

MODELLING THE TEACHING OF MTH 101 USING THE BLOOMS TAXONOMY OF EDUCATION OBJECTIVES

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Abstract: We bring into play a design from the Blooms Taxonomy of educational objectives for teaching and learning of Elementary Mathematics I (MTH 101), using the software Excel and structured to help University teachers in teaching and learning, as well as in potentially developing test patterns and test items for other courses that would enhance their performance in any particular subject area. It is clear and easy to apply.

Keywords: Pedagogy, Blooms Taxonomy, Elementary Mathematics I (MTH 101).

1. INTRODUCTION

What is Digital Pedagogy?

Pedagogy is an orientation toward the theory and practice of teaching and learning that is not necessarily predicated on the use of digital tools but also has to do with the study of such contemporary digital technology in teaching and learning (Brovko, 2025). There is digital and regular pedagogy. Let us strike a difference between Digital Pedagogy and Regular Pedagogy (Attilante, 2019):

In a broader sense, digital pedagogy is the use of electronic elements to enhance the experience of education (Howard, 2007) - Hence the idea conveyed in this article/proposal.

Examples of digital pedagogy are:

- (i) Blogging Assignments
- (ii) Getting Teachers and students to use digital tools to test ideas
- (iii) The use of social media in the classroom (Jordan, 2014)

Summarily, digital pedagogy is an attempt to use technology to change teaching and learning in very many ways. (Hrindniev, 2023)

So, digital pedagogy is all about how to teach beyond walls, seats, chalkboard and podium. This is how we can use technology to enhance learning (Hansen, 2015).

2. IMPORTANCE OF DIGITAL PEDAGOGY FOR SUSTAINABILITY OF EDUCATION

Trilling and Fadel (2009) noted that effective project learning has five key characteristics:

1. Project outcomes are tied to curriculum and learning goals
2. Driving questions and problems lead students to the central concepts or principles of the topic or subject area.

3. Learners' investigations and research involve enquiry and knowledge building.
4. Learners are responsible for designing and managing much of their learning; and
5. Projects are based on authentic real-world problems and questions that students care about. (Trilling et al, 2019).

3. HOW DIGITAL PEDAGOGY SUSTAINS EDUCATIONAL GOALS

Educational goals and objectives are sustainable by digital pedagogies (Zulpuev, 2026) in the following ways:

1. Digital Pedagogy calls us to envision teaching and learning as multifaceted, particularly in the 21st Century (Bokhonko et al, 2023)
2. Helps to enhance learning development and learning experience after the order of the 21st Century. (Ghazal, 2026)
3. Empowers the teacher as a formidable instructional architect who develops and guides learning experience. (Phanchulidze, 2025)

3.1 STEPS FOR DIGITIZING PEDAGOGY

Here below are some steps necessary for digitizing pedagogy

1. Reflection – Sufficient time must be spent reflecting on why you teach the way you do. (Machost, et al, 2023)
2. Identify your core values and belief as an educator (Evans, 2005)
3. Build a philosophy which must be further expressed through the involvement of digital tools (Farrel, 2018).
4. Learning Theories must be harnessed. Learning theories are the basis for pedagogy (Noel, 2011).
5. Both users and creators of knowledge in a digital age are challenged by the form of information and the tools and methods that are used to make sense of it (Burkle et al, 2018).

Therefore students must be adequately exposed to the essential skills to enhance their ability to become effective digital communicators who in turn with time become digital content creators. So, it is not just enough to seek to empower students in a digital environment, but much is desired by way of considering how this impacts their pedagogy. This is crucial and highly imperative (Jacob et al, 2023).

4. DIGITAL TEST CONSTRUCTION - BLOOMS TAXONOMY OF EDUCATION OBJECTIVES

We design a digitized table using the Microsoft Excel platform based on Blooms Taxonomy of Education objectives which reflects contents of a named course unit (Shabatura, 2022), (Adams, 2015).

4.1 BLOOM'S TAXONOMY

Bloom's taxonomy provides an important framework for teachers to use to focus on higher order thinking. It assists teachers in designing performance tasks, crafting questions for conferring with students, and providing feedback on student work, including questions for critical thinking. (Momen, et al, 2022), (Al-Janabi et al, 2019),

4.2 DEFINITION (TEST CONSTRUCTION)

Test construction is part of teacher's duty and teacher made tests are vital aspects of teaching and learning process. One of the ways to utilize well-written objectives in test construction is by means of a table of specification (Chibuikwe et al, 2022), (Green, 2023), (Kissi et al, 2023).

A table of specifications is practically a two-way aid where the content is outlined along the vertical axis and the expected behaviours which the students must accomplish are presented along the horizontal axis (Fives, 2018).

4.3 USE OF TABLE OF SPECIFICATION

1. It is used to guide the teacher's teaching and measurement procedures.
2. It ensures that the teacher's testing parallels his teaching.
3. Each test item given in connection with a particular unit can be related to the content area and behavioural objectives which the item measures.

4. It is convenient way of placing the content outline of a unit in relation to the behaviours the content promotes.

It is crucial to note that the table of specification is a major time-alloted undertaking just before a large end of unit examination. However, it is thoughtful to construct it during the planning stage of the unit. By the table of specifications, the learners determine the content areas and the behaviours in which they are having difficulty. It has a diagnostic value for both the teacher and the learners. It serves as a check on the effectiveness of the teacher by noting areas and objectives in which substantial numbers of learners in a class have difficulty. It ensures that the teacher distributes the questions spanning all objectives. (Alade et al, 2014), (Ing et al, 2017).

4.4 COURSE OUTLINE FOR ELEMENTARY MATHEMATICS I (MTH 101)

In general, the topic heads curriculum content of this course as approved by the National Universities Commission Abuja Nigeria and taught by the Chukwuemeka Odumegwu Ojukwu University is as follows:

- 1. ELEMENTARY SET THEORY**
- 2. SETS OF REAL NUMBERS**
- 3. MATHEMATICAL INDUCTION**
- 4. SEQUENCES AND SERIES OF NUMBERS**
- 5. THEORY OF QUADRATIC EQUATIONS**
- 6. BINOMIAL THEOREM**
- 7. INTRODUCTION TO COMPLEX NUMBERS**
- 8. CIRCULAR MEASURE**
- 9. TRIGONOMETRIC FUNCTIONS OF ANGLES OF ANY MAGNITUDE**
- 10. ADDITION AND FACTOR THEOREMS**

These 10 broad heading topics which normally cover *Elementary Set theory, subsets, union, intersection, complements. Venn diagrams, Real numbers, integers, rational and irrational numbers, mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formulae. Complex numbers, algebra of complex numbers, the Argand Diagram, De Moivre's theorem, nth roots of unity* have been used in designing this teaching model found in the appendix section (Faculty of Physical Sciences (FPS), UNN, 2020).

5. MAIN IDEA

Elementary Mathematics I is one of the campus wide courses hosted by the various departments of Mathematics of Nigeria Universities including the Chukwuemeka Odumegwu Ojukwu University. Numerous other departments, for example Medicine, Microbiology, Statistics, Computer Science, All Engineering departments etc “borrow” these courses from the host department to service their student learning contents. The idea behind this paper is to create a teaching model for the teaching and learning of this course in such a manner that the contents are equitably covered during assessment.

6. METHODOLOGY

The software used in this study is Microsoft Excel. It is recommended that the reader first study this program, to get an understanding of how it works before taking a close look at the table in the appendix. It is reasonably believed that the whole idea would be very easy to grasp. However, any query can be directed to the corresponding author for clarifications.

7. CONCLUSION

The author has used table of specifications and by applying the blooms taxonomy of education been able to design and construct a model for the teaching and learning of Elementary Mathematics I. This can be adopted by other universities delivering similar courses to their students. It provides a guided, and modifiable excel template for other courses example – General Studies 101, Microbiology 101 as offered by institutions of higher learning across the globe.

8. APPENDIX

Following is a result of construction of a 50 - question objective test on the content areas of MTH 101 (Elementary Mathematics I).

Appendix

		BEHAVIOURAL OBJECTIVES WITH PERCENTAGE EMPHASIS						
		KNOWLEDGE	C O M P R E H E N S I O N	A P P L I C A T I O N	A N A L Y S I S	S Y N T H E S I S	E V A L U A T I O N	
MTH 101 CONTENT AREAS	28%							20%
1	ELEMENTARY SET THEORY	1	1	1	1	1	1	6
2	SETS OF REAL NUMBERS	2	1	1	1	1	-	6
3	MATHEMATICAL INDUCTION	1	1	-	1	-	-	3
4	SEQUENCES AND SERIES OF NUMBERS	2	1	1	1	1	-	6
5	THEORY OF QUADRATIC EQUATIONS	1	1	1	-	1	-	4
6	BINOMIAL THEOREM	1	1	1	1	-	1	5
7	INTRODUCTION TO COMPLEX NUMBERS	2	1	1	1	1	-	6
8	CIRCULAR MEASURE	1	1	1	-	-	1	4
9	TRIGONOMETRIC FUNCTIONS OF ANGLES OF ANY MAGNITUDE	2	1	1	1	-	1	6
10	ADDITION AND FACTOR THEOREMS	1	1	-	1	-	1	4
		14	10	8	8	5	5	50

THOSE IN GREEN WERE OBTAINED BY TAKING % OF 50 AS INDICATED

THOSE IN RED ARE THE SUM OF THE ITEMS IN THE INDIVIDUAL CONTENT AREAS.

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