

Research article

VALUES EDUCATION INTEGRATION in INTERMEDIATE ALGEBRA INSTRUCTIONAL MATERIALS

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ABSTRACT

Values in mathematics education are the deep affective qualities which education aims to foster through the school subject of mathematics and are a crucial component of the classroom affective environment. As a result of demands that students become more economically oriented and globally conscious, mathematics educators are being challenged about which values should be developed through mathematics education.

The researchers developed instructional materials with values integration for teaching rational algebraic expressions. It went through five stages including the validation of the materials.

The math experts rated the instructional material “excellent” in all aspects of the quality element, namely: format and design, objectives, content organization/presentation, and language/style. **Copyright © WJER, all rights reserved.**

KEYWORDS: Values Education, Mathematics Curriculum, Teaching Strategy, Instructional Materials, Assessment, Affective Education

Chapter I

THE PROBLEM AND ITS BACKGROUND

Introduction

In the past it was largely the priests and religious who, often at great financial cost, organized and animated an impressive network of Catholic schools and colleges in order to ensure the continuation of the Christian education started at home. Stability and continuity in tradition were rooted in educational ideals going back to distinguished founders, but at the same time the religious orders were always willing to make adaptations and take initiatives to develop educational programs designed to make their schools more socially, culturally and politically relevant.

Throughout history, the school's role as a service-provider to society has been a key element in the Church's educational strategy. Christian schools are supposed to ensure the continuation of the Christian upbringing started in the family, and it is in the school the religious dimension of life of the Church can be further developed. The generations of the young Christians formed as adults make their mark on society, politics, the law, medicine, culture, the arts and intellectual life in general. On top of this, the fact that they provide good quality moral education through good quality teaching has always been a recruiting advantage for Christian schools.

The role of education is not only to enhance learning capabilities among students but also to develop values that will enable them to become productive, self-reliant, versatile, civic-minded, physically fit and consequently, totally developed citizens. To help the educational system of the country, the Department of Education launched the Restructured Basic Education Curriculum (RBEC). This curriculum emphasizes the values integration of all subjects like Mathematics as values loaded subject to meet the need in developing values among children, who are the primary concern of the thrust of education.

Values in mathematics education are the deep affective qualities which education aims to foster through the school subject of mathematics and are a crucial component of the classroom affective environment. As a result of demands that students become more economically oriented and globally conscious, mathematics educators are being challenged about which values should be developed through mathematics education. The concern is that, although values teaching and learning inevitably happen in all mathematics classrooms, they appear to be mostly implicit. Thus, it is likely that teachers have only limited understanding of what values are being taught and encouraged.

At present there is little knowledge about what values teachers are teaching in mathematics classes, how aware teachers are of their own value positions, how these affect their teaching, and how their teaching thereby develops certain values in their students. Values are rarely considered in any discussions about mathematics teaching, and a casual question to teachers about the values they are teaching in mathematics lessons often produces an answer to the effect that they don't believe they are teaching any values. It is a widespread belief that mathematics is the most value-free of all school subjects, not just among teachers but also among parents, university mathematicians and employers.

In light of this, the researcher developed an instructional material with values integration that would serve as a supplement for teaching rational algebraic expressions. Henceforth, the researchers bridged the integration of mathematics and values education in the country.

Conceptual Framework

At the heart of sustainable development lies the question of how we relate to our world and humanity, the environment we live in and people around us, our present and future. In our relationships, lie the values that we live by, the choices we make and the attitudes that we express in our daily life and actions. The road to achieving sustainable development is one of many lanes but the foundation of all of the steps we must take is the values that

determine how, as individuals and global citizens, we interact with each other and nature. Education must be at the forefront of our multi-faceted work for a sustainable future and it must have human values at its heart and the resulting expression of them as its aim.

The researchers adhere to the belief of teaching for understanding. This implies more than just memorizing facts, formulas and procedures. To achieve understanding, students must not only learn the individual elements in a network of related content, but also the connections between them. This way, not only can students explain the information in their own words, but they can also retrieve it and apply it appropriately to solve problems (Brophy, 1989).

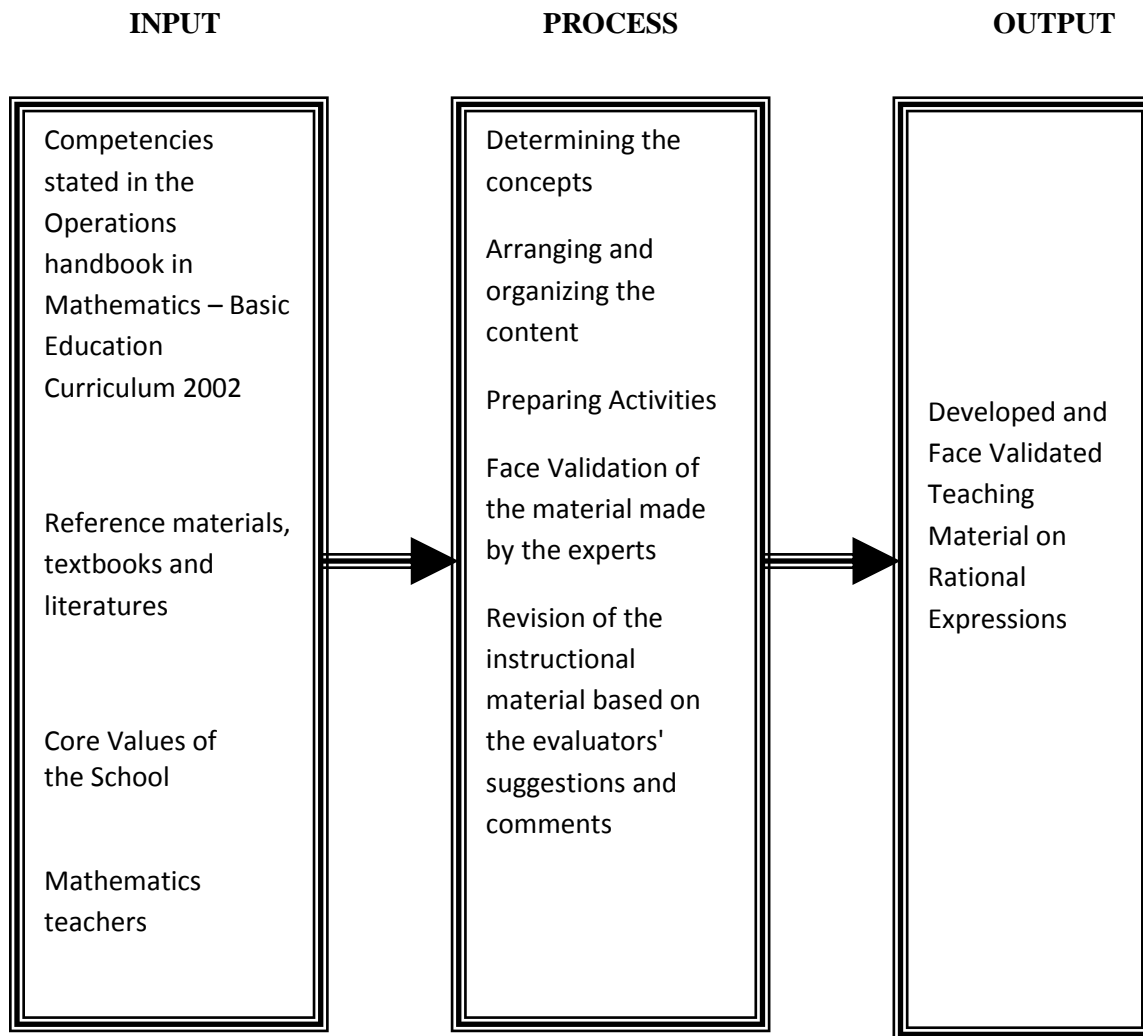
Although, this perspective reinforces and builds on the finding that teachers play an integral role in stimulating student learning, recent research also emphasizes the role of the students. Cognitive psychologists have pointed out that students do not passively receive the information they get from teachers, instead they actively modify it by trying to make sense of it and by relating it to what they already know about a topic.

Thus, students develop new knowledge through a process of active construction. This means that students go beyond rote memorization. For them to achieve true understanding of new information, they need to develop and integrate a network of associations linking new information to pre-existing knowledge and beliefs that are anchored in the appropriate informative experience. (Gonzales, 2003)

Therefore, teaching involves inducing conceptual change in learners, not simply imparting knowledge into a vacuum. As a result of the conceptual change, the students' pre-existing beliefs about a particular lesson are accurate, facilitate learning and provide a natural and articulate foundation for teaching.

To conceptualize the development of the instructional material, the researchers employed, with some revisions, the development model used by Gonzales (2004). The paradigm in Figure 1 shows the INPUT, PROCESS, OUTPUT model.

The INPUT box details the basic materials analyzed by the researchers to identify topics. It includes reference materials, textbooks, and consultations with Mathematics teachers and Core Values of school. The second box, PROCESS, covers the development of the material. This includes the selection and organization of activities. Teachers and experts then face validate this material. After which, comments and suggestions will be consolidated into the revision of the instructional material. The last box, OUTPUT, is the final outcome of this study, the developed Teaching Material on Rational Expressions.



Statement of Purpose

The main concern of this study is to develop instructional materials with values integration on Rational Expressions for second year high school students with the primary aim of providing supplementary materials for teachers.

Specifically, the study aims to:

1. Identify the components to be included in the instructional material.
2. Develop instructional material based on the selected topics.
3. Validate the developed instructional material in terms of the following criteria:
 - a. Format and Design
 - b. Objectives
 - c. Content

- d. Organization/Presentation
- e. Language/Style

Significance of the Study

The researchers believe that the output of this study may help teachers improve students' performance on rational expressions. Furthermore, the developed material may be very useful to the various sectors who are involved in the teaching-learning process of mathematics. Specifically, this study may contribute to the following:

To the **students**, the material may help them better understand the concepts presented with proper motivation and guidance from the teacher. It may help them learn topics in a meaningful manner. It will help them realize that math is not just purely problem solving and calculating; it is also an area filled with values that are essential to one's life.

To the **teachers**, the instructional material may provide supplementary materials for teaching rational expressions. By utilizing the material, teachers can provide students with opportunities to explore, make their own conjectures and generalizations, and find meaning in the learning activities. Also, teachers may become conscious of, and aware of their teaching strategies; thus, allowing them to choose appropriate instructional materials for their students. Math teachers can target two birds in one shot; teaching math and integrating the core values of school.

To the **school administrators**, it may help them gain basic insights and baseline information on students' needs. It may also give an objective feedback on how the objectives of Mathematics education can be achieved. Results of this study will help the school administrators in coming up with in-service training for Math teachers to improve their skills in integrating the Core Values in teaching math.

To the **curriculum planners**, this may give pertinent information on how to prepare curriculum instructional materials, teacher's guide lesson plans, and other supplementary materials that will promote integration of values in mathematics.

Finally, the data from this study may provide other **researchers** with insights for further investigation and may give additional references on how to develop and validate an instructional material.

Scope and Delimitation of the Study

The study involved (6) math experts from distinct academic institutions: 5 from La Salle Green Hills and 1 from The Philippine Normal University who validated the instructional material in terms of format and design, objectives, content, organization and presentation, and language and style.

This study aimed to develop an instructional material for teachers on selected topics in Intermediate Algebra. The researcher selected the following lessons for second year high school on rational expressions:

- Lesson 1 – Rational Expressions
- Lesson 2 – Multiplying Rational Expressions
- Lesson 3 – Dividing Rational Expressions
- Lesson 4 – Adding Rational Expressions
- Lesson 5 – Subtracting Rational Expressions
- Lesson 6 – Complex Fractions
- Lesson 7 – Equations with Rational Expressions
- Lesson 8 – Application of Rational Expressions

The study also focused on face validation of the developed instructional material by experts. No testing and implementation was done.

Chapter II

REVIEW OF RELATED LITERATURE

This chapter presents various reviews of foreign and local literature and studies which provided as basis for the present study.

Mathematics Instructional Materials

According to Homer, as cited by Gonzales (2003), the teacher is not a dispenser of knowledge nor a person 'in charge' of the 'educating' that goes in the classroom, rather, the teacher's role is one of producing the climate, providing the resources, and stimulating the students to explore, investigate, and seek answers. In a rich, pregnant environment, the teacher becomes a guide and facilitator rather than a director.

When developing instructional materials, Mercer and Mercer, as cited by Gonzales (2004), explained that in teaching the students, it is often helpful to supplement or replace commercial materials with teacher-made materials. These materials can supply additional practice, highlight relevant information, provide development of feedback, and increase motivation.

As learners vary in their predispositions to the different process of the learning cycle, it is therefore a wise move for the teacher to use a variety of instructional material that are suited to the learning needs of the class to facilitate teaching and enhance the learning process (Pineda, 2002). As cited by Sabe (2003), stated in "Delivering A Course" by Forgh, Jolliffe, and Stenens (1999), in getting the materials ready, when considering your delivery strategies, you should consider some or all of the following:

- The conventional lecture with its introduction, new material in the middle and a conclusion.
- The interactive lecture where the learner is asked questions or to "shout out all you know about ...".
- Problem solving where the learner adapts existing knowledge to a new learning situation.
- Demonstration in which the learner shows proof of their skills.
- Case studies where the learner considers a real world situation or problems and provides possible solutions.
- Guided discussions in which the learner participates and expresses ideas about the topic under discussion.

Salandanan (2001) proposed the following criteria for creating Instructional Material to ensure its effectiveness.

Emphasis – by just reading the title and the objective of each lesson, the pupil will have an idea of what he is going to accomplish.

Unity – the content material should be logically related. Irrelevant ideas must be avoided especially those that do not add to the understanding and accomplishment of the purpose.

Coherence – the sentences should be grouped towards a better understanding of what it is trying to suggest.

Repetition – this helps the pupil to relate what he has previously learned to new learnings. They must be interrelated to build one another.

Appropriate Vocabulary – the terms and other vocabularies to be used must be familiar to the learners and adapted to their level.

Format – the over-all format should be appealing and acceptable to the readers. The spacing, illustrations, charts, and figures should elucidate and contribute to the better understanding of the activity.

Values Conceptual Framework

The Values Education Framework, herein described, is intended as a guide and form of teaching aid in the implementation of the Values Education Program.

What is not

- It is not prescriptive: values cannot be imposed.
- It is not exhaustive; it does not purport to be a complete list of human values.
- It makes no statement on regional, local, and institutional needs and priorities.

What it is

- It is descriptive: it is an attempt at an orderly description of a desirable value system on the basis of an understanding of the human person.
- It is conceptual: it lists ideals which have to be internalized in the educational process.
- It is intended to be applicable in varying degrees to all three levels of the educational system.
- It is broad and flexible enough for adaptation to specific contexts.

It is desirable that regions, localities, and institutions construct their own values map, with clearly defined priorities, suited to their peculiar context and needs. This DepEd framework should be of help in such a task. Classroom teachers, syllabi constructors, and curriculum planners may use it to identify which values are to be targeted in specific courses and programs.

The Department of Education framework may also serve as a frame for reference in the reform and revision of operative Filipino values. For instance, against the background of the framework, conviviality should be seen as something to be prized but not at the expense of personal integrity, likewise, as a Filipino value, it should be compatible with the much-needed productivity and should even become a bridge to national solidarity. Similarly, conviviality should have wider applications in society so that it can propel other values such as concern for the common good and social justice.

Prevailing Conception of Values/Moral Education

During the time of the Department of Education, Culture and Sports, values education in secondary school was a separate subject which was equal in value as other separate subjects in the curriculum (Floresca-Cawagas & Hepworth, 1987).

The Basic Education Curriculum (BEC) for Philippine public schools requires the integration of Values/Moral Education with Language, Mathematics, and Science education (Cruz, 2003). Values/Moral Education is no longer viewed as an independent subject; it is now a part of Filipino, English, Mathematics, and Science, which are instruments of learning certain values or doctrines (e.g., humane, nature lover). Teachers of such tool subjects are, at the same time, Values/Moral Education teacher. With this new role of the tool subjects, it is no longer apt for students in teacher education institutions in the Philippines to specialize in just one area of study, say, Science or Mathematics education (Cruz, 2003). In fact, Cruz (2003) suggests that all schoolteachers in the Philippine public schools should become well-trained generalists.

Values/Moral Education should be aimed at getting the students to master the correct manner of making reasoned value/ moral choices. Time and again, however, it has been objected that such form of Values/ Moral Education is not particularly concerned with behavior, particularly with getting the students to behave “properly.” But proper behavior is perceived to be morally laudable by the society. To be good, accordingly, is to meet the value/moral expectations of the society. Non-conformity could be anything but good. Or being different could mean a case of moral deviance, which is usually regarded as an instance of “deficiency” in morals or good values. This view of what is moral, however, is highly questionable. It is not unusual for morals and values to be imposed on people by certain, often dominant, entity or interest groups whose attitude, more often than not, seems to lean, if not border on, dogmatism. Such groups could be a political or religious institution/organization.

Despite the strength of moral dominance of an individual or group of individuals over the members of a certain community, it does not follow, however, that conformity to the expectations and cherished values of the dominant entity will necessarily make the conformist a good person. There simply is nothing good about the simple act of following or submitting to the standards of value of a certain institution or organization. For instance, getting the students to believe that honesty is good does not mean that if they will tell the truth without thinking about or due regard to its consequences, they will turn out to be a good person.

Values Education

Values education has been explicit in educational theory from Plato onwards –whether in advocating insight into the ‘form of the good’ (which only a guardian class or Coleridge’s clerisy might attain for the benefit of all) or, according to Aristotle, in arguing for the importance of good habits as an entry to the life of virtue or, according to Dewey, in promoting the social norms which constitute a democratic society.

However, ‘values education’ in educational practices has more often than not been addressed only implicitly and therefore too often uncritically. The ‘disappaliation’ in England of the arts and humanities from the compulsory curriculum after the age of 14 embodies a particular evaluation of those areas of thinking and feeling as a source of values; the promotion of the newly arrived subject of ‘enterprise’ does itself imply a shift in our received list of approved virtues; the direction of students through either academic or vocational pathways reflects the dominant values that are meant to shape the learning of the high achievers.

Recently the teaching of values has become widespread as an explicit focus of curriculum thinking and practising. In the last 50 years or so, prompted particularly by the work of Lawrence Kohlberg at the Centre for Moral Development at Harvard University (Kohlberg, 1976), by the Raths, Harmin, and Simon (1966) and Simon, Kirschenbaum, and Howe (1972) advocacy of ‘values clarification’ and, indeed, in the UK by the work of Wilson, Williams, and Sugarman (1967) of the Farmington Trust, the importance of *teaching* values has been seen to be paramount. Eighty percent of the States in the USA now have mandates regarding the teaching of character education, personal and social education is a requirement for all young people in English schools, the Australian Government has been prominent in its support of values education in all its schools, and ‘emotional literacy’ is now

widely seen everywhere as the latest requirement in a curriculum which appears too often to be overly academic and cerebral.

Therefore, there is a range of different, but interconnected kinds of question about the meaning of values education, as well as the effectiveness of different programmes. Philosophical theory is intertwined with empirical investigation. Bewitched by the use of language, we need to understand the distinctions (if these are to be made) within values education between moral, character, social and holistic education, as well as the differences between all those and emotional literacy. Confusion reigns. Values and character education development usually occurs over a number of years and within a number of environments. Since family members are the first individuals with whom one comes into contact the influence of the family continues to be extremely important to a child's character and values development. This fact is particularly appropriate in the preschools and early school years. As students progress through public schools, it is important that their education provide instructional opportunities, explicit and implicit that help them develop their beliefs about what is right and good.

The Essence and Nature of Values

As cited by Bauzon, in the book, "Essentials of Values Education" (2002). Etymologically, the word values comes from the Latin word "valere" which means to measure the worth of something. Values are the elements of the prevailing in any society. They lie at the core of man's life. They color his choice. They shape and determine an individual's or group's decision to like or dislike, favour or disfavour, change or not to change. Thus, knowledge of people's values including their orientation and preferences, will guide planners, policy-makers and change agents in the planning and implementation of responsive development programs. Equipped with such know-how, they can evoke maximum affirmative public response.

According to Timbreza, in the book, "Filipino Values Today" (2003) :

"Values are important as the food we eat and the air we breathe, so we become the things we value in life. Our health is either sustained or threatened by the kind of food we eat. We are what and who we are because of our values, insofar as we live, act, work, behave, think, judge and make decisions according to our system of values." A value is something desirable, worth having, worth possessing, worth keeping and worth doing.

Synthesis of Related Literature and Studies

The preceding literature and studies helped the researcher conceptualize the present study. Moreover, it gave the researcher enough insights and information on how to develop and validate an instructional material.

The present study and the previous studies stressed that the use of supplementary materials can permit teachers to tailor instructions to particular classrooms that will have significant effect on students' performance.

Values is indeed very important in one's learning plan. It should be integrated and implemented at all times. Teaching math with values is a good avenue in shaping one's future.

Definition of Terms

For a clear understanding of the purpose and direction of this study, the following terms are operationally defined:

Development. This refers to the careful and systematic planning of sequentially organized lessons to provide comprehensive learning activities and to improve students' performance.

Evaluation Instrument. This is the instrument used by the mathematics experts for evaluating the developed instructional material.

Expert. This refers to school heads, department heads, professors, teachers who specialize in mathematics education and have more than five years teaching experience in mathematics.

Initial Assessment. The initial process in determining the efficacy of the proposed material by presenting to the researcher's adviser.

Instructional Material. This refers to the supplementary material which will help teachers in their instruction. It consists of seven parts namely: (1) overview, which introduces the lesson; (2) objectives, which contains the intended outcomes at the end of the lesson; (3) values integration, which highlights the Lasallian core value that is being stressed in a particular topic; (4) strategies, which provides teachers with proper procedure for implementation of the material; (5) rundown, which summarizes the lesson; (6) reflective journals, which allows the students to go beyond the walls of math and discover the values that one needs in achieving his goals; (7) and enrichment, which provides challenging problems for the students to answer.

Validation. The process of determining the usefulness of the proposed instructional material in terms of the following criteria: format and design, objectives, content, organization/presentation, and language and style by presenting the developed material to a panel of experts.

Chapter III

RESEARCH METHODOLOGY

This chapter presents the research design, respondents of the study, research instrument, procedure, treatment of data and statistical tools used in the study.

Research Design

The main purpose of this study was to develop and content validate an instructional material on rational expressions for second year high school students. For this purpose, the study utilized the descriptive-developmental method of research. The descriptive method of research as discussed by Best and Kahn (2002) describes and interprets *what is*. It is primarily concerned with the present, although it considers past events and influences as they relate to current conditions.

The Respondents of the Study

Six evaluators composed of mathematics experts were requested to validate the instructional material. The group came from La Salle Green Hills. Four were teachers of the Honors Class of each year level headed by the Department Coordinator. One expert-evaluator came from The Philippine Normal University.

The Research Instrument

The main instrument used in this study was the Expert's Evaluation Sheet of the Instructional Material on Rational Expressions based on the checklist used by Gonzales (2004). The evaluation checklist was presented to the research adviser and other faculty and was deemed suitable for use. The evaluation sheet was composed of twenty-one (21) positively stated items categorized under format and design; content; organization and presentation; and language/style. It was presented to Mathematics experts so that they could it to evaluate the various aspects of the instructional material.

The evaluation instrument used was based on the Good and Scates'(1972) five-point scale criteria containing the following descriptions:

Point	Description	Characteristics
5	Strongly Agree	The evaluator completely believes that the instructional material responds categorically to the criterion.
4	Agree	The evaluator believes that the instructional material responds categorically to the criterion, however, minor revisions are needed.
3	Uncertain	The evaluator is doubtful that the instructional material responds categorically to the criterion and minor revisions are needed.
2	Disagree	The evaluator believes that the instructional material does not respond categorically to the criterion and major revisions are needed.
1	Strongly Disagree	The evaluator completely believes that the instructional material does not respond categorically to the criterion at all.

The Procedure

The research focused on the development and evaluation of an instructional material on rational expressions. In this regard, the researcher followed the five stages listed below:

A. Planning Stage

This stage consists of the preparation of requirements for the development of the instructional material. The researcher consulted high school mathematics teachers and interviewed some students as a preliminary preparation to identify the topics in Intermediate Algebra for inclusion in the material to be developed. Several reference materials, such as textbooks, journals and articles were also examined regarding the development of the material. Following the consultation with students and teachers, and the examination of the related literature, the researcher selected topics based on the existing objective of Learning Competencies for Second Year of the Revised Basic Education Curriculum. The selected lesson was Rational Algebraic Expressions.

The selected topics were the ones in which students performed poorly, and in which teachers experienced difficulty in teaching and integrating values. Lessons under this topic were usually taught via lecture method by simply giving the steps and illustrative examples without deepening the values that underlies it. Teachers were able to follow the learning plans and deliver the lesson in class but developing the value statement for every plan was not thoroughly enhanced.

B. Development Stage

After identifying the topics for inclusion in the instructional material, and gathering all necessary information, the researcher proceeded to the next stage in line: the actual development of the material. It is in this stage that the researcher took time to review several reference materials and textbooks in Algebra and Values Education. This stage also includes the preparation and design of the format, features and styles which would be used in the proposed material. The instructional material followed the features as listed below:

1. Overview. It introduces the lesson.
2. Objectives. It contains the intended outcomes at the end of the lesson.
3. Values Integration. It contains the Lasallian core value that is being highlighted in the lesson.

4. Strategies. It provides teachers with proper procedure for implementation of the material
5. Rundown. It offers key ideas that summarize the lesson.
6. Reflective Journals. It includes activities that could enhance values integration.
7. Enrichment. It supplies challenging problems for students.

C. Initial Assessment

After the finishing point of the instruction material, it was submitted to the researchers' adviser for consultation and pre-evaluation. Necessary revisions were made as suggested by the research adviser before materials were presented to the math experts for content validation.

D. Content Validation

Upon completion, the proposed instructional material was presented to the five (6) math teachers from La Salle Green Hills and The Philippine Normal University using the Evaluation Sheet. The profiles of the evaluators and summary of the evaluation are also part of the paper. The evaluation instrument was adapted from the study carried out by Gonzales (2004) because of its applicability. The comments and suggestions of the evaluators were considered and were incorporated into the revision of the material.

E. Revision Stage

After the evaluation by the experts, the suggestions and comments were analyzed and used as the basis for making the necessary revisions, for the improvement of the instructional material.

Treatment of Data

The following five-point Likert Scale with boundaries was adapted from the study conducted by Gonzales (2004), and used as a guide for data interpretation:

<u>Scale Value</u>		<u>Weighted Mean</u>
5 – Strongly Agree	4.55 – 5.00	Excellent
4 – Agree	3.55 – 4.54	Very Satisfactory
3 – Uncertain	2.55 – 3.54	Satisfactory
2 – Disagree	1.55 – 2.54	Fair
1 – Strongly Disagree	1.00 – 1.54	Needs Improvement

Scale Value 1 – 5 refers to the score given by the evaluators for how favorable each item in the evaluation checklist is, while the weighted mean refers to the range of the mean scores obtained from the given scores. The verbal interpretation on the weighted mean interval is also included.

The researchers computed the weighted mean of each category in the experts' evaluation sheet. The resultant weighted means were given corresponding verbal interpretations to determine the quality of the material in each category. The overall weighted mean score was also computed to determine the overall quality of the proposed instructional material.

Chapter IV

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the presentation, analysis and interpretation of data gathered from the development and evaluation of the instructional materials.

1. Identify the components of the instructional material.

The developed instructional material was based on the Philippine Learning Competencies of the Refined Basic Education Curriculum. The instructional material on Intermediate Algebra included the following lessons:

Lesson 1 – Rational Expressions

Lesson 2 – Multiplying Rational Expressions

Lesson 3 – Dividing Rational Expressions

Lesson 4 – Adding Rational Expressions

Lesson 5 – Subtracting Rational Expressions

Lesson 6 – Complex Fractions

Lesson 7 – Equations with Rational Expressions

Lesson 8 – Application of Rational Expressions

The instructional material was intended as a supplementary material for second year high school teachers to aid in their instruction. Thus, the target users of the proposed instructional material were the teachers.

Each lesson in the developed material includes the following parts:

1. Overview. It introduces the lesson.
2. Objectives. It contains the intended outcomes at the end of the lesson.
3. Values Integration. It contains the Lasallian core value that is being highlighted in the lesson.
4. Strategies. It provides teachers with proper procedure for implementation of the material
5. Rundown. It offers key ideas that summarize the lesson.
6. Reflective Journals. It includes activities that could enhance values integration.
7. Enrichment. It supplies challenging problems for students.

2. Validation by experts of the developed instructional material in terms of the following criteria:

- a. Format and Design
- b. Objectives

- c. Content
- d. Organization/Presentation
- e. Language/Style

The following tables present the data gathered from the evaluation sheets completed by Math experts. The data represents the experts' assessment of the quality elements of the instructional material:

Table 1
Evaluation of the Developed Instructional Material
in Terms of Format and Design by Experts

Criteria	Mean	Interpretation
▪ The printing is easy to read and understand.	5	Strongly Agree
▪ The quality of the paper is acceptable.	5	Strongly Agree
▪ The illustrations are clear and appealing.	5	Strongly Agree
Overall Mean Score	5	Excellent

Table 1 shows the evaluation of Math experts as regards to the developed instructional material in terms of format and design. The table indicates that the respondents gave the same rating for each item. "*The printing is easy to read and understand*", "*The quality of the paper is acceptable*" and "*The illustrations are clear and appealing*" have a mean score of 5.00, which is excellent.

In general, the mean score of 5.00, characterized as excellent means that the experts consider the format and design of the instructional material very acceptable.

Table 2
Evaluation of the Developed Instructional Material
in Terms of Objectives by Experts

Criteria	Mean	Interpretation
1. The objectives are clearly stated.	4.8	Strongly Agree
2. The objectives are specific.	4.67	Strongly Agree
3. The objectives are attainable.	4.67	Strongly Agree
4. The objectives are relevant to the learning activities.	4.67	Strongly Agree
Overall Mean Score	4.71	Excellent

Objectives are very important because they give the learners and the teachers the target behavior and intended outcomes at the end of the lesson. Table 2 presents the results of the experts' evaluation as regards to the objectives of the developed material. It can be said that among the quality elements in this area, the statement "*The objectives are clearly stated*" rated the highest with 4.8 mean score which means excellent. While the statements, "*The objectives are specific*", "*The objectives are attainable*" and "*The objectives are relevant to the learning activities*" all obtained a mean score of 4.67, which is interpreted as excellent.

The overall mean score of 4.71 indicates that in general, the developed instructional material is highly acceptable in terms of objectives.

Table 3

**Evaluation of the Developed Instructional Material
 in Terms of Content by Experts**

Criteria	Mean	Interpretation
1. The content of the proposed material is suited to the needs of the pupil.	4.67	Strongly Agree
2. The content of the proposed material is within the scope of Learning Competencies for Second Year (RBEC).	5	Strongly Agree
3. The proposed material contains a sufficient number of exercises.	4.17	Agree
4. The activities are clear and easy to understand.	4.67	Strongly Agree
5. The material contains a variety of activities and exercises suitable to students' individual differences.	4.33	Strongly Agree
6. The material can serve as an instructional tool.	4.83	Strongly Agree
7. The material contains activities and exercises that develop creative and critical thinking.	5	Strongly Agree
Overall Mean Score	4.66	Excellent

The figures on Table 3 show the mean ratings given by the experts who validated the content of the instructional material. Just like the previous tables, the respondents rated the content of the instructional material as highly appropriate. This is reflected by the overall mean score of 4.66, which means excellent. Furthermore, the content of the material is highly commendable, as affirmed by one of the experts who commented that “*very good material for senior teachers; well-done; well-thought of; highly commendable.*”

**Table 4
 Evaluation of the Developed Instructional Material in
 Terms of Organization and Presentation by Experts**

Criteria	Mean	Interpretation
1. The suggested activities are simple and easy to follow.	4.67	Strongly Agree
2. The topics are organized and properly presented.	4.67	Strongly Agree
3. The examples are organized and properly presented.	4.33	Agree
4. The material uses appropriate activities in order to promote learning in students.	4.5	Agree
5. The content of the proposed material is suited to the needs of the pupil.	4.67	Strongly Agree
Overall Mean Score	4.57	Excellent

Table 4 shows the summary of means for language/style as perceived by the experts. The table indicates that among the quality elements of the instructional material in this category, the respondents rated highest the statements “*The suggested activities are simple and easy to follow*” and “*The topics are organized and properly presented*” and “*The content of the proposed material is suited to the needs of the pupil*” as the highest, with the mean score of 4.67 and an interpretation of excellent. The statements “*examples are organized and properly*

presented” and “*The material uses appropriate activities in order to promote learning in students*” were rated very satisfactory as reflected in the mean score of 4.33 and 4.50 respectively.

In general, the experts perceived the instructional material to be properly organized and presented, as evidenced by their overall rating of 4.57 which is interpreted as excellent.

Table 5
Evaluation of the Developed Instructional Material
in Terms of Language/Style by Experts

Criteria	Mean	Interpretation
1. The style is appropriate.	5	Strongly Agree
2. The language used is easy to understand.	4.83	Strongly Agree
Overall Mean Score	4.9	Excellent

Table 5 shows the experts’ ratings in terms of the language and style of the instructional material. The statement “*The style is appropriate*” obtained a mean score of 5 which is excellent. And the statement “*The language used is easy to understand*” rated 4.83 with an interpretation of excellent. The overall mean score of 4.9 also verifies that the language and style are acceptable.

Table 6
Overall Evaluation of the Developed
Instructional Material by Experts

Category	Mean	Interpretation
Format and Design	5.00	Strongly Agree
Objectives	4.71	Strongly Agree
Content	4.66	Strongly Agree
Presentation/Organization	4.57	Strongly Agree
Language/Style	4.90	Strongly Agree
Overall Mean Score	4.768	Excellent

Table 6 gives an overall picture of how the experts perceived the developed instructional material on systems of linear equations and inequalities. It shows that the experts rated the instructional material in all the categories as excellent.

Moreover, the overall mean of **4.768**, interpreted as **excellent**, clearly shows that the developed instructional material is highly commendable and is acceptable.

Chapter V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents a summary of the findings, the corresponding conclusions drawn and recommendations formulated by the researcher.

Summary

The study focused on the development and content validation of an instructional material in Intermediate Algebra on Rational Expressions. Specifically, it aimed to (1) identify the components to be included in the instructional material; (2) develop the instructional material based on selected topics; (3) content validate the developed instructional material in the following criteria: format and design; objectives; organization/presentation; and language/style.

This study made use of the descriptive method of research. The researcher adapted the evaluation checklist from the study of Gonzales (2004). The checklist is composed of twenty-one (21) positive statements which the expert used to describe the interpretation as follows: 5 – Strongly Agree; 4 – Agree; 3 – Uncertain; 2 – Disagree; 1 – Strongly Disagree.

For the treatment of data, the weighted mean was computed for each category. The weighted mean was given a corresponding verbal interpretation to characterize the experts' assessment of the developed instructional material.

Findings

The findings are presented in the sequence by which the problems posited in the study:

1. The instructional material is made up of the following parts: (1) overview; (2) objectives ; (3) values integration; (4) strategies; (5) rundown; (6) reflective journal; and (7) enrichment.
2. The developed instructional material underwent the following stages: planning stage; development stage; initial assessment; content validation stage; and revision stage.
3. The math experts rated the instructional material "excellent" in all aspects of the quality element, namely: format and design, objectives, content organization/presentation, and language/style. Mean score in these aspects were 5.00, 4.71, 4.66, 4.57, and 4.90 respectively.

Conclusion

In the light of the findings derived of the study, the following conclusions were drawn:

1. The necessary quality elements of a highly acceptable and commendable instructional material are present in the developed instructional material on rational expressions based on the experts' judgment.
2. The instructional material will most likely be useful to teachers who teach Intermediate Algebra.

Recommendation

Based on the finding and conclusions of the study, the following recommendations are hereby given:

1. The instructional material on rational expressions should be experimentally validated to confirm or contest the result obtained.
2. The instructional material may be used in teaching rational expressions.
3. Similar studies should be undertaken in this, and other areas in mathematics for the high school level.

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