Potential of Interactive Multimedia Instruction for Air Traffic Control Training

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Abstract

Interactive Multimedia Instruction, or IMI, has evolved from early computer-based slide shows to the modern game-based courseware employed by many organizations to provide initial, specialized, and recurring training for their members. This field holds tremendous potential to revolutionize air traffic control training. A brief definition and history of IMI, as well as the possibilities it holds for the training of controllers will be addressed.

Introduction

Huge strides are made every year in the field of information technology. Processors are running faster, software is becoming smarter, storage is constantly cheaper and more reliable, and ever expanding networks allow for the rapid sharing of more information than at any other time in history. These advances have led to advances in business, entertainment, international commerce, and education and training.

IMI Defined

Interactive Multimedia Instruction is a term that seems to defy definition. Often, what it is depends on who is doing the defining, or under what conditions is it being designed and used. It can range from a simple narrated slide show, to a very complex, distributed, multi-user virtual reality scenario in which the students are required to make decisions and apply knowledge already presented to them. However, describing IMI in terms of the desired instructional features yields a clear, easy to understand functional framework that can serve as a basic definition. According to Schwier (1993), IMI is:

- instructional,
- multiply-sourced (i.e., multiple media sources are involved),
- segmented,
- intentionally designed, and
- coherent.

By applying these concepts, an instructional designer can create targeted, engaging, and easy to use courseware for any subject.

Within the instruction design community, IMIs and components of IMIs are usually defined in terms of an interactivity level. The four interactivity levels are defined and described in Table 1.

Interactive Multimedia Instruction Interactivity Levels	
Level 1	Passive – The learner is introduced to ideas and conceptual information in a linear format such as a PowerPoint presentation with minimal interactivity.
Level 2	Limited Participation – The learner is required to recall more information and makes simple responses to instructional clues.
Level 3	Complex Participation – The learner has increased control over the lesson and makes decisions using varying techniques in response to instructional cues and applies complex information to solve a problem or produce results.
Level 4	Real-time Participation – The learner is directly involved in a life-like set of complex cues and responses within a real-time simulated 3D environment. Learners recall large amounts of information and demonstrate specific tasks with measurable results.

Table 1 – IMI Interactivity Levels

These four levels of interactivity clearly and succinctly describe the characteristics to be expected in any IMI. As technology has developed, implementing level 4 interactivity has become both easier and, therefore, more common. Many of today's most advanced IMIs more closely resemble video games rather than the earlier purely instructional applications.

Evolution of IMI

In the early days of IMI, products were quite rudimentary, residing primarily in the level 1 domain. Most consisted of narrated slide shows with some basic computer animation. Interestingly, advances in computer gaming, particularly in the area of animation and graphics, often crossed over into the area of instructional design only after long examination and testing. In recent years, however, the instructional design community has been much more willing to embrace new developments.

Early IMIs were also hard to develop and complex to administer. As computers have become ubiquitous and more powerful and authoring software less expensive and easier to use, the time and effort required to create and maintain IMI has diminished significantly. Initial development can still be time consuming if the IMI is particularly complex and employs a lot of level 4 interactivity. Scripting of the scenarios, creating three dimensional renders, and generating and introducing complex animation still requires training and experience, but the process is getting easier to manage.

IMI and ATC Training

One of IMI's greatest strengths is that it provides the means to ensure training can be consistently delivered nearly everywhere and any time. Students in geographically separated locations can be assured that they receive the same information delivered in the same way that any other student taking the course receives. This leads to the first possible use of IMI in ATC training. Most professionals require periodic recurring instruction, and ATC is no exception. IMI could be effectively employed at multiple organizational levels. First, those topics that need to be reviewed periodically by all controllers FAA-wide could be written into IMI managed through an online educational "blackboard" system. This allows students to access the training from anywhere, and has the functionality to record and report results.

Locally, facility training managers could author and customize training for controllers for whom they are responsible. This training could include both initial certification training as well as recurring regional instruction. In addition to providing standardized classes that students could access at any time, by mating the IMI with a computer-based training record system could automate student performance data collection and storage.

At a more fundamental level, IMI could be incorporated extensively in conjunction with the Air Traffic Selection and Training test, or AT-SAT to screen potential candidates, as prerequisite training prior to starting formal training, during initial controller training at the FAA Academy in Oklahoma City and. As part of the screening and selection process, lessons could be developed to work with the AT-SAT to evaluate potential candidates' suitability for ATC training. Once an applicant is accepted, off-site prerequisite instruction could be accessed from the student's home of record prior to reporting to the Academy. This allows a student to arrive at the first day of resident training better prepared for the rigorous training to come and could reduce the in-resident training time for students. Finally, incorporating IMI into the existing Academy curriculum, with its inherent consistency and ability to be electronically and automatically evaluated and the resulting data stored, can reduce workload on instructors and improve student retention by

While IMI does include some level of simulation, especially if level four is employed, it would not, and indeed could not, replace current or planned/emerging simulator systems. ATC training will always require a way to put the trainee into a realistic, dynamic operational environment where they can practice the principles, concepts, and techniques learned in the classroom. However, by using IMI, that classroom experience can be greatly enhanced and improved.

Conclusion

The state of the art of information technology holds tremendous potential for air traffic control training. Developing and using specially designed IMIs can facilitate controller selection, screening, education, and recurring courseware. IMI is not, and is not intended to be, a panacea for all training requirements of the field. Live instructors conducting classroom instruction and facilitating simulation scenarios will be necessary as long as there are humans providing air traffic control services within the national airspace system. However, IMI can increase training efficiency and effectiveness, ease some of the workload on those human instructors, and aid in standardizing instruction across the entire training domain.

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