

Efficacy of instructional modalities

Dr. Roy Jensen

An academic version of this paper was submitted for publication. This document will be updated with the final citation. The latest version of this document is available at www.CASP.ca

Abstract

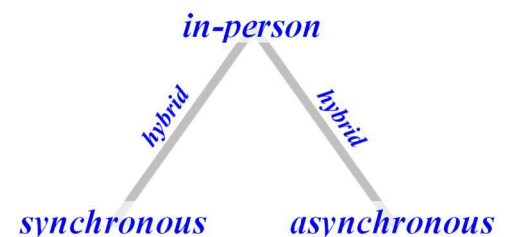
The rapid expansion of online education has prompted renewed interest in the comparative effectiveness of in-person, synchronous online, and asynchronous online instructional modalities. This commentary reviews recent literature examining instructional efficacy, learner preferences, and learner retention across these modalities, in both academic and vocational environments.

When courses are well designed and delivered by skilled instructors, all instructional modalities have similar efficacy. The primary determinants of instructional effectiveness are course design and instructional quality rather than instructional modality. Because asynchronous courses standardize instructional delivery, well-designed asynchronous courses provide more consistent and greater efficacy, particularly in vocational settings where instructors often have limited pedagogical training and experience.

Instructional modalities

An **instructional modality** is how information is taught. There are three instructional modalities:

- **in-person**: learners and the instructor meet in a classroom or learning environment conducive to learning: laboratory, auto shop, martial arts dojo, etc.
- **synchronous**: an online modality where learners and the instructor meet in a virtual classroom
- **asynchronous**: an online modality where learners independently complete prepared learning activities



Hybrid instruction involves using in-person and an online modality to facilitate instruction.

Instructional best practices

Instructional best practices include actions that create an engaging, learner-centered, active-learning environment; present material in an interesting and interactive manner using diverse instructional strategies; link new material to the learners existing knowledge; relate material to the learner's future needs; and have meaningful assessments during and at the end of the course.

Instructional best practices are the same across instructional modalities, but the ability to implement them depends on the modality.

In-person instruction

In-person instruction provides for direct interaction between the instructor and learners, and between learners. This creates the best possible learning environment, where all persons are interested, engaged, and actively learning.

In-person offers the most versatility, and can be used for teaching knowledge and skills. Physical skills, such as mechanics, martial arts, chemistry, etc., must be taught in-person.

Online instruction

Online learning is limited to teaching knowledge and technological skills. Technological skills refer to the development and use of software, networks, and websites.

Synchronous instruction suffers from an “interaction distance”, caused by the instructor and learners being isolated from each other. The interaction distance degrades the learning environment, and puts more responsibility on the learner to remain focused and engaged in learning. Learners have the ability to mute the audio, turn off their webcam, and leave their computer during class. All these actions hinder learning.

Despite the interaction distance, a synchronous instructor is able to use the same instructional strategies as an in-person instructor. Because the instructor and learner are present at the same time, synchronous instruction allows for discussions, debates, case studies, and other interactive instructional strategies. The result is interest, engagement, and active learning similar to in-person instruction.

Asynchronous instruction has the greatest interaction distance. The learner is independent of the instructor and other learners. Interactions between a learner and the instructor, and between learners, does not occur in real time, if it occurs at all. There is even greater responsibility on the learner to manage their time and engage in learning.

Hybrid instruction

Many courses have knowledge components and skill components. An increasingly effective strategy is to teach the knowledge component via an online modality, and the skill component in-person. This strategy allows the learner to complete the knowledge component at their own location and pace before attending a facility to complete the in-person component.

If the knowledge component is required in advance of skill component, or vice-versa, the second instructor requires confirmation that the learner has completed the initial learning. Learning management systems can provide partial certificates verifying component completion, and can allow an instructor to manually enter grades or confirm completion of a component. Continued learning is blocked until the pre-requisite is completed.

Hybrid instruction integrates the best instructional strategies, and has several practical benefits:

- greater time available to complete the knowledge component
- if travel is required for the skill component, the duration and costs are reduced
- the course cost is reduced

Efficacy of instructional modalities

The Institute for Work & Health reviewed the literature from 2010 to 2020 (pre-COVID) and from 2020-onwards (COVID and post-COVID) on the efficacy of in-person vs online vocational instruction.¹ They limited their literature review to the preceding ten years because technological capabilities are rapidly evolving. The pre-COVID studies found no difference between the efficacy of in-person vs synchronous modalities. One study found a marginal benefit for synchronous compared to asynchronous modalities. The post-COVID studies found no difference between the instructional modalities, or a marginal benefit of the synchronous modality. Zeng and Lou conducted a similar review of academic instruction, and found a trivial benefit for asynchronous instruction.²

For information that can be taught via different modalities, all modalities are equally effective.

In another study, a researcher offered a course in both in-person and asynchronous modalities,³ and surveyed learners on the benefits and detriments of each modality. The main benefits reported for in-person instruction included the natural learning environment, that learners were focused on learning, and the natural instructor-learner and learner-learner interactions. The main detriments were the instructional pace and inability to review what was just taught. Once a learner got lost during the lesson, they had to wait until after class before they could try and make sense of the course material.

The main benefits reported for asynchronous instruction include⁴

- the flexibility and convenience of working on the course at times convenient to the learner
- the ability to start, stop, and rewatch lessons as needed to understand the material
- learners can be anywhere — they are not required to travel to campus for daily classes
- learners are better able to balance personal, professional, and academic life
- the ability for all learners to participate in discussions, not just the most talkative

The main detriment observed more by novice learners was the need for better time management and independent learning skills. Experienced and mature learners did not see this as a significant issue.

Overall, 74 % of online learners stated a desire for future courses to be asynchronous, compared with only 59 % of in-person learners wanting their future courses to be in-person.

Learner retention in instructional modalities

Retention refers to the percentage of learners who complete and pass a course, compared with the number that started the course. The opposite is **attrition**, and refers to the percentage of learners who withdraw from a course or program before completion, or fail the course.*

$$\text{retention} + \text{attrition} = 100 \%$$

Numerous instructors, with the opportunity to teach the same course in-person and online, report the same results: retention in in-person courses is higher than in synchronous than in asynchronous. The actual numbers vary significantly, depending on the subject, course, and instructor. A review found the attrition rate from online courses to be 7 to 20 % higher than attrition from in-person courses.^{5,6}

These studies found that the same factors were dominant in determining if a learner was going to withdraw from a course in any modality. These factors include

- quality of instructional material (course design)
- quality of instruction (appropriate selection and use of instructional strategies)

Factors that caused attrition to increase from in-person to synchronous to asynchronous include

- level of course and learner
- reduced and lack of a learning environment
- reduced and lack of instructor-learner and learner-learner interactions
- greater requirement for independent learning skills
- greater non-academic responsibilities that distract from learning (work, family)

Level of course refers to its position in the hierarchy of the subject, and level of learner refers to the how much knowledge the learner has about the subject. Introductory courses and learners new to a subject have increased attrition.

Discussion

For all instructional modalities, two factors are dominant in determining a learner's perception of a course: the quality of instructional material, and the quality of instruction. The efficacy of a course should always be limited by the instructor's ability, not the instructional material.

Designing a course happens once.[†] If done well, revisions only need to bring the knowledge and skills current, with minimal refinement of the instructional strategies.

In-person and synchronous courses have live instructors and real-time interactions between the instructor and learners, and between learners. During instruction, quality instructors dynamically “read the room” and adjust their instructional strategies to create and maintain an optimal learning environment.

* Some institutions replace *attrition* with some combination of drop, withdraw, or fail (sometimes called the DWF rate).

† Many resources train people how to teach. Few resources guide course and program development. Dr. Jensen worked closely with the Center for Teaching and Learning at two institutions, was on the team developing a science degree program, developed several courses for that degree, and worked with vocational organizations to improve their courses and get them accredited. From this experience, Dr. Jensen created a free course design document that provides foundational understanding of learning and practical suggestions on course development.

In-person and synchronous instructors receive feedback and are able to revise the instructional material and instructional strategies after every course. This is not possible with asynchronous courses. Once an asynchronous course is created and on a learning management system, revisions are difficult and time consuming. That said, asynchronous courses should undergo a comprehensive review and revision every three to five years.

In order to create a quality asynchronous course, the entirety of course design and instructional testing must be done in advance of the course being finalized. This results in significantly greater upfront effort. It is estimated that it takes at least 50 hours of development for every hour of finished course.^{7,8}

Quality course development occurs when there is a design team of subject-matter expert(s), instructional designer(s), and reviewer(s). The subject-matter expert identifies the knowledge and skills necessary for competence in a given area. The instructional designer works with the subject-matter expert to select instructional strategies that convey the knowledge and skills in a manner conducive to learning. The reviewer(s) are subject-matter experts that review the developing course and provide suggestions on content and delivery to improve learning.

In addition to having course design teams, quality courses are more-often created when the course is part of an accredited program, and when the course is part of a study.

Poor course design and instruction occur more-often when there is no quality control. Examples of poor courses include courses that are strict lecture; practical courses where the instructor dictates every step; and asynchronous courses that are nothing more than individual chapters uploaded to the LMS, with the instruction being to “read the chapter”.

The Hawthorne effect

The Hawthorne effect is a psychological phenomenon where people modify their behavior because they know they are being observed.⁹ A review found the Hawthorne effect to be widespread.¹⁰

In instructional efficacy studies, the instructors knew their instruction was being assessed. They put extra time, energy, and effort into creating and presenting the best in-person and synchronous courses possible. For asynchronous courses, the developer put extra time, energy, and effort into creating these courses.

Under study conditions — with increased instructor commitment — all instructional modalities had the same efficacy. Under normal conditions, in-person and synchronous courses will return to an average instructional efficacy, but asynchronous courses will maintain the same high instructional efficacy.

Since in-person, synchronous, and asynchronous courses have similar efficacies when taught under study conditions, asynchronous courses will have higher efficacy when taught under normal conditions.

Furthermore, the instructors involved in these studies are committed to quality education. Other instructors may have different priorities (work, research, etc.) and may not put as much time into development of their courses, thereby further reducing instructional efficacy. For example, lecture is one of the easiest instructional strategies to create and use, but has a low instructional efficacy. Active,

learner-centered instructional strategies require more effort from the instructor to develop, but have much higher efficacies.¹¹

Optimal instruction is often seen in K–12, where the Education Department creates lesson plans with diverse instructional strategies, and the teachers are trained in applying those instructional strategies.

Pessimal instruction is most often seen in vocational environments, where someone volunteers or is assigned the role of trainer. These people have limited time to learn how to teach, to develop instructional material, and to practice. Also, they may only teach infrequently, so have less experience and forget between classes.

Conclusion

The primary factors determining effective instruction are *quality instructional material* (course design) and *quality instruction* (instructional strategies). The instructional quality should be the limiting factor.

Under *optimal* instructional conditions, the literature shows that all instructional modalities — in-person, online synchronous, and online asynchronous — have equivalent efficacy. However, the effectiveness of the instructor is artificially high due to the Hawthorne effect.

Under *normal* instructional conditions, I submit that the quality of instructor-led in-person and synchronous instruction reduces, while the quality of asynchronous courses is unchanged. I propose that this results in asynchronous instruction having the greatest efficacy. Further, this is expected to be more pronounced in vocational training, where the instructor's training and experience are limited compared to academic instructors. The critical factor being that the asynchronous course is created by a competent design team using instructional best practices.

References

1. Robson, L. S., Irvin, E., Padkapayeva, K., Begum, M., & Zukowski, M. (2021). *Effectiveness of synchronous online learning in an occupational context: Two rapid reviews*. Institute for Work & Health. https://www.iwh.on.ca/sites/iwh/files/iwh/reports/iwh_report_effectiveness_synchronous_online_learning_ohs_2021.pdf
2. Zeng, H., & Luo, J. (2024). *Effectiveness of synchronous and asynchronous online learning: A meta-analysis*. *Interactive Learning Environments*, 32(3), 4297–4313. <https://doi.org/10.1080/10494820.2023.2197953>
3. Hachey, A. C., Wladis, C., & Conway, K. M. (2023). *Investigating online versus face-to-face course dropout: Why do students say they are leaving?* *Education Sciences*, 13(11), Article 1122. <https://doi.org/10.3390/educsci13111122>
4. Mather, M., & Sarkans, A. (2018). *Student perceptions of online and face-to-face learning*. *International Journal of Curriculum and Instruction*, 10(2), 61–76.
5. Delnoij, L. E. C., Dirkx, K. J. H., Janssen, J. P. W., & Martens, R. L. (2020). *Predicting and resolving non-completion in higher (online) education – A literature review*. *Educational Research Review*, 29, Article 100313. <https://doi.org/10.1016/j.edurev.2020.100313>
6. Rahmani, A. M., Groot, W., & Rahmani, H. (2024). Dropout in online higher education: A systematic literature review. *International Journal of Educational Technology in Higher Education*, 21(1), Article 19. <https://doi.org/10.1186/s41239-024-00450-9>
7. Many variables affect the development time, including the level of the course and the degree of learner interaction. An internet search in 2026 estimates the development time at 50 to 200 hours.
8. Chapman, B. (2010). How long does it take to create learning? Chapman Alliance. <http://www.chapmanalliance.com>
9. Landsberger, H. A. (1958). *Hawthorne revisited: Management and the worker, its critics, and developments in human relations in industry*. Cornell University.
10. McCambridge, J., Witton, J., & Elbourne, D. R. (2014). *Systematic review of the Hawthorne effect: New concepts are needed to study research participation effects*. *Journal of Clinical Epidemiology*, 67(3), 267–277. <https://doi.org/10.1016/j.jclinepi.2013.08.015>
11. National Training Laboratories. (c. 1960). *The learning pyramid*. NTL Institute for Applied Behavioral Science.