

# Researcher Reflections on the Role of Different Media in Mathematics Education

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## Abstract

Emerging technologies including Web 2.0 and Web 3.0 provide educational technology professionals with potential alternatives to transform 20 years of routines which address disk-based mathematics instruction. This new facet of mathematics instruction may enable the stakeholders of mathematics education to renew their ideas regarding technology enhanced instruction. Thus, the current study aims to investigate the researchers' impressions and reflections on student experiences in a technology enhanced environment.

The main study is an experimental one that has been planned as a pretest-posttest control group design. The participants are 113 second-year (sophomore) students enrolled in a department of elementary mathematics education at a medium-size Turkish state university. The design and interventions were provided in an undergraduate must course named Calculus II. The data were collected through research diaries and field notes. An independent observer took place in lessons in order to collect data by taking field notes and one researcher cited his impressions by keeping a research diary. Thus the study has a qualitative identity due to descriptive representation of researchers' experiences. Research meeting minutes and course videos were also used during the research process.

Within the scope of the experimental design, a semantic search engine called "Wolfram Alpha" was used for the web-based education group. For the computer algebra system-based instruction group, Mathematica was used. Instructors used linear web pages within the context of the web supported, instructor-led training group. Calculus II Course activities include

- graphical demonstrations of multivariable functions
- calculating limits and graphical interpretations of limit values
- interpreting continuity with respect to a domain or a point
- calculating derivatives and geometric meaning of the concept "derivative"
- calculating multiple integrals and interpreting integrals within multivariable functions and
- shifting between cartesian and polar coordinates using Wolfram Alpha, Mathematica or linear Web pages.

The research diaries and the field notes were grouped and the qualitative data were analyzed through relevant content analysis methods. Content analysis was chosen due to its opportunity to analyze the data originated from the documents of the course by determining sub themes and concepts of the video-recorded interactions and qualitative data collected by the researchers and the observer.

According to content analysis, it is understood that guiding the students to ask Walpha reasonably is the most important thing, before all of the activities. Another issue raised from the researcher experiences is designing the content field-centered. Also the researchers touched on separating the activities of experimental group into two categories:

- Searching for new information on the semantic search engine
- Applying new information on the semantic search engine

Research meeting minutes tell that unless the instructor simplify the activities in the disk-based mathematics instruction group, this will provoke students to demotivate themselves and not to participate in the activities as well.

The themes of the study can be specified with respect to sub-themes:

Creating Knowledge:

- 1-Supporting works with ICTs
- 2-Being aware of what is being taught and learnt
- 3-Searching for new information
- 4-Using / applying new information

Using Media and Methodology Interactively

- 1-Understanding the advantages of different media
- 2-Technology awareness

Working With Heterogenous Groups

- 1-Participation related to classroom activities
- 2-Interaction with instructors

Working Independent and Responsibility

- 1-Planning work independent

2-Being aware of responsibilities

3-Motivating oneself

The researchers suggest designing a separate lesson for computer ethics or integrating it with scientific research courses. Also, adding concept maps to presentations and preparing warm-up activities are also emphasized for improving current practice.

**Keywords:** Mathematics education; technology enhanced learning; content analysis.

**Acknowledgement:** This study is conducted through the funding provided by Anadolu University (Eskisehir, Turkey) for the project entitled "Cognitive and Psychosocial Effects of Persuasive Technology Use on Mathematics Instruction". (Project ID: 1210E162)