# STUDENT ENGAGEMENT IN ONLINE COURSES

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Teaching in the classroom, face-to-face, provides the opportunity to make immediate connections with students that teaching online does not. In face-to-face classes, there are set times during which students meet with the instructor to examine and to discuss course material: students need only attend course meetings to gain, at least, some exposure to course material. In the online environment, teaching and learning are asynchronous: the instructor may post course resources such as readings, interactive tools and applets, and videos at one time and students may choose to access these resources at another time or choose not to use them at all. In order to engage students in an online course, the instructor must make behavioral, emotional, and cognitive connections with students. However, making such links is a challenge due to the separation of cyberspace.

Students learn differently: techniques, tools, and examples that are effective in helping one student to learn course concepts and methods may be less effective or ineffective in helping other students to understand and to learn the same concepts and methods. During face-to-face course meetings, the instructor can obtain immediate feedback regarding what works with her/his students and what does not work, allowing her/him to change her/his approach as needed as well as to add supplementary information and explanation. However, due to the asynchronous nature of the online learning environment, such changes cannot be directly introduced. Students may choose to use or not to use course resources such as videos and interactive tools and applets and they may skim course readings, thereby gaining only a superficial knowledge of course concepts and methods. Using online tools such as, for example, discussion forums, this surface learning can be discovered and students can be encouraged to reevaluate their approaches to course material so that they can begin to gain the target knowledge. A key element to this reassessment is the students' taking responsibility for their learning in the online environment. Unfortunately, many students taking online courses view these courses as easier than face-to-face courses due to the lack of regular on-campus classroom meetings. However, for those who are not self-motivated, diligent, and responsible, the lack of such regular gatherings makes learning in the online environment difficult for some and impossible for others since they do not have a pressing need or desire to complete course readings and assignments in a timely manner.

An important concern for teaching online must be the learning style of the students. Understanding learning styles helps the instructor, especially those teaching online, to use multiple approaches. The visual learners have the advantage in an online course due to the presentation of information in written and video formats since such individuals learn through seeing and watching. While a narrated video may be useful to auditory learners,

those who learn through listening, information presented in written formats is not as beneficial for such individuals. The online environment is most troubling for kinesthetic learners, those who learn through doing, moving, and touching – that is, through experiencing the learning process – due to the asynchronous nature of the online environment. Students whose learning mode integrates aspects of these styles experience difficulty in the virtual classroom environment as well. Differences in learning styles are less problematic in disciplines for which learning involves reading, discussing, and doing fact-based research. However, learning mathematics requires more than merely discussing ideas and doing simple readings and conducting fact-finding research. Learning mathematics requires students to experience the problem solving process in order to integrate concepts and methods being examined with prior theories, models, and techniques as well as the application of ideas and processes to a variety of situations in order to understand their purpose and use. Active participation in this process is significant to the development of true understanding rather than meager surface familiarity.

Reading and writing mathematics require more skill and precision than reading and writing in disciplines such as, for example, English and history. One cannot read mathematics in the same manner in which one reads a novel or reads about history: to read mathematics, one must understand the notation and the terminology used as well as be able to fill in any mathematical statements that, to the reader, may seem to be missing. That is, to read mathematics, the reader must be able comprehend the words and terminology used to discuss and to describe concepts, techniques, and processes as well as be able to understand and to interpret the symbolic information provided by expressions, equations, tables, and diagrams. In addition, what may seem to be simple word endings to indicate tense as in "increases", "increased", and "increasing", for example, have different meanings and correspond to different processes and concepts in mathematics: "increases" and "increased" are used when interpreting average rate of change and "increasing" is used when interpreting instantaneous rate of change, that is, the derivative. Such subtleties are problematic for students who have poor reading skills and writing skills and are exacerbated by their lack of understanding of differences between concepts and methods. Poor proficiency in reading and writing becomes more problematic in online courses since course information is distributed through readings and concepts and methods are examined and discussed through written postings on discussion forums. Students' lack of experience in using technology, in particular in using equation editors and pallets, as well as lack of experience in writing mathematics make communicating mathematics in online forums a challenge for those taking mathematics courses in cyberspace.

Making the necessary emotional connection with students taking an online course is keenly dependent upon the environment created by the instructor. The atmosphere must be nurturing so that students feel less isolated by the virtual environment. They need to feel protected and fairly evaluated rather than feeling that they are judged based on the questions that they ask and the mistakes that they make. The instructor must instill in students a sense that questions are important and valuable contributions to the learning

process as is making mistakes. In addition, students must come to understand that it is by asking questions, making and reevaluating errors, and applying what they are studying to new problems and new situations that they can integrate prior knowledge with the new concepts, techniques, and processes that they are studying. The instructor can accomplish this by emphasizing the importance of questions and mistakes in her/his course information as well as by stressing the value of all questions in the learning process – there are no stupid questions since questions advance the learning and exploration process. The significance of questions and mistakes must be communicated to students so that they treat the inquiries of class members with respect and as valuable contributions to course discussions. Students must be cautioned to consider carefully the words that they use and how others respond to posting on online forums, wikis, and/or blogs. The instructor must encourage learning and explain and emphasize the difference between correction and criticism as well as stress that learning is not a competition or a solitary endeavor. The instructor must provide clear, constructive feedback in a timely manner to help students to understand the intricacies of the concepts and methods that they study, (s)he must provide practical ways for students to understand and to recognize errors, and (s)he must provide suggestions for improvement. The instructor's feedback must be more than basic comments regarding correctness, and, for postings on discussion forums, wikis, and/or blogs, the instructor's comments should guide students to deeper understanding while providing opportunities for further investigation and exploration. The instructor's remarks should stimulate further thought and help students to make connections between the concepts and methods and their application in new situations. Defining and maintaining the desired nurturing, inspiring, supportive learning environment can be facilitated through the creation and enforcement of *rules of engagement* for communication, online discussions, and course participation. Demanding, rather than simply suggesting, treating all members of the class, both students and the instructor, with respect is crucial. Clearly defining what it means to be respectful of others in the virtual learning environment is important: students need to understand that respect is demonstrated through how they interact and respond to others, by the thoroughness and seriousness with which they perform their studies, including online readings and practice exercises, and by their completing assignments and postings to online forums in a timely manner. They need to recognize that having a superficial understanding of course concepts and methods is detrimental to the advancement of the investigation and exploration of course concepts and methods on discussion forums, wikis, and/or blogs, and they need to realize that they are responsible for how their postings contribute to or undermine the understanding of course material for other students. So, developing a sense of community and responsibility to other class members is essential for cultivating the necessary emotional connection among class members.

Facilitating the cognitive connection between the students and the course material necessitates involving students in the active exploration of course concepts and methods. Doing readings and watching videos are passive acts just like sitting in a classroom listening to a lecture. To make the desired intellectual connection between the students and the course material, the instructor must facilitate active learning. This is easier for well-liked disciplines and more challenging for introductory and general education

mathematics courses. Students who have difficulty learning mathematics, those who have had negative experiences in their past mathematics courses, and those with mathematics anxiety or learning disabilities often have difficulty gaging their understanding of course topics. Such students view their initial efforts as sufficient for mastering course material without review, revision, and reconsideration of course ideas. In addition, negative experiences in past mathematics courses can make some students skittish and averse to participating in course discussions and groups. Setting up a nurturing and supportive course environment is crucial to involving such students in class activities and helping them to learn course material as is contact with the instructor. The instructor's feedback, direction, and encouragement provide the support that students need in order to learn in cyberspace. Communicating with the instructor by phone or using applications such as IM, Elluminate Live, or Skype make the instructor more accessible, creates a more personal connection between the instructor and the students, and helps students to feel less isolated. Integrating course readings and videos and the use of applets and interactive tools with online discussions, assignments, and assessments can facilitate student involvement and exploration of course concepts and methods. Using online discussions, wikis, and/or blogs as components of course assignments and projects enables students to connect, to refine and revise their understanding, and to work together as a unified group with a common goal, learning the course material. Overall, the goal for online discussions and assignments is to involve students in the explanation, analysis, synthesis, and interpretation of concepts and applications of course topics and techniques – these lead to higher knowledge and deeper learning. Using applications related to the major concentrations and career interests of students can help them to view the course material as useful and worthy of study, and getting students to work together and to interact as they discuss and explore course material draws on the community aspect of online learning, taking advantage of the collaborative and social nature of the online environment. Incorporating the tools of cyberspace that students enjoy using such as email, IM, virtual chat, discussion boards, wikis, and blogs, and incorporating applications such as Elluminate Live and Skype, for example, can make the online environment feel more welcoming and their taking the course feel like less of a chore. Gathering students in virtual classroom environments and using Elluminate Live provide the instructor with opportunities to meet with groups of students online so that they can explore, discuss, review, and investigate course concepts and methods together. As they become more involved in discovering, conferring, revising, and examining course ideas, techniques, and processes, students make greater intellectual connections with course material.

The behavioral connection that students make in an online course can be facilitated as the emotional and cognitive connections are made. However, behavioral connections are affected by the students' study habits and their readiness and disposition to learn course material. Past negative experiences investigating related topics, especially those in or related to mathematics, affect the students' openness to learning new ideas and approaches. The ease with which students learn and their level of comfort in examining new areas on their own influence the amount of time that they are willing to spend working on related matters as well as their intensity of concentration and focus. Taking

courses online is not appropriate for students who need the structure provided by the traditional classroom environment. Many students do not have the intellectual maturity, independence, and the motivation to study and to learn online. Unfortunately, even when these necessary qualities are emphasized, students lacking these capacities still elect to take online courses. Students view their not having to attend regular course meetings as a benefit of taking courses online and they fail to consider the effort that they must expend to learn course material on their own using resources posted in cyberspace. Students' experiences taking online courses in other disciplines impact the amount of time and effort that they believe that they should expend when taking other courses online: coursework for online courses in disciplines other than mathematics, especially for introductory and general education courses, typically consists of readings, fact-based research, point-of-view postings on discussion forums, wikis, and/or blogs and writing fact-based research papers. However, taking mathematics courses online involves readings that cannot be understood or mastered using basic surface enquiry, postings on discussion forums, wikis, and/or blogs that require demonstration of their understanding of concepts and their ability to analyze situations and to apply course methods in order to synthesize, explain, and interpret results rather than merely sharing an opinion, and application of topics and techniques to real scenarios rather than simple fact-based research. Unfortunately, students and, often, instructors in other disciplines do not recognize the difference in the level of intellectual intensity necessary for achieving understanding on these different planes.

The support and encouragement provided by the instructor can affect the students' propensity to avoid coursework and make them more willing to initiate and to participate in course discussions and exploration of course concepts and techniques. The caring, involved and supportive instructor can affect the students' views of the course and the topics and methods examined, the value that students place on learning the course material, and the students' willingness to make an effort to learn ideas and procedures that they may consider to be difficult. The involvement of the instructor can influence the amount of time and effort that students devote to coursework but the instructor alone cannot make students complete readings and assignments or contribute to online discussions. Teaching in cyberspace is not for everyone: an involved, interested, and concerned instructor must be willing to monitor her/his students' progress, prepared to contact students who do not complete assignments and postings in a timely manner, and open to meeting with students online, by phone, and/or in person in order clarify expectations, to provide correction, and to facilitate understanding of course material. The instructor in the virtual learning environment must recognize that providing information and tools is not the same as teaching no matter how clear the readings and/or videos are or how useful the available tools may be: the instructor must be willing to reach out to students who need additional instruction and provide the direction necessary to enable them to understand and to be able to apply what they learn. Reaching out to such students breaks the isolation of learning in cyberspace and sets up the supportive environment necessary for learning online. Creating and maintaining a learning environment in which questions are welcomed and valued and for which contact with the instructor is commonplace are essential. Establishing a learning-centered course

community makes learning online possible, fruitful, and pleasant for students and makes teaching online rewarding, productive and enjoyable for the instructor.

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