Defining core competencies of an instructional technologist

Robert D. Tennyson*

Department of Educational Psychology, University of Minnesota, 178 Pillsbury Drive S.E., Minneapolis, MN 55455, USA

Abstract

Development of effective learning environments in an efficient manner is the goal of instructional development. The process of instructional development in highly complex learning situations requires that instructional technologists be competent in three basic core knowledge areas. This article defines the competency requirements for instructional technologists. Competency in the areas of educational foundations, ISD methodology, and ID process would improve learning and reduce the overall risk in the field of technology-based learning. Included in this article is a worksheet (Appendix) to help the reader rate his or her own competency. © 2001 Published by Elsevier Science Ltd. All rights reserved.

Keywords: Educational foundations; Learning theory; Instructional theory; Instructional systems development; Instructional technologist; Core knowledge

An important variable in employing instructional development in solving learning and performance problems in a technology-based environment is the competency of the instructional technologist in three basic core knowledge areas: educational foundations, instructional systems development (ISD) methodology, and instructional development (ID) process. That is, is the instructional technologist one of the following three types of instructional technology (IT) technologists?

1. An IT novice who has no core knowledge in the ID field?
2. An IT apprentice working in an academic or certification program in one of the fields of study associated with instructional development (such as instructional systems, instructional design, educational technology, human resources training and development, etc.)?; Or,

* Tel.: +1-612-626-1618; fax: +1-612-624-8241.
E-mail address: rtenny@umn.edu (R.D. Tennyson).
3. An IT expert who has strong core knowledge in foundations, methodology, and experience?

The goal of this article, in the context of this special issue, is to help improve the general field of instructional technology as well as improve the work in the field of Internet-based learning environments. This goal of improvement can be reached by defining the basic core knowledge associated with expertise of instructional technologists. After reading this article, use the ID core competency worksheet located in the Appendix to self-evaluate your competency as an instructional technologist.

1. Core knowledge

Instructional technologist is a term used to describe a person who is employing the ID process to solve learning and performance problems and needs in a technology-based learning environment; for example, Web-based instruction. In the general sense, an instructional technologist should have knowledge and skills in educational foundations, ISD methodology, and the ID process. In Table 1, I define three levels of instructional technologist competency in relationship to attributes of competence associated with instructional development. Attributes of core knowledge competency include educational foundations, ISD methodology, and ID process experience.

1.1. Educational foundations

Educational foundations refer to core knowledge in learning philosophy, learning theory, and instructional theory. The importance of this knowledge is in the ability of the instructional technologist to make valid decisions about the application of foundations to curricular and instructional design. For example, when planning a learning environment the instructional technologist (or IT author) needs to consider the relationship between a given learning philosophy and practical implications of costs. Instructional development is not a theory — it is a process for applying ISD methodology to the solving of human learning problems/needs. One’s knowledge

<table>
<thead>
<tr>
<th>Instructional technologist</th>
<th>Attributes of core knowledge competence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Educational foundations</td>
</tr>
<tr>
<td>Novice</td>
<td>No</td>
</tr>
<tr>
<td>Apprentice</td>
<td>Yes</td>
</tr>
<tr>
<td>Expert</td>
<td>Yes</td>
</tr>
</tbody>
</table>
and ability to apply the core knowledge will influence the instructional development process. Knowledge of learning theory, for example, will help the instructional technologist in writing goals and objectives, analyzing content, selecting instructional strategies, employing media, designing the means for evaluating students, and determining costs. Likewise, clarifying one’s learning philosophy will provide the basis of specifying the variables and conditions of the learning environment (e.g. an open-ended learning environment or a teacher-centered, structured classroom with minimal student self-regulation). Instructional development does not have an underlying philosophical basis for education; rather your learning philosophy will influence the solutions you develop. A well-defined philosophy is a key competency in IT management resulting in consistent decision making. The underlying theme of this article is that an educational foundation is the most important variable in development of quality learning environments.

1.2. ISD methodology

Competency in ISD methodological implies skill in applying principles of instructional development (including evaluation, design, production, implementation, and maintenance methodologies). ISD methodologies are extensive and may seem at first glance beyond the comprehension of the novice. The question often raised by the novice is, *is all of this methodological stuff necessary to development a good learning environment?* My answer is a qualified *yes* because it is not necessary to use *all* of the concepts and authoring activities for each and every development situation. In fact, it is a rare situation that an instructional technologist would employ all of the concepts and authoring activities in the ISD methodology. As a person moves from the novice level of instructional development to the apprentice level of competency, it is *not* the acquisition of the ISD methodological core knowledge that distinguishes between the two. It is the third competency attribute of ID process experience that moves the instructional technologist into the realm of the IT expert.

1.3. ID process experience

The third ID competency area refers to skillful and thoughtful performances and experiences in developing successful learning environments. An expert in most fields and disciplines is defined as someone who can analyze problems and needs in a most complete fashion before initially attempting to offer solutions. That is, the expert recognizes the complexity associated with problems/needs and tries to understand the problem as much as possible before advancing to a solution(s). In this respect, we call the expert *competent* in that he or she is able to recognize and define new problems in his/her domain of study and future work, as well as solve these problems adequately (Kirschner, van Vilsteren, Hummel, & Wigman, 1997). Acquired competencies enable learners to apply these skills and attitudes in a variety of situations (i.e. transfer) and over an unlimited time span (i.e. lifelong learning; van Merriënboer, 1999).
In all fields of study and disciplines, formal education involves acquiring the foundational and methodological core knowledge of that given area prior to being able to solve complex problems and to advance knowledge. The skill and creativity to propose and solve complex problems/needs comes with experience in applying the core knowledge in real world situations. The length of time required to attain the status of expert obviously varies according to field and discipline. The more complex the methodology and the more the scope and growth of the foundation component, the more years necessary to become an expert (become fully competent). In the field of instructional development, research studies have put the number of years necessary for expertise in instructional development at approximately 5 years (Perez & Neiderman, 1992).

2. ID expert qualities

Often, it is difficult to define expertise in terms of quantifiable variables. However, given the nature of variability and diversity in expertise it is possible to define certain qualities that an expert may possess. Borrowing from the psychological literature dealing with the dichotomous study between novice and expert, I would like to conclude my discussion of the instructional technologist with a summary of qualities that separate the novice and apprentice from the ID expert (Table 2).

2.1. Knowledge in foundations and methodology

Clearly, foundational knowledge separates the novice from the apprentice. Most certification tests are based on testing the entry-level core knowledge of an individual. For the most part, these tests are evaluating the person’s core knowledge of a given field. In my definition of an expert in instructional development, I identify three foundation areas: learning philosophy, learning theory, and instructional theory. The assumption here is that the IT expert is well prepared in a range of educational philosophies and can differentiate major theories of learning (e.g. behavioral, cognitive, humanistic) and can understand the underlying nature of instructional theories. Associated with strong core knowledge is possession of a thorough hierarchical organization and access to the methodology of ISD. These two qualities are often acquired during formal education and training at the apprentice level.

Table 2
Qualities of IT experts in comparison to novices and apprentices

| Possesses more foundational knowledge in learning philosophy, learning theory, and instructional theory. |
| Better hierarchical organization of and access to ISD methodological knowledge. |
| Spends more time analyzing given learning problem(s)/need(s). |
| More easily recognizes problem(s)/need(s) solution patterns and alternatives. |
| Understands learning problem(s)/need(s) at a more complex level. |
| More carefully monitors skillful and thoughtful solution and development performances. |
However, they are also considered a lifetime effort devoted to maintaining contemporary knowledge in both competency areas.

2.2. Experience in problem solving and solution planning

The next two qualities listed in Table 2 are the result of employing the core knowledge in the service of real world problem situations. The first of these qualities is the recognition that it is difficult, if not impossible, to solve a learning problem/need without an initial and thorough analysis of the situation. Research in the ID field shows that IT experts spend much more time on the assessment and evaluation of the learning problem and solution than do IT apprentices and novices (Perez & Neiderman, 1992). IT apprentices (defined as recent graduates of instructional systems and technology programs), in contrast to the IT expert, rarely consider let alone conduct even a cursory needs assessment before jumping into designing and producing instructional materials. An important activity in the problem/need analysis is the quality that not only does the IT expert recognizes possible solution patterns but also identifies the possibility of alternative solutions. This particular activity is what leads to the development of the four-generation of ISD (for a complete review of the four generations of ISD see Tennyson & Foshay, 1998). That is, the more complex the learning problem/need is, the more possibilities of alternative solutions.

2.3. Understanding complexity

The importance of a strong foundational knowledge is shown in the quality of understanding learning problems/needs at a more complex and sophisticated level. Rather than just accepting a surface level interpretation of a learning theory, the IT expert is well acquainted with the interaction between learning theory, instructional theory, and practical implications such as time and costs. For example, the selection of an appropriate instructional strategy should be based upon an understanding of the learning problem/need not on a current educational fad. An expert instructional technologist has available a wide range of possible learning theories to help in the problem/need solution. Fortunately, the amount and rate of research on learning is constantly expanding, providing increasingly more information on understanding the nature and scope of human learning.

2.4. Experience in planning and management

The final two qualities of the IT expert revolve around planning and management. When an ID solution plan is developed from a situational evaluation, skillful and thoughtful monitoring is necessary to complete the development effort within the time frame proposed. The IT expert understands the value and risks of planning preparation and management strategies to reach the final goal of developing an improved learning environment. These two qualities reflect the process of instructional development.
3. Summary

In summary, an instructional technologist needs competence in three broad domains of core knowledge and experience. Foundational knowledge in the content areas of learning philosophy, learning theory, and instructional theory serve as the knowledge which the instructional technologist can employ in making effective decisions over a range of problems and needs. For example, instead of attempting to apply a single learning theory to all situations, the IT expert selects the appropriate learning theory/theories in relationship to the problem and the resources and constraints available at any given time — that is, the tail does not wag the dog. An IT novice has the opportunity to learn foundational knowledge in formal educational and training environments. However, to maintain expertise, continuous in-service learning is important. Likewise, the IT novice and apprentice can learn the methodology of instructional systems development in formal educational and training environments — for example, courses in instructional systems and technology. But, to assume the title of IT expert, the instructional technologist needs experience in the process of instructional development. To conclude this article, I now recommend that the reader complete the ID core competency worksheet.

Appendix A. ID Core Competency Worksheet

Instructional development is a process to improve the efficient production of effective learning environments. However, readers of this article will exhibit a range of instructional development competency — from novice to expert. Therefore, I recommend that the reader complete this worksheet to rate themselves according to the three core competencies of educational foundations, ISD methodology, and ID process experience.

Step 1

The first step in this rating activity is to grade your core competency in the three areas of educational foundations, ISD methodology, and ID process.

**Educational foundations:** this core area includes the three foundations of learning philosophy, learning theory, and instructional theory. Give yourself a score as to your level of knowledge:

- **Score 1** if you have little or no background knowledge in the three areas. Novice.
- **Score 2** if you have formal coursework in the three areas. However, if you were familiar, for example, with the differences between the three areas but have no self-written statement on each, you would not be an expert. Apprentice.
- **Score 3** if you have advanced study in learning psychology and have prepared a written document defining at least one of the core foundations. Expert.
ISD methodology: the second core competency is knowledge and skill in employing instructional systems development methods. Give yourself a score as to your level of knowledge and skill:

**Score 1** if you have little or no background knowledge and skill in ISD methodologies. For example, if you have no idea what an ISD method is, you are a novice. **Novice**.

**Score 2** if you have formal coursework and training in the conventional ISD methodologies but have minimal experience in post-schooling employment of ISD. **Apprentice**.

**Score 3** if you have both formal coursework/training and experience with ISD methodologies in actual practice. **Expert**.

**ID process experience**: the final core competency is extended experience in application of instructional development to solve complex learning problems and needs. The standard that I apply for minimal experience is five years.

**Score 1** if you have no experience in applying instructional development. **Novice**.

**Score 2** if you have experience but have not yet reached the minimal standard of 5 years. **Apprentice**.

**Score 3** if you have more than 5 years of formal application of instructional development. **Expert**.

**Step 2**

The second step is to add up your three scores and identify your core competency level.

<table>
<thead>
<tr>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3–4</td>
<td>5–8</td>
<td>9</td>
</tr>
</tbody>
</table>

Novice          Apprentice          Expert

**Step 3**

The third step is to use this competency level rating in any educational planning or IT experiences.

**References**


