Teaching Elementary Math Conceptually:

A New Paradigm

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Introduction

Welcome to *Teaching Elementary Math Conceptually*, an interactive computer-based instruction course designed to expand your methodology for teaching Mathematics. The course explores an innovative teaching model that incorporates strategies for teaching concepts constructively and contextually. The goal is for you to gain a deeper understanding of the concepts underlying various math topics and to explore the principles of teaching those concepts to learners. You will also explore how to develop computational thinking, which is foundational to learning computer science. The course expands the teaching methodology that supports learning mathematics standards, such as Common Core State Standards (CCSS) and STEM concepts related to technology. This course will focus on the mathematics topics of number sense, basic operations, and fractions, along with the key strategies that connect mathematics and technology.

This computer-based instruction course is a self-supporting program that provides instruction, structured practice, and evaluation all on your home or school computer. Technical support information can be found in the Help section of your course.

Course Materials (Online)

Title:	*Teaching Elementary Math Conceptually: A New Paradigm*
Publisher:	Virtual Education Software, inc. 2010, Revised 2015, Revised 2017, Revised 2020, Revised 2024
Instructor:	Kim Chappell, Ed.D.

Academic Integrity Statement

The structure and format of most distance learning courses presume a high level of personal and academic integrity in completion and submission of coursework. Individuals enrolled in a distance-learning course are expected to adhere to the following standards of academic conduct.

Academic Work

Academic work submitted by the individual (such as papers, assignments, reports, tests) shall be the student's own work or appropriately attributed, in part or in whole, to its correct source. Submission of commercially prepared (or group prepared) materials as if they are one's own work is unacceptable.

Aiding Honesty in Others

The individual will encourage honesty in others by refraining from providing materials or information to another person with knowledge that these materials or information will be used improperly.

Violations of these academic standards will result in the assignment of a failing grade and subsequent loss of credit for the course.

Level of Application

This course is designed to be an informational course with application to work or work-related settings. The intervention strategies are designed to be used primarily with elementary students, or any students who struggle with understanding mathematics.

Expected Learning Outcomes

As a result of this course, participants will demonstrate their ability to:

- Expand conceptual understanding of number sense, basic operations, and fractions
- Explore a conceptual model of teaching math
- Develop skill in designing constructive learning experiences
- Explore strategies to support learning the skills outlined in the CCSS
- Integrate concrete modeling to support conceptual teaching
- Develop the building blocks for STEM using basic arithmetic and math concepts
- Teach problem-solving skills, logical reasoning, and analytical skills necessary to solve complex STEM issues
- Develop precision and accuracy with calculations, measurements, and designs through conceptual learning while minimizing errors to optimize performance
- Present mathematical models to facilitate understanding of more complex systems, predict mathematical outcomes, and design solutions

Course Description

The course *Teaching Elementary Math Conceptually: A New Paradigm* is designed to explain and connect the major concepts, procedures, and reasoning processes of mathematics. Current research and trends in math education will be discussed to outline a teaching methodology that is

conceptual, contextual, and constructive and supports learning mathematics standards, such as the Common Core State Standards (CCSS) and STEM concepts related to technology. Activities are presented to explain underlying concepts and illustrate constructive teaching. The course has been divided into four chapters covering four math topics: number sense, addition and subtraction, multiplication and division, and fractions. The emphasis is on exploring how to develop mathematical understanding and computational thinking in learners to support achievement in mathematics and technology.

Student Expectations

As a student you will be expected to:

- Complete all four information sections showing a competent understanding of the material presented in each section.
- Complete all four section examinations, showing a competent understanding of the material presented. **You must obtain an overall score of 70% or higher, with no individual exam score below 50%, and successfully complete ALL writing assignments to pass this course**. ***Please note: Minimum exam score requirements may vary by college or university; therefore, you should refer to your course addendum to determine what your minimum exam score requirements are.**
- Complete a review of any section on which your examination score was below 50%.
- Retake any examination, after completing an information review, to increase that examination score to a minimum of 50%, making sure to also be achieving an overall exam score of a minimum 70% **(maximum of three attempts). *Please note: Minimum exam score requirements may vary by college or university; therefore, you should refer to your course addendum to determine what your minimum exam score requirements are.**
- Complete all course journal article and essay writing assignments with the minimum word count shown for each writing assignment.
- Complete a course evaluation form at the end of the course.

Course Overview

Chapter 1 – Number Sense

The first chapter outlines the teaching model, including a discussion of the conceptual, contextual, and constructive teaching of math. Comparisons are drawn between traditional math education and conceptual teaching. The chapter also explores the methodology in relationship to the Common Core State Standards and STEM concepts, including computational thinking. The chapter also explores the four key strategies for connecting technology and mathematics (decomposition, abstraction, pattern recognition, and algorithm design) and how to develop a conceptual understanding of number sense, counting principles, and place value. Example activities are presented, both to explain mathematical concepts and to illustrate teaching strategies.

Chapter 2 – Addition & Subtraction

The second chapter covers concepts in addition, subtraction, and estimation. This chapter explores foundational concepts to develop computational fluency without memorization.

Strategies represent conceptual and constructive teaching. A unique manipulative tool is introduced that is used extensively to develop operational concepts and expand place value principles. The computational thinking strategies of decomposition, pattern recognition, and algorithm design are expanded.

Chapter 3 – Multiplication & Division

The third chapter develops concepts in multiplication, division, and prime numbers. In this chapter, designing contextual problems is discussed. Strategies presented are designed to construct operational concepts that are foundational to fractions. Place value concepts are expanded, and prime number concepts are developed. Technology concepts are connected using the strategies of abstraction and algorithm design.

Chapter 4 – Fractions

The final chapter explores fractional understandings. Alternative manipulatives are used to develop essential concepts and computational principles. In addition, a unique strategy is presented for finding common denominators, equivalent fractions, and reduced fractions. All operations, including division, are presented using manipulatives to teach for understanding. The computational thinking strategies of decomposition and algorithm design are expanded.

Examinations

At the end of each course section, you will be expected to complete an examination designed to assess your knowledge. You may take these exams a total of three times. Your last score will save, not the highest score. After your third attempt, each examination will lock and not allow further access. The average from your exam scores will be printed on your certificate. However, this is not your final grade since your required writing assignments have not been reviewed. Exceptionally written or poorly written required writing assignments, or violation of the academic integrity policy in the course syllabus, will affect your grade. As this is a self-paced computerized instruction program, you may review course information as often as necessary. You will not be able to exit any examinations until you have answered all questions. If you try to exit the exam before you complete all questions, your information will be lost. You are expected to complete the entire exam in one sitting.

Writing Assignments

All assignments are reviewed and may impact your final grade. Exceptionally or poorly written assignments, or violation of the Academic Integrity Policy (see course syllabus for policy), will affect your grade. Fifty percent of your grade is determined by your writing assignments, and your overall exam score determines the other fifty percent. ***Refer to the Essay Grading Guidelines, which were sent as an attachment with your original course link. You should also refer to the Course Syllabus Addendum,which was sent as an attachment with your original course link, to determine if you have any writing assignments in addition to the Critical Thinking Questions (CTQ) and Journal Article Summations (JAS). If you do, the Essay Grading Guidelines will also apply.***

Your writing assignments must meet the minimum word count and are not to include the question or your final citations as part of your word count. In other words, the question and citations are not to be used as a means to meet the minimum word count.

Critical Thinking Questions

There are four CTQs that you are required to complete. You will need to write a minimum of 500 words (maximum 1,000) per essay. You should explain how the information that you gained from the course will be applied and clearly convey a strong understanding of the course content as it relates to each CTQ. To view the questions, click on REQUIRED ESSAY and choose the CTQ that you are ready to complete; this will bring up a screen where you may enter your essay. Prior to course submission, you may go back at any point to edit your essay, but you must be certain to click SAVE once you are done with your edits.

You must click SAVE before you write another essay or move on to another part of the course.

Journal Article Summations

You are required to write, in your own words, a summary on a total of three peer-reviewed or scholarly journal articles (one article per JAS), written by an author with a Ph.D., Ed.D., or similar, on the topic outlined within each JAS section in the "Required Essays" portion of the course (blogs, abstracts, news articles, or similar are not acceptable). Your article choice must relate specifically to the discussion topic listed in each individual JAS. You will choose a total of three relevant articles (one article per JAS) and write a thorough summary of the information presented in each article (you must write a minimum of 200 words with a 400 word maximum per JAS). Be sure to provide the URL or the journal name, volume, date, and any other critical information to allow the facilitator to access and review each article.

To write your summary, click on REQUIRED ESSAYS and choose the JAS that you would like to complete. A writing program will automatically launch where you can write your summary. When you are ready to stop, click **SAVE**. Prior to course submission you may go back at any point to edit your summaries but you must be certain to click SAVE once you are done with your edits. For more information on the features of this assignment, please consult the HELP menu.

You must click SAVE before you write another summary or move on to another part of the course.

Instructor Description

Teaching Elementary Math Conceptually: A New Paradigm was developed by Dr. Kim Chappell. Dr. Chappell is an associate professor of Education at Fort Hays State University in Kansas. Currently, she teaches graduate courses in the Advanced Education Programs Department. She supervises research projects, mentors students, and writes curriculum. Dr. Chappell has over 34 years of teaching experience and holds two master's degrees, a Master of Education in Curriculum and Instruction and a Master of Science in Mathematics Education. She also holds an Ed.D. degree in Instructional Leadership.

Contacting the Instructor

You may contact the instructor by emailing Dr. Chappell at kim_chappell@virtualeduc.com or calling her at 509-891-7219, Monday through Friday, 8:00 a.m. – 5:00 p.m. PST. Phone messages will be answered within 24 hours**.** Phone conferences will be limited to ten minutes per student, per day, given that this is a self-paced instructional program. Please do not contact the instructor about technical problems, course glitches, or other issues that involve the operation of the course.

Technical Questions

If you have questions or problems related to the operation of this course, please try everything twice. If the problem persists please check our support pages for FAQs and known issues at www.virtualeduc.com and also the Help section of your course.

If you need personal assistance then email support@virtualeduc.com or call 509-891-7219. When contacting technical support, please know your course version number (it is located at the bottom left side of the Welcome Screen) and your operating system, and be seated in front of the computer at the time of your call.

Minimum Computer Requirements

Please refer to VESi's website: www.virtualeduc.com or contact VESi if you have further questions about the compatibility of your operating system.

Refer to the addendum regarding Grading Criteria, Course Completion Information, Items to be Submitted, and how to submit your completed information. The addendum will also note any additional course assignments that you may be required to complete that are not listed in this syllabus.

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Course content is updated every three years. Due to this update timeline, some URL links may no longer be active or may have changed. Please type the title of the organization into the command line of any Internet browser search window and you will be able to find whether the URL link is still active or any new link to the corresponding organization's web home page.

Updated 7/22/25 JN

COURSE SYLLABUS ADDENDUM

Important - Please Read - Do Not Discard

It is each student's responsibility to read all course materials, including course syllabus and addendum, and to know and understand the course requirements, exam score minimum requirements, and deadlines. Students enrolled in VESi courses are required to check their email for any communications regarding the course until their final grade is posted with the college or university. Once your course materials are received by VESi and have been reviewed, the GRADE IS FINAL.

Grading Criteria:

You must obtain an overall score of 70% or higher, with no individual exam score below 50%, and successfully complete ALL writing assignments to pass this course. This course requires a minimum overall passing grade of "C-" to receive credit. The average from your exam scores will be printed on your certificate. However, this is not your final grade since your required writing assignments have not been reviewed. Exceptionally written or poorly written required writing assignments, or violation of the academic integrity policy in the course syllabus, will affect your grade. Fifty percent of your grade is determined by your writing assignments, and your overall exam score determines the other fifty percent.

No grade will be submitted for partial completion of course assignments, regardless of partial score. An F will be reported if course is not completed by the end of the term enrolled. Exceptions only apply to those that request an extension (must have extenuating circumstances) prior to course deadline.

Letter grades will be assigned as follows:	**90% to 100% A** **80% to 89% B** **70% to 79% C** **69% - lower F**

Course Completion Information:

Grading will take approximately two weeks from the time your materials are received by the instructor, after which we will submit grades to the college/university weekly. If you have a timeline to meet certain school or state requirements, please keep this time period in mind when planning your course completion dates.

Course Completion Instructions

- **Once you have completed all of the course requirements, follow the instructions from the Complete Course toolbar to submit your materials to VESi's office for processing.** You can only submit the course ONE TIME. Be sure that you have completed all requirements and exams.
- **Course Evaluation:** Please take a moment to fill out the course evaluation which is also found under the Complete Course toolbar.

- **Print Certificate:** You can print a copy of your course certificate for your records.

Accessing your NDSU Transcript:

After the grade for your course(s) is posted, approximately two weeks after the course submission, you can access your NDSU transcript for documentation of course completion and performance. Instructions are found at this link: Transcript Instructions | Continued Learning | NDSU

Drops & Refunds:

Once learners have received the course materials, they are no longer eligible for a refund. Appeals will be considered on a case-by-case basis.

Questions or Concerns:

Please direct any questions or concerns regarding this class to ndsu.dce@ndsu.edu. Please include the title of the course in your correspondence.