



# Raising Learner Satisfaction in Online Computer Programming and Information Technology Courses: One Instructor's Five Successful Strategies

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## Abstract

Online learning has risen in popularity among learners, educators, and university administrators over the last 3 decades. However, one of the biggest challenges for educators is adapting to best practices, pedagogies, tools, and technologies when delivering instruction in this environment. Because learners have choices when enrolling in a university degree programme, educators need to prioritise learner satisfaction. Many universities focus on retention and recruitment, and a high learner satisfaction rate can significantly improve these outcomes. When an educator discovers a strategy that enhances learner satisfaction, it is crucial to share this knowledge with other professionals. This case study highlights five strategies that have proved effective in computer programming and information technology courses to improve learner satisfaction. These strategies include providing individualised video feedback, using simulation products, integrating real-world projects, offering conversations with industry experts, and ensuring prompt learner engagement.

**Keywords:** distance learning; learner satisfaction; online pedagogy; instructional design

## Introduction

Over the last decade, universities have had to significantly increase their online course offerings due to student requests, or faculty members wanting a more flexible schedule, or a global pandemic (i.e., COVID-19). Today, over “70% of universities consider online learning as critical for long-term educational success and a ‘core business’ of the university” (Carragher-Wolverton & Zhu, 2021, p. 388). With such a high value placed on online learning, and with “technological advances, online pedagogy, course content, and the changing nature of student learning” (Bickle & Rucker, 2020, p. 5), faculty members teaching in this environment must frequently update course curricula to encourage stronger learner participation, improve student retention, and ensure they provide the same academic quality as they do in traditional face-to-face courses.

However, many faculty members who teach online report having little to no training or access to mentoring programmes in this environment (Martin et al., 2019). Given this drawback, it is critical that faculty members are willing to experiment with new technologies and stay up to date with best practices and pedagogies in the online environment. When these faculty members do discover a successful strategy, they should be willing to share the technique with other practitioners to continue improving learner satisfaction.

## Literature review

Effective teaching methods are crucial in shaping the learning outcomes and overall educational experience for students. In modern education, technology has become an essential component, revolutionising these teaching methods and enriching the learning process. Extensive research has been dedicated to exploring and enhancing teaching strategies to cater to the changing needs of diverse learners through the use of information and communication technologies (ICT). However, educators must be prepared to update or modify their teaching methods when implementing ICT (García-Martínez et al., 2019). Literature suggests that integrating technology in education offers significant benefits, such as improving student engagement and achievement, increasing collaboration, and ensuring learners have the digital literacy skills to become marketable job candidates.

Numerous studies emphasise the positive impact of technology on student engagement (Peters et al., 2020; Petranek & Gallegos, 2023; Salhab & Daher, 2023). Some of the most successful ways that technology has improved student engagement lie in the use of interactive educational software. Interaction between people and with the software is critical because “it has proven to be effective against learner isolation and dropout, which are frequent problems in online learning environments” (Roque-Hernández et al., 2021, p. 3). Interactive educational software captures students’ attention and motivates them to participate actively in the learning process. Technology tools, such as simulations and virtual reality software, provide realistic and interactive environments for students to explore and increase their engagement (Rogmans & Abaza, 2019; Yu et al., 2021). Many of these tools can also provide tailored content, adaptive assessments, and immediate feedback—enabling students to progress at their own pace and focus on areas of personal difficulty.

Collaboration between instructors and learners is essential, and online learning environments enable participants to search, create, and share content (Mucundanyi & Woodley, 2021). This collaboration can occur through synchronous or asynchronous technologies. Popular synchronous collaborative tools, as suggested by Fasciani et al. (2019), include Zoom, Google Hangouts, BigBlueButton, and BlueJeans. Asynchronous technologies include email, Google Docs, Microsoft Office 365, and online discussion forums. Regardless of the method or tool used to facilitate collaboration, interaction between instructors and learners plays a critical role in the learning process (Dunaway & Kumi, 2021, p. 106). Educators should actively encourage the use of collaboration tools to foster idea sharing and project collaboration. Group projects are one way to encourage project collaboration. They hold a fundamental place in higher education because they allow students to develop vital skills such as project management and communication (Lesoski, 2022).

The integration of technology with teaching methods is essential to equip learners with vital digital literacy skills. Educators should acknowledge that digital literacy is a crucial life skill that is highly valued by businesses in today’s fiercely competitive market (Khan et al., 2022). When technology tools are used, learners improve their “ability to interpret the messages delivered through communication media, being able to select the most appropriate messages or, in contrast, to create their own messages so that they reach population groups” (García-Pérez et al., 2021, p. 4). Moreover, technology integration promotes the development of other critical skills (including creativity, problem-solving, and adaptability) that are necessary for success in an increasingly technology-driven society.

## Design and method

The purpose of this qualitative case study was to determine and share strategies for improving the learner satisfaction scores of those enrolled in information technology and computer

programming disciplines. This study aimed to describe common techniques used by a faculty member whose course evaluations improved over a 2-year period. It was not an intervention study to review student success scores, although some students may have improved their overall course grade through the instructor's implementation of these strategies. Merriam (1998) suggests that a case study design be used when seeking an in-depth understanding of a situation and focusing on the process rather than outcomes. Therefore, the study focused on the process (strategies for improving student satisfaction scores) rather than student success rates (outcomes).

The participant in the study was an experienced faculty member with over 12 years of online teaching experience. During this time, the faculty member taught several information technology and computer programming courses at both undergraduate and graduate levels. These courses included "Introduction to Computing Concepts", "Computer Applications", "Introduction to Web Design and Development", "Introduction to Computing Programming", and "Database Development and Management". The courses used in the study were delivered at two regionally accredited Carnegie R1 universities—one located in the southwestern quadrant and the other in the eastern quadrant of the United States of America. These courses had an average enrolment of 20–100 learners per section. They comprised both undergraduate and graduate students.

After investigating and analysing both end-of-course evaluations (identifying what learners enjoyed and areas for improvement) and the faculty member's own experiences, five main strategies were discovered. These strategies included providing individualised video feedback, using simulation products, integrating real-world authentic projects, offering conversations with industry experts, and promoting quick learner engagement. Within each strategy, the faculty member shared multiple techniques that could be applied. Below is an outline of each strategy used to enhance overall learning satisfaction.

### Strategy 1: Providing individualised video feedback

Educators must remember that feedback is "information provided by an agent (e.g., instructor) regarding aspects of one's performance or understanding" (Hattie & Timperly, 2007, p. 19). While feedback is critical, faculty should ensure that they provide rich and meaningful feedback to learners on all graded items. Most learning management systems (LMSs) allow instructors to attach a file for feedback when grading work. For example, if the assignment is a paper, the faculty member can download the learner's paper, provide feedback using comments or track changes in Microsoft Word, and then upload the file for the learner to review. However, a challenge for many computer science faculty members is how to provide this quality of feedback when evaluating programming assignments.

Based on the learning experience of the faculty member in the study, providing video feedback turned out to be the most successful strategy. Using screen-capture software (i.e., Camtasia), the instructor was able to download a learner's programming assignment, launch Camtasia, and record an individualised video explaining the learner's syntax. This allowed the learner to see what they did correctly or incorrectly, and strategies for improving their syntax. Once the video was recorded, the instructor could upload the video to the feedback section of the LMS. Learners could then download the video and review the individualised feedback from the instructor. Not only does this apply an important concept within online learning (i.e., learner-to-instructor interaction), but it also helped reduce the number of emails received from learners once an item was returned. Learners were able to see exactly why they lost points on their programming activity.

Most learners today find written feedback "unhelpful because comments are illegible, vague, limited in providing guidance, and excessively focused on errors and omissions, or inconsistent with the assignment learning goals" (Babula & Kay, 2021, p. 248). The faculty member stressed

that it is critical to avoid solely pointing out errors in the learner's submission; they must also provide opportunities for improving the functionality of the syntax. For example, if there is an easier way for the learner to arrive at the same solution, it should be demonstrated in the individualised video. Sometimes the faculty member was able to challenge learners who excelled at the assignment by presenting a different approach to the problem.

## Strategy 2: Using simulation products

Most colleges and universities today require learners to complete a computer literacy course as part of their core curriculum. This course might cover different areas (such as Microsoft Office, computer hardware, or introductory programming) but they all share one thing—the course includes learners from multiple and unique disciplines. Additionally, many institutions design this course as a high-enrolment class, often with over 200 learners. Meeting students' expectations of constructive and prompt feedback can cause significant stress for faculty members, especially when there are so many learners. Nevertheless, students are “digital natives who prefer an independent learning style with less passive but more visual and kinesthetic learning” (Shorey et al., 2021, p. 103247). To address the preferences of digital independent learners and the need for prompt feedback, educators can use products such as Pearson's MyLabs Plus, Cengage's MindTap, or McGraw Hill's SIMnet.

The faculty member in the study used Pearson's MyLabs Plus to teach two fully online courses: “Introduction to Computing Concepts” and “Database Development and Management”. These courses had an average enrolment of 40–100 learners and were offered in multiple sections, with one section spanning a 16-week semester and the other a 7.5-week semester. “Introduction to Computing Concepts” focused on intermediate concepts in Microsoft Word, Excel, and PowerPoint, while “Database Development and Management” covered intermediate to advanced concepts in Microsoft Access.

While teaching these courses, the faculty member found that using MyLabs Plus helped ensure that each learner received prompt feedback without compromising their digital independence. MyLabs Plus offers two major types of activities: simulation training and grader projects. Simulation training comprises web-browser-based activities in which learners are given specific tasks (e.g., making a paragraph in a document bold). Many learners benefited from these activities because they provided an opportunity to practice the concepts before tackling the grader projects. Moreover, the MyLabs Plus system includes learning aids (helpful hints) for each simulation problem, guiding learners through the solution for each task. Once learners were comfortable with the simulation training, they proceeded to the grader projects, which applied concepts throughout the chapter (in the textbook) by providing them with a set of instructions and a start file to download. Using the start file, learners followed step-by-step instructions to modify the file. When it was completed, the file was uploaded back to MyLabs Plus for grading. In seconds, the system “counted the errors and graded the submitted document accordingly” (Ali & Wibowo, 2016, p. 82), providing learners with prompt feedback without the need for manual grading by the faculty member.

Furthermore, the faculty member mentioned assigning two grader projects per chapter. For the first grader project, the faculty member created a video that walked learners through the problem step by step. Learners had an unlimited number of attempts to submit the item, allowing them to earn a perfect score and practice the concepts. The second grader project served as the assessment for the chapter, with learners able to submit the item only once for grading. Many learners appreciated having an unlimited number of attempts for the simulation training and the first grader project because it helped them prepare for the graded assessment project.

### Strategy 3: Integrating authentic real-world projects

One of the main goals of any college educator should be not only to transfer knowledge to learners but also to ensure that learners become gainfully employed after graduation. Many accreditation bodies hold universities to these standards. However, many employers today are “dissatisfied with the performance of recent graduates, who they consider rigid, unable to adapt to the demands of working life, and lacking basic skills such as problem-solving, critical thinking, communication skills, and teamwork” (Villarroel et al., 2018, p. 841). This goal can be accomplished by incorporating real-world authentic assignments in the course curriculum. Authentic assignments involve a “more synchronic approach combining academic genres with everyday genres, interweaving school-based learning with everyday real-world writing” (Wargo, 2020, p. 540).

In this study, the faculty member implemented two major concepts in “Introduction to Web Design and Development”: a) authentic real-world projects and b) teamwork. The course had an average enrolment of 250 students and was offered in multiple sections, with one section being offered over a 16-week semester and the other over a 7.5-week semester. The overall focus of the class was to provide beginning-to-intermediate knowledge of HTML, CSS, and JavaScript.

At the start of the semester, a team project was assigned that required learners to develop a website for a fictitious organisation (e.g., a new startup restaurant). This task applied the concept of an authentic assignment because it was not a standard textbook problem—the team had to develop the design and content for the business. Learners were provided with some basic requirements such as the number of pages, a minimum number of tables and forms, images, and the use of an external style sheet. (In the faculty member’s industry experience, many clients provide a vision or minimal requirements and expect the developer to create the site.) Teams used the system development life cycle to develop the site from start to finish. They performed a needs analysis, developed wireframes, provided two drafts of the site, created and implemented a usability test, and published the site to the university’s web server. By the end of the semester, teams had a solid website that could be added to a portfolio for future employers to review.

Two items that the faculty member found extremely helpful were the selection of groups and the requirement of bi-weekly status reports. The faculty member had always used the LMS to randomly assign groups in previous semesters, but they had more success with group satisfaction when they allowed students to form their own groups. At the start of the semester, a dedicated discussion forum was provided to allow learners to introduce themselves and describe their work-style preferences. From there, they were tasked with forming a group of four or five members. Because the groups were established from the very beginning, the faculty member could hold everyone responsible. Second, groups were required to submit a bi-weekly status report. These reports were brief (less than one page) but allowed the group to share updates, challenges, or major items for the instructor to address. If a group did not submit the report, or indicated that a learner was not active, the faculty member reached out to provide support or assistance. Overall, these reports helped ensure that each group was on track, reduced conflict, held members accountable, and ensured that a site would be ready to submit by the end of the term.

### Strategy 4: Offering conversations with industry experts

Industry experts, often known as guest speakers, can play a huge role in higher education. These individuals are used as “a common approach of enriching students’ learning experiences in the education of many disciplines” (Zou et al., 2019, p. 175). In a traditional face-to-face classroom, a faculty member can arrange for a guest speaker to come into the class to give a lecture on a dedicated day. This allows learners to hear from a real-world industry expert and hopefully see how the content of the course relates to the profession. In addition, these speakers often bring

“the latest industry trends and news, and sometimes may even recruit from the class” (Chi & Gursoy, 2009, p. 315). Many universities today require internships or a practicum as part of the degree requirements, and having these experts (especially those who are willing to recruit) can help create a valuable connection. Learners can introduce themselves and establish this valuable professional connection. However, implementing guest speakers in a fully online course, especially those that are intended to be asynchronous, requires a few adjustments to the curriculum.

The faculty member in the study found two successful techniques to allow learners to connect with industry experts while taking an online course. First, they provided an optional remote synchronous session for the industry expert to deliver a lecture. This session allowed the guest speaker, faculty member, and learners to collaborate much as they would in a face-to-face classroom. The guest speaker communicated in real time and even spent a few moments in breakout rooms to connect individually with learners. One of the biggest challenges with this approach was learners’ scheduling conflicts. When possible, recording the session for learners who were unable to attend helped serve as a solution.

A second technique was for learners to connect individually with an industry expert via an interview. The faculty member in the study found this technique worked best in “Introduction to Computing Programming”. This course averaged 20–30 learners per section and was offered over a 16-week semester. The focus of the course was to introduce pseudo code, flow charts, and elementary Python programming. Learners were computer science or information technology majors and were either second-semester freshmen or first-semester sophomores. For this activity, learners had to locate a current (local) computer programmer and conduct a one-on-one interview with them. The instructor provided a set of interview questions, and learners could add questions with their instructor’s approval. Once the questions were approved, the learner set up a time to interview the programmer and then recorded a 10–15-minute video reflection. This video reflection was then shared with the class. Many learners stated how much value they received by meeting individually with a programmer and seeing their daily duties and responsibilities. Some learners were able to see current programs that the programmer was working on, and met other information professionals in the organisation. A few individuals were even able to meet managers and establish connections for internship opportunities. The faculty member emphasised the value of this activity within introductory courses. Allowing learners to connect with industry experts can help them remain passionate about their career path and improve student retention.

### Strategy 5: Quick learner engagement

Faculty engagement can play a key role in student success in the online environment, where an engaging instructor is “someone who is visible on the screen, addressing students actively through text discussions, checking students’ progress, and providing feedback” (Namboodiri, 2022, p. 149). This engagement often occurs through email (asynchronous communication) and during virtual office hours (synchronous communication). But while teaching online offers flexibility in the instructor’s location, not all learners are in the instructor’s time zone. In fact, learners might be travelling and not even be in the same country. Therefore, being able to “respond quickly to questions or concerns” (Smith et al., 2001, p. 792) via email, text message, or online discussion forum (e.g., a course café) is critical for learner success. This doesn’t mean that faculty must respond within seconds of receiving a message—most learners find a 24–48-hour response to be reasonable (p. 791). The importance lies in being able to respond within this timeframe so that learners can continue their learning. Learners reach out to faculty because they are stuck or need clarification on an assignment, reading, or other course item, and can’t continue until their questions are addressed.

One approach used to encourage engagement with learners is through virtual office hours. Learners who are enrolled in traditional courses can stop by an instructor's on-campus office, and online learners should have the same opportunity. Some learners enrol in fully online degree programmes due to the reputation of the faculty, university, or a department's accreditation—or because they want to receive a degree from a bricks-and-mortar university. However, if they are not close to the university, or have other obligations (e.g., they are professional working adults), they might not be able to physically visit campus to meet with faculty members. Walker and Koralesky (2021) discovered that over 60% of learners reported that virtual office hours were meaningful when taking an asynchronous course. Faculty members have found that these virtual opportunities are a great way for learners to make personal connections with other learners, and for faculty members to share their professional knowledge and experience (Miller, 2021).

The faculty member in the study found two positive techniques to improve learner engagement. Firstly, increasing the email and discussion forum response rate was effective. One common feature of any LMS is discussion forums. A course café discussion forum was created for each course taught by the faculty member. Learners were instructed to post their questions to this discussion forum (unless it was something personal, such as a grade issue). Most LMS platforms allow users to subscribe to certain discussion forums, so the faculty member subscribed to the course café and received an email notification every time a post was created. Because many faculty members use their personal mobile devices to check email, this faculty member was able to receive the notification email and respond to the message within a few hours. Another point mentioned by this faculty member was the importance of acknowledging a learner's message and promising them a response time. On several occasions, the faculty member received lengthy messages on their mobile from learners who required a detailed response (e.g., they had a programming syntax issue). In these cases, the faculty member acknowledged the learner's email and stated that they would respond in more detail by the end of the day. The faculty member found that a simple acknowledgment helps to reduce a learner's stress and anxiety.

Secondly, virtual office hours were extremely beneficial to the faculty member, especially with programming courses. When learners were stuck on syntax or runtime issues, they were reminded of the virtual office hours and encouraged to attend. A key point stressed was to ensure that these virtual hours were spread throughout the day, because each learner has a unique schedule. The faculty member had greater success when they offered an equal number of hours at different times (e.g., 2 hours in the morning 1 day per week, and 2 hours in the evening on a different day). Although there were times when only a few learners attended, those who did attend were able to receive assistance and connect better with the instructor, thus increasing the learner-to-instructor presence in the course.

## Conclusion

Educators must remember that learners have choices when pursuing an online degree. Learners want to have a positive experience during their educational journey, and they want to stay connected with other learners and faculty. One of the best ways to achieve this is for educators to stay up to date with best practices and pedagogies, and be willing to implement new tools and technologies. Using a course shell from one semester to the next without any changes to the content, tools, or engagement is a thing of the past. Online educators must be willing to change and experiment.

The five strategies presented in the study helped improve learner satisfaction in computer programming and information technology courses. Learners repeatedly mentioned that they felt better connected to the content, other learners, and the faculty member. Other disciplines in higher education have similar tools and technologies that can be implemented to achieve comparable outcomes.

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