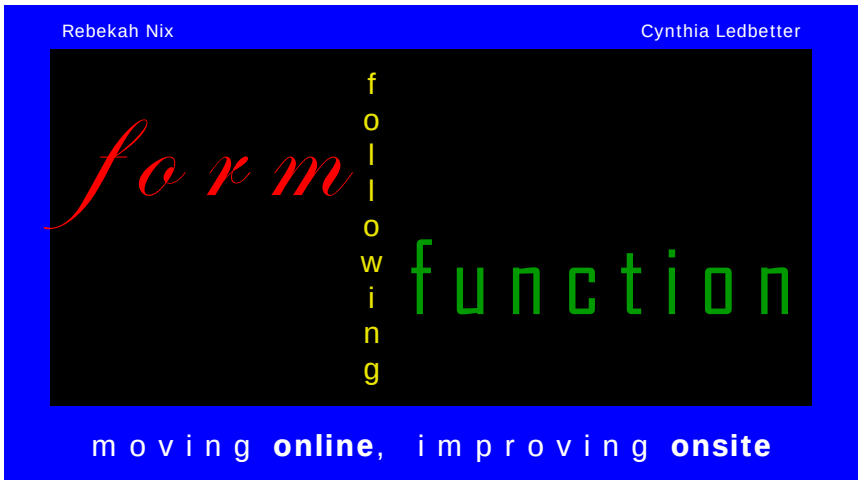


# Form Following Function: Moving Online, Improving Onsite

Find out how faculty and designers teamed to develop an online course sequence that enhanced its onsite counterpart. We'll provide specific examples of how instructional and research design elements supported constructivist pedagogy and rigorous evaluation. Items that fostered the new learning environments include syllabus, instructors, lessons, assignments, assessments, and projects.

IOL Innovations in Online Learning — Our System Clicks

**Friday, May 25, 2007,** 1:45 p.m. – 3:00 p.m., *Travis III*

**Rebekah K. Nix**
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UTD MASTER OF ARTS IN TEACHING SCIENCE EDUCATION online!

Fall 2006 Schedule | SCE 5305 (0T1)

# Evaluating Research in Science Education

For easy reference, this overview is matched directly to the navigation buttons in the UTTC course menu. It summarizes key items to be completed and indicates the availability timeframe for each unit. Specific details are provided in each respective area of the course. Class officially starts on August 17, 2006.

GMA = Gay, L.R., Mills, G.E., & Airasian, P.W. (2006). *Educational Research: Competencies for Analysis and Applications, 8/E*.

APA = American Psychological Association. (2001). *Publication Manual of the American Psychological Association: Fifth Edition*.

| ☑ | | |
|---|---|---|
| ☑ | **Part I.** | **THE BIG PICTURE** |
| 01 | Dates | August 17, 2006 – August 24, 2006 (opens August 18, 2006) |
| ❒ | Lesson | **Welcome to SCE 5305!** |
| ❒ | Project | Review requirements |
| ❒ | Assignment | RMD Tool |
| ❒ | Discussion | *Café '05:* Seat Yourself! |
| ❒ | Assessment | Research in Science Education<br>• GMA: Introduction to Educational Research (pgs 1-31) |
| 02 | Dates | August 24, 2006 – August 31, 2006 |
| ❒ | Lesson | **Learning about Learning?** |
| ❒ | Project | Application tutorial |
| ❒ | Assignment | Digital Library |
| ❒ | Discussion | *Café 05:* Lunch Counter |
| ❒ | Assessment | Are you scientifically literate?<br>• Individual survey; no associated text. |
| ☑ | **Part II.** | **PUTTING THE PIECES TOGETHER** |
| 03 | Dates | August 31, 2006 – September 7, 2006 |
| ❒ | Lesson | **Parts is 'parts'…** |
| ❒ | Project | Literature Search |
| ❒ | Assignment | Stolarchuk, E. and Fisher, D. (2001). |
| ❒ | Discussion | *Teaching Reflections:* Teaching Tools |
| ❒ | Assessment | Research Design<br>• GMA: Evaluating a Research Report (pgs 540-559)<br>• APA: Content and Organization of a Manuscript (pgs 1-30) |

| | | |
|---|---|---|
| 04 | Dates | September 7, 2006 – September 14, 2006 |
| ❒ | Lesson | **Lights, camera, action!** |
| ❒ | Project | Theoretical Goals |
| ❒ | Assignment | Tabachnick, B. R. and Zeichner, K. M. (1999). |
| ❒ | Discussion | *Teaching Reflections:* Learning Theories |
| ❒ | Assessment | Classroom Research<br>• GMA: Action Research in Schools (pgs 498-513) |
| 05 | Dates | September 14, 2006 – September 21, 2006 |
| ❒ | Lesson | **Can you hear me, now?** |
| ❒ | Project | Tentative Topic and Reference Section Draft |
| ❒ | Assignment | Lorsbach, A. and Basolo, F. (1998). |
| ❒ | Discussion | *Teaching Reflections:* Learning Environments |
| ❒ | Assessment | Qualitative Data<br>• GMA: Qualitative Research: Data Collection (pgs 398-439)<br>• GMA: Selection and Definition of a Problem (pgs 32-97)<br>• APA: Expression of Ideas (pgs 31-40) |
| 06 | Dates | September 21, 2006 – September 28, 2006 |
| ❒ | Lesson | **All things being 'equal'…** |
| ❒ | Project | Practical Tools |
| ❒ | Assignment | Barnea, N., and Dori, Y. (1999). |
| ❒ | Discussion | *Teaching Reflections:* Gender Differences |
| ❒ | Assessment | Qualitative Analyses<br>• GMA: Qualitative Research: Data Analysis (pgs 466-487)<br>• APA: Reference Citations in Text (pgs 207-214) |
| 07 | Dates | September 28, 2006 – October 5, 2006 |
| ❒ | Lesson | **I may not be right, but I'm sure about it!** |
| ❒ | Project | Tentative Research Question |
| ❒ | Assignment | Trumper, R. (2001). |
| ❒ | Discussion | *Teaching Reflections:* Misconceptions |
| ❒ | Assessment | Descriptive Research<br>• GMA: Survey (Descriptive) Research (pgs 158-189)<br>• APA: Quotations (pgs 117-119) |

| | | |
|---|---|---|
| 08 | Dates | October 5, 2006 – October 12, 2006 |
| ❒ | Lesson | **Do your socks match?** |
| ❒ | Project | Purpose Section |
| ❒ | Assignment | Van Zwanenberg, N., Wilkinson, L J., and Anderson, A. (2000). |
| ❒ | Discussion | *Teaching Reflections:* Learning and Teaching Styles |
| ❒ | Assessment | Correlational Research<br>• GMA: Correlational Research (pgs 190-215)<br>• APA: Tables (pgs 147-175) |
| 09 | Dates | October 12, 2006 – October 19, 2006 |
| ❒ | Lesson | **Reality Check!** |
| ❒ | Project | Review of Literature Draft |
| ❒ | Assignment | Huber, R. and Moore, C. (2001). |
| ❒ | Discussion | *Teaching Reflections:* Learning through Hands-on |
| ❒ | Assessment | Causal-Comparative Research<br>• GMA: Causal-Comparative Research (pgs 216-231)<br>• APA: Figures (pgs 176-201) |
| 10 | Dates | October 19, 2006 – October 26, 2006 |
| ❒ | Lesson | **Playing 'the links'?** |
| ❒ | Project | Introduction and Conclusion Sections |
| ❒ | Assignment | Jones, M. G., Carter, G., and Rua, M. (1999). |
| ❒ | Discussion | *Teaching Reflections:* Concept Mapping |
| ❒ | Assessment | Experimental Research<br>• GMA: Experimental Research (pgs 232-273) |
| 11 | Dates | October 26, 2006 – November 2, 2006 |
| ❒ | Lesson | **Sharing the wealth…** |
| ❒ | Project | Position Presentation Draft |
| ❒ | Assignment | Foxon, M. (1993) and Foxon, M. (1994). |
| ❒ | Discussion | *Teaching Reflections:* Transfer of Knowledge |
| ❒ | Assessment | Mixed Methods<br>• GMA: Mixed Methods (pgs 488-497) |

| | | |
|---|---|---|
| 12 | Dates | November 2, 2006 – November 9, 2006 |
| ❒ | Lesson | **The same, but different!** |
| ❒ | Project | Abstract |
| ❒ | Assignment | Stecher, B., Klein, S., Solano-Flores, G., McCaffrey, D., Robyn, A., Shavelson, R., and Haertel, E. (2000). |
| ❒ | Discussion | *Teaching Reflections:* Alternative Assessment |
| ❒ | Assessment | Research Ethics<br>• GMA: The Ethics of Research (pgs 73-79)<br>• APA: Ethical Standards for the Reporting and Publishing of Scientific Information (pgs 387-396) |
| ☑ | **Part III.** | **TAKING IT ALL IN…** |
| 13 | Dates | November 9, 2006 – November 16, 2006 |
| ❒ | Lesson | **Next steps…** |
| ❒ | Project | Final Presentation DUE |
| ❒ | Assignment | Work on your FINAL paper! |
| ❒ | Discussion | *Research Practice:* Position Presentations (and Peer Review) |
| ❒ | Assessment | Work on your FINAL paper! |
| 14 | Dates | November 16, 2006 – November 23, 2005 |
| ❒ | Lesson | **What do you think?** |
| ❒ | Project | Final Paper DUE |
| ❒ | Assignment | Peer Review of Position Presentations |
| ❒ | Discussion | *Research Practice:* Research Study Proposal |
| ❒ | Assessment | Work on your Research Study Proposal! |
| ☑ | UTD Closed | *Thanksgiving Break (November 23-24, 2006)* |
| 15 | Dates | November 23, 2006 – November 30, 2005 |
| ❒ | Lesson | **Looking back ~ and ahead!** |
| ❒ | Project | Research Study Proposal DUE |
| ❒ | Assignment | UTTC Survey |
| ❒ | Discussion | *Café '05:* 'Comment Form' |
| ❒ | Assessment | Course Evaluation |

| | | |
|---|---|---|
| ⇨ | **Part IV.** | **SCE 5308! Research Design and Methodology for Science Educators!** |

Instructor(s)
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RMD: RESEARCH METHOD DESIGN

UTD LIBRARY
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Gradebook
Tools

Tools
Communication
Course Tools
Course Map

Control Panel

Refresh
Detail View



# Lessons

## THE BIG PICTURE

**Welcome to SCE 5305!**
Click here to open Lesson 01 (Package File)
Course Overview and Student Orientation

**Learning about Learning?**
Click here to open Lesson 02 (Package File)
Learning about Learning - Literacy

## PUTTING THE PIECES TOGETHER

**Parts is 'parts'...**
Click here to open Lesson 03 (Package File)
Reviewing Literature and Understanding Research Design

**Lights, camera, action!**
Click here to open Lesson 04 (Package File)
Classroom Research and Learning Theory

**Can you hear me, now?**
Click here to open Lesson 05 (Package File)
Learning Environments and Qualitative Data

**All things being 'equal'...**
Click here to open Lesson 06 (Package File)
Gender Differences and Qualitative Analyses

**I may not be right, but I'm sure about it!**
Click here to open Lesson 07 (Package File)
Misconceptions and Descriptive Research

**Do your socks match?**
**Open this folder** to start Lesson 08!
Learning and Teaching Styles, and Correlational Research

**Reality Check!**
Click here to open Lesson 09 (Package File)
Learning through Hands-on and Causal-Comparative Research

**Playing 'the links'?**
Click here to open Lesson 10 (Package File)
Concept Mapping and Experimental Research

**Sharing the wealth...**
Click here to open Lesson 11 (Package File)
Transfer of Knowledge and Mixed Methods

**The same, but different!**
Click here to open Lesson 12 (Package File)
Alternative Assessment and Research Ethics

## TAKING IT ALL IN

**Next steps...**
Click here to open Lesson 13 (Package File)
Position Presentation DUE

**What do you think?**
Click here to open Lesson 14 (Package File)
Literature Review DUE

**Looking back ~ and ahead!**
Click here to open Lesson 15 (Package File)
Research Study Proposal DUE

wondering just why that researcher chose to study that particular phenomenon. The statement of the research goal should make the reason for undertaking the research clear. Below is the statement of her research goal that Tosca will be using for our mini-study:

> *While much is known about who prefers to pursue a career in science education and much is known about who might choose to pursue an advanced degree in college, little is known specifically about the characteristics of those who choose specifically to seek an advanced degree in science education. It is the goal of this study to help members of the teacher preparation community gain a better understanding of who chooses to seek advanced degrees in science education and why that choice is made by those individuals.*

This goal shapes the parameters of Tosca's study. In order to meet this goal,

- Who must Tosca study?
- What kind of information must Tosca learn about her subjects?
- How might her results be analyzed? What kinds of analyses are not needed?
- What sorts of conclusions can Tosca appropriately draw?

RMD: RESEARCH METHOD DESIGN

Those are discussion for the next several weeks. At this point, where does what you know already about Tosca's study take you on the RMD Tool? Think about the following:

- Does her question answer what or why?
- Is she studying humans?
- How many groups does she have?


*Click here to find out!*

That's your next learning experience, too!

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## Assignments

**Student Responsibility Agreement**
To make sure that you know what's expected of you by the course instructor(s), the Science/Mathematics Education Department, and the University of Texas at Dallas - in terms of your responsibilities as a student in SCE 5305, please read the following agreement (summarized from the Syllabus).

**01 RMD Tool**
Explore the 'RMD Tool' pathways! There's no formal assignment to be turned in for this lesson.

**02 Digital Library**
Access UTD/UTTC digital library! Although there's no formal assignment to be turned in for this lesson, you'll definitely need to be able to get into the digital libraries for the following lessons so don't put this task off...

**03 Stolarchuk & Fisher (2001)**
Research Paper Evaluation:
The lesson gave you a taste of participating in and reviewing research. With this introduction, we'll continue with an in-depth analysis to show you how to begin evaluating research papers. The first paper is:

**Stolarchuk, E. and Fisher, D. (2001). First years of laptops in science classrooms result in more learning about computer than science. *Issues in Educational Research, 11*(1), 25-39.**

The paper is electronically available at: http://education.curtin.edu.au/iier/iier11/stolarchuk.html

*For this first paper, we will perform the analysis together.*

**04 Tabachnick, B. R. and Zeichner, K. M. (1999).**
Research Paper Evaluation:
As you know, the chief method for understanding research papers is to continuously ask yourself questions about what you are reading. We've provided a list of questions for this paper but you will notice that it is shorter than the first article you reviewed.

**Tabachnick, B. R. and Zeichner, K. M. (1999). Idea and action: Action research and the development of conceptual change teaching of science. *Science Education, 83*, 309-322.**

The paper is electronically available through the UT Dallas library under eJournals and through the UTTC digital library under Articles by Citation.

You are beginning to have to ask your own questions so that you'll be able to choose really good papers to use in your research. As you read through this paper, answer the following questions to find out more...

**05 Lorsbach, A. and Basolo, F. (1998).**
Research Paper Evaluation:
Once again we've provided a list of questions for this paper. You'll notice that the amount of information I'm giving you to analyze the paper is shrinking. *You are being forced to ask more and more of your own questions.* Here's what we'll look at this week:

**Lorsbach, A.W. and Basolo, F. (1998). Collaborating in the evolution of a middle school science learning environment. *Learning Environments Research, 1*, 115-127.**

The paper is electronically available at the UT-Dallas library under eJournals.

# Review Assessment: 04 Tabachnick, B. R. and Zeichner, K. M. (1999).

| | |
|---|---|
| **Name** | 04 Tabachnick, B. R. and Zeichner, K. M. (1999). |
| **Status** | Completed |
| **Score** | 0 out of 19 points |
| **Instructions** | Retrieve and read through the research paper specified above. When you're ready, click on the link to evaluate the work for assignment credit.<br><br>Items are presented one at a time. Moving to another question will save your entry. (Note that you may change your responses by going back and forth through the items before submitting your work.) There is no time limit and you may return to this task as needed before the due date.<br><br>*Be sure to review and print the final results ~ add this evaluation summary to your copy of the paper for reference purposes!* |

## Question 1 — 0 out of 1 points

In what order are the major parts of this paper?

| Correct Answer | Selected Answer |
|---|---|
| ✓ 1. Abstract | ✗ - [None Given] |
| ✓ 2. Introduction | ✗ - [None Given] |
| ✓ 3. Research Methods and Context | ✗ - [None Given] |
| ✓ 4. Using Action Research | ✗ - [None Given] |
| ✓ 5. Conclusions | ✗ - [None Given] |
| ✓ 6. References | ✗ - [None Given] |

**Feedback:** Be sure that you notice that these are not the same headings as were in the first paper you read. They do, however, have the same information.

## Question 2 — 0 out of 1 points

In the abstract:
Why are the researchers writing this paper?

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ "This article describes and analyzes an action research seminar for prospective elementary and secondary teachers."

**Feedback:** Note that the research question is a 'two for one'; it has two parts. Now when you read the conclusions you have to look for two answers to this question.

## Question 3 — 0 out of 1 points

In the abstract:
Who are the participants?

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ "prospective elementary and secondary teachers"

**Feedback:** Take another look...

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ all of these, however the study was with prospective teachers rather than inservice teachers

**Feedback:** "First, the action research seminar helped prospective teachers understand their students' thinking and preferences... Second, although most of the prospective teachers became practiced in eliciting students' prior knowledge, only a few were able to use their knowledge of their students' thinking to plan their teaching."

**Question 5** **0 out of 1 points**

From the Introduction and following sections:
This a 'stand alone' paper.

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ False

**Feedback:** "This is the third in a set of six articles about how two significant ideas - constructivism and reflective practice - were applied in a science teacher education program at the elementary and secondary levels."

**Question 6** **0 out of 1 points**

From the Introduction and following sections:
This paper uses two definitions of action research.

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ True

**Feedback:** "Action research is a form of collaborative self-reflective inquiry undertaken by teachers to improve their own practices, their understandings of those practices, and the situations in which those practices are carried out (Kemmis & McTaggart, 1988). . . Action research is a systematic examination and collaborative analysis of the consequences of some classroom action."

**Question 7** **0 out of 1 points**

From the Introduction and following sections:
What is strategic action?

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ an action that is deliberate, considered, and undertaken to bring about change

**Feedback:** Check again.

**Question 8** **0 out of 1 points**

From the Introduction and following sections:
Action research related to conceptual change model because both are learning theories that deal with classrooms.

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ False

**Feedback:** "As does the conceptual change model, action research assumes that an observer-participant can infuse an observed event with meanings."

**Question 9** **0 out of 1 points**

From the Introduction and following sections:
Why do preservice programs fail to impact teacher learning?

**Selected Answers:** [None Given]

**Correct Answers:** ✓ they don't examine or confront prospective teachers' conceptions of teaching and learning
✓ they don't help overcome the gap between what is taught in teacher education programs and how teaching goes on in schools

**Feedback:** "(1) their failure to examine and confront the conceptions of teaching and learning that prospective teachers bring to programs; and (2) their failure to confront and somehow overcome the gap that typically exists in teacher education programs between how prospective teachers are encouraged to teach and the teaching that goes on in the schools where they are placed during their education for teaching.

**Question 10** **0 out of 1 points**

From the Introduction and following sections:
What were the research questions?

**Selected Answers:** [None Given]

**Correct Answers:** ✓ To describe the seminar and determine if it helped new teacher learn to teach for conceptual change?

**Feedback:** "What was the character of the action research seminar, and how did it facilitate prospective teachers learning to teach for conceptual change?"

**Question 11** **0 out of 1 points**

From the Introduction and following sections:
How were data gathered?

**Selected Answers:** [None Given]

**Correct Answers:** ✓ audio and video tapes, written reports, journals

**Feedback:** "The data gathered during both semesters of the action research seminar included audiotape recordings of all class sessions (these were all transcribed), videotapes of the final class sessions in which course members presented their action research projects, written reports of the action research projects of some course members (this was not a course requirement), prospective teachers' journals and course instructors' written responses to journal entries, and course instructors' journals."

**Question 12** **0 out of 1 points**

From the Introduction and following sections:
Table 1 tells about who was in which part of the study.

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ True

**Feedback:** Supposedly this table gives some information about who was in which part of the study and how the data were collected. It's really superfluous. The same information could have been transmitted in the text - probably in a clearer format!

**Question 13** **0 out of 1 points**

From the Introduction and following sections:
*An emergent research design is based on what is happening during a research study. As the name implies, the design emerges as questions are asked and answered and as observations are made.*

These researchers used an emergent design.

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ True

**Feedback:** "Unlike most of the other courses these prospective teachers had taken at the university, the action research seminar did not have a syllabus that laid out the semester's topics and readings in advance. We told the prospective teachers that their action research issues

would determine the content of the seminar and that readings and other external sources of knowledge would be brought into the course to inform and challenge their inquiries."

**Question 14** **0 out of 1 points**

From the Introduction and following sections:
What is evidence of a thick description in this paper?

**Selected Answers:** [None Given]

**Correct Answers:** ✓ The entire section on Using Action Research

**Feedback:** A thick description is produced when a researcher describes a situation so well that the reader feels a part of the environment.

**Question 15** **0 out of 1 points**

From the Introduction and following sections:
Why is this a 'primary research' report?

**Selected Answers:** [None Given]

**Correct Answers:** ✓ The researchers collected and reported on their own data.

**Feedback:** Primary research shows that the researcher set up the study, then collected and reported on the data. It does not rely on data from other studies.

**Question 16** **0 out of 1 points**

From the Introduction and following sections:How successful was this research?

**Selected Answers:** [None Given]

**Correct Answers:** ✓ It succeeded because they answered their question and they found the limiting factors.

**Feedback:** "There were a variety of factors that undermined our hopes that there would be a more noticeable shift toward conceptual change teaching by our prospective teachers during their student teaching semester." This is successful research because they answered their question and they found the limiting factors to implementing action research and teaching for conceptual change in the classroom.

**Question 17** **0 out of 1 points**

From the Reference Section:
There are some very old references in this list to set up the background for the study.

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ True

**Feedback:** Older research sets the stage for the research study and brings in pertinent background regarding not only what data were collected and analyzed but how these studies were designed.

**Question 18** **0 out of 1 points**

From the Reference Section:
References in this paper conform to current APA style. See your APA manual, the References section.

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ False

**Feedback:** Neither italics nor underlining is used in the appropriate manner.

**Selected Answer:** ✗ [None Given]

**Correct Answer:** ✓ False

**Feedback:** Someone had a grant from the NSF, but beyond that we don't have any idea.

OK