MAXIMIZING TECHNOLOGY INTEGRATION EFFORTS USING A RESEARCH-BASED APPROACH

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Abstract

Integrating technology into a curriculum can increase the efficiency and effectiveness of the curriculum; however, technology integration represents a formidable instructional problem. A deliberate analysis must precede integration efforts to understand this problem and determine how to optimize the potential learning gains of technology integration. This analysis should examine how the learning system will affect the integrated technology and how the technology will affect the system. This paper describes an approach called Technology Integration Analysis (TIA). The TIA is an approach for analyzing a learning system to identify the most effective and efficient way to integrate technology.

The TIA represents a different way of thinking about integrating technology into a curriculum. The TIA treats technology integration as more than overlaying hardware and courseware onto existing course structures. Successful technology integration requires a complex analysis of the interrelated components of the learning system leading to purposeful recommendations for effective and efficient technology integration to maximize the learning system. Basing the TIA approach on a research model allows flexibility to customize the analysis for every environment rather than prescribe a lockstep procedure that may not work well in all situations.

The TIA is an inductive, empirically based research approach for conducting an analysis. This approach ensures the critical variables that impact the effectiveness of technology integration are explored. This paper will describe the TIA approach including the principles guiding the analysis, the research goal, and some of the research questions used to meet that goal. The learning system examined during the analysis will also be defined and applications of the TIA in military environments will be described. This paper concludes with a summary of the advantages of using a research-based approach for conducting an analysis in preparation for technology infusion.

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INTRODUCTION

Consider an existing learning system like a puzzle where all the pieces of the learning system fit nicely together in a well-organized structure. Suppose another piece, called technology, is introduced into the puzzle. If the technology piece is forced into the puzzle, the puzzle begins to break apart. The learning system may eventually accommodate the new technology piece, but the transition is likely be quite disruptive and the final accommodation may not be what was intended and may not fully exploit the benefits of the proposed technology.

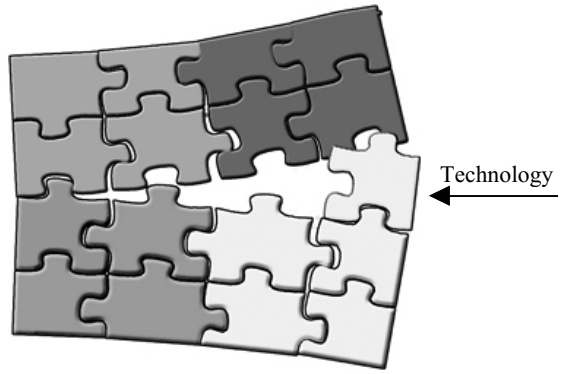

Figure 1. Introducing technology into an existing learning system.

Predicting how the technology puzzle piece will fit into the system provides an opportunity to prepare the system to accommodate the technology and to prepare the technology to fit better into the system. The Technology Integration Analysis (TIA) does just that. It is an approach to study how the integration of technology is going to impact the learning system and how the learning system is going to impact the effectiveness of the technology.

Technology infusion can increase the efficiency and effectiveness of a curriculum; however, a deliberate analysis must precede infusion efforts to optimize potential gains. The TIA approach described in this paper identifies opportunities to integrate technology to increase the effectiveness and efficiency of a targeted course and the learning system in which it resides. This approach provides a framework for examining all variables of the learning system and recognizes the dynamic nature of the relationships among these variables. The TIA provides a guide for maximizing the acceptance of technology infusion efforts and the achievement of instructional gains predicted by the advocates of technology.

WHAT IS THE TIA?

The TIA Is Not A Media Selection Model

To describe what something is, it is often useful to explain what it is not. The TIA is not a media selection model. There are several ways the TIA differs from media selection models. First, most media selection models consist of a flow chart, decision tree, matrix, table, or worksheet that take the user through a series of yes/no decisions (for example, Marx, 1999 and Romiszowski, 1988) to determine the media best suited for the course content. Many of the elements considered in these models are laudable, but often these elements require more than a simple yes/no consideration. Heinich, Molenda, Russell, and Smaldino (1996) state (p. 45) [t]he limitation of such media selection models is their emphasis on simplicity. Reducing the process to a short checklist may lead one to ignore some possibly important considerations. The TIA differs from many media selection models in that it offers a more comprehensive approach to exploring selection elements, how they interact, and how they affect the learning system.

Second, unlike the TIA, some media analyses rely on matching media attributes to learning requirements for selecting media (e.g., Smith & Ragan, 1993; Marx, 1999). This approach considers only one small piece of the complex learning system puzzle. Understanding the attributes of a medium is only one consideration for making technology integration decisions; more information about the learning system is needed. For example, a learning objective for self-paced instruction indicates a student must identify enemy aircraft. Pairing this requirement to the attributes of media could lead to the use of photographs as a medium for helping

students meet this objective. However, merely matching the objective requirement to media attributes does not take into account the learning environment, the working environment, students previous knowledge, students learning preferences and needs, staffing, and facility issues, all of which will affect the effectiveness of technology integration. In the example, photographs were an ineffective medium for several reasons. One reason was that students tended to memorize the photos rather than learn the attributes of the aircraft and thereby failed to identify aircraft under different conditions. Also, the single dimension provided by the photographs did not facilitate learning to identify aircraft from multiple angles or various distances. In addition, although competition among students was highly effective for motivating this student population, the use of photographs did not take advantage of this opportunity. These aspects of the learning system, as well as additional factors, were considered in determining that interactive courseware with a gaming function was the most appropriate medium. An audit that simply matches media attributes to learning objectives would not link the critical learning issues to solve this learning problem. The TIA looks at learning occurring in the classroom as well as how learning fits into the learning system, including the organization in which learning takes place. Considering the bigger picture shows how technology integration will affect the training pipeline, performance on the job, and ultimately the effectiveness of the organization.

And third, media selection models fall short by failing to help the user to integrate the technology whereas the TIA leads the user to a technology integration strategy. Although media selection models may assist the user in selecting a delivery technology, they fall short by failing to tell the user how best to integrate the selected technology into the learning system. For example, a media selection model may help the user decide that self-paced interactive courseware (ICW) is the best medium for delivering the content of a lesson. However, getting students access to computers may be difficult, or providing staff to maintain the hardware or courseware may be impossible due to budgetary constraints. Also, instructors may have little experience with computers and find it difficult to support their use. Some instructors may fear the computer will replace them in the classroom. All of these factors (as well as others not mentioned here) suggest a multifaceted strategy for making the ICW work in this learning system. The approach of the TIA is to study the learning system so that the user will be able to identify the best methods for making the introduction of technology into the system successful.

The TIA Approach Is Different From ISD

The TIA does not fit neatly into the current instructional system design (ISD) model (analyze, design, develop, implement, and evaluate). The traditional ISD model helps subject matter experts and practitioners to create instruction. The TIA helps practitioners study a learning system to determine the most effective and efficient way to integrate technology to include selection of appropriate hardware, recommendations for courseware design, priorities for course conversion, and recommendations for using technology with existing trainers and instructional media and materials. Although the TIA has been used primarily after a course has been designed, it could be argued that the TIA would be appropriate during the analysis phase of the ISD model. Elements studied during a TIA in the analysis phases certainly could contribute to all phases of the ISD process. However selection of delivery technology is traditionally considered as an integral part of the design, development, and delivery components of the ISD model. Few pursue this aspect during the analysis stage (Piskurich and Sanders, 1998).

The TIA approach is also quite different from traditional ISD procedures. The TIA is not a step-by-step procedure to be followed, as are many ISD processes. Current procedures and standards (for example, the Navy s NAVEDTRA 130) assure that a standardized ISD process will be followed each time it is used. While efficient for ensuring uniformity, the process leaves little room for examining the new ways of approaching learning. They do not fully account for the many issues that must be considered prior to successful technology integration. In many respects technology integration represents innovation, presenting unknowns and opening doors for instructors and learners to present and think about information in new and different ways. The TIA allows for an exploration of issues to try to uncover these unknowns and unravel the complex issues facing successful technology integration.

This exploratory approach is one way the TIA is set apart from the ISD approach. ISD was designed to become a technology of instruction –~~a~~ process which, used as directed, would produce predictable, reliable results in learning (Gordon and Zemke, 2000, p. 48) and using the ISD process will produce acceptable and safe training. However, Gordon and Zemke (2000) argue that ISD was never meant to be so prescriptive. The elements of ISD were meant to guide thinking processes used for creating instruction, and was never meant to be a lock-step, engineering-like endeavor (Gordon and Zemke, 2000, p. 48). Diane Gayeski (as

cited in Gordon and Zemke, 2000) suggests that the prescriptive nature of the ISD model came about as a way to make the training profession sound more scientific. The TIA represents this new way of thinking about how ISD is performed. Rather than relying on a deductive approach leading to acceptable training, the TIA relies on an inductive approach leading to exceptional training.

In summary, deductive approaches have not accommodated what a technology integration analysis should be. The TIA represents a different way of thinking about integrating technology with learning. The TIA treats technology infusion as more than converting existing paper-based courses to electronic format or conducting audits linking test items to objectives. Converting overheads to PowerPoint slides does not necessarily represent technology integration.

Technology integration is a formidable instructional problem. Learning occurs in a complex environment where many variables affect the success of the learning experience. Successful technology integration requires a complex analysis of the interrelated components of the learning system that leads to the identification and understanding of the problems that must be solved and identification of the best solutions. The best way to identify and understand the aspects of this instructional problem is to use an inductive, empirically driven, research approach.

This document describes a different approach to technology integration analysis that will identify opportunities to infuse technology to increase the effectiveness and efficiency of a targeted course.

TIA PROBLEM SOLVING APPROACH

The TIA uses an inductive research process to solve technology integration problems. Research is the systematic application of a family of methods that are employed to provide trustworthy information about problems (Gay & Airasian, 2000 p. 3). Technology integration presents a formidable instructional problem. Learning occurs in a complex environment where many variables affect the success of the learning experience. A purposeful effort to examine these variables is necessary to find the most efficient and effective way to integrate technology. Research methodology provides a systematic way to examine all aspects of the technology integration problem, ensuring that the instructional problems will be identified, understood, and that comprehensive solutions can be provided. Using a research methodology also allows flexibility to customize the analysis process for every environment rather than prescribe a lockstep procedure that may not work well in all situations.

Research can be characterized in many ways. The TIA is best characterized as using an empirically based approach; observations are collected in the real world of the learning system under study. The TIA is based on a set of guiding principles and it utilizes a research goal, research questions to pursue that goal, and proven data collection and analysis methods to answer the research questions.

Guiding Principles of the TIA

Stating these principles provides context for understanding the selection of the research goal, research questions, and methods for answering the research questions. The following principles drive the TIA:

- Learning needs should be the primary consideration when making hardware, software, and courseware recommendations.
- The nature of the course and the circumstances surrounding the course should affect the methodology selection for the TIA.
- The TIA requires well-developed analysis skills and a strong background in instructional theory and design. In fact, Piskurich and Sanders (1998) identified 31 competencies that practitioners need for implementing appropriate learning technologies. Furthermore, the TIA is neither linear nor lockstepped and decisions requiring professional judgment for determining the next steps are required throughout the TIA. In addition, once data are collected and analyzed, synthesis of findings from various analyses must be done, requiring the integration of different kinds of data from many sources.
- It is unlikely that one medium will fulfill all needs. The TIA will lead to recommendations regarding the mix of media that will best suit the most needs.
- The key to effective instruction is the selection and use of an effective instructional strategy and instructional methods supporting the strategy. The media do not cause learning to happen; instructional methods stimulate learning.

- Gains cannot be achieved simply by overlaying hardware and courseware on the existing course structures. Technology must be *integrated*, often allowing more effective or efficient strategies to be implemented.
- Learning occurs within a system. To make intelligent recommendations concerning technology infusion the learning system must be understood. Infusing technology into one part of the system will have impact on all parts of the system. By understanding the system, these impacts can be predicted and maximized.

Research Goal

One distinct characteristic of research methodology is that it requires clear articulation of a goal (Leedy, 1989). As such, a research goal for the TIA must be identified. The research goal guides the research questions that are investigated during the TIA. The research goal of the TIA is to determine if and how technology can be effectively and efficiently infused into the targeted course by examining:

- how training is currently being conducted in the learning system;
- what ways technology could support and improve learning in the learning system;
- how technology will impact other components of the learning system;
- how the learning system will impact the integrated technology;
- the priorities for technology integration;
- infrastructure requirements for implementing the technology infusion plan; and
- the costs and benefits of technology integration for the learning system.

The Learning System Defined

Understanding the learning system is key to successful technology integration. Any course is one part of a larger system in which learning is intended to occur. Introducing a change to one part of the learning system (e.g., integrating technology) impacts all components, which ultimately impacts learning and performance in the organization. It is critical to the success of technology integration efforts that the impacts on the whole system are understood so that appropriate recommendations can be made.

A learning system can be defined in many ways and can be as large as the definition allows. The TIA learning system model is defined as being made up of the course, people, infrastructure and the environment (see Figure 2).

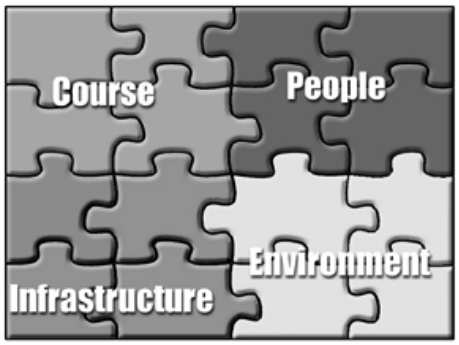

Figure 2. The TIA Learning System Model

The course component of the learning system consists of the content (what is delivered) and the instructional strategies (how it is delivered). The people component includes the instructors and the students immediately involved in the course. Although other people are certainly involved in the learning system, they are considered to be part of the infrastructure and environment. The infrastructure provides the resources and processes for supporting the learning system. Two elements have been identified as part of the infrastructure component; management issues and facilities. And the environment component provides the context within which the course exists. Organizational culture and the training continuum are elements of the environment component.

This model is depicted as a puzzle in Figure 2. The puzzle pieces could be reconfigured to fit together in many different ways but they fit together in the manner shown because the puzzle pieces were designed to fit together in this way. Learning system components can also be designed in different ways, but are designed to fit together in a specific way to create a learning system to meet identified learning needs. The shapes of the pieces and the way they interconnect represent the relationships among the components and elements of the learning system. Understanding these relationships is key to understanding how the learning system is designed and how it functions.

Using this systems view of learning acknowledges the important role of all components in the learning system and organizes the complex set of decision criteria that must be considered to meet the research goal. Each component must interact effectively in order to achieve the learning objectives of the course. No one component should be overemphasized in the learning system, and the contribution of each component needs to be considered to maximize learning.

The following research questions will lead the analysis team to an understanding of the learning system, which will lead to meeting the research goal.

Research Questions

This section contains TIA research questions that help explore the learning system. The research questions are organized by the components of the learning system model. Within the components of the learning system (course, people, infrastructure, and environment) several elements help to define each component. The components and elements are summarized as follows:

Course	People
Content	Instructors
Delivery	Students
Infrastructure	Environment
Management Issues	Organizational Culture
Facilities	Training Continuum

As with most research endeavors, each research question must be considered in conjunction with the others. The answer to one question often cannot be fully answered without the answers to other questions. And, as more is learned through various data collection processes, the answers to the questions will evolve. The answers to most of these questions are not simple and can not be answered through one source. Several sources should be accessed to thoroughly examine each question and to ensure an accurate and comprehensive answer can be provided. Interviews, surveys, document analyses, and observations are examples of how data may be collected to answer the research questions. The research questions are not necessarily appropriate questions for interviews or surveys however, they provide the basis for determining appropriate data collection strategies and related questions.

The following research questions are provided as examples of the information gathered for each component of the learning system and are organized by the elements and components of the learning system model. Although most research questions can be used in any TIA, the flexibility of this approach allows for additional research questions to be added (or some deleted) to accommodate the characteristics of the learning system under study. There are many research questions that could be pursued, however, only a small sample is provided in the following sections.

Course —Content. This area is primarily concerned with the characteristics of the course content.

Validity of the Content. It is important to establish the validity of the course content under study. Content that is not relevant to current fleet practices does not need to be converted to a computer-based delivery format. The currency of the curriculum and the stability of the content will indicate whether a content update is necessary and whether technology infusion efforts should be temporarily delayed.

- Are there any redundancies in the curriculum?
- How frequently does the curriculum change?
- Is the curriculum appropriate given fleet operations?
- Are there any anticipated changes in the fleet that will affect the curriculum?

Course objectives. Instructional goals as stated in the course objectives are important to understand so that technology infusion recommendations will support these goals. Also, understanding the requirements stated in the objectives helps determine if and how technology can support objectives and indicate if there are opportunities for reusing content objects. Critical objectives are also considered as part of the content characteristics. Typically, critical objectives are those that are considered important in relation to its application to actual job performance. Identifying the critical objectives is important to ensure they receive adequate treatment during the course.

- Can course objectives be supported by computer-based technologies?
- What are the most critical objectives in the course? And how can they be supported by computer-based technologies?

Content Characteristics. Questions regarding the characteristics of the course content lead to a better understanding of the course requirements.

- What are the most difficult topics for students to learn and why are they difficult?
- Which labs are the most difficult for students and why?
- Which course topics are appropriate for IMI?
- Which course topics could be supported by IMI in a learning resource center (LRC)?
- What is the priority for electronically converting the course?

Course —Delivery. This area is primarily concerned with how the course is delivered, including the assessment strategy.

Instructional strategy. The overall instructional strategy for a course is examined. For example, in one A School course, instructors typically introduce a system, review theoretical troubleshooting with students in class, and then work with students in labs where

students practice troubleshooting on trainers. Sequencing of the content is also addressed because this impacts the overall effectiveness of the course. If the content is not sequenced well, the addition of technology may not increase the effectiveness of instruction. Safety is always as issue, but affects courses differently.

- What is the general instructional strategy of the course?
- How are students involved in the learning process?
- Is the sequencing of topics appropriate to the training situation?
- How are safety issues addressed during the course?

Current instructional methods. These questions focus on how individual lessons are currently taught. Specifically, what methods and media are used to deliver instruction. Trainers should also be examined to see how well they are able to meet specified objectives and if computer-based training (CBT) could support learning with the trainer.

- How are objectives currently taught in the course?
- What media are used to deliver instruction (e.g., transparencies, flockcards, models, lab, and PowerPoint presentation)?
- How do current training equipment/devices support instructors and how could CBT help?
- Is distributed learning a viable option?

Learner assessment. The assessment strategy should also be examined and considered when making technology infusion recommendations. Looking at the level that the curriculum is tested and how the objectives are tested provides a better understanding of the learning requirements placed on students. Computer-managed instruction issues should be considered when looking at how testing results support learning (e.g., remediation assignments).

- To what level is the curriculum formally tested?
- How are objectives formally tested in the course?
- How often are students formally tested on knowledge and performance?
- How often do student receive informal feedback? How is it provided?
- How are testing results used to support learning?

People —Instructors. Instructors attitudes about technology and their level of preparedness for technology infusion are the focus of these questions. Also, any performance issues that may affect technology infusion should be investigated, e.g., inability to provide sufficient feedback due to the size of the class. Collateral duties may also affect infusion because instructors may have difficulty finding time to become accustomed to technology.

- What are instructors computer skills?
- What are instructors attitudes toward technology infusion?
- Are there any instructor performance issues that may be addressed by CBT?
- How might technology infusion affect instructors performance or role?

People —Students. Student demographics may provide some indication about the likely success of technology infusion, or provide insight as to the most effective ways to infuse technology. Selection criteria need to be considered because poor selection criteria can affect the efficiency and effectiveness of the entire course. Student preparation for the course may help to identify ways technology could be used to prepare students before they begin the formal portion of the course.

- What are the demographics for the student population?
- What are students attitudes toward technology infusion?
- What are students computer skills?
- What are the selection criteria for this course?
- How prepared are students for this course?

Infrastructure —Management Issues. These questions focus on management issues affecting the efficiency and effectiveness of the course. Questions address computer-managed instruction (CMI) needs and staffing needs to support any technology infusion efforts. Questions also address time required for students to meet objectives to identify opportunities for more efficient instruction. Many of these questions will provide data for a Return on Investment (ROI) analysis. Although learning is the most important aspect of the recommendations to infuse technology, ROI issues will be a critical factor for making final decisions. Identifying ROI opportunities (shortening the length of the course, re-use opportunities) and the impact on other components of the training continuum (including the fleet) is important.

- What are the CMI needs?
- What staffing infrastructure is currently in place to support technology infusion and maintenance? What will be needed?
- Are there any pooling problems related to students waiting on a course to begin?
- Are there bottlenecks, and when do they occur?
- What is the attrition rate? What are the reasons for attrition?
- What are the benefits and costs (and risks) of implementing each recommendation? (In terms of the students, instructors, schoolhouse, the command, and the training continuum.)

Infrastructure —Facilities. Facilities must be able to support the recommended hardware. These questions

will provide information regarding the current condition and capacity of the facilities. Also, if any existing electronic classrooms or learning resource centers are in use, they should be considered in the technology infusion recommendations.

- What physical infrastructure is in place to support technology infusion and maintenance?
- What are the capacity and restrictions of the current facilities?
- What alterations will be necessary to accommodate technology?
- What electronic courseware is currently available for this course?

Environment - Organizational Culture. Understanding the organizational culture provides one indication of how well technology infusion efforts will be received. An organization that is very suspicious of technology may require recommendations for a slow infusion schedule coupled with opportunities to educate the organization on the benefits of technology in their classrooms.

- Are there any aspects of the organizational culture that may affect technology infusion efforts?

Environment - Training Continuum. The training continuum encompasses any and all training and experiences that may precede or follow the course being studied. The training continuum and how the course contributes to the continuum need to be understood before recommendations are made that may impact different points of the continuum. The training continuum includes the fleet environment in which students will work. The characteristics of the work environment may help explain why certain strategies are implemented in the current course. Also, current training may or may not be helping students prepare for working in the real-world conditions in the fleet. A training environment with higher fidelity may be necessary for preparing students for the fleet.

- What is the training continuum and where does this course fall in the continuum?
- Has technology been infused in other areas of the continuum? Where? How?
- How could follow-on courses benefit from any electronic courseware developed for this course?
- What are the most difficult aspects of the job in the fleet?
- What performance issues do the fleet face?
- What will the work environment in the fleet be like for the students of this course?

APPLICATION OF THE TIA IN THE MILITARY

The TIA approach has proven useful in the various military environments. In many situations, the case could be made for the integration of technology into the existing course because course objectives and learning outcomes would support the use of technology. However, different components of the learning system played key roles in determining which technologies should be integrated and where and how the technology integration could best achieve the course goals.

By examining research questions for each of the four components of the learning system, the course, people, infrastructure, and environment, the TIA provides information needed to assess priorities and make decisions to meet their needs. Although each project begins with a core of similar research questions, there is no single formula used to determine the outcome. Certain common themes often emerge (e.g., problems of meeting diverse learning needs of students, conflicts with existing organizational culture, limitations of the infrastructure). Decisions of which technologies to integrate or where in the curriculum to integrate them often have been based on balancing the needs in several areas. Each of the examples below illustrates how the analysis approach was used to balance these needs of the learning system.

Course 1

This course provided academic instruction in math, science and English. The technology used to teach the course was minimal; sometimes dry erase boards or overheads were used. Course content would readily support delivery through advanced media for both group-paced instruction and self-paced instruction, however, it was the present and future environment that played key roles in making technology decisions. A goal of the course was to prepare students to be competitive with their peers in academic settings. To do so, students needed computer skills to communicate and prepare research using electronic resources. Therefore, recommendations for Course 1 included establishment of minimum skill sets for computer competency and workstations accessible 24 hours a day for each student as well as incorporation of technology into math, science and English curricula.

Course 2

Course 2 provides a different example of the role of environment, and in particular organizational culture, plays in technology integration decisions. Course 2 provided hands-on training with minimal emphasis on theory. Technology could be used to enhance conceptualizations of systems that are too large for individuals to see when they practice on real equipment or to prepare students for training simulators. However, a compelling reason for including some computer-based

training was that the organizational culture was beginning to require computer literacy for all jobs. In order to function within the system, order materials, communicate with others, individuals needed opportunities to gain computer literacy. Incorporation of computer-based technology to enhance learning and provide computer experience was recommended.

Course 3

This course provided skill training with an emphasis on application of theory to make decisions quickly. Current instructional methods, learner assessment issues, and infrastructure strongly influenced technology integration decisions. Although students had been required to memorize information, the integration of technology offered opportunities to provide structural frameworks for both conceptual and visual knowledge (e.g., using a split screen to show how the change in a setting on a console can change the position of an aircraft.). Technology integration to supplement trainers and provide opportunities for practice and immediate feedback at points where bottlenecks could occur were among the recommendations.

The comprehensive nature of the TIA approach calls attention to the sometimes competing needs within the learning system and can serve as a guide for anticipating how changes will affect the entire system. The framework does not presuppose a formula for determining which component is most important for technology decisions. Rather it helps to identify issues so that decision-makers can more fully understand and identify potential obstacles. To use the metaphor of a puzzle once again, the flexibility of the TIA permits not only a good fit within the existing puzzle, but also allows for the creation of new designs where appropriate, puzzles that fit together but take a new shape.

CONCLUSION

The advantages of using the TIA include;

- The TIA helps the user to identify a technology integration strategy rather than simply select appropriate media.
- The TIA provides a framework for considering a wide range of variables rather than limit the user to a lock-step approach.
- The TIA does not presuppose a formula for determining which variables are most important.
- The TIA permits a good fit of technology within the existing learning system and allows for the creation of a new learning system design when appropriate.
- The TIA provides a framework for addressing all areas that could help in problem identification.
- The TIA addresses each major learning system component, however emphasis varies and outcomes markedly differ based on the learning system being examined.

The TIA presented here represents a different approach to the integration of technology into a learning environment. It is an approach that can be used by seasoned ISD professionals to study and solve the technology integration problem. Users should find this approach useful as a way to study the technology integration problem and create an effective technology integration strategy.

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