does not understand abstract concepts that depart from concrete reality. The formal-operational student, on the other hand, thinks in terms of what might happen and envisions all the changes that are possible. Formal-operational students can reason without the aid of visual props. She cited Herron saying that teachers can confront the problem of delivery of chemical concepts to concrete-operational students in one of two ways: either skirt the problem or overcome it. Skirting the problem involves making formal concepts accessible to concrete-operational students by emphasizing concrete concepts and testing for their mastery. Such problems can be overcome if concrete conceptualizers are developing into formal thinkers at some later time. She further said that teachers can help students gain stand-in concepts which can substituted for the real thing by providing extensive experience with concrete props that model the abstract concept. This transition can be encouraged if students are forced to think about what they are doing, are engaged in the intellectual debate of ideas, are required to weigh evidence, and are helped to sense of a series of observed facts. Another theory that suggests how an individual learn is the constructivist model of learning. Orna (cited by Prichard, K. and Sawyer, R., 1994) [15] made mention of the Bodner model of learning summarized as follows: In this model, knowledge is considered to be constructed in the mind of the learner. This idea is a logical outgrowth of Piaget's model of intellectual development, since Bodner's model was also built upon the assumption that knowledge is constructed as learners strive to organize their experiences in the framework of preexisting mental structures. Constructivism also proposes that individuals learn by constructing meaning through interacting with and interpreting their environments. Consequently, the most important contribution of constructivism to science education is that it alerted teachers to learners' prior knowledge and its role in learning.

Orna identified another cognitive development model that seems useful to chemistry educators: William Perry's scheme of development. This model gives the idea that most freshmen function as dualist and that chemistry classes are largely filled with dualistic thinkers who expect a dualistic approach.

Dualists are supported by highly structured course that includes lectures providing clearly defined terms, a defined syllabus, a clear set of expectations, homework assignments that parallel the text materials and so forth.

## 2.2. Characteristics of a Good Textbook

A good textbook is a textbook that incorporates characteristics which enable it to support the learners and teachers. Accordingly, the presence of these characteristics in a textbook will indicate its quality or its potential to support the learner and teacher. The identification of the characteristics of good textbooks, requires the determination of the functions that science education textbooks must fulfill in order to support the learners and teachers in the learning process

Mikk (2000) [12] identifies the following functions of textbooks in its support of students in their learning: motivate students to learn, represent subject knowledge, guide students to acquire knowledge and learning strategies, aid self-assessment, and facilitate value education. As for support of teachers, textbooks must: aid in planning, describe the relevant content or subject knowledge, provide pedagogical knowledge relevant to the content that is taught, develop their content or subject knowledge and nature of science, To accomplish each of the function mentioned above, the textbook must possess the following characteristics:

### *Characteristics that motivate students to learn*

Examples of strategies that have proven to be successful in stimulating student motivation, active engagement in text processing, and learning science from text include: portraying science and scientific inquiry as a human endeavor, the use of variation and curiosity and stimulating need or relevance, and the use of verbs that represent more concrete actions.

### *Characteristics that guide student learning*

Textbooks can facilitate learner construction of new concepts by illustrations. The use of explanatory principles (plausibility, parsimony, generalizability, fruitfulness) in textbooks can contribute to conceptual change.

### *Characteristics that guide students to acquire learning strategies*

Textbooks can guide learners to develop learning skills by including activities that help learners make summaries, organize their work, take notes and memorize information.

### *Characteristics that facilitate coordination with other educational aids*

Textbooks should refer to other educational aids. Textbooks can provide lists of books that cover the same content and even refer to films or story books in which the phenomena or principles that are discussed in the text are observed or applied.

#### *Characteristics that aid differentiation*

The textbook can be an excellent aid in this regard by providing multiple exercises and application opportunities for learners of different levels of competency.

#### *Characteristics that facilitate value education*

Textbooks have to include activities that provide opportunities for learners to learn to identify and critically evaluate scientific knowledge claims and the impact of this knowledge on the quality of socio-economic, environmental and human development (Swanepoel, 2010 [20]).

### **2.3. Evaluation of Textbook**

Great theorists in the field of textbook design and analysis such as: Williams, 1983 [21]; Sheldon, 1988 [18]; Brown, 1995 [2]; and Cunningsworth, 1995 [5] (cited by Tok, 2010) agreed that evaluation checklists for textbook should have some norms pertaining to the physical characteristics of textbooks such as layout, organizational, and logistical characteristics. Other important criteria that should be incorporated are those that assess a textbook's methodology, aims, and approaches and the degree to which a set of materials is not only teachable, but also fits the needs of the individual teacher's approach as well as the organization's overall curriculum. Finally, textbook evaluations should include criteria that pertain to representation of cultural and gender components in addition to the extent to which the linguistic items, subjects, content, and topics match up to students' personalities, backgrounds, needs, and interests as well as those of the teacher and/or institution.

The effectiveness of an instructional material is best determined using appropriate evaluation instruments. Mopera (2011) [13] made use of content, clarity, appeal to the target users, and originality to verify the acceptability of science based modular worktext. Various approaches to textbook evaluation include the following: analysis, experimental investigation (measuring outcomes), respondent opinions. Each of these methods has the potential to provide information on the quality of a book, but using two or more methods in conjunction can enable researchers to test the validity of results (Mikk, 2000 [12]). Usually pre and post tests of students are utilized to quantitatively measure increase in skills, knowledge and understanding. And teachers who have used the textbook can give their comments on their experience of teaching with the textbook. For this study, the retrospective method was used in the evaluation.

In another study, Tok (2010) [22] stated that since English teachers use textbooks in their classrooms, they have the right to be involved in the process of

evaluation in order to be provided with the relevant textbook for their specific learner group. Their views on the usefulness and effectiveness of the textbook are needed so as to identify the weak and strong points in relation to their own teaching situations. The same author also suggested the following criteria in determining the extent of effectiveness of a textbook: layout and design, activities, skills, language type, subject and content and whole aspect.

### **2.4. Teaching and Learning Effectiveness from Textbook**

Looking closely into the role of teachers, obviously, it has now been transformed into that of facilitators using up their time on actively teaching with textbooks which are designed by experts in their field of study. Teachers now see the role of textbooks in the improvement of education as effective tools to ensure consistency, coverage, appropriate pacing and better quality in terms of instruction and content. They considered textbooks essential to effective teaching. In the study, conducted by Swanepoel (2010) [20], it was mentioned that textbooks can support teachers in their planning and their teaching. Conclusively, textbook is considered a written curriculum that links the intended National Curriculum statements to the implemented curriculum in the classroom. Thus, teachers can now transform the intended curriculum into activities or implemented curriculum. In particular, to beginning teachers who have yet to gain in confidence, textbooks could be a very good support. Teachers also believe that instructional work text could be one effective means of addressing the difficulty of delivering the lessons. The purpose of science education textbooks is to support teachers and learners in the learning process (Litz, 2001 [10]).

Hewson (2004) [7] articulated that textbook can provide scaffolding or instructional support that would help students learn. They can provide questions that activate relevant prior knowledge and direct attention to relevant information. Textbooks are also good resources that form the basis for the so called pedagogical content knowledge that facilitates learning. Although some researchers see text as a mere transport that delivers the content of the lessons without influencing learning, most researchers are aware of the assistance it gives. Another researcher, Ogan-Bekiroglu (2007) [14] said that since learning is an active constructive process that involves interaction with the textbook, the characteristics of such medium must influence the learning process. He said the textbook's role can go beyond the learning opportunities from the classroom to the home where quality printed material can facilitate learning and guide learners through

appropriate learning activities. This implies that textbooks can be utilized with extensively in a variety of activities, ranging from individual to group activities and from lectures to inquiries, and from introductory activities to application practice. Cunningsworth (1995, cited by Tok, 2010) identifies a textbook as a resource in presenting the material, a source for learners to practice and do the activities. They also provide the learners with a reference source on grammar, vocabulary and pronunciation. In addition, textbooks serve as a syllabus and a self-study source for learners. Meaning, textbooks provide learners with access to the entire curriculum in an integrated form which they can refer at any time.

Mayer (2003) [11] found that students learn more deeply from words and pictures than from words alone (under the right conditions). It is obvious that the illustrations in textbooks can contribute to the learning process in science education and, therefore, influence the quality of the textbook. The visual design or layout of a textbook can give salience to some elements in the text: the elements can be marked as more important and more worthy of attention than others. This is attained through the relative size, sharpness of focus, relative positioning, tonal contrast and colour contrasts (Hsu and Yang, 2007 [8]).

### 3. Methodology

#### 3.1. Method

The descriptive research method was utilized in the evaluation of the effectiveness of the textbook entitled "Concepts in Inorganic and Organic Chemistry" by the chemistry faculty members. The study made use also of the quasi-experimental design, specifically, the pretest-posttest nonequivalent control group design. The pre-test and posttest scores were used to evaluate the impact of the Book on the performance of the students. Quasi-experimental research involves the use of intact-groups of subject in an experiment, rather than assigning subjects at random to experimental treatments. Thus, the experimental and control groups were set-up for this purpose and such groups were made equivalent to eliminate other factors that may influence the outcome of the result.

#### 3.2. Participants in the Study

The respondents of the study were the chemistry faculty members from the College of Engineering and Arts and Sciences, Rizal Technological University. All of them were teaching chemistry on the first year students. The study also included four intact groups, of comparable sections of BS Psychology, BS Biology,

and BS Nursing first year students from the College of Arts and Sciences for first semester of SY 2011-2012. Two sections were assigned as the experimental groups and the other two the control groups. The experimental and control groups, consisting of 29 students each, were made equivalent to minimize threats to validity.

#### 3.3. Instrument

The data collection instrument comprised two types. The first type was the "Teacher Textbook Evaluation Scale", which elicits the criteria of a textbook for Chemistry course. The "Teacher Textbook Evaluation Scale", adapted from the work of Hidayet Tok (2010) [22], was modified by the researchers to suit the requirements of the study. The instrument evaluated the book in terms of 'layout and design, activities, skills, language type, and subject and content. The original version, "Teacher Textbook Evaluation Scale (TTES)", was developed by Sung Kyun Kwan University in 2000.

The second type was the researchers' made achievement test. The topics covered are matter and its properties, theory of atoms, chemical bonding, stoichiometry part I and II, aqueous solutions, gases, and acids, base and salts. The chemistry test (pre-test and posttest) was constructed based on the course syllabus for Chemistry I. This was item analyzed to identify the good and very good items that would be used in the study. The achievement test, initially 100 item test was reduced to 60 items after the quantitative validation. Then, the 60 item test was run to another group of students to measure its reliability coefficient. This test was administered as the pretest and posttest to the respondents in the experimental and control groups.

Five degrees of intensity was given a numerical weight from 5 to 1, with 5 as the highest and 1 the lowest rating. The scale of statistical value adopted to assess the quality of the textbook is as follows:

Weighted Average	Value	Verbal Interpretation
4.21 – 5.00	5	Strongly Agree
3.41 – 4.20	4	Agree
2.61 – 3.40	3	Moderately Agree
1.81 – 2.60	2	Disagree
1.00 – 1.80	1	Strongly Disagree

#### 3.4. Research Procedure

The evaluation of the above book has two parts: one taking into account its effect on student performance in major exams, and the other which entails the professional assessment of individual teacher-user. For the assessment involving student performance, pre-tests were given to the two groups at the start of the semester. Then same coverage of lessons was given,

but one group was exposed to the treatment (with book) and the other group to the traditional lecture method. Posttests were conducted after the duration of the lessons. Data were subjected to statistical treatment.

The other aspect of evaluation requires a more stringent procedure and will require a valid instrument for the teacher-user to use. The chemistry faculty members were made to assess the book after it was used for one semester. Such procedure is expected to yield a fair and scientific assessment of the book.

### 3.5. Data Analysis

The data and information gathered were classified, tallied and tabulated. The tabulated data constituted were analyzed and interpreted using the following statistical tools: Frequency count and percentage were used to describe the distribution of the respondents by groups. Weighted Mean was utilized to obtain the assessment of the teacher-users on the textbook in terms of the five identified characteristics. While t-test for Independent Sample Means was adapted to test for the significant difference between the pretest and post test scores of the experimental and control groups.

## 4. Results and discussions

### 4.1. Pretest Scores of the Experimental and Control Groups

**Table 1**  
Pretest Results of the Experimental and Control Groups

Group	No. of Samples	Mean Score $\bar{X}$	Standard Deviation
Experimental	29	24.17	4.71
Control	29	22.21	2.47

Results show that the pretest mean score,  $\bar{x}=24.17$ , of the experimental group is higher than the control group,  $\bar{x}=22.21$ . This indicates that both groups fall below the achievement level of the 50% median. This is valid with the presumption that pretest is given at the start of the semester to determine where the weaknesses of the students are in the lessons that will follow. The results confirm Patel's (1990, cited by Ortigas, 2011 [16]) observation that pretest should be administered to determine the status of knowledge of incoming students in the class.

### 4.2. Difference in the Pretest Scores

**Table 2**  
Difference on the Pretest Mean Scores of the Experimental and Control Groups

Test	Groups Test				Computed t-value	Critical t-value	Interpretation
	Experimental		Control				
	$\bar{X}$	SD	$\bar{X}$	SD			
Pre-test	24.17	4.71	22.21	2.47	-1.992	2.018	*NS

\*NS= not significant at  $\alpha = 0.05$ , if p-value > 0.05;\*\* S = significant if p-value<0.05

Data confirm that the pretest mean scores of the experimental and control groups yield a difference of 1.96. The experimental group is more heterogeneous in nature as shown by its standard deviation of 4.71. The computed t-value of  $-1.992 <$  critical t-value of 2.018 implies that the pretest scores of the two groups do not significantly differ. The results could be due to the method utilized in controlling variables such as age, sex, and university admission test. The idea was supported by Fraenkel and Wallen (2006) [6] in his book that says in an experimental study threats due to subject characteristics could be minimized or eliminated by equating the two groups.

### 4.3. Posttest Scores of the Experimental and Control Groups

**Table 3**  
Posttest Results of the Experimental and Control Groups

Group	No. of Samples	Mean Score	Standard Deviation
Experimental	29	45.00	4.93
Control	29	38.66	4.77

The experimental group's mean score is higher than the control group's mean score by 6.34. Obviously, the experimental group performed better in the achievement test in chemistry than the control group. These findings can be attributed to the utilization of textbook, which according to Clough (2006) [1] can contribute much in enhancing the knowledge of learners during the learning process.

### 4.4. Difference in the Posttest Scores

**Table 4**  
Difference in the Posttest Mean Scores of the Experimental and Control Groups

Test	Groups Test				Computed t-value	Critical t-value	Interpretation
	Experimental		Control				
	$\bar{X}$	SD	$\bar{X}$	SD			
Pre-test	45	4.93	38.66	4.77	-4.982	2.003	** S

\*NS= not significant at  $\alpha = 0.05$ , if p-value > 0.05;\*\* S = significant if p-value<0.05

To justify the effectiveness of the textbook in enhancing the performance of the experimental group in chemistry, the difference in the pretest and posttest scores of the experimental and control groups were considered. The posttest mean score of  $\bar{x} = 45.00$  for the experimental group and  $\bar{x} = 38.66$  for the control group yield a difference of 6.34. This indicates that the control group's scores have more variations compared to the experimental group with standard deviations of 4.93 and 4.77 respectively. The computed t-value of -4.982 > the tabular t-value of 2.003 implies a better performance in favor of the experimental group which could be attributed to the effective utilization of the textbook. These findings support the idea that learning could be reinforced on the basic science principles and concepts with the use of textbook. Results are in accordance with the works done by Hewson (2004), wherein he articulated that textbook can provide scaffolding or instructional support that would help students learn. In other words, textbooks are good resources that form the basis for the so called pedagogical content knowledge that facilitates learning.

## 5. Extent of Effectiveness of the Textbook As Assessed by Teacher

### 5.1. In terms of Layout and Design of the Textbook

**Table 5**  
Assessment on the Layout and Design of the Textbook

A. Layout and Design	Weighted Mean	Verbal Interpretation
1. The textbook includes a detailed overview of the functions, structure and vocabulary that will be taught in each chapter.	3.67	A
2. The layout and design is appropriate and clear.	3.50	A
3. The textbook is effectively organized.	3.17	MA
4. An adequate vocabulary list or glossary is included.	2.67	MA
5. The objectives of the textbook are apparent to both the teacher and student.	3.50	A
General Weighted Mean	3.30	MA

The faculty members agreed in their assessment of the textbook for having a detailed overview of its purpose, structure and vocabulary that are taught in every chapter. Seemingly, the faculty members' assessment on the appropriateness and clarity of the objectives of the lessons found in the textbook was very well reflected in Items 2 and 5 which shows a high weighted mean of 3.50. In terms of lay-out, the book deviated from the usual character of a standard foreign authored book in basic chemistry. In a foreign authored book, understanding the concepts in chemistry, as well as tackling the quantitative aspect of chemistry, is simultaneously required as topics in the first few chapters of the book. In the textbook evaluated, the presentation of the quantitative aspect of chemistry is presented in the middle portion in response to the analytical ability requirement of the Book while understanding the concepts. Another factor to consider is understanding the language better. These two requirements must not be expected simultaneously from the students to make learning easier. Moreover, these findings affirm the analysis of Ogan-Bekiroglu (2007) [14] wherein he said that since learning is an active constructive process that involves interaction with the textbook, the characteristics of such medium must influence the learning process. He said that textbook's role can go beyond the learning opportunities with quality printed materials that facilitate learning and guide learners through appropriate learning tasks.

### 5.2. In terms of Activities found in the Textbook

**Table 6**  
Assessment on the Activities Found in the Textbook

B. Activities	Weighted Mean	Verbal Interpretation
1. The textbook provides a balance of activities (e.i. there is an even distribution of free and controlled exercises and tasks.	3.67	A
2. The activities promote creativity, logic, and independent learning.	3.67	A
3. The textbook activities can be easily modified or supplemented.	3.67	A
4. The activities incorporate individual, pair, and group work.	3.33	MA
5. The activities encourage the students to learn more than what is presented.	3.50	A
General Weighted Mean	3.57	A

The faculty members agreed that the textbook provides balanced activities which: (a) promotes logic, creativity, and independent learning; (b) are easily modified to suit the type of learners; (c) and would encourage learners to learn more. Clearly, the weighted average of 3.67 and 3.50 respectively from items 1-3 and 5 can be interpreted as the result of the great value of the textbook towards learning as claimed by Cunningsworth (1995, cited by Tok, 2010). He identified the textbook as a source for learners to practice and do the provided activities to improve their performance.

### 5.3. In terms of Skills Reflected on the Textbook

**Table 7**  
Assessment on the Skills Reflected in the Textbook

C. Skills	Weighted Mean	Verbal Interpretation
1. The material include and focus on the skills that I/my students need to practice	3.33	MA
2. The material enables the students to improve their analytical skills.	3.33	MA
3. The material enables the students to improve their reading skills involving technical terms in chemistry.	3.50	A
4. The material enables the students to understand specific concept(s) in each chapter.	3.00	MA
5. The material enables the student to see the relationship between concepts or ideas.	3.17	MA
General Weighted Mean	3.27	MA

The faculty members agreed that the textbook is found to be effective in terms of the skills acquired by the students. Evidently, results show the potential value of the textbook in improving the reading ability of the students. It may be inferred from the findings that the textbook has not yet fully address the difficulty of delivering chemistry lessons. Although, Hewson (2004) concluded that textbooks can activate relevant prior knowledge and direct attention to relevant information which would facilitate learning.

### 5.4. In terms of Language Type Used in the Textbook

**Table 8**

### Assessment on the Language Types Used in the Textbook

D. Language type	Weighted Mean	Verbal Interpretation
1. The language used in this book is appropriate for the subject being taught.	3.83	A
2. The language used is at the right level for the students' current English language ability.	4.00	A
3. Chemical terms are correctly phrased and can be clearly understood.	3.67	A
4. Chemical concepts are clearly developed through the use of English language.	3.67	A
5. There is coherence among the sections of each chapter.	3.67	A
General Weighted Mean	3.77	A

The general weighted mean of 3.92 interpreted verbally as strongly agree points to the idea that the choice of words and way concepts were written made the textbook easy to read and understand. Appropriate vocabulary and writing style are key factors that will make the learners engrossed to the printed instructional materials. As per analysis, the textbook apparently provide the learners with a reference source on grammar, vocabulary and pronunciation. They serve as guide for learners in the interpretation of the text as a whole. In the same manner, the study done by Sulaiman and Dwyer (2002) [19] showed that learners can be assisted in inorganizing information by outlines, signalling headings, pointer words, structured illustration, and coherent structures through the use of textbooks. Swanepoel (2010) [20] also mentioned that it is important that the language used in textbooks carries words and sentences that the learners can comprehend.

### 5.5. In terms of Subject and Content of the Textbook

**Table 9**  
Assessment on the Subject and Content of the Textbook

E. Subject and Content	Weighted Mean	Verbal Interpretation
1. The subject and contents of the textbook are relevant to the students' needs as a beginner in chemical education.	3.50	A

2. The subject and contents of the textbook are complete in that they cover all required topics at this level of chemical education.	3.00	MA
3. The subject and contents of this textbook may find practical applications.	3.50	A
4. The subject and contents of this textbook are interesting, challenging, and motivating.	3.33	MA
5. The discussion in this textbook sufficient covers relevant perspective about the topics being discussed.	3.33	MA
General Weighted Mean	3.33	MA

Results of the study reveal that the textbook enables the learners to value the significance of chemistry and how it is transmitted to the different life sciences. The faculty members agreed that the subject contents of the textbook are relevant to student's 'needs, as a novice in chemical education. They also agreed that the subject and contents of this textbook should be seen in the day to day activities of every individual for them to appreciate chemistry in their life. These findings could be attributed to the fact that the authors take into consideration the basic components of a quality textbook during the development process. Accordingly, the book should include criteria that relate the extent to which the linguistics items, subjects, contents, and topics match up with students' personalities.

### 5.6. In terms of Overall Assessment of the Textbook

**Table 10**  
**Overall Assessment of the Textbook**

F. Overall assessment of the book	Weighted Mean	Verbal Interpretation
1. The textbook is appropriate for chemistry students at the college level.	3.33	MA
2. The textbook motivates me/students to study advance courses in chemistry.	3.67	A
3. The textbook appropriately prepares the students for advance courses in chemistry.	3.50	A
4. The objectives of the textbook are achieved after one semester of use.	3.50	A
5. I will choose to study/teach using this textbook again.	3.17	MA
General Weighted Mean	3.45	A

The faculty members assessed positively the attributes that contribute in making a quality textbook. They have the same opinion in saying that the textbook was appropriate for students use in learning chemistry. The book enables the learners to integrate chemistry concepts and apply them that would in effect improve their performance. The textbook as perceived by the faculty members is also a good learning material that facilitates effective classroom teaching. Thus, they moderately agreed to study and teach with the use of the textbook. Science lessons are effectively communicated through the use of the textbook. Communication is thus a pivotal point in establishing knowledge claims and should be an important component in science education (Butler and Nesbit, 2008 [4]). The results of the research seemed to demonstrate that this particular textbook actually stands up just reasonably well to the assessment and that the positive attributes far out-weighed the negative characteristics.

### 6. Conclusions

This research concludes that the textbook "Concepts in Inorganic and Organic Chemistry" is perceived by the teacher-users to possess the positive attributes of a quality textbook such as: objectives are attainable; activity based; learner-centered; relevant subject matter and content; and well understood. The research proves that formulated hypothesis has been verified. The experimental group performs better than the control group with the students from the experimental group getting high scores in the achievement test.

### 7. Recommendations

Whatever strategies are being utilized by the teachers in the classroom, they should maintain high enthusiasm and motivation in delivering the lessons to sustain the improved performance of the students. Since the textbook has been found to improve students' performance, teachers may carry on its use as the required textbook for classroom learning. Teachers should have access to high-quality textbooks which are self-contained and have properly described principles and concepts for effective instruction. Authors need to develop textbook with the basic elements of variations in the presented activities. Considering that understanding chemistry requires higher order thinking skills, the textbook must contain practice exercises that develop such skills. There is a need to organize the sequencing of the contents with the goal of improving the analytic and communicative competence of the students. The University should come up with textbook that would raise the level of interest and comprehension of students in chemical education.



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