# Comparing learning objective communication between professors and students in the classroom

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**Abstract**: University courses have learning objectives that are commonly found in course syllabi. Because students and professors place different values on syllabi, perceptions of learning objectives vary. Previous studies have investigated the relationship between student-teacher expectations and syllabi content, but do not address the role of explicit syllabi content. Our study used qualitative methods to investigate the relationships among student-reported perceptions of course learning objectives, professor-reported intended course learning objectives, and explicit syllabus content. We used interviews from two professors who taught introductory biology courses for non-majors, course syllabi, and student responses to an open-ended questionnaire about course learning objectives. After deductively coding students' responses, we found only 21% of students accurately identified a learning objective listed in the course syllabus. We identified three main themes in student reported learning objectives: Knowledge (539), Practice (30), and Performance (41). Two of these (Knowledge and Practice) are in line with professor intended learning goals. Our findings show that the syllabus alone is an ineffective tool for communicating course learning objectives. Other communication methods should be employed to convey course learning objectives to students. By understanding how students interpret learning objectives, professors are better equipped to help students succeed.

## Introduction

Defective communication practices highlight disconnections between teacher intended learning objectives and students' interpretations of said objectives (Aggar & Shelton, 2015; Collier & Morgen, 2008). A major communication tool between students and professors is the course syllabus. Syllabi act as a classroom contract and present rules, behaviors, assignments, and anticipated learning outcomes to which students are expected to adhere (Griffith, Rodriguez, & Anderson, 2014). However, syllabi alone have been documented as inadequate communication tools, because students and instructors place value upon different aspects of the syllabi (Becker & Calhoon, 1999).

Traditionally, syllabi fulfill one or more of four primary roles: as a contract, a permanent record, a learning/ teaching tool, and/or a communication device (Albers, 2003; Parkes & Harris, 2002; Thompson, 2007). As a contract, the syllabus presents expectations, rules, and responsibilities both faculty and students are expected and in some cases, agree to adhere to (Matejka & Kurke, 1994; Parkes & Harris, 2002). Syllabi also serve to present logistical information regarding due dates for assignments, exams, grading criteria, and anticipated learning outcomes (Parkes & Harris, 2002). As a permanent record, the syllabus can inform administrators of teacher performance by documenting the scholarship of the course, course concepts, expectations for students, and evaluation techniques (Albers, 2003; Parkes & Harris, 2002). Additionally, documentation of course content in such a manner can assist administrators or reviewers in the determination of a course's alignment with a department and/or institution's mission (Albers, 2003). Syllabi designed as learning/ teaching tools concentrate on motivating students and positively influencing their attitudes and perspectives (Bain, 2004; Parkes & Harris, 2002). Additionally, as a learning/ teaching tool, the syllabus places increased emphasis on tools,

resources, and practices students can utilize in the course to become better learners (Davis & Schrader, 2009).

There is little variety in basic syllabi content across academic disciplines. Typical syllabi components identify the instructor of record, contact information for said instructor, course title, as well as course, grading and policy information (Doolittle & Siudzinski, 2010; Eberly, Newton, & Wiggins, 2001; Wolf et al., 2013).

Students place significantly more value than faculty on components of a syllabus they believe will help them to be successful in passing the course. These components include: course and assignment grading criteria, assignment due dates, number and dates of exams and/or quizzes. These components are indicative of the contractual nature of a syllabus (Davis and Schrader, 2009; Marcis & Carr, 2004). In contrast, faculty are more likely to place value on syllabi components related to student conduct such as the course purpose, academic honesty policies, student conduct policies, learning objectives and outcomes (Davis & Schrader, 2009; Wolf et al., 2013). This suggests faculty value the syllabus as a learning-tool over conceptualizing it as a contract.

While the information presented in syllabi may vary little across disciplines, the format and language used in the document can fluctuate greatly, ultimately leading to miscommunication between students and faculty (Ludy et al., 2016). Reasons for miscommunication range from students and instructors placing differing value on different components of the syllabus, to students misinterpreting instructor intent through vocabulary used (Becker & Calhoon, 1999; Davis & Schrader, 2009; Garavalia et al., 1999; Kierkus, 2017; & Schaub, Cadena, Bravender). First-year students may further misunderstand the purpose or language in a syllabus due to their lack of exposure during their secondary education. The

transition from rigid lessons plans to more free-form syllabi may come as a to shock to some students, limiting their ability to comprehend the breadth of material found within (Nunez Rodriguez et al., 2017).

Prior studies have explored the disconnections between students' perceptions and understandings compared to teachers' expectations (Aggar & Shelton, 2015; Collier & Morgen, 2008). Unfortunately, these studies failed to explore the role that explicit objectives in syllabi play in this fragmented communication. Studies addressing misaligned teacher and student expectations found miscommunication stemmed from various sources such as student understanding of syllabi content (Collier & Morgen, 2008) and student goals (Stark, 2000). While current research briefly explores the relationship between student-teacher expectations and syllabi content in other fields, these studies fail to address the relationship between explicit syllabi content, teacher reported intended learning objectives, and student perceptions of intended learning objectives in biology courses.

Each course taught at the university level has learning objectives, which are commonly found in course syllabi. Students might perceive these learning objectives differently than how the professor intends for them to be interpreted and how they are expressed in the course syllabus. Our purpose for this study was to investigate the relationship amongst student reported perceptions of course learning objectives, professor reported intended course learning objectives, and explicit syllabus stated learning objectives. Our research was guided by asking the following questions:

1. In what ways do student reported perceptions of course learning objectives compare to professor reported intended course learning objectives?
2. In what ways do student reported perceptions of course learning objectives compare to

explicitly stated syllabus content?

3. In what ways do professor reported intended course learning objectives compare to explicitly stated syllabus content?

**Theoretical Framework**

Efficacy of instruction relies on the professor's ability to communicate with students and the professor's views regarding communication itself. Instructional communication theory places the professor as a communicator. Their success in this enterprise relies on: 1) their communication conduct and 2) their opinions and views on communication (Staton-Spicer & Marty-White, 1981). There are three paradigms that are used when studying instructional communication theory: process-product paradigm, student-mediated paradigm, and culture-of-the-school paradigm. Our project focuses on process-product paradigm of instructional communication theory, which is based on the notion that teacher behaviors precede and are most responsible for student learning and achievement (Morreale, Backlund, & Sparks, 2014). However, in our study, the process is the usage of explicit learning objectives in syllabi by professors, and the product will be *accurate* (as defined and described by professors) student perception of learning objectives. It is important to note that in this case the term *accurate* is entirely from the perspective of the professor, as they are the person who is responsible for creating and communicating the course learning objectives throughout the semester.

Previous studies in this area have explored three stages of instruction: preoperational, process, and product (Staton-Spicer & Marty-White, 1981). The preoperational stage typically involves measuring teacher characteristics (such as their opinions of and methods for communication), the process stage typically includes observation of teacher classroom behaviors, and the product stage assesses teacher effectiveness by measuring student outcomes.

However, for this project, since we are more interested in students' understanding of course learning objectives rather than student learning outcomes, we decided to frame the preoperational stage as determining how (if they do so at all) teachers display course learning objectives in their classrooms. We did this through semi-structured interviews and analysis of course syllabi to check for the presence of course learning objectives. For our process component, course syllabi were used to assess how the objectives were displayed (explicit vs. implicit). The product component of our study was students' ability to correctly remember and identify course learning objectives.

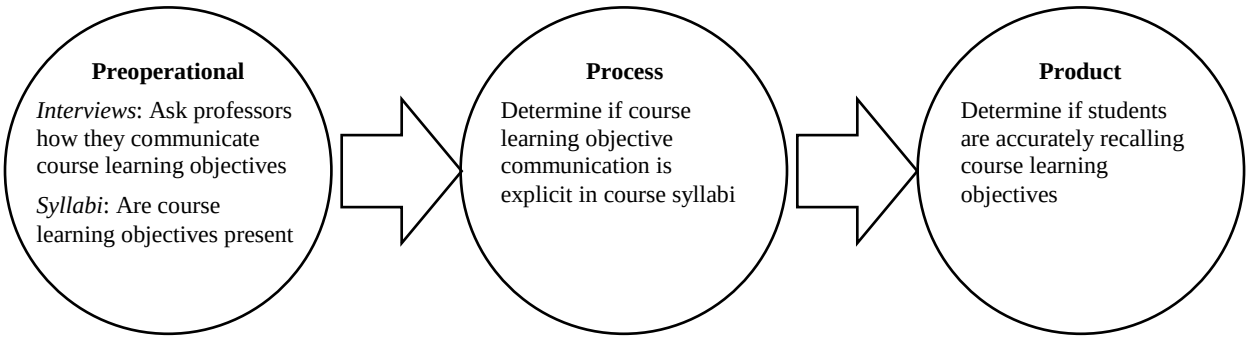


**Figure 1.** Process-product paradigm of instructional communication theory.

## Methodology

Participants for this qualitative study included two professors who taught three sections of an introductory biology course for non-majors at a university in central Texas and their undergraduate students. We asked undergraduate students enrolled in each professor's course to voluntarily take part in an online, open-ended questionnaire where students described their ideas about course learning objectives and how these learning objectives were communicated to them.

We collected data from student responses (n=424), as well as individual semi-structured interviews with each participating professor. These interviews helped to establish intended course learning objectives and identify how each professor conveyed those objectives including

and beyond their course syllabus. Additionally, we used a course syllabus from each professor to identify explicitly stated learning objectives for each course section.

**Data Analysis**

Data analysis involved examining responses and searching for common themes that emerged across all participants and data sources. We transcribed data and then applied descriptive codes to each student identified objective. We recorded student responses to identify themes regarding student perceived learning objectives using an inductive approach. We then deductively sorted these responses as either "accurate" or "inaccurate" based on whether they matched one of the explicitly stated learning objectives identified from the course syllabus. We examined those responses that did not match explicitly stated learning objectives and compared them to the professor's interview response.

At least two members of our research team coded each data source to ensure inter-rater reliability. We employed member checking with each professor to ensure our interpretations of their course objectives were consistent with their intended objectives. We also generated frequency counts of student response accuracy to support interpretations of the data. It is important to note that one response does not necessarily represent one student in the coding process. There were multiple student responses which required separation into two separate categories, which explains why there are more responses than students. For example, the student response, "To understand the basic biology behind an organism. Such as cell structure, and DNA and how it all shapes living organisms and its functions" was coded for general biology content and genetic biology content.

## Results

Learning objectives for the introductory biology course for non-majors used in this study

cover a variety of biology-based content such as cell diversity, cell structure and function, genetics, anatomy and physiology, and biotechnology, as well as the nature of science, the scientific method, and hypothesis testing. Student outcomes from taking the course should include the ability to demonstrate understanding of basic biology principles, have at least a conversational knowledge of breaking biological science, and be able to make wise decisions regarding health and nutrition based on metabolism, physiology, and genetics.

**Professor Reported Objectives**

In accordance with Texas House Bill 2504, all undergraduate course syllabi in Texas are required to have explicitly stated learning objectives for each course which are published on a university's website for public access (Kolkhorst, 2009). For the University utilized in this study, it is department policy that introductory courses with multiple sections taught by multiple professors have the same or similar learning objectives to ensure continuity of content for students across sections. Although different instructors created the syllabi, the explicitly stated learning objectives in the syllabus were identical for both professors (Table 1).

Table 1. Course learning objectives for an undergraduate non-majors biology course.

| **Course Learning Objectives** |
| --- |
| To examine the nature of science, the scientific method, & hypothesis testing. |
| To examine cell diversity, structure, & function. |
| To examine basic chemical principles, the nature of organic molecules, & the function of chemicals within cells. |
| To examine the role of energy in maintaining life & learn how cells acquire & use energy. |
| To examine the structure & function of DNA especially as it pertains to protein synthesis. |
| To examine the principles of inheritance (genetics) & explore patterns of inheritance in humans. |
| To examine the principles & regulation of cell division, & the consequences of malfunctions in the regulation of cell division (e.g. cancer). |
| To examine aspects of biotechnology & discuss the role that biotechnology plays in our world, including an exploration of the ethics & consequences of emerging technologies. |
| To examine the anatomy & physiology of the human reproductive system. |

When asked to identify learning objectives for her course, Professor Richards (pseudonym) acknowledged the science content based learning objectives outlined in her course syllabus, "the course objectives...because of the way the state of Texas is and the requirements are…" but did not focus on them. Instead, Richards discussed her implied objectives that centered around themes of science perception and life skills. "My learning objective in a non-majors course is not so much sciencey… I want them [students] to leave class feeling good about science…and just have better critical thinking skills." These themes continued throughout the interview, as Richards described the importance of leaving non-science majors, "feeling like science is approachable" and teaching them to be, "a little more skeptical about what they read and what they hear and what they believe." Similarly, Professor Kommala (pseudonym) stressed the need to make science approachable for non-majors, "…the course objective is to do the applied measures of biology without making the students hate biology." Both professors discussed at length the importance of showing students that science is approachable and relevant in every day life, "…humans are affected or benefited by the microorganisms… I extract the main concepts that apply to daily life, like what makes you sick and why you have less immunity to a disease when you have cancer/when you go through chemo." However, this differs from the explicitly stated learning objectives in the syllabi that focus on the need to learn biology-based content.

**Student Reported Objectives**

The total number of coded responses from student participants was 610. Student reported perceptions of course learning objectives explicitly stated in the syllabus were largely "inaccurate" (480). Only 130 identified an actual learning objective and 13 of those copied their response word for word, directly from the syllabus. While these students may not have identified

an explicitly stated learning objective in their own words, this does show that they know where to find information about learning objectives.

Three themes emerged – Knowledge (539), Practice (30), and Performance (41) (Table 2) from inductively coded student questionnaire responses. These themes were further subdivided to gain a more in-depth understanding for student perceptions of course learning objectives.

Table 2. Themes and subthemes that emerged from our dataset.

| **Theme** | **Subtheme** | **Example** |
|---|---|---|
| Knowledge (539) | Biology Based Content (403) | Learning the basics of modern biology, such as how organisms grow, work, and reproduce. |
| | Nature of Science (82) | Basic understanding of scientific theory, to know what science is. |
| | Directly from Syllabus (13) | To examine cell diversity, structure, and function; to examine basic chemical principles, the nature of organic molecules, and the function of chemicals within cells. |
| | Reflective (15) | Ensuring that students gain a stronger sense of the world around them and how each living thing comes to be. |
| | Personal (26) | My goals for this course is to become more knowledgeable about the study of living things. |
| Practice (30) | Science Specific Skill (14) | Learning how to apply content from the course in a practical/objective manner. |
| | Non-Science Specific Skill (16) | To be able to think more critically. |
| Performance (41) | Grade Driven (41) | Getting an A so my grade doesn't drop. |

We coded any student response that described an act of learning or acquiring new knowledge as Knowledge. We then further subdivided these responses: Content Based Knowledge, Nature of Science and Taken Directly from the Syllabus. A majority of student perceived learning objectives (403) identified biology based content (to gain a better

understanding of the world around me from an atomic level to a biological level; to understand what biology really means).

Student responses under Practice (30) focused on gaining critical thinking skills (the ability to demonstrate critical thinking skills; to apply the information I know to real world situations). These were further divided into the subthemes of science specific skills (using the scientific method to test out biological functions) and non-science specific skills (.

We coded the remaining student perceived learning objective responses (41) as Performance based goals that centered upon passing or making a good grade in the course (I just want to pass; I need to get an A in the class).

## Discussion

Department or state mandated course learning objectives and professor-determined course learning objectives are sometimes not identical, but these differences are often communicated via the syllabus or the professor during class meetings. We found both Professor Richards and Professor Kommala focused more on the learning objectives identified in their interviews rather than the learning objectives explicitly stated in the course syllabus. This trend is supported by the finding that only 130 of students could accurately identify a course learning objective. Many students reported they believed the learning objectives to be “to learn modern biology” or “the fundamentals of science.” Because the state mandated policy is very specific with student learning objectives, these perceived learning objectives are considered inaccurate to what is explicitly stated in the course syllabus. However, when coded inductively, the vast majority of students (569) reported perceived learning objectives that aligned with professor intended objectives: Knowledge and Practice. This suggests that students are picking up on the

professors' focus on intended learning objectives regarding skills and familiarity with science rather than the explicitly stated learning objectives outlined in the syllabus.

When creating a course syllabus, instructors should reflect on what outcomes they want for students and craft learning objectives accordingly (Rubin, 2016; Schaub, Cadena, Bravender, & Kierkus, 2017). From the interviews, professor responses centered more on developing skills such as critical thinking and collaboration rather than content mastery. The goal of increasing student critical thinking skills is supported by the classroom activities each instructor used in their courses (i.e. case study assignments). Neither of the professors' explicitly stated skill development in their syllabi learning objectives. Because of the disconnect between professors intended learning objectives and those explicitly stated in the syllabus, we found that students were unable to accurately identify what the course learning objectives were. In fact, students (30) reported the development of some kind of skill, from critical thinking or being better able to apply biology content to their lives.

Becker and Calhoon reported syllabi alone are not an effective way to convey course learning objectives to students (1999) and this is evident from student responses for identifying the course learning objectives. In fact, students have difficulty recalling information presented in the syllabus throughout the semester (Smith & Razzouk, 1993) and prefer to have a syllabus that focuses more on assignment details and grading policies (Appling, Gancar, Hughes, & Saad, 2012). Therefore, it is imperative that professors use other methods to communicate learning objectives to their students. In terms of the process-product paradigm of Instructional Communication Theory (Morreale, Backlund, & Sparks, 2014), we found the process of explicitly stated learning objectives in syllabi does not work as the majority of students could not correctly identify them. However, the product of students' accurate interpretation of learning

objectives as defined by the professor does work when the professor uses other ways to communicate their learning objectives such as the usage of active learning activities done in class. This is evident through the professors' reinforcement of course learning objectives at the start of lecture and in assignments (Althoff, Linde, Mason, Nagel, & O'Reilly, 2007; Appling, Gancar, Hughes, & Saad, 2012).

If students are not accurately interpreting the intended learning objectives that are outlined in the course syllabus, they may not achieve the professor, department, or even the university's desired outcomes for the course. Understanding how students use the syllabus could be insightful when planning instructional methods, thus increasing the chances of student success in the course (Bain, 2004; Becker & Calhoon, 1999). Professors use the course syllabi to convey course learning objectives to students, yet when asked to describe the learning objectives for the course, the professors in this study described learning objectives that reflected on the development of skills and ease/familiarity with biology. Our findings indicate that their students picked up on the learning objectives the professors identified in their interviews over those explicitly stated in the syllabus, most likely due to the frequency these ideas were covered and re-enforced through classroom activity. Therefore, we recommend professors clearly tie the intended learning objectives covered in class back to those explicitly stated in the course syllabus to ensure re-enforcement of the ideas covered through classroom activities and assignments. Establishing a clear concise link may increase students' ability to accurately determine course learning objectives.

Prior studies (Aggar & Shelton, 2015; Collier & Morgen, 2008) demonstrated the fragmented communication between professors and students in other fields and our findings confirmed that this holds true for biology. Future research directions should then explore the

relationship between students' perceptions of explicitly stated course learning objectives and student performance in the course. This would allow us to further understand the importance of course learning objectives in student learning.

## References

Albers, C. (2003). Using the syllabus to document the scholarship of teaching. *Teaching Sociology*, 31, 60-72.

Aggar, B., & Shelton, B. A. (2015). Time, motion, discipline: The authoritarian syllabus on American college campuses. *Critical Sociology, 43*, 355.369.

Althoff, S. E., Linde, K. J., Mason, J. D., Nagel, N. M., & O'Reilly, K. A. (2007). Learning objectives: Posting & communicating daily learning objectives to increase student achievement and motivation. Retrieved June 15, 2017 from ERIC – Education Resources Information Center.

Appling, J., Gancar, J. , Hughes, S., & Saad, A. (2012). Class syllabi, general education, and ePortfolios. *International Journal of ePortfolio, 2*, 199-206.

Becker, A. H., & Calhoon, S. K. (1999). What Introductory Psychology Student Attend to on a Course Syllabus. *Teaching of Psychology, 26*, 6-11.

Collier, P. J., & Morgan, D. L. (2008). "Is this paper really due today?": Differences in first-generation and traditional college students' understandings of faculty expectations. *Higher Education*, *55*, 425-446.

Davis, S., & Schrader, V. (2009). Comparison of syllabi expectations between faculty and students in a baccalaureate nursing program. *Journal of Nursing Education*, *48*, 125-131.

Doolittle, P. E., & Siudzinski, R. A. (2010). Recommended syllabus components: What do higher education faculty include in their syllabi? *Journal on Excellence in College Teaching*, *20*, 29-61.

Eberly, M. B., Newton, S. E., & Wiggins, R.A. (2001). The syllabus as a tool for student-centered learning. *The Journal of General Education*, *50*, 56-74.

Elkins, D. (2016). Grading to learn: An analysis of the importance and application of specifications grading in a communication course. *Kentucky Journal of Communication, 35*, 26-48.

Garavalia, L. S., Hummel, J. H., Wiley, L. P., & Huitt, W. G. (1999). Constructing the course syllabus: Faculty and student perceptions of important syllabus components. *Journal of Excellence in College Teaching*, *10*, 5-21.

Goodboy, A. K. (2011). Instructional dissent in the college classroom. *Communication Education*, *60*, 296-313.

Griffith, S. M., Rodriguez Domenech, M. M., & Anderson, A. J. (2014). Graduate ethics education: A content analysis of syllabi. *Training and Education in Professional Psychology*, *8*, 248-252.

Kolkhorst, L. W. (2009). Texas House Bill 2504. 81st Texas Legislature. Found in: http://www.legis.state.tx.us/billlookup/Text.aspx?LegSess=81R&Bill=HB2504

Momsen, J. L., Long, T. M., Wyse, S. A., & Ebert-May, D. (2010). Just the facts? Introductory undergraduate biology courses focus on low-level cognitive skills. *CBE-Life Sciences Education*, *9*, 435-440.

Ludy, M., Brackenbury, T., Folkins, J.W., Peet, S. H., & Langendorfer, S. J. (2016). Student impressions of syllabus design: Engaging versus contractual syllabus. *International Journal for the Scholarship of Teaching and Learning*, *10*, 1-23.

Marcis, J. G., & Carr, D. R. (2004). The course syllabus in the principles of economics: A national survey. *Atlantic Economic Journal*, *32*, 259259.

Matejka, K., & Kurke, L. B. (1994). Designing a great syllabus. *College Teaching*, *42*, 115-117.

Morreale, S., Backlund, P., & Sparks, L. (2014). Communication education and instructional communication: Genesis and Evolution as field of inquiry. *Communication Education*. *63,* 344-354.

Nunez Rodriquez, N., DiSanto, J., Varelas, A., Brennan, S., Wolfe, K., & Ialongo, E. (2017). Building understanding of high school students' transition to college. *International Journal of Teaching and Learning in Higher Education*, *29*, 402-411.

Parkes, J., & Harris, M. B. (2002). The purpose of a syllabus. *College Teaching*, *50*, 55-61.

Robinson Wolf, Z., Czekanski, K. E., & Dillon, P. M. (2013). Course syllabi: Components and outcomes assessment. *Journal of Nursing Education and Practice*, *4*, 100-107.

Rubin, L. (2016). Six-word memoirs: A content analysis of first-year course learning outcomes. *International Journal of Teaching and Learning in Higher Education*, *28*, 395-403.

Schaub, G., Cadena, C., Bravender, P., & Kierkus, C. (2017). The language of information literacy: Do students understand? *College and Research Libraries*, *78*, 283-295.

Smith, M. F., & Razzouk, N. Y. (1993). Improving classroom communication: The case of the course syllabus. *Journal of Education for Business, 68,* 215.221.

Stark, J. S. (2000). Planning introductory college courses: Content, context and form. *Instructional Science*. *28*, 413-438.

Staton-Spicer, A. Q., & Marty-White, C. R. (1981). A framework for instructional communication theory: The relationship between teacher communication concerns and classroom behavior. *Communication Education*. *30,* 354-366.

Thompson, B. (2007). The syllabus as a communication document: Constructing and presenting the syllabus. *Communication Education*, *56*, 54-71.

Walker, P. (2008). What do students think they (should) learn at college? Student perceptions of essential learning outcomes. *Journal of the Scholarship of Teaching and Learning*, *8*, 45-60.