Enhancing Teaching Efficiency – A Design Model

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Efficient teaching reduces instruction preparation time and effort while improving student learning effectiveness. This paper provides instructors with teaching methods that can improve learning outcomes and reduce student studying time while reducing time spent in instruction. This paper uses both individual experiences and evidence from the literature to demonstrate how course design and method of instruction can yield significant student performance gains while reducing faculty preparation time. The importance of empowering students to improve student learning and teaching efficiency, the opportunity to enhance efficiency arising from teaching courses in multiple modes of instruction (in-person, online, hybrid), and the effective use of AI for efficient instruction and learning will also be addressed in this paper.

Introduction

Efficiency, as defined by Oxford Reference A Dictionary of Business and Management (Law, 2009) is, "A measure of the ability of an organization to produce the maximum output of acceptable quality with the minimum of time, effort, and other inputs." This paper seeks to suggest teaching methodologies that can achieve learning outcomes by using efficient teaching methods. Efficiencies that focus on enhancing revenue, such as assigning more students per instructor, reducing the quality or quantity of material covered, or lowering the assessment standards of the course are not considered. Teaching efficiency here is defined by maximizing student performance while minimizing the ongoing efforts on the faculty's part. As workloads of faculty steadily increase, the need for an efficient use of time and resources is becoming ever more important.

Increased Workload

Efficiency is becoming more important as instructors are steadily being asked to do more with less time and resources. According to the American Council on Education, (2022), faculty workloads have grown since the pandemic. These increased workload demands come as institutions face lower enrollments and reduced state support leading to institutional budget constraints (Fischer 2022). This includes not only course load schedule but also additional administrative tasks such as student advising (both formal and informal) and recruitment and retention work for student enrollment. Tenured faculty continue to be under pressure to research and publish with less resources both with student assistants and finances. These budget issues limit the resources available to support teaching, conduct research and hire additional instructors. The increase in workload is not limited to instructors. Almost two thirds of higher education management and teaching and learning professionals also report having excessive workloads that are leading to "burnout" (Muscanell 2024). This negatively impacts the amount of teaching and learning services available and their effectiveness, which can in turn increase the workload of instructors who are forced to take on these tasks. Teaching efficiency is important as faculty navigate their work and life balance.

Instructional Efficiency

One way to mitigate the higher faculty workload expectations and potential burnout is through improved efficiency in teaching. The design of the course, method of instruction, assessment and feedback and appropriate use of ancillary materials can all provide significant efficiency gains. There are certainly overlaps in each of these four areas as they relate to student learning and instructional efficiency. In general, by investing in modest changes to how courses are designed and taught, instructors can enhance learning while reducing their ongoing course instruction and set-up efforts.

Course design

A stitch in time saves nine....

In designing the course, the syllabus has been found to be key to efficient instruction. This may take more preload effort but is worth it. The National Council for Accreditation of Teacher Education (NCATE 2010) states that Instructors should have well organized course structure and objectives,

clearly defined assignments, and effectively connect the learning activities to appropriate assessments. Research shows that students will not only view these instructors as more knowledgeable but can learn in these more organized courses (Educational Testing Services 2014, Bain 2004, Teitel 2004). Providing students with specific activities, assignments, and deadlines gives a clear understanding of what is required for being successful in the course. Students will also benefit from guidance on how to obtain help. Frontloading valuable information at the beginning of the semester and providing the information in the syllabus reduces student confusion and improves efficiency.

Although Instructor availability to students is necessary, clearly outlining other available resources can often provide students with options that can more quickly and effectively address their needs. For example, peer tutors have been found to significantly improve student academic performance (Leung 2019, McMaster, Fuchs, D., & Fuchs, L. S. 2006). Tutors are available at our campus, and students who have gone for help have found them worthwhile. For example, information on how to arrange for tutors, how to participate in student lead study tables or how online resources like YouTube and generative AI can be used to review or test their understanding. Students can also be pointed to the appropriate campus help desks for issues that involve technology, learning platforms or library resources.

In addition to instructor availability, utilizing a classmate friend is highly encouraged. Many students come to university with the habit of their K-12 teachers providing them with missed material, notes or handouts. For in-person class, encouraging students to pair with another classmate not only helps them to form friendships, but also provides them with someone to ask questions with that may be less intimidating than the instructor. This reduces the number of times you are asked the question of “What did I miss in class?” Classmate friends are most efficient for in person courses where excused absences may be made up, if possible, or notes were given.

Frontloading information on the use of Artificial Intelligence (AI) is necessary for the class to run efficiently. Instructors should consider including statements on the permissibility of the use of generative AI, and student conduct in their syllabus. These are particularly important when teaching in a hybrid or fully online format where a substantial portion of the course work is online and often asynchronous. Providing a summary of the institutional student code of conduct and a link to the full policy will go a

long way towards highlighting its importance and saving instructors from headaches later. For example, including something like, “It is the policy of X University to uphold standards of honesty and integrity, and enforcement of these standards are viewed as critically important. Any misconduct including cheating on exams, collaborating with fellow students, when not permitted, or using other’s words or ideas without providing credit to the source are subject to disciplinary action.” Similarly, a statement on the acceptable use of generative AI is important. For example, “The use of generative AI such as ChatGPT, Open AI, Co-Pilot… is not allowed unless specifically stated by the instructor. Students that are unsure about whether to use a particular technology should contact the instructor.”

Experienced teachers often find students ask the same questions. An effective tool to reduce ongoing time spent answering these questions is by simply providing students with a list of frequently asked questions. Even if students do not take the time to read this at the start of the course, the instructor can refer the student to it instead of repeating the same answers repeatedly. It is certainly true that providing detailed explanations of common student questions, outlining generative AI permissibility, establishing study tables … will take initial efforts in set-up and organization, but they are effective at aiding student learning and will certainly pay off in reducing the ongoing time the instructor spends individually answering student questions.

Method and Depth of Instruction

The method(s) and depth of instruction employed are also important to enhance teaching efficiency. In general, it has been found that instructors should focus on covering less vs. more material. The amount of material covered has been found to be inversely related to the number of topics a student can grasp and retain. Weimer (2006), for example, finds that for any class or study session focusing on fewer topics allows students to learn more material. Particularly in courses instructed in-person, class time is often spent more efficiently if the instructor spends more time on fewer topics. This will then free up time to engage the students more productively through in-class discussions and activities. The quantity of material students learn in the course is not necessarily being reduced. The efficiencies arise from the focus on topics most critical to the course learning objectives and those topics that are more difficult for students to learn independently. It is ineffective and inefficient to attempt to touch on

every topic covered in a textbook. Many concepts can be readily understood by students, and if they are not, they can be encouraged to ask for clarification. Devoting class time, (lecture, review, or practice) on easy concepts not only reduces the time available to be spent on more difficult material, but students will be bored and pay less attention during class. This will also reduce student class attendance if students view class time as unnecessary or not helpful. Lecture topics should therefore be reserved for the most important and difficult material and in class activities should provide opportunities for students to practice and struggle with these concepts. It is likely that instructors will need to explain early in the course that they are only going to focus class time on the most difficult and important material. Further, it is helpful to point out that just because a topic is not presented in class does not mean that the students do not need to understand this topic and then clarify how it would be a waste of their time to cover many topics that are straight forward and easily understood. Certainly, courses taught in a hybrid or online format will also benefit from focusing on fewer topics more deeply. In these formats, the ancillary materials will take a larger role in focusing students on these more difficult topics. Efficiency is attained by focusing not on the topics which students already know, but on those that are most important and new, allowing for efficient use of class time.

Assessment and Feedback

Assessment and feedback can also be structured to allow for teaching efficiencies. Assessment should align with the course material and the practice and/or low stakes homework and other activities that students are regularly assigned. For example, students could be assigned weekly multiple-choice quizzes and class time could be set aside for students to answer essay type practice questions. Particularly in hybrid and online courses where assessment is often conducted online, it is appropriate for instructors to use the same multiple choice test bank and similar essays for student course assessment. It will take considerable frontloading time to acquire enough questions, but once these test banks are set up, they can be used for every class taught going forward. Having a large test bank of assessment questions ensures students are not able to effectively cheat by sharing their work (since each student will receive completely different questions). A large test bank of questions will also free instructors to

provide plenty of sample questions that can provide low stakes feedback to students.

Teachers can also utilize Generative AI such as ChatGPT, Open AI, MetAI, Co-Pilot, Gemini … to quickly provide an unlimited number of questions of any type, which the instructor can then select and/or modify. The key to receiving questions that are appropriate is to provide prompts that are specific to the type of question, the topic being assessed and the level of difficulty being assessed. For example, simply asking ChatGPT to provide a test question on "What is an Opportunity Cost?" It will yield various questions from simple definitions to more complex questions involving specific situations or numerical calculations. Although this variety might be appropriate, particularly for low stakes practice or homework, to better assess students' understanding, use a more specific prompt. For example, a prompt such as "Write a multiple-choice question with four answers that calculates the opportunity cost of buying something." will provide questions that force the student to apply the concept to a situation. To obtain even higher order question types add "challenging" or for less puzzling questions add "straight forward" to the prompt. For example, ask, "Write a challenging multiple-choice question with four answers that calculates the opportunity cost of buying something." After you receive a suitable question then simply ask, "Provide 5 additional versions of this question." Additionally, if you want to provide students with feedback then simply ask, "Explain why the correct answer provided is true and why the other options are incorrect."

Feedback has been found to play a significant role in student learning. Using a meta-analysis of 435 studies of feedback, Wisiewski et al. finds that feedback positively improves student learning. (Wisniewski, Zierer & Hattie 2020). Specifically, their studies find that feedback which contains more information is significantly more effective in positive learning outcomes and that corrective type of feedback is highly effective for learning new material. Hattie and Timperley (2007) find that three types of feedback are all important. "Feed-up" focuses on letting students know where they currently stand relative to the learning goals, "feed-back" provides students with how they have improved relative to their previous performance, and "feed-forward" guides students on how they can adapt their learning approaches to perform better in the future. This last type of feedback emphasizes how self-regulation is important in student learning. Empowering students to be responsible for their learning will go far in

increasing the efficiency of instruction. Guiding students on effective study strategies will give them the ability to perform better in the current (and future) course(s). One way to empower students to be better learners is to instruct them that re-reading and highlighting the textbook is less effective than self-testing their understanding of a section of the course material. One way to accomplish this is for students to simply progress through the textbook pausing and writing everything they know about a topic they just read. Alternatively, they can try explaining how one concept leads to the next concept anticipating what comes next in the textbook. Another efficient technique for in-person courses is to match students early in the course with a "study friend." They can be encouraged to work with fellow students on activities throughout the course, studying together and quizzing each other on the topics. Generative AI can also be used effectively by students to self-test.

Feedback to students on essays or how they are progressing can be time-consuming. A worthwhile tool that can reduce the time of providing feedback is a text expander. There are many of these programs available, often providing free to use basic operations or trial periods. Phrase Express is a solid example of a text expander program that allows instructors to create "phrases" that can be inserted in online feedback boxes or emails to students. The "phrases" can be specific to commonly missed topics and blanks can be filled in with responses tailored specifically to the student. For example, if there are a few commonly made mistakes students make on an essay question a "phrase" can be inserted into the grading feedback box that provides help for that specific mistake. This approach can also save time by providing individualized student feedback on course performance after their midterms. Two "phrases" could be created. For the "A" students, the instructor could use a "phrase" that says, "_<student name>____, your performance at the halfway point of this course has been solid. Your homework average is _<hw>__, your write-ups average is _<writeup>_ and your current course grade is a <grd>__. Keep up the good work!" A key stroke would invoke this "phrase" and will prompt the instructor to type in only at the blanks. For the "D" student an alternative "phrase" could read, "_<student name>_, in reviewing your grades at the halfway point of this course, it appears you are really struggling. Your homework average is _<hw>__… I'd like to point out some resources that might help you going forward… Please feel free to contact me if you have any questions about any of the material covered or concerning this course in general." A few

keystrokes will paste either of these “phrases” so instructors need only fill in the blanks while looking at a gradebook. Using similar “phrases” can handle any common correction or commonly asked question that then can be customized to fit the specific student situation. These “phrases” can be inserted in an email or any place where typing is performed.

Ancillary Materials

The use of appropriate ancillary materials can support the Course Design and Method of Instruction as discussed previously. Use of these materials will enhance teaching efficiency by reducing instruction time and allowing students to learn the material more efficiently. These materials are particularly important in hybrid and online courses which often do not have synchronous lectures as part of the course. The main goal in providing these is to enhance the material found in the textbook and provide opportunities for the student to practice their understanding. Since not all the course material that students are expected to learn is covered during class meetings, it is helpful to provide students with resources beyond the textbook.

One way to do this is to make small additions to a Power Point that asks the student to consider alternative examples or to answer questions over the concepts just presented. This allows for some interaction with the material that will enhance learning. It is also not difficult to construct multiple choice questions within a slide that will prevent the student from advancing until they answer correctly (and will send them backwards to the appropriate topic when they answer incorrectly). Once one of these type questions is designed, the series of slides can be readily re-used by changing only the question/answer text.

AI can also be used to quickly develop materials to provide students with step-by-step explanations of complex problems, labs or calculations. For example, asking a generative AI program to, “Write a step-by step solution of the substitution and income effects when price increases and the good is inferior.” provides an example and five step process to solve this problem. The response even provides a summary at the end to reinforce how it arrives at the solution and goes on to highlight how the inferiority of the good is important to the correct solution.

On a cautionary note, the answers and explanations are not always correct. In one instance, when this substitution and income effects question was asked to Meta AI, the answer provided was the opposite of what is

true. Instructors should carefully read any AI responses and should caution their students about this possibility if they are using it to study on their own.

Videos are another efficient way to expose students to material. Students are likely less than enthusiastic to view full course length videos of past class meetings. Instead, short videos (less than 10 minutes) that focus on specific topics are more effective by providing readily available help to address student specific needs. Students are more willing to watch these since they are not forced to spend excessive time on topics they already understand. Listing an appropriate video title that includes the specific of topic(s) covered and the time length of the videos is also extremely helpful by directing students to the material they do not understand and letting them how much time they will need to allocate to view it.

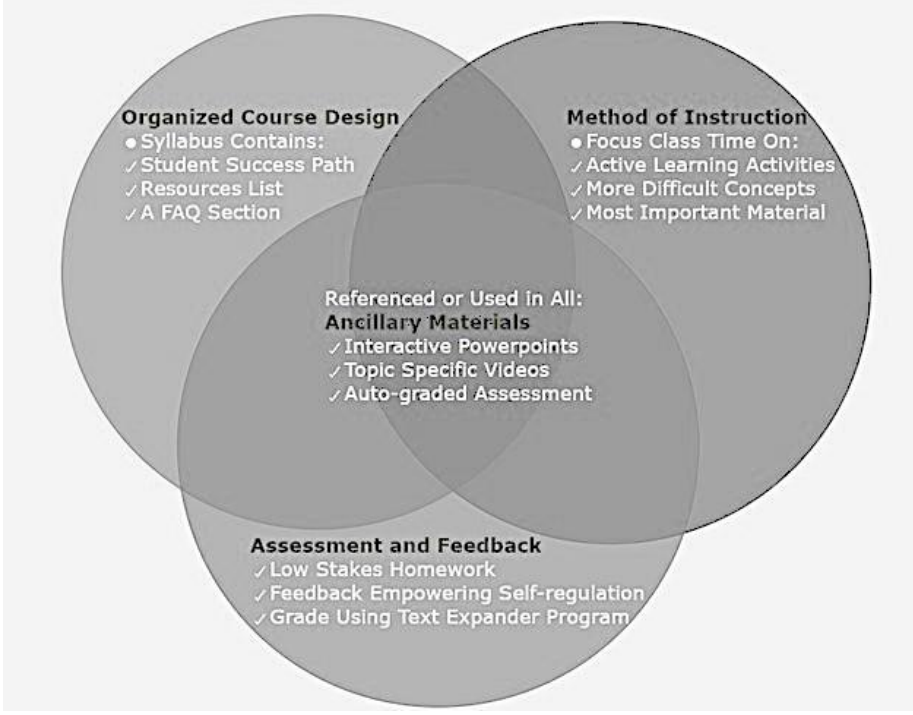
Sample or practice assignments that align with the types of questions used in assessment are also important. Most textbooks have homework platforms available that will allow students to practice their understanding. An alternative that is not tied to a specific publisher is Cerego. Cerego is an online homework platform that allows students to practice their understanding of course content by answering questions using a proven method of learning. It has content available that is applicable to many subjects and can be customized to the specific material needs of any specific course or textbook. Cerego allows students to do short study sessions from their phone and forces students to pace their learning over time. This type of spaced work has been found to be important for efficient learning (Kapler et al. 2015, Brown et al. 2014)

Conclusion

Higher education instructors are increasingly under pressure to teach more courses and improve learning outcomes. It is therefore more important than ever to teach efficiently. Modifying how courses are designed and taught can not only reduce the ongoing time demands but can enhance student learning. This paper outlined several strategies that will help instructors become more efficient (*Figure 1* summarizes the interrelation of these strategies), but there are certainly many more. It is unlikely that every suggestion outlined here is applicable to any course or instructor, but it is certainly true that efficiency gains will not come unless changes are made. Keeping the goal of improving efficiency at the forefront of the mind, being willing to try new approaches, and seeking and being

open to others' ideas and approaches are the keys to improving teaching efficiency.

Strategies Involved in Teaching Efficiency



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