

Time Well Spent:

Flipped Classrooms and Effective Teaching Practices

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**ABSTRACT**

Good teaching practices are the crux of student education and require constant evaluation to meet current generations' learning needs. Flipped classrooms have sought a foothold in higher education to provide opportunities for deep learning through the delivery of content online prior to attending class while having activities related to processing and applying the information during class. Using a large-scale, multi-institution study of faculty teaching flipped courses, this study empirically links flipped procedures to other forms of effective educational practice and additionally focuses on the motivations and impacts on the faculty side of this pedagogical practice. Findings indicate numerous learning and development benefits for students with implications for supporting and motivating faculty across disciplines, faculty identities, and course types.

Key words: TEACHING AND LEARNING, INNOVATION IN TEACHING, SCHOLARSHIP OF TEACHING AND LEARNING, PEDAGOGY, FACULTY, HIGHER EDUCATION, EDUCATIONAL TECHNOLOGY, FSSE

## FLIPPED CLASSROOMS

### Time Well Spent:

#### Flipped Classrooms and Effective Teaching Practices

A new generation of student beckons a new learning environment and many scholars point toward flipped classrooms as a solution (Bishop & Verleger, 2013; Gannod, Burge & Helmick, 2008; Roehl, Reddy & Shannon, 2013). Assessment of flipped classrooms have historically had mixed results; however, the active learning component makes it a strong contender for modern higher education (Nilson, 2016; Roehl, Reddy & Shannon, 2013). Students are provided study questions while viewing at-home modules to help process the content as they normally would during class. Often students do not ask questions in large lectures, and few students reported missing the opportunity to do so while taking a flipped course (Foertsch et al., 2002). Collaborative learning is frequently a component of a flipped class (Gannod et al., 2008; Foertsch et. al, 2002). The class structure professionalizes students by providing skills they will need in the workforce (Foertsch et al., 2002).

Good teaching practices are the crux of student education (Bain, 2004), and require constant evaluation to meet current generations' learning needs (Seemiller & Grace, 2016). Flipped classrooms have sought a foothold in higher education to provide opportunities for deep learning through layering course material throughout each class session (Du, Fu, & Wang, 2014; Herreid & Schiller, 2013), which is known to reinforce the importance of cumulative knowledge and application (Lang, 2016). However, little research has been conducted on faculty perspectives related to flipped courses as well as the link between course design and student engagement indicators. The study seeks to weigh the costs of a flipped classroom to the benefits by answering the following research questions:

1. What kinds of faculty and in what types of courses are more likely to be flipped?
2. What factors most strongly motivate faculty to flip their courses?
3. How does the amount of time faculty spend on teaching-related practices differ in flipped and traditional courses?
4. How does having a flipped course relate to effective educational practices?

## FLIPPED CLASSROOMS

### **Background**

Evidence has demonstrated the success of flipped classrooms (Bergmann & Sams, 2012). “The flipped model puts more of the responsibility for learning on the shoulders of students while giving them greater impetus to experiment” (Educause, 2012, p. 2). Ambrose and company (2010) found students who reflect on their ability to achieve a problem are more likely to study and achieve the outcome. Moreover, if students do not achieve the outcome that is set for them, good learners will try a new strategy and likely succeed after another attempt. By having to teach themselves outside of class, students may more thoroughly master content. In addition, the flipped classroom design has shown to yield significant improvements in student self-efficacy as compared to a traditional classroom design (Thi Thai, Wever, & Valcke, 2017).

Researchers posit the effects of a flipped classroom could teach students study-skills that are beneficial to their success in other courses (Bauer & Haynie, 2017). Thus, the outcomes are assumed to be moderated by self-monitoring as literature shows students who have high levels of the skill are more successful (Ambrose, Lovett, Bridges, DiPietro, & Norman, 2010). This is likely since flipped classrooms parallel “small teaching,” a paradigm that has been found to increase student learning (Lang, 2016). The practice recommends frequent quizzing of students at the beginning and end of classes to activate knowledge retrieval processes, which boost students’ learning (Lang, 2016).

The flipped student-centered approach aims to increase higher levels of student engagement. (Gilboy, Heinerichs, & Pazzaglia, 2015). Unlike traditional in-class lectures where students are passive observers, the flipped design incorporates aspects of constructivist learning. In this learning environment, new knowledge is constructed rather than merely transmitted from instructor-to-student. A constructivist approach lends itself to a class design where instructors are no longer viewed as “the sage on the stage, but a guide on the side.” (King, p. 30). In assuming the role of facilitator, faculty members prompt students to use their own knowledge to engage with course content that encourages making connections, questioning, reflection, and higher ordered thinking (Hockings, Cooke, Yamashita, McGinty, & Bowl, 2008). Furthermore, the flipped design aligns with research that suggests that class time utilized for knowledge

## FLIPPED CLASSROOMS

application promotes deeper comprehension and increased engagement (Ferrerri & O'Connor, 2013; Pluta, Richards, & Mutnick, 2013).

The flipped classroom has been applied in many disciplines: software engineering, cinematography, and statistics (Enfield, 2013; Gannod, Burge, & Helmick, 2008; Wilson, 2013). Wilson (2013) claimed students taking statistics in flipped classrooms scored higher cumulative graduate point averages than control groups. Additionally, Foerstch and company (2002) found students believed electronic lectures to be more useful than in-person lectures. Enfield (2013) discovered students reported educational technology helpful to learning course material by working alongside videos and taking notes during the take-home portion of flipped classrooms. Furthermore, Mok (2014) found that a major advantage for students under the flipped design is having the option to watch each video lecture as many times as it requires to hold a deep understanding of course content prior to attending class. Using integrative teaching practices has demonstrated an increase in student interest and learning in STEM fields (Becker & Park, 2011); thus, it is important to continue to experiment with new pedagogy to improve educational experiences for all students

The flipped classroom not only has benefits for students, but many for faculty as well. The course structure is excellent for lower level courses, which faculty are often not too keen on teaching; the new teaching paradigm can instill excitement to old content (Gannod et al., 2008). Moreover, by not having to worry about covering specific content in a timely manner during class, instructors can easily schedule guest lectures to introduce students to a breadth of perspectives. While it can be more time consuming to use a flipped paradigm due to content creation, the model will save faculty time in future years because they can reuse their recorded material. The recorded material further proves advantageous in continuing to move a course forward when faculty members have to cancel an in-class session. Instead of forfeiting lecture time, students may receive meaningful instruction without the instructor present (Roehl et al., 2013). Faculty are provided opportunities for deep learning through layering course material throughout each class session, which is known to reinforce the importance of cumulative knowledge and application (Lang, 2016).

## FLIPPED CLASSROOMS

### Literature

#### Limited Resources

Lack of time and frequent roadblocks for innovative practices necessary to advance the central missions of higher education institutions. The visuals created for students need to be succinct and in-class activities need to be planned well in advance (Nilson, 2016). In tandem, the time required to assess new practices can curtail the continuation of such practices, thus it is recommended institutions and departments provide faculty time, resources, and support to advance instructional methods. Providing time for faculty to pursue endeavors related to flipped classrooms and new practices will be beneficial for both students and faculty.

Continued assessment of teaching practices and their effects on students are essential for understanding how to best promote learning. While this study provided an overview flipped classrooms as it relates to faculty practices it did not assess the effects on students. Quasi-experimental methodologies may be best suited to understand the relationship between classroom practices and student learning outcomes.

#### Who Benefits from Flipped Classrooms

Flipped classrooms are sometimes viewed as stifling due to students' inability to ask questions as they listen to content. However, some faculty in lectures disagree as students have the most questions when they are attempting to apply their knowledge thus demonstrating a need for flipped classrooms (Foertsch et al., 2002). The flipped classroom paradigm will likely challenge faculty to change their philosophy on teaching leading to positive or negative effects on the classroom experience.

Student resistance to the new pedagogy has been a source of limitation for many new ways of teaching (Nilsen, 2016). Oftentimes, students fear change and are used to being taught in a specific manner during k-12 that when it comes time for new pedagogy in college they are often hesitant to buy-in (Roehl et al, 2013). However, one believes the limitation can be combatted by involving students in the course design process. Nilson (2016) claimed it is important to allow students to define their own learning goals to help them rethink how they are obtaining their content.

Literature demonstrates numerous studies have been conducted on student satisfaction of flipped classrooms, but few on engagement or related indicators of

## FLIPPED CLASSROOMS

learning (Enfield, 2013; McNally et al., 2017; Wilson, 2013). Flipped classrooms were designed to improve learning yet there is a limited understanding of faculty perceptions of how the design affects students.

### Methods

#### Data

The data for this study come from the 2018 administration of the Faculty Survey of Student Engagement (FSSE). The purpose of FSSE is to measure faculty and instructor perceptions of and involvement in undergraduate student engagement at four-year colleges and universities. Every year FSSE appends extra item sets to the end of participating institution's administrations to further explore topics of interest to the field of higher education. The focus of this study was on an extra item set about teaching practices and motivations surrounding flipped classrooms (see this paper's measures section for more details). Eighteen institutions, resulting in 1,353 faculty respondents, received this set. See Table 1 for a listing of the extra items used in this study.

#### Respondents

Respondents in this study are limited to those faculty who responded to at least one item in the flipped classroom extra item set. The faculty respondents were from a variety of disciplinary areas with the largest proportions in Art and Humanities (24%); Health Professions (13%); and Social Science fields (12%). Respondents that held the rank of Full Professor (29%), Associate Professor (24%), and Assistant Professor (27%) represented the large majority, while those holding the rank of Full-time Lecturer/Instructor (11%) and Part-time Lecturer/Instructor (9%) represented smaller proportions. Over a third of the faculty were tenured (41%) with an additional amount of faculty on tenure track (20%). The remaining faculty were not on a tenure track (24%) and 15% did not have a tenure track system at their institution. A little more than half of the faculty identify as women (51%), and less than half identified as men (43%). Due to very small numbers, faculty who chose another gender identity other than man or woman were excluded from this study. Two-thirds of the faculty identified as White (66%) with smaller proportions identifying as Black or African American (12%) or Asian (4%). Most faculty (83%) identified as straight (heterosexual). Details about faculty respondents' demographics by having a flipped course can be found in Table 2.

## FLIPPED CLASSROOMS

The faculty in this study exhibited variations in their selected course characteristics. Over half of the faculty respondents' course selection did not meet a general education requirement (56%), while 44% of course selections met a general education requirement. Around a third each of faculty respondents taught a course size of 20 or fewer (35%), 21-30 (33%), or 31 or more (32%). The largest proportion of faculty taught in a course format of classroom instruction on campus (84%), with smaller proportions of classroom instruction at an auxiliary campus (2%), distance education online (2%), and a combination of classroom instruction and distance education (13%). Most faculty taught a higher course load of 8 or more courses (29%) and 6-7 courses (30%). Lower course loads of 4-5 courses (22%) and 0-3 courses (19%) were less represented. Over half taught an upper division course (54%), and under half taught a lower division course (39%). Nearly two-thirds of the faculty previously taught their selected course 5 or more times (66%) with 3-4 times (13%), 1-2 times (14%) and 0 times (7%) representing lower proportions. Details about faculty respondents' course characteristics by participation in a flipped classroom can be found in Table 3.

### **Measures**

A key variable of interest in this study asks faculty how much their selected undergraduate course fits the following description of a flipped course: "A *flipped* course swaps traditional in-class learning with typical out-of-class learning. For instance, new information is delivered online prior to attending class while activities related to processing and applying the information are completed during class." For this study, courses were deemed to be "flipped" if faculty responded that their course fit this description "very much" or "quite a bit;" courses where faculty responded "some" or "very little" will be referred to as "traditional." The other items from this set studied here involved the reasons faculty chose to flip their course. Examples of such reasons were being awarded a teaching grant that supports innovative curriculum design, believing it would improve students' retention of faculty or procedural knowledge, and needing to redesign the course due to the volume of course content. The listing of these items can be found in Table 1. From the core FSSE survey, a variety of items were used to assess faculty use of effective educational practices, the time faculty spend on teaching-related

## FLIPPED CLASSROOMS

activities, and traditional independent variables such as gender, faculty rank, and course format. More details about these items can be found at [fsse.indiana.edu](http://fsse.indiana.edu).

### **Analyses**

To answer what kinds of faculty are more likely to flip courses and what types of courses are more likely to be flipped, a series of chi-square ( $\chi^2$ ) analyses and adjusted standardized residuals were computed. Standardized residuals greater than 2 or less than -2 were considered notable differences (Agresti & Finley, 2009). To answer the second question about what factors most strongly motivate faculty to flip their courses, descriptives were examined to see which of the given factors were most substantial in their decision to flip their course. To answer how much the amount of time faculty spend on teaching-related practices differ in flipped and traditional courses, *t*-tests and Cohen's *d* effect sizes were used to examine faculty reports of time spent on various activities between courses that were flipped versus traditional. To answer the final research question about how having a flipped course relates to effective educational practices, *t*-tests and Cohen's *d* effect sizes were used to examine faculty scores on the core FSSE Scales of effective educational practice between courses that were flipped versus traditional. A series of regression models using the core FSSE Scales as dependent variables followed, having a flipped course as the key independent variable, and controlling for the course and faculty demographics found to be significant in the first research question.

### **Results**

#### **1. What kinds of faculty and in what types of courses are more likely to be flipped?**

Courses taught in Business fields (AR = 2.2,  $p < .05$ ) and courses taught by full-time Lecturers or Instructors (AR = 3.0) were more likely to be flipped courses. Faculty of color, particularly Asian (AR = 2.0,  $p < .01$ ) and Black or African American (AR = 3.0) faculty, were more likely to teach a flipped course with White faculty less likely to do so (AR = -3.7). Courses taught either in a distance education (AR = 2.9,  $p < .001$ ) or combination of in-class instruction and distance education (AR = 8.0) were more likely to be in a flipped format, but courses taught in a classroom setup on campus were less likely to be flipped (AR = -8.6). Differences in the representation in flipped status were

## FLIPPED CLASSROOMS

not found by faculty members' tenure status, gender identity, or sexual orientation or in a course's general education status, course size, course level, faculty course load, or faculty's previous experience in teaching the course. See Table 4 for more details on the statistically significant  $\chi^2$  tests; non-significant tests were not included in the table.

### **2. What factors most strongly motivate faculty to flip their courses?**

Feeling that teaching a flipped course would improve student retention of factual or procedural knowledge ( $M = 2.92$ ,  $SD = .959$ ; where 1=Very little and 4=Very much) or that teaching a flipped course would improve students' metacognitive skills ( $M = 2.84$ ,  $SD = .988$ ) were faculty's most substantial reasons for flipping their course. Moderately substantial reasons for flipping a course included wanting to address student feedback from a previously taught course ( $M = 2.04$ ,  $SD = 1.056$ ); needing to redesign the course due to the volume of course content ( $M = 2.00$ ,  $SD = .987$ ); and being influenced by their institution, department, and/or faculty peers ( $M = 1.78$ ,  $SD = .948$ ). Being awarded teaching grants in support of innovative curriculum design ( $M = 1.27$ ,  $SD = .709$ ) or feeling a need to redesign the course due to a high student-to-instructor ratio ( $M = 1.63$ ,  $SD = .940$ ) were factors that were least substantial. Additionally, qualitative responses for faculty motivation indicated that their use of a flipped classroom design was inspired by the adoption of a pedagogical practice that improves student outcomes, convenience for students in engaging with core course content, and a class structure that most appropriately fit a flipped design.

### **3. How does the amount of time faculty spend on teaching-related practices differ in flipped and traditional courses?**

Most notably, faculty with flipped courses required more time with course administration than faculty teaching traditional courses ( $d = .44$ ,  $p < .001$ ). Faculty with flipped courses spent moderately more working to improve their teaching ( $d = .38$ ,  $p < .001$ ), grading assignments and exams ( $d = .36$ ,  $p < .001$ ), meeting with students outside of class ( $d = .28$ ,  $p < .001$ ), and time preparing class sessions ( $d = .24$ ,  $p < .01$ ) than their peers that did not teach a flipped course. There were no differences between the amount of time faculty spent actually teaching flipped and traditional courses. See more details in Table 5.

### **4. How does having a flipped course relate to effective educational practices?**

## FLIPPED CLASSROOMS

In examining analyses without controls, faculty with flipped courses were more strongly intentional in having Course Goals related to student learning and development ( $d = .56, p < .001$ ), emphasized more Higher-Order Learning ( $d = .49, p < .001$ ), and more substantially used Effective Teaching Practices ( $d = .44, p < .001$ ) than their peers teaching in a traditional format. Faculty with flipped courses encouraged more Collaborative Learning ( $d = .38, p < .001$ ), more strongly valued Reflective and Integrative Learning activities ( $d = .35, p < .001$ ), more strongly valued students' use of Quantitative Reasoning skills ( $d = .35, p < .001$ ), and encouraged more student use of effective Learning Strategies ( $d = .34, p < .001$ ) than their peers teaching in a traditional format. Still notable, faculty teaching a flipped course also more frequently participated in Student-Faculty Interaction with students outside of class ( $d = .29, p < .001$ ), more strongly value increasing their institution's Supportive Environment for students ( $d = .29, p < .001$ ), and provide more opportunities for Discussions with Diverse Others ( $d = .28, p < .001$ ). Even when controlling for faculty academic rank or position, course format, faculty racial/ethnic identification, and faculty disciplinary appointment, faculty with flipped courses display more use of effective teaching practices in all of the aspect studied here with the exception of faculty perceptions of students' interactions with others on campus (Quality of Interactions). Although coefficients suggest a slightly smaller relationship when controlling for faculty and course characteristics, faculty with flipped courses still use more educationally beneficial pedagogies, most notably intentionally structuring their courses for learning and development ( $B = .375, p < .001$ ), emphasizing higher-order learning skills ( $B = .362, p < .001$ ), using clear and effective teaching pedagogies ( $B = .332, p < .001$ ), and encouraging collaboration among peers ( $B = .325, p < .001$ ) than their peers teaching traditional courses. See more details in Table 6.

### Limitations

Institutions self-select to participate in FSSE and can select their own faculty samples which may limit generalizability. Despite this self-selection, FSSE institutions and respondents mirror many characteristics of faculty and institutions across the U.S. except for fewer part-time faculty respondents in FSSE (FSSE, 2017). Additionally, faculty choose one course which they are teaching or taught during the current school

## FLIPPED CLASSROOMS

year to respond to questions about their teaching practices, so these results may not represent all the courses they teach. Finally, some groups of faculty were small, such as those that identified as a gender identity other than man or woman, and were removed from this study. Other groups such as those that identified as American Indian, Alaska Native, Native Hawaiian, or other Pacific Islander or faculty who identified with a sexual orientation other than straight were grouped together to create larger subpopulations of faculty. Removing small groups and collapsing others may lead to results that do not apply to all subpopulations of faculty and this variation should be further examined in future research.

### **Discussion**

While many of the previous studies on flipped courses focused on math-related fields (Foertsch et al., 2002; Gannod, Burge & Helmick, 2008; Herreid & Schiller, 2013; Wilson, 2013), this study adds to the literature more broadly across disciplines and even institution types. The literature also focuses on the student perspective of flipped courses, leaving the faculty side to be very anecdotal (McNally et.al, 2016; Wilson, 2013). The study empirically links flipped courses to other forms of effective educational practice and takes care to focus on the motivations and impacts (in terms of time) of the faculty side of this pedagogical practice.

Aligned with the literature (Du, Fu & Wang, 2014), the study finds overwhelming evidence of the benefits of flipped classrooms. In flipped courses, faculty are providing students with more active and engaging environments, encouraging more learning with peers, using more effective teaching practices, and being more intentional in how they structure their courses for students' learning and development. However, the decision to flip courses is not spread equally amongst types of faculty or courses. Differences by field and faculty demographics may signal the need for more interdisciplinary training and faculty development to help all kind of faculty and in different fields take part in flipped setups. In many aspects of course type, however, there were no differences indicating that flipped activities can be universally helpful.

Faculty's most strong reasons for flipping their courses are student-focused indicating that faculty know such practices are good for students. Helping other faculty see the benefits of course flipping may help in motivating them to take action. The

## FLIPPED CLASSROOMS

immediate feedback provided to faculty in flipped courses can also help them to see the benefits to students (Herreid & Schiller, 2013). It is important to keep in mind, that flipped courses will likely take faculty more time, especially at first, and most notably in aspects of course administration (emailing students, maintaining websites, etc.) Institutions and faculty development offices interested in increasing flipped classrooms must allow and support faculty with the time and resources to make flipping courses attainable. Faculty members should be supported and provided time to pilot new ways for students to learn (Herreid & Schiller, 2013; Roehl, Reddy & Shannon, 2013).

### **Future Research Directions**

While this study uncovers whom, where, and why faculty may teach a flipped course, we did not fully investigate the quality of the course itself. More research is necessary to understand what aspects of the flipped course design contributes the most to specific learning behaviors and attitudes. For example, to what extent are quizzes and assignments motivating factors for learners to consume the online lecture prior to the in-class session? Does scaffolding and retention of knowledge improve when students consistently complete the lectures and pre-work assignments? What are the most effective interactive ways to reinforce these new concepts in large, medium, and small groups? Diving into questions like these, that investigate the connection between students' meta-cognition and the intervention itself, will help instructors design efficient and effective learning environments. Although findings show that instructors flip because they want to improve student learning and retention of knowledge, did this actually happen because of the flip classroom design. Only conducting quasi-experimental research would lead us to this answer.

This study also revealed how faculty distribute their time can vary greatly by teaching mode. Although time spent in-class was similar, out-of-class time preparing, grading, and improving the course was not. It appears flippers spent substantial more energy creating clear and organized learning experiences through thoughtful construction of out-of-class and in-class activities. Ali, Rajan, and Ratliff (2016) argued that high-quality blended courses provide a unique opportunity to adapt instruction and feedback based on the individual needs of the learner, providing a more efficient and

## FLIPPED CLASSROOMS

personalize learning experience. Yet, is this just a case of good teachers teaching well? Wang and colleagues (2015) found undergraduates who experienced clear and organized instruction improved their cognitive development over four year, by using deep approaches to learning more often. It is possible the reason flipped courses benefit students is that both are happening concurrently. That is, students are benefiting from personalized learning experiences as well as clear and organized instruction. Future studies might to fully investigate these issues from the student perspective. What specific aspects of the flipped course contribute to their success and failure?

Lastly, this study reveals pockets of faculty and disciplines where these future studies may occur. We typically look to tenure and tenure-track faculty as the experts in teaching methods in their respective field. However, this study shows full-time lecturers may be an untapped resource regarding innovative teaching practices like flipped course design. This study also concludes racial and ethnic background of faculty matter in determining whether they taught a flipped course. This is a curious finding that should be further investigated. What about a flipped course design aligns with the pedagogical approach of some minoritized faculty? Digging deeper into the racialized experiences of faculty and their choices of teaching approaches maybe another line of inquiry.

### **Conclusion**

The heightened interest in examining the flipped classroom design has been spurred on by educators seeking to utilize advancements in technology to improve student learning and meet the needs of a newer generation of students. While the bulk of research on the flipped classroom is focused on how this nontraditional approach influences student learning outcomes, this study contributes to the flipped classroom literature by analyzing this pedagogical approach from a faculty perspective. As noted within the results, it has been discovered that variation exists across disciplinary fields and faculty demographics in instituting a flipped classroom design. The identification of this variation serves as empirical evidence for departmental leaders and administrators to take into account when strategically designing professional development initiatives that promote best teaching practices amongst all faculty members and academic disciplines.

## FLIPPED CLASSROOMS

Faculty members embracing the flipped paradigm have shown to implement the practice as a way to support students in achieving higher learning outcomes through increased comprehension of course content and more advanced cognitive skills that encourage the use of application, evaluation, and synthesis. When coupled with this finding, it is of no surprise that these same faculty members employing the use of the flipped design also more frequently engage in good educational practices as compared to their counterparts teaching in a traditional manner. More specifically, these practices include placing a higher emphasis on higher-order learning, establishing course goals, and effective teaching practices. Although the results of this study suggest that the flipped design may serve as an effective teaching tool, it is important to recognize the challenges associated with teaching a flipped course.

The challenges observed within this study show that teaching a flipped course can place a heavier time burden on faculty members that have to exert extra energy on creating or compiling course materials for students to engage with prior to attending class. Additionally, faculty frequently reported that it was difficult to actually get students to review the posted course material, which in turn left the students unprepared to fully participate within the in-class session. Although a base of research is currently forming around the flipped classroom teaching model, further research on flipped classrooms is needed to investigate what specific aspects of the flipped model contribute the most to student learning, supportive structures that aid faculty in implementing the flipped design, and possible solutions to mitigate the observed challenges of teaching a flipped course.

## FLIPPED CLASSROOMS

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## FLIPPED CLASSROOMS

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## FLIPPED CLASSROOMS

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## FLIPPED CLASSROOMS

### KEY TERMS AND DEFINITIONS

**Course Goals:** The anticipated outcomes faculty desire for their students such as, advance writing, numeracy, or critical thinking skills.

**Engagement Indicators:** Several scales used in analyses measuring various constructs including: Higher Order Learning, Reflective and Integrative Learning, and Effective Teaching Practices.

**Effective Teaching Practices:** The methods in which instructors organize their lessons, use descriptive examples in class, and provide students feedback for work among other indicators.

**Flipped Classroom:** A flipped course swaps traditional in-class learning with typical out-of-class learning. For instance, new information is delivered online prior to attending class while activities related to processing and applying the information are completed during class.

**FSSE:** The Faculty Survey of Student Engagement is a research instrument used to measure teaching practices of instructors at four-year colleges and universities.

**Higher Order Learning:** The emphasis of course material challenging students to apply theories to practice, analyze new ideas, and form new meanings based on content.

**Reflective and Integrative Learning:** The processes by which students are encouraged to connect material to societal issues, reflect on strengths and weaknesses of arguments, and combine knowledge from other coursework.

# FLIPPED CLASSROOMS

Table 1. Select Items in the FSSE2018 Flipped Classroom Item Set

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Earlier, you answered some questions based on one particular undergraduate course section you are teaching or have taught during this academic year. Thinking again about that course, please respond to the following questions.

**A *flipped* course swaps traditional in-class learning with typical out-of-class learning. For instance, new information is delivered online prior to attending class while activities related to processing and applying the information are completed during class.**

**About how much does your selected undergraduate course fit this description of a *flipped course*?**

Response options: Very much, Quite a bit, Some, Very Little

**To what extent did the following reason(s) prompt you to teach a flipped course?**

Response options: Very much, Quite a bit, Some, Very Little

- a. I was awarded a teaching grant that supported innovative curriculum (re)design
  - b. I was influenced by my institution, department, and/or faculty peers
  - c. I believed it would improve students' retention of factual or procedural knowledge
  - d. I believed it would improve students' metacognitive skills
  - e. I wanted to address student feedback from a previous course that I taught
  - f. I needed to redesign the course due to the volume of course content
  - g. I needed to redesign the course due to the high student-to-instructor ratio
  - h. Other, please specify:
-

## FLIPPED CLASSROOMS

Table 2. Select Faculty Demographics and Characteristics by Flipped Classroom Status

	<i>Flipped Course (Row %)</i>	<i>Traditional Course (Row %)</i>	<i>Total (Column %)</i>
<i>Disciplinary Area</i>			
Arts & Humanities	16.6	83.4	23.6
Bio Sciences, Agric, & Natural Resources	11.9	88.1	6.8
Phys Sciences, Math, & Computer Sciences	14.6	85.4	10.6
Social Sciences	16.6	83.4	12.3
Business	25.4	74.6	10.3
Comm, Media, & Public Relations	12.5	87.5	3.9
Education	23.4	76.6	9.0
Engineering	7.4	92.6	2.2
Health Professions	23.5	76.5	13.2
Social Service Professions	26.8	73.2	3.3
Other disciplines	13.8	86.2	4.7
<i>Academic Rank</i>			
Full Professor	15.6	84.4	29.1
Associate Professor	18.7	81.3	23.8
Assistant Professor	18.1	81.9	27.0
Full-time Lecturer/Instructor	28.0	72.0	11.3
Part-time Lecturer/Instructor	16.7	83.3	8.7
<i>Tenure Status</i>			
No tenure system at this institution	14.2	85.8	15.0
Not on tenure track, but this institution has a tenure system	19.9	80.1	24.3
On tenure track but not tenured	21.3	78.7	20.0
Tenured	17.6	82.4	40.7
<i>Gender Identity</i>			
Man	16.4	83.6	42.7
Woman	20.2	79.8	51.4
I prefer not to respond	18.1	81.9	5.9
<i>Racial/Ethnic Identification</i>			
Asian	28.8	71.2	4.2
Black or African American	27.4	72.6	11.9
Hispanic or Latino	23.1	76.9	3.2
White	15.3	84.7	65.6
American Indian, AK Native, Native HI, Pacific Islander, or Other	25.0	75.0	2.0
Multiracial	15.4	84.6	3.2
I prefer not to respond	20.5	79.5	10.0
<i>Sexual Orientation</i>			
Straight (heterosexual)	17.3	82.7	83.3
LGBQ+	25.0	75.0	5.3
I prefer not to respond	22.9	77.1	11.5

## FLIPPED CLASSROOMS

Table 3. Select Course Characteristics by Flipped Classroom Status

	<i>Flipped Course (Row %)</i>	<i>Traditional Course (Row %)</i>	<i>Total (Column %)</i>
<i>Course Format</i>			
Classroom instruction on campus	14.3	85.7	83.9
Classroom instruction at an auxiliary campus	25.0	75.0	1.6
Distance education online	42.9	57.1	1.7
Combination of classroom instruction and distance education	41.5	58.5	12.8
<i>Course Load</i>			
0-3 courses	17.9	82.1	19.0
4-5 courses	18.0	82.0	22.0
6-7 courses	18.0	82.0	29.7
8 or more courses	19.2	80.8	29.3
<i>Class Level</i>			
Lower division	16.1	83.9	39.3
Upper division	20.3	79.7	53.7
Other	14.9	85.1	7.1
<i>Previous Experience Teaching The Course</i>			
0 times	18.5	81.5	7.4
1-2 times	24.7	75.3	13.7
3-4 times	19.8	80.2	13.1
5 or more times	16.7	83.3	65.7
<i>General Education Requirement</i>			
Not a general education course	18.8	81.2	55.8
Selected course meets general education requirement	18.2	81.8	44.2
<i>Course Size</i>			
Small (20 or fewer)	19.0	81.0	34.9
Medium (21-30)	17.9	82.1	33.4
Large (31 or more)	18.6	81.4	31.7

# FLIPPED CLASSROOMS

Table 4. Chi-Square Statistics for Differences in Faculty Demographics and Course Characteristics by Flipped Status

	Standardized Residual		<i>n</i>	<i>df</i>	$\chi^2$ sig
	Traditional	Flipped			
<i>Disciplinary Area</i>			1,227	10	19.387*
Arts & Humanities	0.9	-0.9			
Biological Sciences, Agriculture, & Natural Resources	1.6	-1.6			
Physical Sciences, Mathematics, & Computer Science	1.2	-1.2			
Social Sciences	0.6	-0.6			
Business	-2.2	2.2			
Communications, Media, & Public Relations	1.1	-1.1			
Education	-1.5	1.5			
Engineering	1.5	-1.5			
Health Professions	-1.8	1.8			
Social Service Professions	-1.4	1.4			
Other disciplines	0.9	-0.9			
<i>Academic Rank</i>			1,167	4	10.129*
Full Professor	1.6	-1.6			
Associate Professor	-0.1	0.1			
Assistant Professor	0.2	-0.2			
Full-time Lecturer/Instructor	-3.0	3.0			
Part-time Lecturer/Instructor	0.5	-0.5			
<i>Racial/Ethnic Identification</i>			1,226	6	18.747**
Asian	-2.0	2.0			
Black or African American	-3.0	3.0			
Hispanic or Latino	-0.8	0.8			
White	3.7	-3.7			
Other, American Indian or AK Native, Native HI or other PI	-0.9	0.9			
Multiracial	0.5	-0.5			
I prefer not to respond	-0.7	0.7			
<i>Course format</i>			1,242	3	77.016***
Classroom instruction on-campus	8.6	-8.6			
Classroom instruction at an auxiliary location	-0.8	0.8			
Distance education	-2.9	2.9			
Combination of class instruction and distance education	-8.0	8.0			

\* $p < .05$ . \*\* $p < .01$ , \*\*\* $p < .001$

## FLIPPED CLASSROOMS

Table 5. Faculty Time Means and Statistics by Flipped Course Status

	Flipped Course		Traditional Course		t	Sig.	d
	Mean	SD	Mean	SD			
Preparing class sessions	9.4	5.44	8.1	5.13	-3.274	**	.24
Teaching class sessions	10.4	5.10	9.8	4.65	-1.564		.11
Grading assignments & exams	8.2	5.44	6.4	4.54	-5.250	***	.36
Meeting with students outside of class	5.8	4.41	4.6	3.60	-4.102	***	.28
Course administration	7.2	5.66	5.0	3.94	-6.774	***	.44
Working to improve your teaching	5.9	5.17	4.2	3.77	-5.802	***	.38

Key: \*\* $p < .01$ , \*\*\* $p < .001$

## FLIPPED CLASSROOMS

Table 6. FSSE Scale Means and Statistics by Flipped Course Status

	Flipped Course		Traditional Course		Without Controls			With Controls <sup>a</sup>	
	Mean	SD	Mean	SD	t	Sig.	<i>d</i>	B	Sig.
Higher-Order Learning	47.8	11.35	41.8	13.14	-6.373	***	.49	.362	***
Reflective & Integrative Learning	48.3	11.98	43.8	13.51	-4.637	***	.35	.223	**
Learning Strategies	42.9	15.39	37.6	15.83	-5.266	***	.34	.233	**
Quantitative Reasoning	40.1	17.12	33.5	19.55	-4.628	***	.35	.276	***
Collaborative Learning	41.9	14.83	36.1	15.41	-5.783	***	.38	.325	***
Discussions with Diverse Others	31.4	18.31	26.6	16.30	-4.801	***	.28	.186	*
Student-Faculty Interaction	40.6	13.35	36.8	13.08	-3.847	***	.29	.222	**
Effective Teaching Practices	52.4	7.75	48.8	8.47	-3.553	***	.44	.332	***
Quality of Interactions	38.0	10.86	36.5	10.15	-1.475		.14	.112	
Supportive Environment	45.9	11.09	42.7	10.91	-3.179	***	.29	.241	**
Course Goals	43.0	11.66	36.4	12.23	-6.668	***	.56	.375	***

Key: \* $p < .05$  \*\* $p < .01$ , \*\*\* $p < .001$ .

a. Variables were standardized before entry into models so that unstandardized B's can be interpreted as effect sizes.

Controls included faculty academic rank/position, course format, faculty racial/ethnic identification, and faculty disciplinary appointment.