2006-1960: BLEND IT!

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Richard Fasse, Ed.D., is currently an Instructional Technology Specialist in the Teaching, Learning, Technology group at RIT. He earned a BS in Business and Computer Science at the University of Kansas and an MBA in Information Systems at Pennsylvania State University before beginning his career at Xerox Corporation in Rochester, New York. He was a systems designer and later manager of the Xerox Billing Systems group responsible for planning and implementing changes to large scale administrative systems. He returned to school and received an MS in Mathematics Education and an Ed.D. in Instruction and Curriculum at the University of Rochester while he worked 1/2 time teaching introductory computer science courses at SUNY-Brockport. He also earned a Graduate Certificate in Interactive Media Design from RIT at about the same time he completed his doctoral dissertation on the topic of "Electronic Texts as Alternative to Traditional Textbooks." He finished his Doctorate in Education just when web browsers were becoming popular so he marshaled all these experiences and brought them with him to RIT's Distance Learning program. He was instrumental in converting the RIT distance learning program to a new generation of internet tools that helped promote greater interactivity among students and faculty. He is now working with several teams at RIT to transfer some of the lessons learned in the distance learning courses to traditional on-campus courses.

Blend it!

Introduction

In the engineering and engineering technology community we continuously strive to improve the education we provide for our students. A recent innovation in transforming the classroom experience for our students is "blended learning," a hybrid classroom model that includes significant online learning activities. At the Rochester Institute of Technology (RIT) a Blended Learning initiative is attempting to take advantage of what has been learned in our 25 years experience with distance learning. The Blended Learning initiative combines the best practices of our distance courses with the best practices of our campus courses to create a better overall learning experience than either format alone can provide. Underlying our Blended Learning initiative is the introduction of more learner-centered educational practices. [1, 2]

Learner-centered teaching focuses attention on what the student is learning, how the student is learning, the conditions under which the student is learning, whether the student is retaining and applying the learning, and how current learning positions the student for future learning. [1, 3] Learner-centered education thus places the student at the center of their education. And it begins with understanding the educational contexts from which a student comes. It continues with the instructor continuously evaluating the student's progress toward learning objectives. By helping the student acquire the basic skills to learn, it ultimately provides a basis for learning throughout life. It places the responsibility for learning on the student while the instructor assumes responsibility for facilitating the student's education. This approach strives to be individualistic, flexible, competency-based, varied in methodology, and not always constrained by time or place. [4]

In blended learning the faculty combines both classroom and online instruction to create engaging, leaner-centered forms of teaching and learning. The term "blended learning" has gained considerable currency in recent years as a description of particular forms of teaching with technology. [4-6] Blended learning aims to unite the best of classroom teaching and learning with the best of online teaching and learning. Interest in blended learning has been growing as more and more universities become accustomed to using a courseware management system, and as academic leaders increasingly endorse active learning with the effective use of instruction technology for the following reasons: [5]

1. Learner-centered models of instruction are moving to center stage.
2. The contentious debate over "classroom vs. distance education" has subsided.
3. Courseware management systems are widely available.
4. Today's students are knowledgeable about and comfortable with online communication.
5. Both faculty and students are "time starved" and crave greater flexibility in scheduling work.

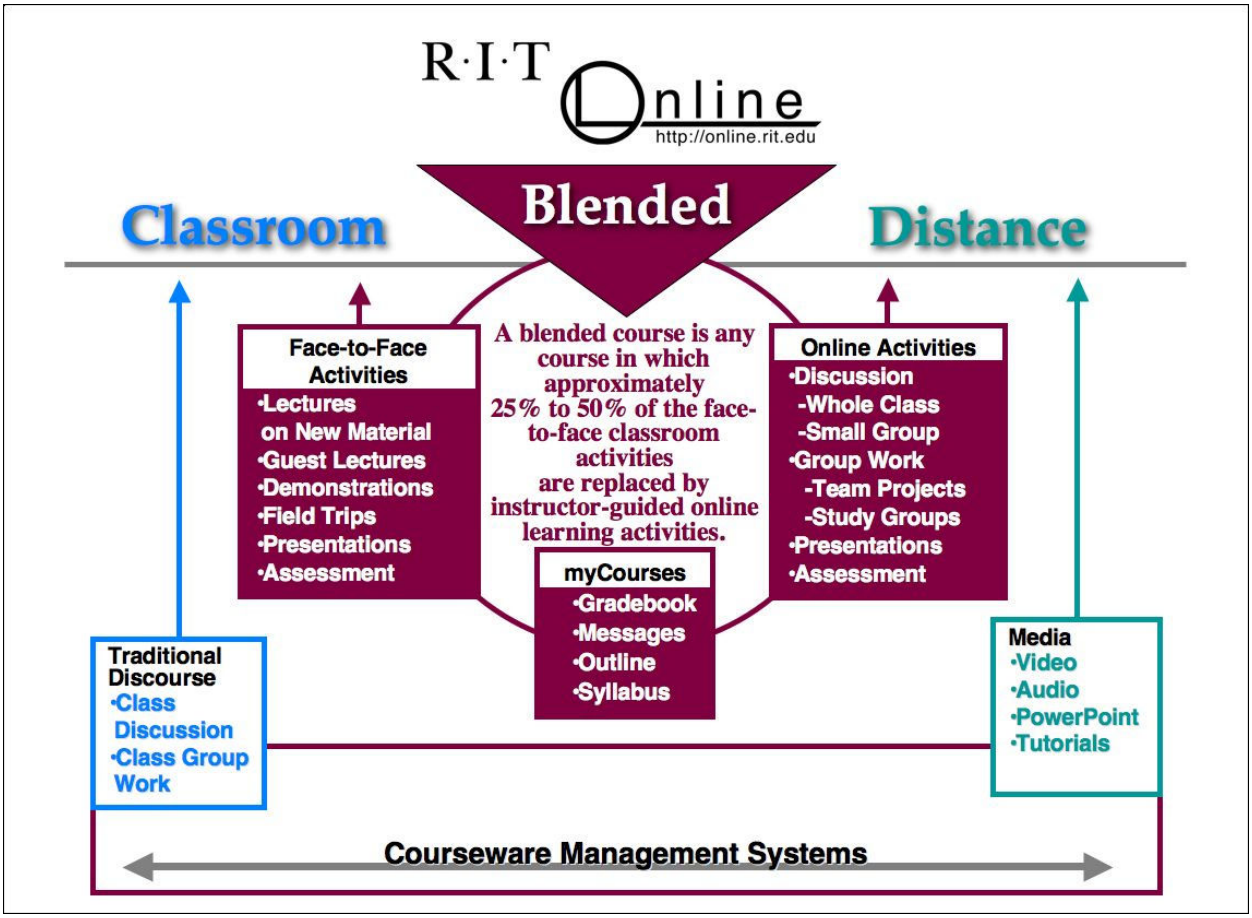
This study describes experiences that promote a learner-centered environment where students are engaged and interactive with each other, and where openness to a diversity of ideas is supported through a blended-learning format in the classroom. More particularly, this paper examines an asynchronous learning environment that capitalizes on blended-learning in teaching a technical course in plastics technology.

Methodology

RIT's Model in Blended Learning

During the spring and summer of 2003, the Online Learning department at RIT developed a learner-centered instructional design model for the Blended Learning Pilot (Figure 1).[5] Within this model, a "blended course" is defined as any course in which approximately 25% to 50% of classroom lectures and other seat time are replaced by instructor-guided online learning activities or experiences—primarily asynchronous (anywhere, anytime) discussions (in teams or with the entire class)—but also synchronous chat sessions, as well as online quizzes, games, discovery labs, and simulations. The model recognizes the "affordances and constraints" of each environment (for instance, the classroom is well suited for demonstrations, but less suited for group work), and illustrates how the two environments can be integrated for maximum learning effectiveness.

Figure 1. RIT's Blended Learning Instructional Model



Need for Blended Learning

"Plastics Processing Technology" is a technical elective course that provides fundamentals in plastics processing to upper levels of students (i.e., 4th or 5th year status) in manufacturing and mechanical engineering technology programs at the Rochester Institute of Technology. The course emphasizes the skills and knowledge needed in engineering tasks such as teamwork and problem solving for manufacturing plastic products. However, keeping students engaged and on task in an evening course is a challenge.

Design of Blended Learning Course

The study was conducted in a "Plastics Processing Technology" course in the winter quarter of 2004-05. The course traditionally meets on Mondays and Wednesdays for two hours each evening. Fifteen students participated in the study. All of the class sessions were blended such that asynchronous online activities were added to traditional face-to-face meetings in the class. Online activities were performed on a courseware system branded "myCourses" (powered by Desire2Learn) which is used at RIT. The online activities were based on the objectives and overall design of the course. Also, students actively participated in assigned activities online and shared their experiences online throughout the whole winter quarter.

For the "Plastics Processing Technology" Blended Learning Pilot, I proposed canceling the Wednesday sessions (although not the first and last sessions) and substituting several online activities for these time periods throughout the quarter. The online activities were divided among small groups consisting of three students who would work together to complete the assigned online tasks, such as problem solving, projects, and discussions. The online discussions were related to topics in the chapters of the textbook. The other activities included two research projects and assignments to respond to specific questions in problem solving in plastics processing that were facilitated in the online discussion area of the course. These online components replaced class time previously used for lectures on course textbook contents and other assigned reading of course materials.

Some class time was provided for students to collaborate on group projects, so there was a natural online extension of that activity to the online discussion. Low-stakes online quizzing was assigned before each online discussion to encourage students to open their books and review course material before engaging in the online discussions. During the online discussions, students' activities were monitored and instructor feedback was provided where appropriate on their postings. There were chapters that needed to be covered thoroughly in the Monday classroom sessions, and those were called "keepers." These keepers were presented in the face-to-face sessions on Mondays and usually covered the introduction of new concepts or more difficult topics where student questions could be followed up and elaborated as necessary.

Student Survey

The purpose of the student survey was to investigate how students felt about their

Blended-learning experience after completion of the course. The results of the survey were summarized to understand some implications of the blended-learning format in plastics processing technology. The survey questions are listed in Table 1.

Table 1: Student Survey Questionnaire

Perceptions of Blended Learning

1. I learned more about my classmates than normal because of the online discussions.
2. I work just as much or more, even though some of the lectures are cancelled.
3. The flexibility of the online portion allows me to do my best work when I am ready.
4. Working with online team members is a professional skill I will need in industry.
5. I found myself doing coursework in smaller spurts, but more often.
6. Working with online team members is more trouble than meeting face-to-face.
7. I think instant messaging is a good way to work with online team members.

Perceptions of the Learning Experience with Online Discussion

8. I learned a great deal from my peers.
9. The online discussion helped improve my communication skills.
10. The online discussion provides useful social interaction.
11. Online discussion was a great chance to share opinions among peers and instructor.
12. Most of my peers' online discussion comments are not very valuable.

Perceptions of Online Discussion Motivation and Enjoyment

13. Online discussion motivated me to do my best work.
14. My learning interest is improved by online discussion.
15. I enjoy sharing knowledge with my peers in online discussion.
16. Online discussion wastes my time.
17. The instructor plays a critical role to motivate effective online discussion.

Survey Results and Discussion

Perceptions of Blended Learning – Table 2

The survey revealed strong positive perceptions and attitudes for the blended course re-design among students. The Table 2 summary shows the strongest agreement (68%) for the Question 4 statement about working in online groups being an important professional skill to develop. Strong agreement (56%) was also recorded for Questions 1, 2, and 3 suggesting that students feel online discussion allows them flexibility to contribute when they are best prepared, learn more from their classmates, and spend the same or more time than the time given up in the traditional classroom for these benefits. The other questions in this section also showed much stronger agreement than disagreement.

Perceptions of the Learning Experience in Online Discussion – Table 3

The survey questions in this section reflect generally positive perceptions of the online discussion, although there were many more "Neutral" responses (37% to 50%). The most agreement (56%) responses were associated Question 11 about how online discussions provided opportunities for sharing opinions among students and instructor. A total of 49% disagreed in Question 12 that their peers' online comments were not very valuable. Considering the large number of neutral responses, the agreement responses stand out strongly against the disagreement regarding the value of online discussion. For example, the greatest disagreement was recorded in Question 9 (24%) about how online discussion improved their communication skills. It is possible that these students simply felt there communication skills were already high and responded accordingly.

Perceptions of Online Discussion Motivation and Enjoyment – Table 4

The only survey question with more disagreement than agreement was in this section in Question 14 where more students disagreed (39%) than agreed (31%), that their learning interest improved with online discussion. Again, it is possible that these students felt they already had a strong interest in learning this course material but further study would be required to clarify this issue. In Question 15, 50% of the students agreed and only 6% disagreed that they enjoyed sharing knowledge with their peers in online discussion. Perhaps most significantly, in Question 17 49% of the students recognized the critical role the instructor plays in online discussion, with only 12% disagreeing. This reflects the careful re-design of the course to insure that online discussion was not simply an added activity with little instructor presence. By canceling almost 50% of the traditional lectures the instructor was able to invest time in the online discussion to help facilitate online discussion and the learner-centered goals of the course re-design.

Conclusions

There is a risk that online discussion activities can become simply an additional course requirement that strains students' ability accomplish the other course requirements without necessarily enhancing the learning experience. In this course re-design, care was taken to make the online activities integral to the classroom experience. The results of the student survey suggest a positive student reaction to the blended learning format for this course. The pedagogical richness, convenient access to knowledge, opportunities for greater interaction, and learner control, are all positive attributes of the course re-design that will be planned for future instances of the same course. An additional benefit of developing the course in this manner is that the online discussion topics, team structures, and online content of the course are easily re-used within the course management system.

Acknowledgements
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References

1. Weimer, M. G. “Learner-centered teaching: Five key changes to practice,” San Francisco, Jossey-Bass, 2002.
2. McCombs, B. L. and Whisler, J. S. “The learner-centered classroom and school: Strategies for increasing student motivation and achievement,” San Francisco: Jossey-Bass, 1997.
3. Razmov, V. and Anderson R. “Pedagogical Techniques Supported by the Use of Student Devices in Teaching Software Engineering,” SIGSCE, Houston, TX, March 1-5, 2006.
4. Arizona Faculties Council. http://www.abor.asu.edu/4_special_programs/lce/afc-defined_lce.htm.
5. Online Learning Department. “Final Report for 2003-4 and 2004-5 in Bended Learning Pilot Project,” R.I.T, 2005.
6. Voos, R. “Blended Learning-What is it and where might it take us? Sloan-C View, Volume 2 Issue 1, February 2003.”

Appendix

Table 2: Perceptions of Blended Learning

Please indicate your level of agreement with these statements about learning from online discussion.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Did Not Answer	
0%	**56%**	18%	**18%**	6%	**0%**	**1. I learned more about my classmates than normal because of the online discussions.**
31%	**25%**	25%	**18%**	0%	**0%**	**2. I work just as much or more, even though some of the lectures are cancelled.**
25%	**31%**	18%	**25%**	0%	**0%**	**3. The flexibility of the online portion allows me to do my best work when I am ready to participate.**
0%	**68%**	18%	**12%**	0%	**0%**	**4. Working with online team members is a professional skill I will need in industry.**
0%	**43%**	31%	**25%**	0%	**0%**	**5. I found myself doing coursework in smaller spurts, but more often.**
0%	**12%**	37%	**43%**	6%	**0%**	**6. Working with online team members is more trouble than meeting face-to-face.**
18%	**37%**	12%	**25%**	0%	**6%**	**7. I think instant messaging is a good way to work with online team members.**

Table 3: Perceptions of the Learning Experience in Online Discussion

Please indicate your level of agreement with these statements about learning from online discussion.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Did Not Answer	
0%	**43%**	50%	**0%**	6%	**0%**	**8. I learned a great deal from my peers.**
0%	**37%**	37%	**18%**	6%	**0%**	**9. The online discussion helped improve my communication skills.**
6%	**37%**	37%	**12%**	6%	**0%**	**10. The online discussion provides useful social interaction.**
6%	**50%**	43%	**0%**	0%	**0%**	**11. Online discussion was a great chance to share opinions among peers and instructor.**
0%	**6%**	43%	**43%**	6%	**0%**	**12. Most of my peers' online discussion comments are not very valuable.**

Table 4: Perceptions of Online Discussion Motivation and Enjoyment

Please select the response that best fits your sentiment for each statement.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Did Not Answer	
0%	**37%**	37%	**25%**	0%	**0%**	**13. Online discussion motivated me to do my best work.**
0%	**31%**	31%	**31%**	6%	**0%**	**14. My learning interest is improved by online discussion.**
0%	**50%**	43%	**6%**	0%	**0%**	**15. I enjoy sharing knowledge with my peers in online discussion.**
12%	**6%**	43%	**18%**	18%	**0%**	**16. Online discussion wastes my time.**
12%	**37%**	37%	**12%**	0%	**0%**	**17. The instructor plays a critical role to motivate effective online discussion.**