

MATH 630 (MAST 652), Sec. AA
Topics in the Psychology in Math Education
Fall 2017

Instructor: Dr. A. Sierpinska, Office: LB 921-09 (SGW), Phone: 848-2424, Ext. 3239
E-mail: anna.sierpinska@concordia.ca

Classes: Thursdays, 6:00–8 :15 pm, LB 921.04

Office Hours: By appointment.

Texts: There is no single textbook for this course. A variety of sources (books, articles) will be used.

Purpose: This course is premised on the assumption that there is no learning without overcoming some difficulty. If you have experienced no difficulty in performing a task then you have probably learned nothing by doing it. Therefore difficulties are treated as something normal, expected and even welcome. The teacher must have a sufficiently deep understanding of the possible cognitive, epistemological, and didactic sources of difficulties in mathematics to recognize those difficulties in particular students. Based on this understanding, the teacher can create learning situations that motivate students to overcome the difficulties associated with the material. In this course, you will have an opportunity to learn to anticipate the possible difficulties students may have in learning different content areas in mathematics such as arithmetic, high school algebra, geometry, college algebra, college level calculus, and, depending on the interests of the participants, the more advanced areas of mathematics. Difficulties related to the specificity of mathematical reasoning and proving will also be tackled. Students will choose topics to study more in depth according to their own interests. They will inform the instructor about their interests and the instructor will help them select relevant literature.

Assessment:

Assessment will be based on

- | | |
|---|------|
| - attendance and participation in class discussions | 10% |
| - a reading presentation | 15% |
| - review of readings on students' difficulties
in a chosen mathematical area/concept/process
(3000 words) | 25% |
| - report from a diagnostic interview conducted by
the student (6000 words) | 50% |
| TOTAL: | 100% |

Attendance and participation

Attendance is compulsory. If, for some important reason, a student cannot attend the class, he or she must inform the instructor as early as possible.

Students are expected to actively participate in classroom discussions. Interventions should be based on knowledge of mathematics and mathematics education literature and not only on personal experience and opinion.

Reading presentations

In September, students will inform the instructor (by email) about the area/concept/process of mathematics they wish to study more in depth from the point of view of difficulties related to learning it. The instructor will advise each student on relevant readings, but students are welcome to propose their own lists of readings.

Presentations of readings will take place in October.

Literature review

The student will read at least four articles or book sections on students' difficulties in learning their chosen area/concept/process of mathematics.

In an essay of about 3000 words, the student will identify and describe the difficulties, their nature, their sources, their symptoms in the form of, for example, certain recurrent errors or behaviors. The student will also describe the diagnostic instruments that allowed researchers to reveal these difficulties and theoretical frameworks used to analyze and explain them. This assignment will be due by mid-November.

Interview Report

The student will design and conduct an interview with 2-4 students aimed at revealing their difficulties with a particular mathematical area/concept/process.

The student will describe the interview and its analysis in a report of about 6000 words.

The Report should contain the following parts:

1. Introduction

Brief presentation of the aim of the interview, the participants' backgrounds, and a preview of the results obtained.

2. The interview instrument

How was the interview structured? What were the questions? How can they be justified from the point of view of the goals of the interview: what made the interview questions suitable for the task of revealing a particular set of difficulties?

3. Results

The participants' responses are described and analyzed.

4. Discussion

The results of the interview are discussed in the light of what has already been found about students' difficulties in the literature. Do the results corroborate those found by other researchers? Do they refine them? Contradict them?

5. Conclusions and recommendations

5.1 Summary of the revealed difficulties

5.2 Could the interviewing instrument and/or technique be improved for diagnostic purposes? How?

6. References

References must be listed in alphabetical order, using the APA Sixth Edition style. References within the main body of the text should have the format "(AUTHOR-LAST-NAME, YEAR)", e.g., (Ainley, 1994).

Students will have an opportunity to present their (ideas for) the Interview in the November class sessions, and obtain feedback and advice from their peers and the instructor.

The deadline for submission of completed Reports is December 11, 2017.

Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: concordia.ca/students/academic-integrity." [*Undergraduate Calendar, Sec 17.10.2*]