Efficacy of instructional modalities

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This article analyzes the factors affecting the efficacy of instructional modalities, and recommends strategies for optimal instruction.

Executive summary

In-person instruction provides the best possible learning environment, and is required when teaching physical skills. *Online instruction* is limited to teaching concepts and technological skills, but is more convenient and accessible. Together, hybrid instruction combines the best of both modalities.

The primary factors determining effective instruction are *quality instructional material* and *quality instruction*. The instructional material should never be the limiting factor. Under *optimal* instructional conditions, all instructional modalities — in-person, online synchronous, and online asynchronous — have equivalent efficacy. However, the effectiveness of the instructor varies substantially in in-person and synchronous instruction. Under *normal* instructional conditions, the quality of instruction is reduced, resulting in asynchronous instruction having the greatest efficacy. This is more pronounced in vocational training, where the instructors' training and experience are limited compared to academic instructors.

Asynchronous instruction provides substantial advantages in flexibility, accessibility, and learner control, and is preferred by a majority of learners. However, it requires greater time management and independent-learning skills. As learners are often limited in these skills, asynchronous instruction has the greatest attrition rate. Quality course development moderates attrition.
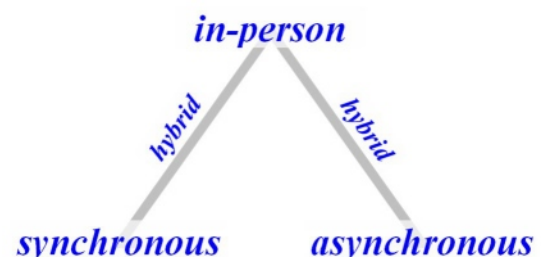
In summary, asynchronous courses developed using instructional best practices create an interesting, engaging, learner-centered, active-learning environment. This form of instruction is as effective or more effective than other instructional modalities.

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.

Instructional best practices

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

The most effective instructional strategies depend on the learner level and the material being presented.

Instructional best practices are the same across 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 is the most versatile modality, and can be used for teaching knowledge and skills. Physical skills, such as mechanics, martial arts, and chemistry lab, must be taught in-person.

Online instruction

Online learning is limited to teaching concepts and technological skills, such as the use of programs 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 engage in learning. Despite the interaction distance, a synchronous instructor is able to use the same instructional strategies as an in-person instructor. 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 other learners is not in real time. There is even greater responsibility on the learner to engage in learning.

Hybrid instruction

When a course has knowledge and skills components, it is possible to teach the knowledge component via an online modality, and the skills component in-person.

Efficacy of instructional modalities

The Institute for Work & Health reviewed the literature from 2010 to 2020 (pre-COVID) and from 2020-onwards (post-COVID) on the efficacy of in-person vs online vocational instruction.[1] They limited their literature review to the preceding ten years because of the rapidly evolving technological capabilities.

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 either no difference between the instructional modalities, or a marginal benefit of synchronous modality.

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

Another researcher offered a course in both in-person and asynchronous modalities,[2] and surveyed learners on the benefits and detriments of each modality.

The main benefits of in-person instruction are 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 they got lost during the lesson, they had to wait until after class to try and make sense of the course material.

The main benefits of asynchronous instruction include[3]
- 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 — 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. Extrapolating these values over courses results in 61 % of learners preferring asynchronous instruction, and 39 % preferring in-person instruction.

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.[*]

retention + attrition = 100 %

Numerous instructors, with the opportunity to teach the same course in-person and online, report the same results (uncited): retention in in-person courses is higher than in synchronous than in asynchronous. The actual numbers vary significantly, depending on the specific course. A 2023 literature review[4] reports the attrition rate from online courses to be 7 to 20 % higher than attrition from in-person courses. A 2024 literature review found that the attrition rate from online courses was up to 80 % — much higher than in-person courses.[6]

These reviews[5,6] 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
- 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 obligations)

Discussion

For all instructional modalities, optimal courses require extensive course development and quality instruction.

In-person and synchronous courses have live instructors and real-time interactions between the instructor and learners, and between learners. During instruction, quality instructors can dynamically "read the room" and adjust their instructional strategies to create and maintain an optimal learning environment. Quality instructors will also revise the course material and instructional strategies based on their observations and learner feedback after every course. This ensures that the next teaching of the course will be better.

Routine revision is not possible with asynchronous courses. Once created and installed on a learning management system, revisions are difficult and time consuming. In order to create a quality asynchronous course, all the 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 between 20 and

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[*] Some institutions replace *attrition* with some combination of drop, withdraw, or fail (often called the DW, DF, WF, or DWF rate).

50 hours of development for every hour of finished course.[*] Asynchronous courses should undergo a comprehensive review and redevelopment every three to five years.

Negatives of different instructional modalities

As noted above, the quality of instruction is critical to effective instruction. In the published studies, the instructors knew their instruction was being assessed. Many would have put extra time, energy, and effort into presenting the best in-person and synchronous courses possible. Conversely, it was not possible to modify the asynchronous course for the study. With this increased instructor commitment, the studies found that all instructional modalities have the same efficacy.

Now consider the average instructor. They will put less time, energy, and effort into their instruction, reducing the efficacy of in-person and synchronous instruction. Lecture is the simplest and safest form of instruction. Many novice instructors teach primarily using lecture. Lecture is instructor-centered, has passive learners, and has an information retention rate of around 5 %. Active, learner-centered instructional strategies require more effort from the instructor, and have information retention rates of up to 90 %.[5]

Considering these factors, it is logical to conclude that asynchronous instruction has consistently greater efficacy than everyday instruction in in-person and synchronous courses.

To go further, *optimal instruction* is most often seen in K–12, where the government Education Department creates lesson plans with diverse examples and activities to keep learners interested, engaged, and actively learning.

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, develop instructional material, and practice. Also, they only teach infrequently, so don't have much experience and forget between classes.

> *A well-developed asynchronous course is consistently taught better than the average in-person and synchronous course.*

Pessimal instruction also occurs when there is no quality control on asynchronous course development. I have personally seen an asynchronous course that was nothing more than the individual chapters uploaded to the LMS, with the instruction being to "read the chapter". Then a quiz. Then "read the next chapter". This is not instruction. This is forced reading.

However, it is readily possible to review an asynchronous course. There is no instructor to get permission from. There are no timing issues. A manager or prospective client can hire an independent expert reviewer from anywhere in the world!

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[*] My experience developing courses for **CA✦SP** is around 40 hours of development per instructional hour for full development. When receiving a course and script developed by a subject-matter expert, it takes around 12 hours per instructional hour to create the online asynchronous version of the course.

Courses development

The limiting factor on the efficacy of a course must always be the instructor's abilities. Never should the course material or course design limit the efficacy of a course. Time, thought, and energy should be focused into designing the course and selecting instructional strategies to effectively convey knowledge and skills to learners. Designing a course happens once. If done well, revisions only need to make the knowledge and skills current, with minimal refinement of the instructional strategies.

For optimal learning, courses must be developed based on instructional best practices.

While many resources train people how to teach, few resources guide course and program development. As a result of his time with the Center for Teaching and Learning at a few institutions, and his experience developing a science degree program and several courses therein, Dr. Jensen created a free course design document that provides foundational understanding of learning and practical suggestions on course development.

Conclusions

The primary factors determining effective instruction are *quality instructional material* (course design) and *quality instruction* (instructional strategies). The instructional material should never be the limiting factor. Under *optimal* instructional conditions, all instructional modalities — in-person, online synchronous, and online asynchronous — have equivalent efficacy. However, the effectiveness of the instructor varies substantially in in-person and synchronous instruction. Under *normal* instructional conditions, the quality of instruction is reduced, resulting in asynchronous instruction having the greatest efficacy. This is more pronounced in vocational training, where the instructor's training and experience are limited compared to academic instructors.

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References

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