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Original Paper

Secret of Instructional Design Revisited

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Abstract

Improvements in technology, especially automation, robotics, and artificial intelligence have dramatically changed what people do in the workplace and how they do it. Technology advancements over the past 3 decades have reshaped demands in schooling and the workplace bringing on new challenges and opportunities. Employers need employees who are critical thinkers, communicators, collaborators, and creators to remain competitive and innovative. Educators recognize these abilities that learners must have to take advantage of the opportunities and face the challenges that are presented to them in the 21st century. As was the case 30 years ago, the same consistency is needed today among the four elements of instructional design: objectives, methods, content, and evaluation. There must also be integration of the instructional system with authentic, real-world performance. If these two critical aspects are not met the chances of obtaining the desired effectiveness of learning is not likely to be met. The Internet and cloud computing allow more rapid development of instruction for more efficient and affective learning. The pace of change also requires a greater emphasis on the iterative nature of evaluating the instructional design system.

Keywords

instructional design, 21st century skills, instructional content, instructional methods, instructional goals, evaluation of instruction

1. Introduction

Over thirty years ago, Stephen Yelon and I wrote an article describing the secret of instructional design (Yelon & Berge, 1988). Since then, this framework has helped many instructional designers, students, teachers, curriculum developers, and learning and development specialists. The purpose of this article is to reflect on the changes in technology and expand this still-useful instructional system model to the knowledge, skills and abilities needed in the 21st century. Figure 1 indicates the four major elements in the instructional system.

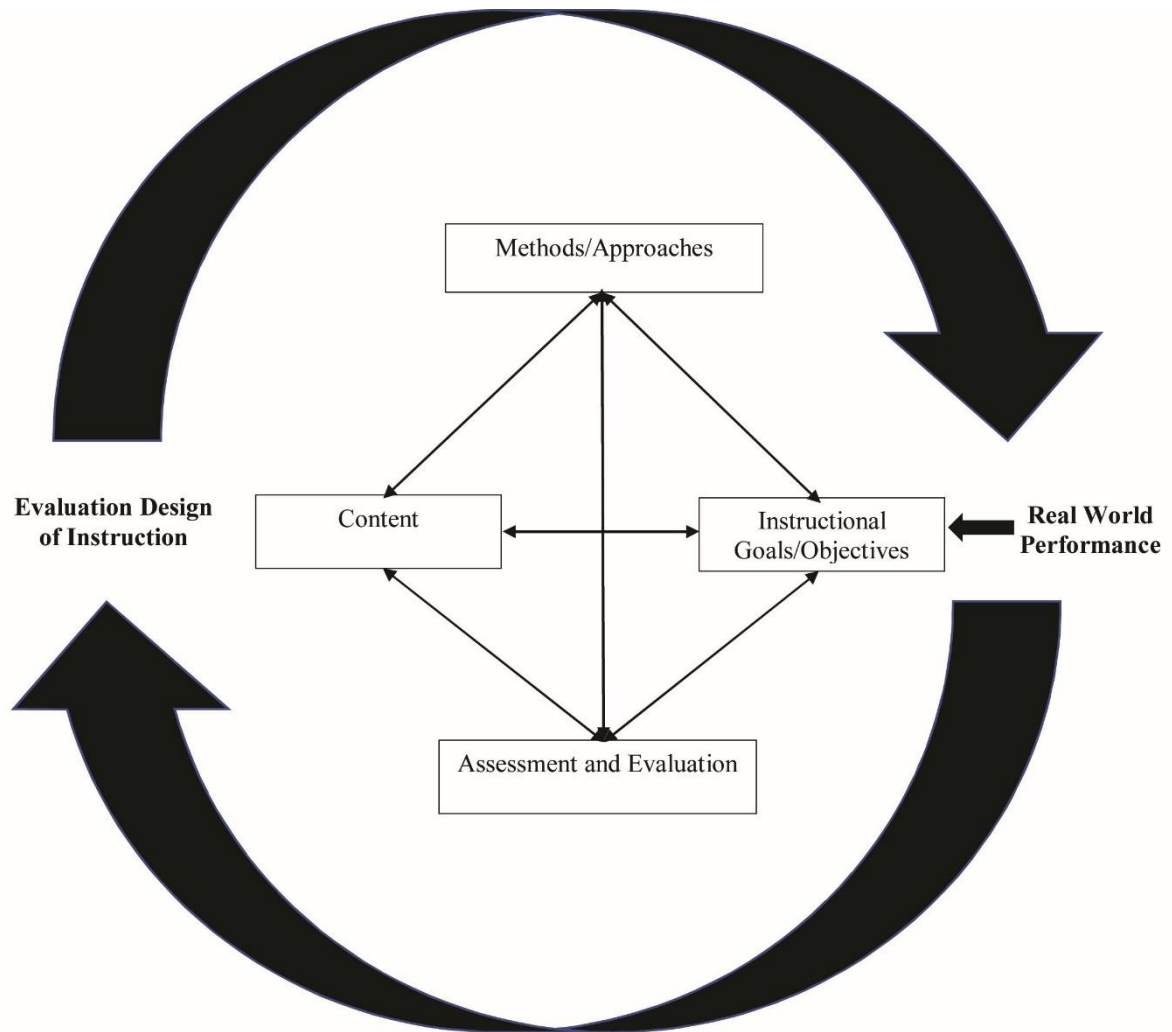


Figure 1. Secret of Instructional Design Revisited

A key to designing effective instruction is to assure consistency among four elements of instruction: 1) goals or objectives, 2) content, 3) the teaching methods and approaches used, and 4) the assessment and evaluation of the learning. Another critical aspect of effective instruction is to integrate or align these elements with real-world performance. Consistency and integration do not guarantee effective instruction because there are other factors that may interfere with learning, such as whether the conditions under which final performance is evaluated may not be the same as the authentic conditions, or the testing environment may be different than the real-world environment. However, without having consistency within the system and alignment of instruction with real-world performance it is unlikely outcomes will be as desired.

Instructional Design (ID) is the systematic process of designing and creating a learning experience, focusing on *how content can be conveyed most effectively*. Instructional designers, teachers, and other learning and development professionals, whose job it is to develop learning experiences in schools or the workplace, work daily to design new instruction and revise instruction that does not meet the desired

results. Such development and revision work often starts with a simple question: “What achievement is desired”, or questions that derive from this question. What student learning outcomes will the material serve? What should learners know, understand, and apply in real-life settings? What will inspire students or employees to learn and strive for excellence?

2. Elements of Instructional Design Revisited

Effectiveness has to do with how well the instruction enables learners to achieve stated goals or expected outcomes. *It is the instructional design that primarily determines the effectiveness of instruction.* Technology has more to do with the *efficiency* and the *affective aspects* of learning.

2.1 Instructional Goals and Objectives

Regardless of whether the job is to develop new instruction or revise existing instruction, the goals or behavioral objectives must match authentic, real-world performance which the learner is striving. Depending upon the prior knowledge and skill level of the learner, the design may need to be broken down into goals or objectives needed to be mastered before the ultimate performance can be performed. These enabling goals or objectives often derive from the experience of the teacher or subject matter expert working with the instructional designer.

2.2 Content

Content is basically the knowledge that the learner needs to perform the tasks to be learned. Traditionally, when talking about school learning, content is often learned just-in-case. The idea being that a broad amount of information is taught so that some of it may be useful to the learner later in school or in the future. There are several conceptual problems with this. For instance, it is difficult to know what individuals may need to know as their learning path continues and especially what will be needed outside of schooling in the job situation. In addition, many students today are not sufficiently motivated to learn knowledge and skills in which they do not believe will be relevant to them later.

In the workplace, much of the knowledge and skills learned are done to perform competently that which is needed for a specific job the employee is doing. Learning often occurs just-in-time to solve the problem at hand. Job related learning occurs for the most part through informal learning, rather than formal learning events. In the strictest sense, learning and development professionals cannot design informal learning. Still, there is a need for supporting informal learning. It should be noted that the Internet holds an immense store of information. Videos, for instance, are available at the fingertips of learners that can be used to demonstrate much of the needed knowledge and skills when needed just-in-time to help solve the problem with which the learner is facing.

One of the biggest changes due to technology over the last several decades regarding the development of instruction is the easy access to content, subject matter expertise and demonstration online by a more experienced practitioner. Having said that, it is easier to take a subject matter expert and teach them the fundamentals of designing instruction compared to teaching an instructional designer the competencies of an expert in a field. There are many thousands of experts developing their own instructional videos

and putting on easy-to-use platforms such as YouTube—currently with varying degrees of effective instructional design. Often a lot of skills are learned through feedback from people who perform the skill better than the learner does.

Before the Internet and cloud technologies, changes to instruction were costly, compared to today. The implementation of instruction needed to wait for each piece of the instruction to be analyzed, developed, and evaluated. Otherwise, resources would need to be spent to fix the final instructional product. Today, a designer or the subject matter expert can distribute what content is at hand, (e.g., a video, a pdf, a podcast), and add a quiz to evaluate the most important parts of the lesson to evaluate learning. If changes are needed, it is not nearly as costly as it was when developing a workbook or even a CD-ROM for distribution. This is not to suggest that the design and consistency among instructional elements in the system should be careless or mindlessly done. What is meant is that it is much less costly to change that which needs changed and doing this assessment and evaluation at near real-time provides flexibility to the design that has not been available traditionally before the cloud and Internet. Another aspect of content development based primarily on the Internet is curation. Curation of digital content is a part of nearly all learning and learning support. It is the confluence of informal learning, and the cost- and time-savings of content curation that allows learning and development professionals to better meet individuals' needs in their daily learning challenges. When learners curate their own information, the curation becomes just-for-me and is very useful to performance.

2.3 Methods and Approaches to Instruction

While one should not confuse the delivery system of instruction with the instructional methods and approaches being used, because of technological advances there are certain instructional methods that are easier to accomplish now than in the past. For example, with the seemingly infinite amount of information at an instructional designer's fingertips, it is much easier now to find videos and other content. Certainly, when viewing 21st century skills such as communication and collaboration, the Internet promises activities, and approaches to learning regardless of geographic separation. These activities were too time consuming and much more difficult to accomplish in the past. Of course, along with these opportunities comes the responsibility to instruct learners about the literacy skills that are needed when many of the quality control aspects previously supplied by publishers, librarians and other gatekeepers of information, media, and technology are absent.

The methods and approaches to instruction that are taken by teachers, designers, or other specialists are generally dictated by the instructional theory being used. in the design and development of instruction. That and personal preferences learned through experience are usually found in the overall instructional system. It doesn't matter how the designer chooses the instructional approach taken as long as it aligns with the other elements of the instructional system.

Two critical functions of the methods selected for use are to motivate learners to *engage* with the content and to *practice* the enabling objectives and the overall performance being mastered.

2.3.1 Engagement

Learning engagement is the ability for the learners to be both motivated and show behavior that indicates they are engaged in the learning process. For learners to be motivated and engaged they must know what they are learning and why it is important to learn. Therefore, the instructor must make sure the purpose of the learning is clear to the learner. The learning tasks must be challenging and connect to real-world performance.

There are many strategies that teachers and designers use to create activities and approaches to keep students invested in their learning. Authentic learning experiences are generally motivating, especially when designed for students to work together to complete a project or solve a problem, perhaps through inquiry-based activities and experimentation (Arghode, Brieger, & Wang, 2018). Essentially the course must be meaningful to the learners, and it must be clear to the learners what is in it for them. The methods and approaches designed in the instruction need to further the learners' engagement with the course content as much as possible. One approach that often works to promote learner engagement, when possible, is to have the learners collaborate with others (Ferlazzo, 2021).

2.3.2 Practice

The designer should be mindful of how much practice is needed for a learner to believe success will happen the next time performance is tried. Too little practice and the learners will lack confidence in their abilities; too much is just boring and tedious. Thus, an important goal for the designer of instruction is to request just-enough practice.

The reason to practice the activities that are relevant to a job or solving a problem is to demonstrate the knowledge, skills and abilities needed to perform the task at hand. With sufficient motivation, the more practice increases the more competency develops. Competencies are broader combinations of abilities that can often predict superior performance in an educational domain or on the job (Maher, 2017).

If proficiency at competencies is important to the person and the organization, more than knowledge is needed. While knowledge and skills are the foundation, proficiency also involves these being combined with the ability to apply the foundational activities correctly in the right situations (Hartman, 2019). Active practice of the knowledge, skills and abilities is needed for proficiency to know when and how to use a competency in a problem-solving or business situation (Hartman, 2019). So, practice is needed to develop competencies that match real-world performance.

2.4 Assessment and Evaluation of Learning

One way to think about assessment is that it is feedback from the learner to the instructor about the student's learning. Evaluation can be thought of as feedback from the instructor to the student about the student's learning. Evaluation uses methods to judge how well the student learned the knowledge and skills needed for grading and reporting purposes.

Generally, the instructor and the designer want to gather feedback about the various elements of the instruction such as the affective components of the methods and approaches being used, the content, the pace, and what is still unclear to the learner. Critical reflection papers on the course and the most

important content or activities (and least important aspects) are valuable to both the learners and the instructor for revisions of the instruction. Evaluation can take the form of quizzes and examinations. Evaluations could also be in other formats such as clinical evaluations, papers, group or individual projects, worksheets, practical exams of skills and competencies, or any other graded assignments. Due to advances in technology, changing instruction is less costly and time consuming than before. This allows more rapid, near real-time implementation and evaluation making the revising and evaluation of the instructional system more continuous.

3. Impact of Technology Improvements

It is hard to overstate the impact that improvements in technologies have had over the past 30 years in reshaping how people work or how they manage their lives outside the workplace. The U.S. Bureau of Labor Statistics has speculated that today's individuals will have 8 to 10 jobs before they are 40 years of age. Additionally, it has been estimated that "85% of the jobs that today's learners will be doing in 2030 haven't been invented yet" (IFTF, 2018, p. 14). Whether these estimates become true or not, there is immense changes to the workplace and that the pace of change is ever-increasing. An individual will have many jobs and the responsibilities of those jobs will no doubt be substantially different than what that person studied. Workers will need to create, collaborate, and innovate as they continue to learn new things. New problems mean the need for new knowledge, skills, and abilities. Technology has a major impact on at least two areas to our discussion here: 1) how learning takes place and 2) how instructional systems are developed.

4. 21st Century Skills

Employers want employees with abilities in communication, teamwork, critical thinking, and problem-solving (Kusssmaul, 2020). Over the past 20 years or so, educational leaders have worked diligently to reform curriculum to emphasize what has widely been called 21st century skills. There is quite a bit of agreement regarding the needs of individuals to think critically about and solve complex problems, collaborate with others when finding innovative and creative solutions, and view learning as a lifelong process if they are to meet the challenges and opportunities in the workplace. The point in this paper is not to rehash these efforts or choose any one list of skills (Note). Sufficient for purposes here is to say there are commonalities in many of these frameworks. For instance, Stauffer (2020) categorized 21st century skills that include *learning skills*, *literacy skills*, and *life skills*:

Learning skills are efforts to teach students about the mental processes required in a modern work environment including critical thinking, creativity, collaboration, and communication.

Literacy skills focus on how students can discern facts and the technology behind them. Additionally, the focus is on determining trustworthy sources and truthful information to separate these sources and facts from misinformation. These skills include information literacy, media literacy, and technology literacy.

Life skills are those skills that are often intangible elements of a student's everyday life. They focus on both personal and professional qualities and include flexibility, leadership, initiative, productivity, and social skills.

School leaders and business leaders agree that 21st century skills are important for learners throughout school and going into the workplace to take advantage of the opportunities available to them and to overcome challenges faced by learners. The more learning and development professionals are mindful of these skills and embed them in curriculum and training the better prepared learners will be generally.

There are a variety of reasons why schools are having a difficult time refocusing education systems to develop such skills as logical thinking, curiosity, leadership, creativity, and complex problem-solving. Such skills are hard to define. Additionally, they are difficult to operationalize so that they can be observed, measured, and evaluated. A large part of these abilities mentioned involve cognitive processes and thinking that goes on in the learner's head. Another factor is that many teachers believe they must "cover" many facts and details; not to mention that it is more difficult to move learning to higher order skills.

As solutions to problems become more complex, the methods and approaches used for performance in higher-order skills and abilities often require a project-based, team approach, with research and writing integrated throughout and giving students more responsibility for what they learn and how quickly they learn it as problem-solving advances. It is a significant change for most teachers to facilitate learners group work where they analyze, discuss, plan, practice time management, and hold each other accountable for meeting performance goals (Lombardi, 2021).

5. Revising Ineffective Instruction

Over the past two decades, technology has changed the way much of instructional design implementation is done from large, "needs to be exact the first time the product is distributed" to an emphasizing the iterative design. Because technology (e.g., the cloud) has made it possible to make lower-cost changes to instruction it is becoming more important to rapidly develop a prototype of the instruction and test it with some learners for their feedback and effectiveness than in the past. Iterative instructional design is an approach of "incrementally developing and refining a design based on feedback and evaluation. Iterative design can apply to a learning experience, the creation of media, or the development of learning systems" (Culatta, 2021, para. 1).

Instruction is to revise instruction that is not as effective as desired. In Figure 1, this is represented by the cycle around the four elements of instruction. The person who is revising existing instruction for whatever reason, starts by checking several aspects of the system.

- Is a major instructional element missing?
- Is a major instructional element inconsistent with the rest of the instruction?
- Are there constraints to the system that are causing ineffectiveness, and can they be eliminated or minimized?

- Is the instruction integrated with real-world performance?
- The person seeing to revise instruction could also check other variables such as environmental conditions (e.g., heat and noise), management of instruction (e.g., the speed of feedback), and learner variables (e.g., low motivation or inadequate knowledge and skills on entry into the instructional unit).

6. Development Can Start from Any Instructional Element

Instructional designers are usually taught to develop instruction in a rather stepwise manner that starts with analysis of the learners and the learning environment. For example, the experience level of the learners will affect the types of activities incorporated in the instruction being developed. Next, what are the prerequisites, if any. That is followed by an analysis of the knowledge and skills needed to perform the task or solve the real-world problem. This is followed by writing behavioral objectives and then developing the content to enable the learner to obtain the knowledge and skills to reach the end goal and perform the task or solve the problem, and so forth. The teaching method or approach that is best suited to help the learner is designed and is developed to assure that the learner is competent and has mastered the content needed to perform the tasks. There is nothing wrong with this approach and it likely leads to an instructional system that promotes the learning of the end goal if the analyses and conditions faced by the learner in the real-world are completed effectively.

Experienced instructional designers know that development can begin from any element in the system and proceed to the other elements if the elements are consistent in the final instructional plan. This is especially important when revising instruction that is not as effective as desired. For instance, if there is a change in legal mandates or change to a certifying examination, it may be unnecessary to begin from a clean slate if former instruction was effective. In other words, if a sample examination is available, an instructional designer with some experience can use that exam to develop the content and instructional objectives needed to revise the instruction, often using the same effective teaching approaches that have been working. The same is true for a teaching approach that is known to produce results (e.g., flipping the classroom; demonstration; or viewing video performances by more skilled practitioners). The key is to make sure there is consistency throughout the four elements in the final instruction.

7. Conclusions

The world of information and communication has changed tremendously in the past 30 plus years and will continue to do so. Automation and other technologies continue to improve the quality of work people do by allowing them to focus “on more strategic, value-creating, and personally rewarding tasks” (Strack et al., 2021, “Three components of workforce imbalances” para. 1). For these changes to occur, employers seek to employ critical thinkers, communicators, collaborators, and creators to maneuver through the oftentimes globally competitive environment (Zain, Muniandy, & Hash, 2016). Realizing this, school leaders recognize they must help students learn the 21st century skills necessary

to develop flexible, innovative, self-directed employees. Both in school and in the workplace the instructor and the designer of instruction need to master what motivates learners to engage with the knowledge, skills, and abilities needed for developing competencies.

While the major elements of an instructional system have not changed, instructional designers and other learning and development specialists must change the way they work when developing new instruction or when revising existing instruction. The cloud, Internet, and other technologies allows rapid development of instruction with a greater emphasis on the iterative nature of revisions to the instructional system. The added emphasis on the iterative nature of rapid development and revision of instruction makes assessment from learners more valuable than ever. These changes reduce instruction's time-to-market and the cost of development compared with traditional instructional development product before these technologies came into widespread use. Understanding the relationship among the basic elements of the instructional system and the ramifications of changes within that system lets the learning and development professional foresee the consequences of such changes.

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Note

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