2015

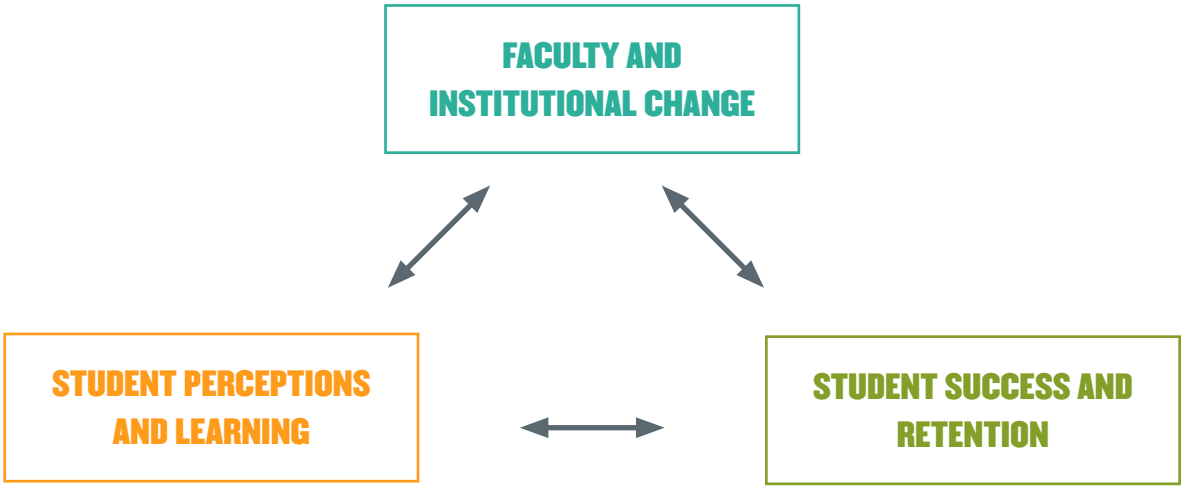
Annual IMPACT Report 2015: A report by the IMPACT Data Collection and Analysis Team, Part 3

IMPACT Management Team

IMPACT Assessment Team

GENERAL STATISTICS ABOUT THE REACH OF IMPACT

- Over 200 faculty
- 10 of the 11 colleges
- All first-time freshman who started at Purdue in Fall 2015, and who did not test out of English 106 and Communications 114 are currently enrolled in an IMPACT course
- In Fall 2015, 16,989 out of 29,521 students (57.5%) are enrolled in IMPACT causes
- In terms of individual registrations, 28,526 registrations out of a cumulative total of 150,136 registrations, or 19%, were from IMPACT sections
    - Enrollments = Distinct students enrolled in at least one course
    - Registrations = *Cumulative count of all students in all sections*



Faculty and Institutional Change (led by the DLRC)

Student Perceptions and Learning (led by CIE)

Student Success and Retention (led by OIRAE)

Figure 1: *Assessment goals for the IMPACT program.*

FACULTY AND INSTITUTIONAL CHANGE

This section summarizes faculty self-reported changes to teaching practices (regarding course planning, preparation and implementation) as a result of participation in the IMPACT program.

FACULTY REPORTED IMPACTS ON TEACHING

This section summarizes the immediate and longer term effects of IMPACT participation as perceived by faculty. Specific evaluation questions addressed are:

1. What are the perceived effects of participating on faculty self-reported attitudes, beliefs and practices regarding teaching and learning?
2. What are the benefits and challenges of participation in IMPACT for instructors?
3. To what extent is the transformation begun in IMPACT transferred to other courses taught by IMPACT faculty fellows?
4. To what extent is the transformation begun in IMPACT sustained over time and across instructors?
5. What are the associated barriers and supports to transferability and sustainability?

IMPACT fellows are surveyed and interviewed throughout their participation in the program. Faculty are asked about their perceptions of the faculty development activities, the impacts of participation on their teaching approaches, the benefits and challenges of participating and implementing a redesign, and the catalysts and barriers to sustaining and transferring their new teaching practices. Survey data are tabulated and analyzed descriptively. Mean response rates to surveys are approximately 60%. Interview data are transcribed and analyzed for salient themes associated with the

areas of interest. Evaluation results and discussion for each question follow. Unless otherwise stated, results are drawn from the cumulative data collected from participating faculty over the life of the IMPACT program.

1. What are the perceived effects of participating on faculty self-reported attitudes, beliefs and practices regarding teaching and learning?

One evident effect of participation in IMPACT is that instructors adopt more student-centered teaching practices. Table A displays means and standard deviations for instructors who completed surveys at their entrance to the IMPACT program and after implementing their redesigned course. The means were compared with a paired t-test and the t-statistic for each test is included in Table A. The degree to which instructors report that they have clear learning objectives increased significantly from pre-participation to post-implementation. Instructors also reported an increase in their ability to provide individualized feedback to students. Additionally, instructors reported a significant increase in their ability to identify appropriate educational technology for their course.

During the IMPACT learning community sessions, instructors had opportunities to reflect on their teaching and further develop the goals for their redesigned course. This time for learning and reflection allowed them to adjust many of their beliefs and expectations about teaching a redesigned course. Table B displays means and standard deviations for instructors who completed surveys at their entrance to the IMPACT program and after participating in the learning community sessions. The means were compared with a paired t-test and the t-statistic for each test is included in the table. For example, after completing the IMPACT learning community, instructors were more likely to view the teaching of their redesigned course as "very time consuming." They were significantly less concerned that they would be able to cover less content in their redesigned course.

2. What are the benefits and challenges of participation in IMPACT *for instructors?*

The clearest benefit of participation for instructors is opportunity for reflection about teaching and learning. Table C shows the percentage of instructors who responded "strongly agree" or "agree" to a series of statements about their experience in the IMPACT learning community. A total of 89 percent of instructors agreed or strongly agreed that they had the opportunity for reflection. Instructors also report that they gained knowledge about teaching and learning (e.g., knowledge about teaching strategies and activities); they also gained awareness of the pedagogical and technological resources available on campus to support teaching and learning.

In interviews after participating in the learning community, faculty mentioned gaining valuable insights including the fact that good teaching and course redesign take time and the fact that a course schedule should have room for flexibility and reorganization. Participants also noted that the arrangement and organization of the learning community transformed their roles from instructors to students, which provided them with the opportunity to reassess the quantity and quality of weekly assignments in their own classes as well as the chance to realize the importance of detail and accuracy in syllabi and assignment outlines.

Another benefit reported by participating instructors was an increase in satisfaction about teaching. Table D displays means and standard deviations for instructors who completed surveys at their entrance to the IMPACT program and after implementing their redesigned course. The means were compared with a paired t-test and the t-statistic for each test is included. After implementing their redesigned course, instructors showed a significant increase in their satisfaction with the assessment methods they use, with their teaching approaches, and with the support of their teaching assistants.

Finally, instructors noticed positive changes in their students' behavior after implementing their redesigned course. Table E displays means and standard deviations for instructors who completed surveys at their entrance to the IMPACT program and after implementing their redesigned course. The means were compared with a paired t-test and the t-statistic for each test is included. Instructors reported statistically significant increases in student activity and engagement in class; and significant increases in student displays of good study habits and critical thinking skills. Significant decreases were reported in negative student classroom behaviors such as falling asleep in class and distraction by technological devices.

Instructors also perceive several challenges to their participation. Time is chief among these barriers. Even after they become aware through the learning community sessions about the resources available to support them, their perception of the redesign as a very time consuming endeavor increases significantly and their perception of their ability to devote enough time to the effort remains unchanged (Table A). Only 59% of instructors felt that their participation in IMPACT would enhance their career (Table C). During the learning community, instructors become significantly more aware of potential administrative challenges to changing the classroom in which the course is taught. They also become significantly more concerned about potential negative student reaction to the course changes.

3. To what extent is the transformation begun in IMPACT transferred to other courses taught by IMPACT faculty fellows?

In a follow up survey one year or more after they first implemented their redesigned course (N=48), 85% of instructors rated their course as transferable or mostly transferable. A total of 88% of instructors indicated that their experience redesigning a course in IMPACT influenced the way in which they teach their other courses. Instructors cited several supports that could assist them

in transferring practices adopted during IMPACT to other courses. These included graduate assistants or other support staff dedicated to assessment of their courses that would allow them to demonstrate the efficacy of their practices (46%), resources for supporting and training more teaching assistants to help facilitate redesigned courses (40%), and continued support in improving their own skill in facilitating active learning (29%).

4. To what extent is the transformation begun in IMPACT sustained over time and across instructors?

A total of 83% of IMPACT instructors who responded to the follow up survey one year after they implemented their redesigned course were still assigned to teach that course. Of those, 95% continue to utilize at least some of the active learning strategies begun as a result of their participation in IMPACT.

5. What are the associated barriers and supports to transferability and sustainability?

(1) The most commonly cited challenges to transferability of the changes they made were: lack of time for planning and administrating other courses (35%), (2) lack of teaching assistants to assist in other courses (25%), and (3) lack of access to classroom facilities that allowed for the types of active learning pedagogies they wanted to use (17%).

The most commonly cited challenge to sustaining the redesign was a lack of time for administering (teaching, grading, planning) the course (31%), a lack of teaching assistants (25%), lack of access or difficulty scheduling classroom facilities that allowed for the types of active learning pedagogies they wanted to use (23%), and negative reactions from students enrolled in redesigned courses (21%).

Summary

The data examined indicate that IMPACT is assisting instructors

in learning about student-centered, active learning pedagogies, the classroom technologies and strategies that support these pedagogies and the many resources on campus that are available to support their implementation. After participating in IMPACT, instructors report the use of more student-centered instructional practices. Instructors find the time for reflection on teaching and learning to be one of the primary benefits of participation in IMPACT. After participation in IMPACT, instructor satisfaction increases significantly. This increased satisfaction may enhance the probability that changes made to courses as a result of participating in IMPACT will be sustained over time. They believe the redesign adds value to their course and report significant increases in student engagement and critical thinking and decreases in disengaged behaviors by students.

During their focused learning community time, instructors become more aware of the time needed to plan and administer a student-centered course. Time is the most frequently cited barrier by instructors to participation in IMPACT and the continuation of student-centered instruction. Only 59% of instructors believe that their participation in IMPACT will benefit their career. Thus, it may be difficult for many instructors to view redesigns as a priority in light of the many competing demands on their time. Instructors also indicate that resources often necessary to execute student-centered courses, particularly for large enrollment courses, are lagging behind the scale up of IMPACT. Lack of these resources, such as teaching assistants and flexible facilities are cited as barriers to sustainability and transferability of the changes begun as IMPACT participants.

TABLES

Table A. Paired t-test Comparison of Instructor Teaching Practice Before and After Implementation

		Pre-participation		Post-implementation		
"To what extent do you agree or disagree with the following statements…" (1 = "Strongly Disagree", 6 = "Strongly Agree")	**N**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**t**
I have incorporated instructional technology effortlessly	39	3.26	1.390	3.64	1.135	1.685
I have been able to identify appropriate instructional technology for this course	39	3.77	1.180	4.56	.680	3.597*
I have been able to create clear learning objectives for my course	39	4.33	1.084	5.18	.644	4.852*
I am able to provide students with individualized feedback	39	3.97	1.308	4.36	1.224	2.029*

*Note: *= significant at the p<0.05 level*

Table B. Paired t-test Comparison of Instructor Perceptions of Redesign Process Before and After Participation in Learning Community

		Pre-participation		Post-implementation		
"To what extent do you agree or disagree with the following statements…" (1 = "Strongly Disagree", 6 = "Strongly Agree")	**N**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**t**
The implementation of my redesign will be very time consuming	79	4.61	0.869	5.32	0.809	6.834*
I will be able to devote enough time to the implementation	79	4.65	0.801	4.41	0.994	-1.903
I am less concerned that implementing my redesign may lead to less course content being covered	79	3.32	1.266	3.87	1.338	3.625*
I am concerned that I will be adopting methods that have not been previously used in my field/ department	79	2.48	1.338	2.86	1.439	1.980
Administrative bottlenecks may hinder me from changing the course location	79	3.08	1.448	3.56	1.567	2.409*
Students will be receptive to the course redesign	76	4.45	0.900	4.13	0.957	-2.841*

*Note: *= significant at the p<0.05 level*

Table C. Instructor reported impacts of participation in learning community

"To what extent do you agree or disagree with the following statements…" (1 = "Strongly Disagree", 6 = "Strongly Agree")	N	SA/A	%
I had the opportunity to reflect more on my teaching and how to improve it	104	93	89
I gained useful ideas from the support team	104	90	87
My participation in IMPACT will add value to the course I teach	104	90	86
I gained specific knowledge that I can incorporate into my course	103	85	83
I was informed of useful pedagogical resources for course redesign	104	82	79
The lessons learned will help me be a better teacher	104	81	78
The program enhanced my knowledge of teaching strategies	104	80	77
I was informed of useful technological resources for course redesign	104	78	75
I learned how to better deliver my course content	104	66	63
My participation in IMPACT will enhance my career	103	61	59

*Note: *= significant at the p<0.05 level*

Table D. Paired t-test Comparison of Instructor Satisfaction Before and After Implementation

		Pre-participation		Post-implementation		
"To what extent do you agree or disagree with the following statements…" (1 = "Strongly Disagree", 6 = "Strongly Agree")	**N**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**t**
I am satisfied with the methods that I currently use to assess student learning	39	3.38	.877	4.23	.986	4.038*
I am satisfied with my current teaching approaches	39	3.64	1.088	4.36	.811	3.306*
I am satisfied with the support I get from my teaching assistants	33	4.18	1.467	4.82	1.131	2.552*
The learning space is conducive to active student engagement in the course	39	3.26	1.409	4.41	1.428	3.940*

*Note: *= significant at the p<0.05 level*

Table E. Paired t-test Comparison of Instructor Perceptions of Student Behavior Before and After Implementation

		Pre-participation		Post-implementation		
"To what extent do you agree or disagree with the following statements…" (1 = "Strongly Disagree", 6 = "Strongly Agree")	**N**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**t**
Students are active in the course	39	3.95	0.999	4.77	1.063	4.309*
Students are engaged in the course	39	4.13	0.833	4.67	0.982	2.883*
Students often fall asleep in the class	39	2.46	1.097	1.87	0.801	-3.049*
Students are often distracted by technological gadgets	39	4.00	1.395	3.15	1.387	-3.208*
Most students in the course demonstrate critical thinking skills	39	3.64	0.843	4.26	1.044	3.523*
Most students in the course demonstrate good study habits	39	3.51	0.914	4.13	1.128	3.132*
Most students in the course demonstrate information literacy skills	38	3.95	1.114	4.26	0.978	1.455

*Note: *= significant at the p<0.05 level*

STUDENT PERCEPTION AND LEARNING

The results reported in this section were collected in Fall 2014 and Spring 2015 on all IMPACT courses taught during that period with the use of a student survey. The survey was administered to students at the end of the semester to capture their perceptions of the classroom environment and their learning gains. A copy of the survey can be obtained upon request. The questions of interest are grouped into the following constructs.

Learning Climate (6 items) α*=.95, Autonomy (7 items)* α*=.76, Competence (6items)* α*=.72, Relatedness (8 items)* ^{a}*=.83, Perceived Knowledge Transfer (8 items)* α*=.97, Self-determined Motivation (18 items).*

These constructs are derived from Self-Determination Theory (SDT), which has been under investigation for the past 40 years. SDT guides the implementation and assessment of the IMPACT program.

SELF-DETERMINATION THEORY (SDT)

is a theory of motivation. It is concerned with supporting our natural or intrinsic tendencies to behave in effective and healthy ways. SDT has been researched and applied by a network of researchers around the world.

The theory was initially developed by Edward L. Deci and Richard M. Ryan, and has been elaborated and refined by scholars from many countries since its beginnings in 1975.

More can be learned about the theory at the following website.

http://www.selfdeterminationtheory.org/

In addition to information about the theory, the website also provides resources, including validated scales, addressing motiva-

tional issues around human needs, motivation across cultures, and psychological well-being. SDT has been applied in a variety of domains including, but not limited to

- Education
- Organizations/Work
- Relationships
- Goals
- Health

SDT posits the existence of three basic psychological needs, which when fulfilled, contribute to the creation of a student-centered, autonomy-supportive learning environment. The basic needs are autonomy, competence, and relatedness. During the process of the redesign, support team members work with faculty to create a learning environment, which will foster the satisfaction of the three basic psychological needs.

Researchers also use the Learning Climate Questionnaire (LCQ) to asses an autonomy-supportive, student-centered environment. For the assessment of IMPACT, the short version of the LCQ is used, which is comprised of 6 items (Black & Deci, 2000; Williams & Deci, 1996).

Autonomy,

in the context of SDT, does not mean independence but rather feelings of volition and choice. For example, students tend to feel autonomous when they are given choices and options about how to perform or present their work. When choice is not possible, the provision of a rationale for the task to be completed fosters perceptions of autonomy.

Competence,

has been the focus of multiple higher education studies, and represents the extent to which students believe they have mastered

content material or are able to perform academically (Deci, Koestner, & Ryan, 1999; Deci & Ryan, 2000).

Relatedness

is met, when students feel connected, intellectually and emotionally, to other students in the class, as well as to their instructor. In addition, **connectedness** to the material presented in class, also termed relevance, is important to foster perceived relatedness. The basic needs are measured with the use of the Basic Psychological Needs Scale (BPNS), which is comprised of 21 items (7 items for autonomy, 6 items for competence and 8 items for relatedness). For the assessment of IMPACT, students complete an adaptation of the BPNS at Work (Kasser, Davey, & Ryan, 1992; Levesque-Bristol, Knapp, & Fisher, 2010), which has been the most widely used in previous research.

Further, according to SDT, when basic psychological needs are met in student-centered, autonomy-supportive environments, self-determined motivation is fostered. SDT defines self-determined motivation as those forms of motivation guiding behaviors that are valued and chosen volitionally (e.g. identification). In contrast, non-self-determined motivation underlies behaviors that are coerced or pressured by others (e.g. introjection). From the least self-determined to the most self-determined forms of motivation, they are: Amotivation, Extrinsic Motivation, Introjection, Identification, Integration, and Intrinsic Motivation (See IMPACT report 2015, Part 1 for the continuum). For the assessment of IMPACT, students complete the Situational Motivation Scale (SIMS), which is comprised of 18 items, 3 items for each of the 6 forms of motivation (Guay, Mageau, & Vallerand, 1997).

When evaluating the effectiveness of IMPACT, we examine the extent to which the transformations created a student-centered learning environment as assessed using the LCQ. We also examine the motivational mechanisms (SDT principles) as moderators of the relationship between redesign models using active learning strategies and student success and outcomes. Our general moderation hypothesis is that active learning strategies are effective as long as they contribute to the creation of a student-centered (autonomy-supportive) environment by fostering autonomy, competence, and relatedness. These environments in turn foster student motivation, which can then lead to student success, learning, transfer of knowledge, retention, and ultimately progress toward degree completion (See Figure 1).

As part of the IMPACT assessment, we also assess students perceive knowledge transfer (PKTS). This is a new scale under validation that we have developed as part of the IMPACT project, and it is comprised of 8 items (Levesque-Bristol, Zissimopoulos, Richards, Wang, & Shi, 2015).

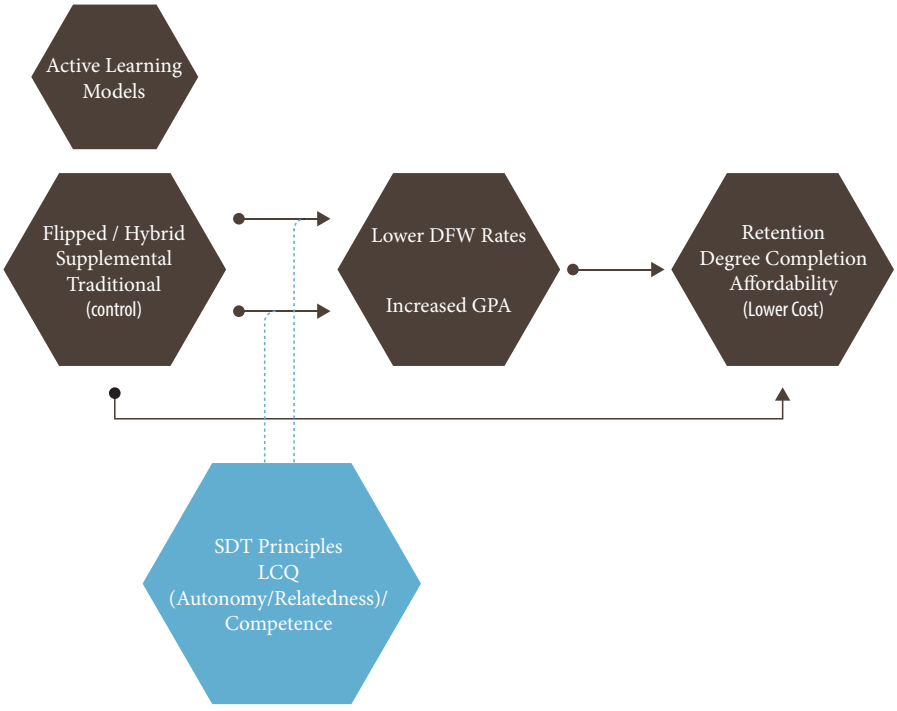


Figure 1. This graphic shows the relationship between active learning models and strategies, motivational principles, and student success variables.

IMPACT'S GOAL

The overarching goal of IMPACT is to achieve student-centered learning environments through a variety of active learning pedagogies.

The goal of IMPACT is to create a student-centered learning environment. Student-centered courses were categorized in the following way: Only courses with at least 15 responses to the post-survey and a response rate of at least 25% (acceptable response rate for survey research), were considered. A course was considered "high" student-centered if at least 75% of the students rated the learning environment as student-centered (above the scale mid-point on the learning climate scale). All other courses were considered "lower" student-centered. Based on this categorization, over 80% of the IMPACT courses that met the response rate inclusion criteria were categorized as "high" student-centered (N = 5433 enrollments). This high number speaks to the effectiveness of the intervention.

Over 80% of the IMPACT courses were categorized as "high" student-centered.

RELATIONSHIPS BETWEEN STUDENT PERCEPTIONS

The relevant demographics are presented in Table 1. The correlations presented in this section are based on the post-survey data (N = 5970).

As seen in Table 2, relationships between constructs follow predictions of Self-Determination Theory (Deci & Ryan, 1985, 2000), which is the theoretical framework used to guide the IMPACT redesigns. All correlations were statistically significant. A student-centered learning climate is significantly associated with greater perceptions of autonomy, competence, and relatedness, as well as higher levels of self-determined motivation. In addition, when students perceive the learning environment to be student-centered, they also report greater knowledge transfer, learning gains, and greater performance in the course.

Table 1 — Demographics for Spring2015

		All Students (N = 13709)	Post-Survey Students (N = 5970)
Gender	female	44%	50%
	male	56%	50%
Age	16 – 55	M = 19.97, SD = 2.25	M = 20.17, SD = 2.60
Ethnicity	White	65%	67%
	International	18%	18%
	Asian	5%	4%
	Black/African–American	3%	3%
	Latino / Hispanic	4%	4%
Underrepresented Minority		8.9%	7.5%
Class Level	freshmen	26%	22%
	sophomore	33%	32%
	junior	23%	27%
	senior	18%	19%
Overall GPA	GPA ranged from 0 to 4.0	M = 3.00, SD = 0.61	M = 3.13, SD = 0.56
Impact Course Grade	Course grade ranged from 0 to 4.0	M = 3.37, SD = .84	M = 3.27, SD = 0.89

"... when students perceive the learning environment to be student-centered, they also report greater knowledge transfer, learning gains, and perform better in the course."

Table 2 — Correlations between Learning Climate and other study variations including course grade in Spring 2015. All correlations are statistically significant.

	Learning Climate
Autonomy	.72
Competence	.56
Relatedness	.42
Self-Determined Motivation	.50
Knowledge Transfer	.54
Learning Gains	.45
Course Grade	.17

Self-determined motivation is fostered by satisfaction of basic psychological needs of autonomy, competence, and relatedness.

DOES REDESIGN TYPE MAKE A DIFFERENCE?

When it comes to creating a student-centered learning environment, our findings suggest that "how" the redesign is delivered is more important then the type of redesign used. Results indicate that both the supplemental and replacement model can foster high level of student-centered learning (See Figure 2). More data are needed for online courses in order to substantiate that conclusion. When differences exist, the replacement/flipped model tends to outperform the other models.

Learning Climate

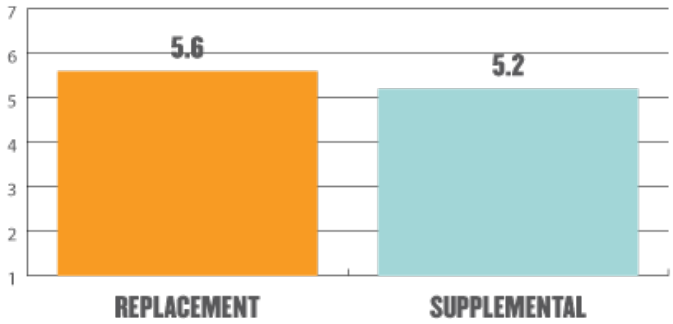


Figure 2 — Learning climate by redesign type in Fall 2014 and Spring 2015. (Replacement, N = 1651; Supplemental, N = 2872)

Faculty fellows chose the supplemental model to a greater extent (See Figure 3). It is a good entry level redesign model which has been showed to be effective. In sum, regardless of the redesign model used, students in the courses which produce higher level of student-centered learning tend to feel more competent, autonomus and connected, and also believe they can transfer their knowledge more easily to other academic areas. In addition, these students tend to earn higher course grades, provide more positive

evaluations of their learning, the course, and the instructor when compared to students in courses associated with lower level of student-centered learning (See below figures 4–10).

Transformation Model Count

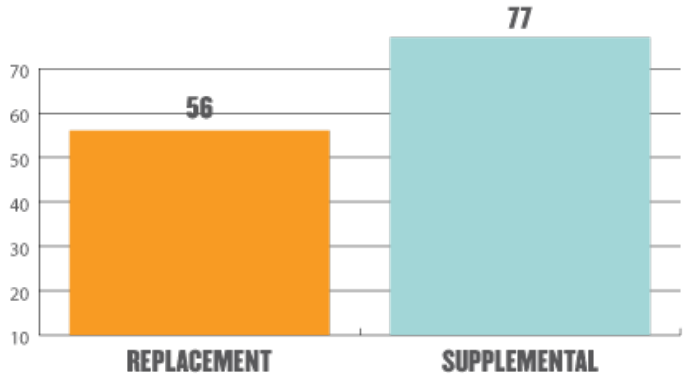


Figure 3 — Number of sections redesigned by type in Fall 2014 and Spring 2015.

EFFECTS OF STUDENT-CENTERED LEARNING I COMPARISONS BETWEEN COURSES CATEGORIZED BASED ON THE EXTENT TO WHICH THE LEARNING ENVIRONMENT WAS DETERMINED TO BE STUDENT-CENTERED

Students in IMPACT courses which were associated with a high level of student-centered learning reported significantly greater levels of perceived competence (Figure 4), relatedness (Figure 5) and autonomy (Figure 6) as well as significantly greater learning gains on faculty identified learning outcomes (see Figure 7).

Competence

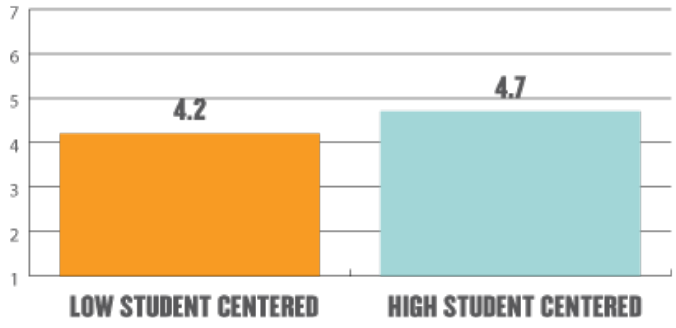


Figure 4 — Perceived competence in function of student-centered learning in Fall 2014—Spring 2015.

Relatedness

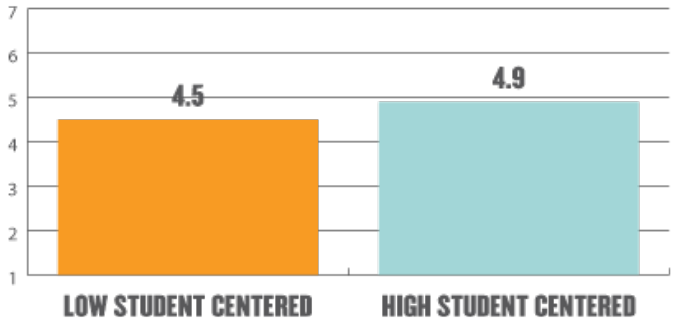


Figure 5 — Perceived relatedness in function of student-centered learning in Fall 2014—Spring 2015.

Autonomy

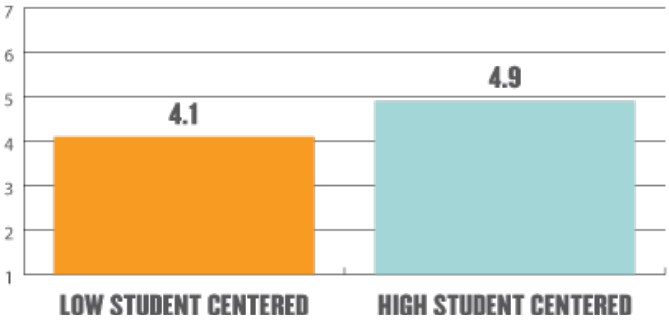


Figure 6 — Perceived autonomy in function of student-centered learning in Fall 2014—Spring 2015.

Learning Gains

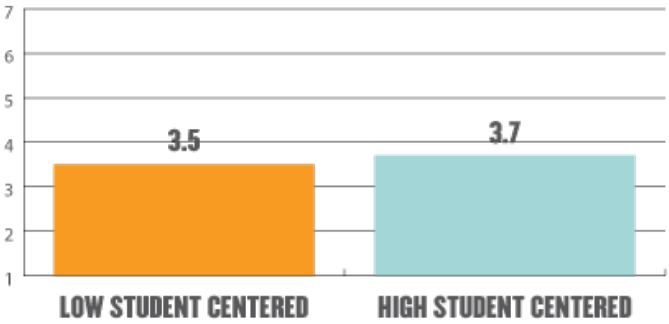


Figure 7 — Perceived learning gains in function of student-centered learning in Fall 2014—Spring 2015.

These students also reported that they would be able to transfer knowledge obtained in the IMPACT course to other relevant academic areas or life in general (See Figure 8).

Knowledge Transfer

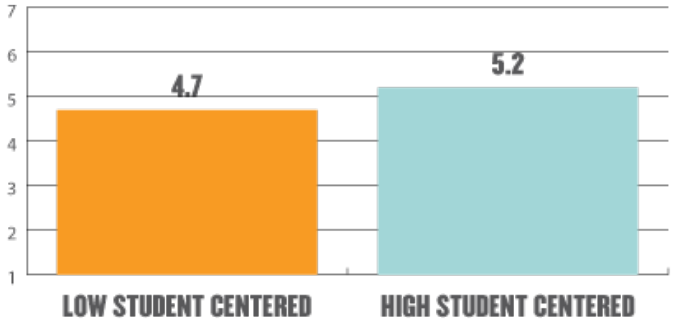


Figure 8 — Perceived Knowledge Transfer in function of student-centered learning in Fall 2014—Spring 2015.

Students in high student-centered course, as a result of the creation of a more autonomy-supportive, student-centered environment, also reported significantly greater levels of self determined motivation (See Figure 9).

Students in high student-centered courses also rated the course as well as the instructor significantly more positively than students in lower student-centered courses (See Figure 10).

Self-determined Motivation

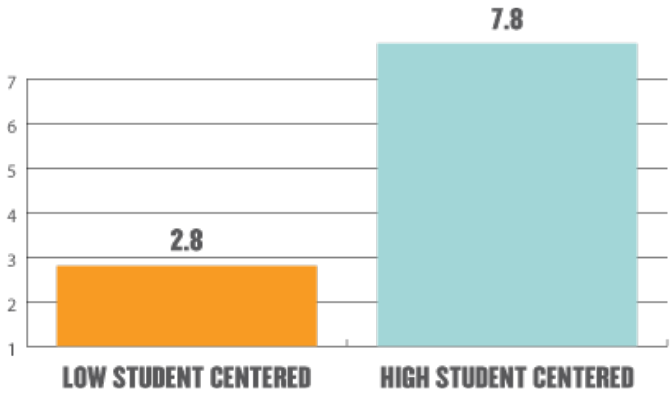


Figure 9 — Self-determined motivation in function of student-centered learning in Fall 2014—Spring 2015.

Course Evaluation

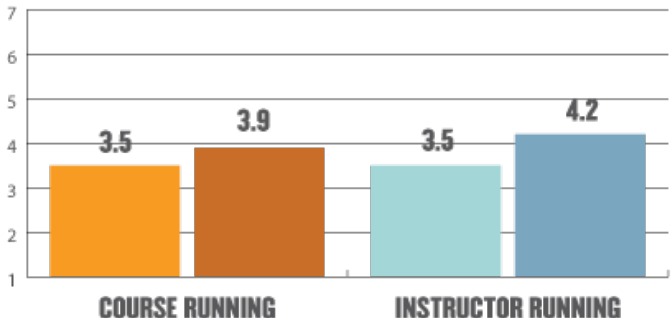


Figure 10 — Course evaluation in function of student-centered learning in Fall 2014—Spring 2015.

All the significant effects reported above are significant and associated with moderate to large effect sizes.

In sum, our analyses of the IMPACT program thus far support the notion that non-cognitive factors, such as the extent to which the environment is student-centered, are associated with a variety of student perceptions and improved student performance, whether the redesign chosen by faculty is replacement or supplemental.

Taking into consideration a student-centered learning environment is extremely important in interpreting the data and the effectiveness of the redesigns conducted through IMPACT.

It is easier and in most cases as effective to transform a large lecture course into one that is more student centered by supplementing it with technologies —and active learning activities, implemented well.

STUDENT SUCCESS AND RETENTION

OVERVIEW

For this section of the report, all courses with at least one IMPACT-ed section of the course during any academic period between fall 2011 and spring 2015 were included in the analysis. For a general summary of the counts of sections, within specific academic periods, refer Table 3. Overall, 153 sections, IMPACTed during at least one academic period, are included in the analysis. A list of transformed courses and Fellows appears on the IMPACT website (http://www.purdue.edu/impact/).

Table 3 — Count of IMPACTed sections offered within academic periods, by cohort.

IMPACT Cohort	Academic Period							
	fall 2011	spring 2012	fall 2012	spring 2013	fall 2013	spring 2014	fall 2014	spring 2015
Fall 2011	9	8	5	3	5	7	1	1
Spring 2012			0	4	9	3	8	9
Fall 2012			1	0	4	9	2	9
Spring 2013					6	6	9	6
Fall 2013						5	6	2
Spring 2014							7	9
Fall 2014								0
All Total	9	8	6	7	24	30	33	36
						Grand Total		153

ALL COHORTS DFW RATE AND FINAL GRADES

DFW rates

An analysis of variance was conducted to explore the effect of IMPACT iterations on course **DFW rates *by section***. The overall model was statistically significant, F(7,1300) = 10.287, $p<.001$. The effect size was small (Eta squared = .023). Post-hoc comparisons using Tukey's HSD showed the pre-IMPACT mean DFW rate differed significantly from the mean DFW rate of iterations 1, 2, 3, 4, 5, and 7.[1] See Table 4 for a summary by iteration.

Table 4 — All Cohort Comparison of DFW Rates, IMPACT Iterations to pre-IMPACT, based on Sections.

					IMPACT Iteration Comparisons to Pre-IMPACT	
Iteration	IMPACTed?	DFW Rate	S.D.	N (of sections)	Change in Mean (from Pre-IMPACT Iteration)	Sig.
Pre-IMPACT	No	14.00%	0.128	367	--	--
1	Yes	11.10%	0.091	270	-3.00%	**
2	Yes	9.90%	0.093	207	-4.20%	***
3	Yes	9.50%	0.088	164	-4.50%	***
4	Yes	10.20%	0.075	104	-3.90%	*
5	Yes	9.10%	0.073	100	-5.00%	***
6	Yes	12.10%	0.086	69	-2.00%	
7	Yes	23.60%	0.122	20	9.50%	***

*Significance: * implies p<.05; ** implies p<.01; *** implies p<.001; [blank] implies p>.05.*

1 There are additional cases where some IMPACTed iterations were significantly different from other IMPACTed iterations. Since the significance desired is a comparison of IMPACTed iterations to pre-IMPACT, cases of significance between IMPACTed sections are not reported anywhere in this report.

Final Grades

An analysis of variance was conducted to explore the effect of IMPACT iterations on students' **final grades *by section***. The overall model was statistically significant, $F(7,1297) = 14.679$, $p<.001$. The effect size was moderate (Eta squared = .074). Post-hoc comparisons using Tukey's HSD showed the pre-IMPACT mean differed significantly from the final grade means for all iterations. See Table 5 for a summary by iteration.

Table 5 — All Cohort Comparison of Final Grades, IMPACT Iterations to pre-IMPACT, based on Sections.

					IMPACT Iteration Comparisons to Pre-IMPACT	
Iteration	IMPACTed?	Final Grade	S.D.	N (of sections)	Change in Mean (from Pre-IMPACT Iteration)	Sig.
Pre-IMPACT	No	2.89	0.566	366	--	--
1	Yes	3.11	0.452	269	0.22	***
2	Yes	3.17	0.509	206	0.28	***
3	Yes	3.16	0.457	164	0.27	***
4	Yes	3.12	0.446	104	0.23	***
5	Yes	3.17	0.424	100	0.28	***
6	Yes	3.18	0.544	69	0.29	***
7	Yes	2.44	0.497	20	-0.44	**

*Significance: * implies p<.05; ** implies p<.01; *** implies p<.001; [blank] implies p>.05.*

SPRING 2013 COHORT DFW RATES AND FINAL GRADES

DFW Rates

An analysis of variance was conducted to explore the effect of IMPACT iterations on course **DFW rates *by section***. The overall model was statistically significant, $F(4,134) = 7.852$, $p<.001$. The effect size was large (Eta squared = .195). Post-hoc comparisons using Tukey's HSD showed the pre-IMPACT mean DFW rate differed significantly from the mean DFW rate of iterations 2 and 3. See Table 6 for a summary by iteration.

Table 6 — Spring 2013 Cohort Comparison of DFW Rates, IMPACT Iterations to Pre-IMPACT, based on Sections.

					IMPACT Iteration Comparisons to Pre-IMPACT	
Iteration	IMPACTed?	DFW Rate	S.D.	N (of sections)	Change in Mean (from Pre-IMPACT Iteration)	Sig.
Pre-IMPACT	No	17.2%	0.120	47	--	--
1	Yes	12.1%	0.115	21	-5.1%	
2	Yes	4.8%	0.084	40	-12.4%	***
3	Yes	8.2%	0.102	16	-9.0%	*
4	Yes	10.4%	0.102	11	-6.8%	

*Significance: * implies p<.05; ** implies p<.01; *** implies p<.001; [blank] implies p>.05.*

Final Grades

An analysis of variance was conducted to explore the effect of IMPACT iterations on students' **final grades *by section***. The overall model was statistically significant, $F(4,134) = 15.734$, $p<.001$. The effect size was large (Eta squared = .326). Post-hoc comparisons using Tukey's HSD showed the pre-IMPACT mean differed significantly from every IMPACT iteration. See Table 7 for a summary by iteration.

Table 7 — Spring 2013 Cohort Comparison of Final Grades, IMPACT Iterations to Pre-IMPACT, based on Sections.

Iteration	IMPACTed?	Final Grade	S.D.	N (of sections)	IMPACT Iteration Comparisons to Pre-IMPACT: Change in Mean (from Pre-IMPACT Iteration)	Sig.
Pre-IMPACT	No	2.64	0.526	47	--	--
1	Yes	3.19	0.633	21	0.55	**
2	Yes	3.57	0.528	40	0.93	***
3	Yes	3.30	0.582	16	0.66	***
4	Yes	3.19	0.585	11	0.55	*

*Significance: * implies p<.05; ** implies p<.01; *** implies p<.001; [blank] implies p>.05.*

FALL 2013 COHORT

DFW Rates

An analysis of variance was conducted to explore the effect of IMPACT iterations on course **DFW rates *by section***. The overall model was statistically significant, $F(3,326) = 6.999$, $p<.001$. The effect size was moderate (Eta squared = .065). Post-hoc comparisons using Tukey's HSD showed the pre-IMPACT mean DFW rate differed significantly from the mean DFW rate of iterations 2 and 3. See Table 8 for a summary by iteration.

Table 8 — Fall 2013 Cohort Comparison of DFW Rates, IMPACT Iterations to Pre-IMPACT, based on Sections.

Iteration	IMPACTed?	DFW Rate	S.D.	N (of sections)	IMPACT Iteration Comparisons to Pre-IMPACT: Change in Mean (from Pre-IMPACT Iteration)	Sig.
Pre-IMPACT	No	12.4%	0.115	132	--	--
1	Yes	9.5%	0.086	107	-2.9%	
2	Yes	7.9%	0.079	55	-4.5%	*
3	Yes	4.7%	0.070	33	-7.7%	***

*Significance: * implies p<.05; ** implies p<.01; *** implies p<.001; [blank] implies p>.05.*

Final Grades

An analysis of variance was conducted to explore the effect of IMPACT iterations on students' **final grades *by section***. The overall model was statistically significant, F(3,324) =8.588, *p*<.001. The effect size was moderate (Eta squared = .074). Post-hoc comparisons using Tukey's HSD showed the pre-IMPACT mean differed significantly from every IMPACTed iteration. See Table 9 for a summary by iteration.

Table 9 — Fall 2013 Cohort Comparison of Final Grades, IMPACT Iterations to Pre-IMPACT, based on Sections.

Iteration	IMPACTed?	Final Grade	S.D.	N (of sections)	IMPACT Iteration Comparisons to Pre-IMPACT: Change in Mean (from Pre-IMPACT Iteration)	Sig.
Pre-IMPACT	No	3.00	0.606	130	--	--
1	Yes	3.22	0.405	107	0.22	**
2	Yes	3.21	0.414	55	0.21	*
3	Yes	3.43	0.316	33	0.43	***

*Significance: * implies p<.05; ** implies p<.01; *** implies p<.001; [blank] implies p>.05.*

CONCLUDING THOUGHTS

In light of IMPACT's overarching goal to work with faculty to create student-centered learning environments, and the positive influence of a student-centered learning environment on student outcomes including performance, future work could examine the effect of redesigns on DFW rates, course GPA, and retention to the university, as a function of student-centeredness. More specifically, courses that are being categorized as high student-centered would be tracked separately from courses that are categorized as low student-centered. We hypothesize that greater effects on DFW rates, course GPA, and retention to the university would be observed for high student-centered courses.

In addition, more work needs to be done in order to identify what factors or redesign elements can be statistically linked or more closely associated with the creation of a student-centered learning environment.

Although the main effect of the intervention is not located in the type of redesign which is implemented, it would still be useful to identify elements of redesigns which tend to lead to great student-centered teaching.

PLEASE SEND YOUR COMMENTS OR QUESTIONS TO

impact@purdue.edu