Evaluation of On-line First Responder Training:
Not Always Right, but Always Learning

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ABSTRACT

First Responders must make on-the-spot decisions that affect their own safety and that of many others. They are extremely vulnerable because of the urgency of their decisions, subsequent actions and frequent unknowns surrounding the situations they find themselves in. As potential recipients of their service, we expect them to be well trained and up to date on medical knowledge and procedures, especially for accidents or major incidents. Much first responder continuation training takes place in large seminars and consists of lectures on diverse subjects that may be of interest, and, less likely, of use to most first responders. This issue led to a program to standardize treatment protocols and provide first responders training that keeps their knowledge and skills sharp. This report discusses a set of on-line courses that were developed under military sponsorship, but which are of specific interest and use to the emergency medical service community. The paper reports the partial results of a validation effort for two of these courses: WMD/HazMat and Mass Casualty Incidents. There is much to learn, even from these partial results. The authors have been quite candid in reporting both success and failure.

This paper will report the process employed to evaluate the effectiveness the e-learning system, report the results, and discuss implications. The authors not only report their findings about the effectiveness of the continuation training tool, but also about the use of web-based technology as a delivery medium.

ABOUT THE AUTHORS

William J. Walsh has been designing innovative training and education technologies for military and civilian customers since 1968. His work has ranged from defining requirements for new training systems, designing and developing e-learning and intelligent tutors, and developing and delivering train-the-trainer courses. Mr. Walsh has been active in I/ITSEC over the years as a paper author and presenter, as 2001 Program Chair and 2003 Conference Chair. Mr. Walsh has a BA from the University of Scranton and a MA from The Pennsylvania State University.

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Gerald Kastigar has over 20 years experience in Instructional Systems Design (ISD). Recently he has been involved with development of on-line training programs for a variety of customers. Mr. Kastigar is a former Navy Corpsman and Intelligence Specialist. He is currently pursuing a MIS degree at Wright State University.

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INTRODUCTION

The Emergency Medical Technician Practice, Learn and Use System© (EMT-PLUS™) is the commercial outgrowth of a Small Business Innovation Research (SBIR) contract for Global Treatment Protocol Course (GTPC) via Advanced Distributive Learning (Gearhardt, et al., 2003; Walsh, et al., 2004; Gearhardt, et al., 2004; and Gearhardt, et al., 2004a) managed by Dr. Barbara Sorensen of the Air Force Research Laboratory, Human Effectiveness Directorate, Warfighter Readiness Research Division. This report of the on-line courseware validation effort will complete Phase II activities. In fact, commercialization of the product is already underway.

EMT-PLUS™ courseware consists of ten (10) independent continuing education courses which follow the GTPC protocols. Of these ten courses, five (5) are scheduled for completion by September 2006, and are either in validation, just completing validation or preparing for validation. The courses and their continuing education credits are:

- WMD/HazMat (5 CEUs)
- Mass Casualty Incidents (3.5 CEUs)
- Trauma (5 CEUs)
- Medical Emergencies (5 CEUs)
- Infectious Diseases (4.5 CEUs)

While the courses are based on protocols that were originally aimed at standardizing medical treatment procedures and training across military services, they soon became narrowly focused on civilian emergency responders because each of the military services was concerned with their own specific issues.

THE PROBLEM

This report discusses partial results of the validation effort. The focus is on two of the first five courses to be developed: WMD/HazMat and Mass Casualty Incidents. We feel that even the partial results have much meaningful information for those who may be involved in validation activities at one time or another. We have been quite candid in reporting both our successes and our failures. In the opinion of the authors, both can contribute something to those who will follow in our shoes.

As a commercial product, it was imperative that EMT-PLUS™ courseware be moved into the marketplace as quickly as possible. Sometimes haste in getting things ready forces us to make decisions that we would otherwise have not made if we had time. Like the infamous World War II Operation "Market Garden," planning was not always flexible and ready to adapt to changing circumstances. The results can be significant to the entire program.

A Word about Design

In designing and developing the EMT-PLUS™ courseware, including the two courses that are the subject of this study, we made conscious design decisions based on instructional principles that we hoped would be received well by our target audience. The principles we followed were: 1) Learning occurs in context and technology can facilitate learning by engaging learners in solving complex problems in real world contexts (Duffy & Cunningham, 1996; Honebein, 1996; and Brown, Collins & Duguid, 1989); 2) Learners should have control over their learning environment (Hannafin, 1984; Reigeluth & Stein 1983; and Hannafin & Hooper, 1993); and 3) Learners should be presented ways of assimilating new information to existing cognitive structures. Learning should be extensible by providing tools that extend learning beyond the immediate environment (Cognition and Technology Group, 1994; Roblyer, Edwards, and Havriluk, 1997). Each of these instructional design principles were used in designing and developing the courseware. As a consequence, we made use of actual case studies in which students were asked to solve the problem. We enabled students to control where they wanted to go in the course, what to study next, and when to do it. Finally, we offered students additional

learning aids which they could use or not in the course and certainly employ after the course on-the-job.

PART I: WMD/HAZMAT VALIDATION RESULTS

During the period 6-19 February, 2006 a formative evaluation was conducted to test whether the EMT-PLUS™ Weapons of Mass Destruction/Hazardous Materials (WMD/HazMat) courseware was effective with trainees.

Process

When viewed in light of military training the evaluation of this course should be considered a validation study. During the validation, we used the approach outlined in MIL-HDBK 29612-2A Instructional Systems Development/Systems Approach to Training and Education, and TRADOC Pamphlet 350-70-10, Systems Approach to Training Course and Courseware Validation.

The validation was planned to consist of a screening test to determine the participants' level of entry knowledge, use of the on-line course over a period of approximately two weeks, and an end of course test to measure learning gain over the period of study.

Screening Test

A screening test was administered to ninety two (92) members of the Kettering, Ohio Fire Department (57%). The screening test was used to determine how much knowledge of the subject matter (Weapons of Mass Destruction/Hazardous Materials - WMD/HazMat) each participant had prior to taking the on-line course. The screening test indicated that the department as a whole had some knowledge of the subject matter (average score 60.7), but most members taking the test (79%) had insufficient knowledge of the subject matter and failed the test (passing score was set at 70). Results of the screening test are as shown in Figure 1 and Figure 2.
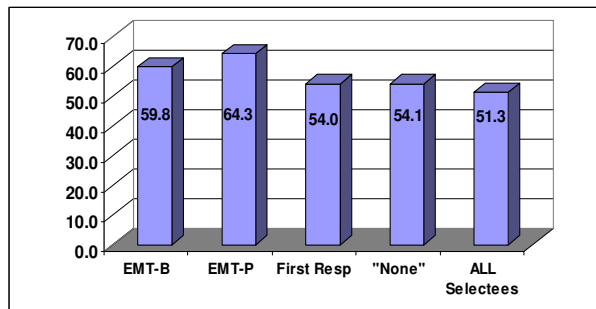

Figure 1. Score by EMT Level.

Naturally enough, the highest average (64.3) among the various EMT levels belonged to Paramedics, and the

lowest average scores (54 & 54.1) to the least experienced groups - first responders and those without any National Registry of Emergency Medical Technicians (NREMT) certification (we classified these EMTs as "None"). The highest average score on the screening test was achieved by EMTs with 6-10 years of experience. Perhaps the most surprising results of the screening test were the declining average score for those having more than ten years experience (see Figure 2). If accurate, this would appear to indicate a decline in EMT knowledge after the 10 year point. Additional study will be required to verify these results.
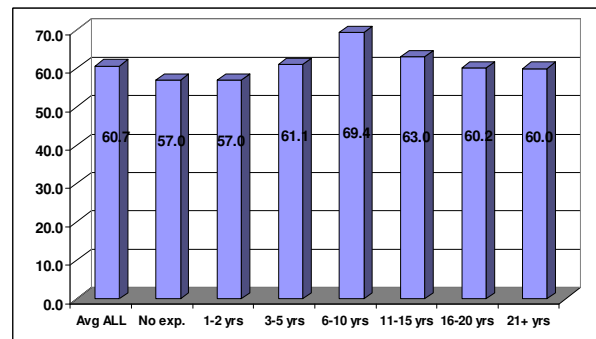

Figure 2. Score by Experience.

Selecting Participants

From those members taking the screening test, we selected a group of thirty (30) potential participants, i.e., those who recorded the lowest scores. The rationale was that these participants knew the least amount about the subject matter and therefore would provide the best candidates to test the effectiveness of the training materials. In addition to the low scoring group, we also selected three (3) participants who scored well on the screening test (better than 70). These additional selectees were to be followed closely with the idea that they might provide a different perspective on the courseware than the low scoring group.

Preliminaries

On February 6, 2006 the first of four meetings was set up at the fire station to brief participants. The reason participants were not all briefed at the same time was due to their work assignments to various shifts at the Kettering Fire Department.

Just a few days prior to the first of these meetings, it was brought to the attention of the validation team that all members of the Kettering Fire Department would be going through required standing orders training during the first week designated for the validation study. This standing orders training and testing is critical to their jobs, so it took primacy over the validation study. The

validation team was faced with the choice of postponing the validation which would delay fielding of the commercial product, or going ahead with the validation with the likelihood of reduced participation from some of those selected because of the standing orders training. The decision was made to go ahead with the validation.

By watching participant activity in the Virtual Schoolhouse (the learning management system), we were able to determine that only one student was able to complete most of the lessons, and just a few others got started during the week of 6-11 February. In fact, most participants did not even look at the courseware until near the end of the second week of the validation period. Of the thirty three (33) participants selected for the validation trial, only eleven (11) or 33% completed the courseware and took the exam.

Exam Results

For purpose of validating the courseware, the trial and exam results were considered near disastrous by the validation team. Individual results are as depicted in Figure 3. While the validation study did not yield the results necessary to lay the foundation for "validating" the courseware, there was much for the team to learn from the initial trial.
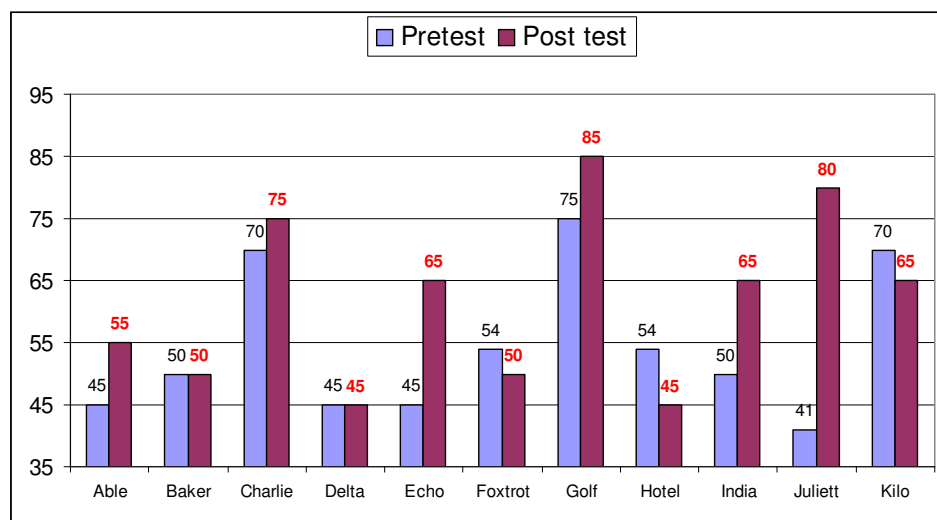

Figure 3. Exam Results.

The average gain from screening test to post test by participants who took the exam was just over 7 points (from an average of 54.5 to 61.8). Six participants (55%) improved their screening test scores in the post test. The largest gain was 39 points by participant "Juliet." Two participants (18%) showed no improvement at all, and three participants (27%) actually got lower scores on the post test than they did on the screening test. Of the three high scoring candidates from the screening test, one increased his score 10 points (from 75 to 85), another increased 5 points (from 70 to 75), and the last actually decreased 5 points (from 70 – "passing" to 65 – "failing"). Results like these puzzled the validation team to the point that they determined that a follow up interview with the participants was necessary.

Post-validation Interview

The validation team felt that there had to be some legitimate reason for the failure of the trial other than the courseware. The team suspected that the standing orders testing required of the participants during the same period may have contributed to the problem. Consequently, the team set up a debriefing of participants to clarify potential causes. During one-on-one follow up interviews, participants were asked sixteen questions to clarify their results in the validation study. Interview results are reported below.

Although a majority (53%) of participants reported that they felt that the validation study was very important to them (question 11), they still failed or were unable to complete the lessons, or having completed the lessons, failed the exam. Indications are that the primary reason (53%) for participant inability to complete the lessons and pass the exam was that they were rushed (question

1) and had little time to concentrate on the training materials or exam. Participants (53%) indicated that there were also various other factors that influenced their ability to complete all the courseware (question 15).

The validation team explored various issues that might have been contributing causes to such a high percentage of the participants failing the exam. One factor explored was whether participants thought that they needed to read all the materials before taking the exam. While most (80%) thought they'd need to read through all the material before taking the exam, only 40% actually did read through all the materials. Probing further, the team found out that participants considered the courseware materials to be just about right (87%) in reading difficulty.

Much of the lesson content was provided in practical applications called "Case Studies." The validation team wanted to know if participants actually used the case studies and whether they were helpful to them in understanding the material. Many participants (67%) worked through all the case studies, and the same number (67%) reported that they were helpful. In spite of this proclivity for the case studies, exam results were still poor. Open ended responses from participants indicated that they may have been misled by the level of difficulty and number of embedded questions associated with the case studies. Some of the open ended responses highlight this issue (see Figure 4).

- Level of difficulty of embedded questions fine, but easy in comparison to exam.
- Test questions phrased differently than embedded questions.
- Embedded questions . . . too few questions with each scenario.
- Embedded questions okay, probably should be more questions.
- Case study questions helpful, reinforced point. More questions needed for lessons with more content.

Figure 4. Open Ended Responses.

Time Spent

As a result of these additional questions asked during the post validation interview, the conclusion is that time was a major factor in participant failure on the exam. This conclusion is reinforced by an additional piece of data that was collected during validation. Participants were asked to keep track of the time spent on each lesson and the exam. Results are as reported in Figure 5. For every lesson included in the course (except the introduction), participants took less time than that

estimated by the development team when using the formula specified by the Continuing Education Coordinating Board for Emergency Medical Services (CECBEMS). The average time participants spent in all lessons was 152 minutes compared to the preliminary CECBEMS estimate of 482 minutes. In other words the participants took approximately 32% of the estimated time to complete the lessons and exam.
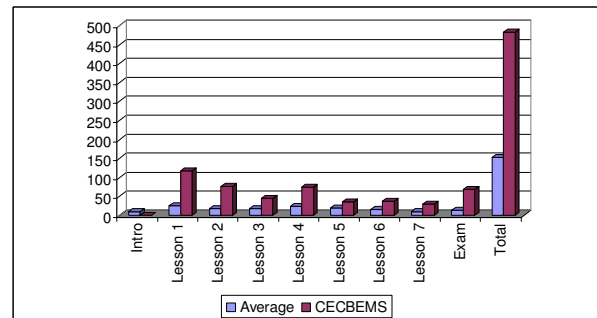

Figure 5. Time per Lesson.

Preliminary Conclusions

The validation team has drawn no final conclusions regarding the courseware from this trial. The entire team felt that there may be some indicators that should be watched carefully in future trials, but since participants were unable to adequately test the materials because of time and other factors, the courseware module has been rescheduled for another trial. The second trial will include a different set of participants. Furthermore, the participating fire department will be asked to commit a designated block of time for participants to complete the courseware and exam. In addition, participants will be briefed carefully beforehand about ensuring that they are ready to take the exam, and they will be cautioned that the exam is as difficult as the screening test, even if participants feel they were able to answer the embedded questions easily.

PART II: MASS CASUALTY INCIDENTS (MCI) VALIDATION RESULTS

Validation Procedures

Again, although our target population encompasses primarily civilian emergency medical technicians (EMTs), we were guided in the design and conduct of our validation study by military documents. Those documents indicate that evaluation should be integrated throughout each activity of the instructional development process with a focus on continuous improvement of training system quality. Following procedures outlined in the documents, we employed a sequential sampling method (also know as the sequential probability ratio method) for validation of the Mass Casualty Incidents (MCI) course. This

method is frequently preferred for validation, since it requires a lesser number of participants. The exact number of participants depends on a criticality standard as defined for course objectives by subject matter experts. Using the sequential sampling method, training is presented to each student individually. This method is preferable when validating individually adaptive instruction, as is the case with the MCI course and all of the EMT-PLUS™ courseware.

MCI course objectives were rated by our subject matter experts on each criterion from a Criticality Standards for Rating Learning Objective worksheet. These criticality ratings are primary indicators of the criteria necessary for each objective, and consequently the course to pass validation. The resulting score is linked to a Sequential Testing Chart in our Evaluation Plan. Each chart indicates a minimum number of students required to pass an objective before a single failure of that objective, thus providing us with the minimum number of student participants required for validation. Since we had a limited number of volunteers (20) from the target population, and the number of volunteers who were below the knowledge threshold on the screening test was only eleven (11), we decided to use test scores from all participants in calculating success or failure of the MCI validation.

Validation Results

During the period 8-24 May, 2006 a formative evaluation was conducted to test whether the MCI courseware is effective with potential trainees. Results of the validation were highly successful because of a significant gain in knowledge by all students. This was measured by a comparison of increased test scores between the (initial) screening test and the MCI post-test. This report summarizes the results of the validation.

PROCESS

Selection of Participants

During our first attempt at validation, we tried to exploit the entire force of the Kettering, Ohio Fire Department. Various problems associated with that approach have already been described in this report. For validation of the MCI course, we narrowed our focus by asking for volunteers from the same department. Twenty five (25) emergency medical service personnel from the department volunteered to participate in the MCI course validation study. This number was reduced almost immediately when five (5) people withdrew from consideration for various personal reasons before even taking the screening test.

Our intention was to select a subset of those not passing the screening test to participate in the validation. Normally, from those volunteers taking the screening test, we would have selected those with the lowest scores to participate in the validation study, then tried out the courseware until the required number of students passed the post-test. However, due to the size of the sample, we elected to allow all to participate. The rationale was that since most screening test scores were clustered closely around the mean 64.4 (see Figure 6); most participants could potentially show some learning gain. Since we were conducting a sequential validation of the EMT-PLUS™ courseware, a few extra participants would not detract from the study.
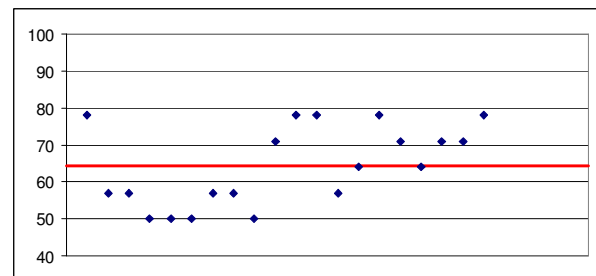
Figure 6. Screening Test Scores.

Preliminaries

On May 8, 2006 the first of five meetings was held to brief participants. Once again, participants were not all briefed at the same time since they are active EMT personnel assigned to various shifts at the Kettering Fire Department. Validation personnel briefed the volunteers on how the Virtual Schoolhouse works, how to log on, and various other administrative issues related to gaining access to the courseware. Participants were also briefed on the necessity for the pre- and post-testing that would take place. Finally, they were asked to respond to an anonymous on-line course critique at the completion of the course. If participants had specific comments to make they could register them in the critique, or email them to the Virtual Schoolhouse administrator at any time during or after the course.

As before, by watching activity in the Virtual Schoolhouse we were able to track participant activity during the validation. In this way we were able to verify when there was sufficient evidence to determine that the MCI course had passed the validation trial. However, once we determined that all participant data would be used in calculating success or failure of the MCI course, we only monitored performance to determine when participants had finished the course. At the end of the second week of the MCI validation period, it became obvious that only 17 of the 20 volunteers would finish the course. As a result the

validation was stopped, since we already had convincing evidence of the MCI course success.

Screening Test

A screening test was administered to twenty (20) volunteers from the Kettering, Ohio Fire Department (12%). The screening test was used to determine how much knowledge of the subject matter (mass casualty incidents) each participant had prior to training. As with the first set of trials, the screening test indicated that department participants had some knowledge of the subject matter (average score 64.4), but eleven (11) members taking the test (55%) failed to achieve a passing score (70) and of those passing the test the highest score was only 78 (achieved by 5 participants). Results of the screening test are as shown in Figure 7.
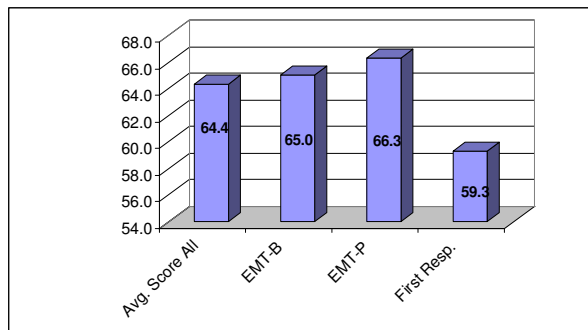

Figure 7. Screening Test Summary.

Once again, the highest average (66.3) among the various EMT levels was achieved by the Paramedics, and the lowest average score (59.3) by the least experienced group (First Responders/No Certifications). Unlike the previous trial, the highest average score on the screening test was achieved by EMTs with more than 16 years of experience.

Results

For purposes of validating the courseware, the validation trial and exam results were considered successful since all participants who used the course materials showed some learning improvement as measured by a comparison of their pre- and post-test scores. Individual results are as depicted in Figure 8.
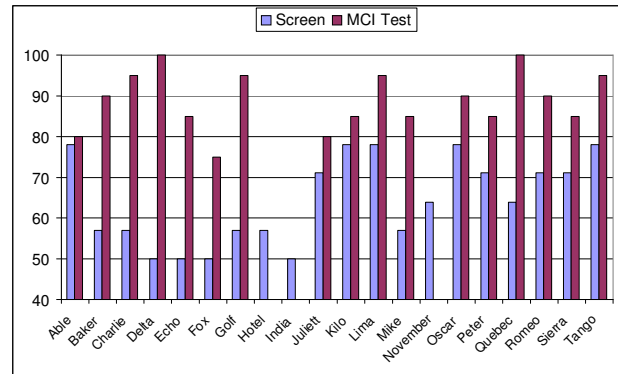

Figure 8. MCI Individual Results.

Seventeen (17) of the twenty (20) volunteers actually took the MCI course and post-test (85%). The average gain from screening test to post test by participants who took the MCI course was 23.2 points or 25.6% (screening test average: 64.4; post test average: 88.8). Every participant (100%) who took the MCI course improved his score (knowledge) from screening test to post-test. The smallest gain was 2 points by participant "Able" and the largest gain was 50 points by participants "Delta" and "Quebec." Three volunteers (15%) were unable to even start the course because of various operational constraints.

Gains by EMT Level

All levels of emergency medical personnel were represented in the sample, from those with EMT certification to novices (Paramedic 15%; EMT-B 70%; First Responder 10%, and even one novice 5% with no certification yet). Results by EMT level are reported in Table 1. One would have expected greater gains from those in a level with less certification, but that is not the case. Significant gains were achieved by all participants.

Table 1. EMT Levels Represented.

Participants	EMT-P	EMT-B	First Responder	No Cert.	Total
Screening Test	3	14	2	1	20
MCI Post-Test	2	12	2	1	17

Gains

	EMT-P	EMT-B	First Responder	No Cert.	Total
Screening Test	66.3	65	60.5	57	64.4
MCI Post-Test	95	89.2	77.5	95	88.8
% Increase	28.6	24.5	22.3	40	25.6

Table 2. Experience Levels Represented.

Participants	0-2 Yrs	3-5 Yrs	6-10 Yrs	16-20+ Yrs	Total
Screening Test	6	4	6	4	20
MCI Post-Test	5	3	6	3	17

Gains					
Screening Test	65.2	58.8	65.2	67.5	64.4
MCI Post-Test	89	88.3	87.5	91.7	88.8
% Increase	22.8	32.2	25	24.8	25.6

Gains by Experience

When we factor the same data by years of experience rather than EMT certification level, results are similar. While one might expect the greatest gains to be achieved by those with the least experience, more significant gains (32.2%) were experienced by journeymen in the 3-5 year experience category. Still, significant gains were made by personnel in each experience level category (see Table 2 and Figure 9).

Figure 9. Gains by Experience Level.

Student Opinions

Participants were asked to fill out an on-line critique of the MCI course, after they were finished with all MCI courseware and testing. So that participants would feel free to express themselves openly about the courseware, the critique is not linked to the rest of the data collected by the Virtual Schoolhouse, i.e., their student record. The critique consisted of twenty five questions about the MCI course.

Twenty four of the questions were structured so that the participants only had to answer by selecting how well they agreed or disagreed with the statement (see Figure 10). The scale used in the critique is as depicted in Figure 11. The twenty fifth critique question was open ended. It asked for participants to describe their overall

experience with the on-line MCI course in their own words.

Figure 10. Sample Critique Question.

Figure 11. Critique Question Scale.

Critique questions were clustered into two groups. One group elicited participant opinions about the mechanics of the course, how the course navigation worked, whether the materials were at the right reading level for participants, and other similar issues. The second cluster of questions was more comprehensive. These questions sought participant opinions about how well they liked the course compared to traditional classroom instruction, whether they would recommend the course to others, whether the course would be useful for better job performance, etc. This second group is obviously of more global interest, while the first group provides developers with data needed to revise sections of the courseware.

Global Questions

Results from the critique provided us with insight into how participants felt about the MCI course. While most participants appear to have taken courses on-line before (Q22, "*I have taken courses on-line before.*" 5.375, S 1.09), [1] they appear less than enthusiastic about taking on-line courses again rather than classroom training (Q23, "*I'd like to take on-line courses again instead of in a classroom.*" 4.563, S 1.31). In fact, they had the most trouble agreeing with the statement that they thought the on-line course was better than traditional classroom lecture (Q21, "*Compared to a traditional classroom lecture I think this on-line course was better.*" 4.313, S 1.195). However, participants seem more willing to recommend on-line training of this sort to co-workers (Q24, "*Will you recommend this type of refresher/CEU training to fellow EMS co-workers?*"

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[1] Our method of notation here is to cite the question number, the text of the question, then the mean response and standard deviation.

5.0, S .89). Participants also agreed that the course may help them do their job better (Q20, "*This course will help me do my job better.*" 4.688, S .946), but this was not the overwhelming endorsement that the developers had hoped for. Perhaps the primary reason for this response is that most EMTs take on-line courses for continuing education credits (CEUs). The way most CEU programs are structured, they may have little or no relationship to on-the-job performance. Another contributing factor may be that participants found the course only somewhat interesting (Q2, "*The course was interesting.*" 4.625, S .719). Again, this level of response may be partly attributable to the fact that mass casualty incidents are not the typical routine for most emergency medical service organizations.

Courseware Questions

Navigation

Several issues were highlighted as a result of the critique. One item concerned course navigation. The development team made a conscious effort to give the learner control over what to look at, when to look at it, and how to move around within the courseware. By design, there was no "Next" button in the courseware. Learners were forced (or rather empowered) to make navigation decisions on their own. The validation team hoped that their decision to empower the learner would be justified by the ratings and comments on the critique. This was not the case. Participants reported that there was only some agreement about being able to navigate easily through the course (Q10, "*It was clear how the course was organized. I could navigate easily.*" 4.563, S 1.263). Perhaps as a result of the navigation approach, participants had a skewed view of how the course was organized (Q9, "*The course presented the material in a logical order. Each new idea built on the one before it.*" 4.625, S .806). In fact three of the participants even made comments about the navigation (see Figure 12).

- Navigation was not clear at the beginning. Once familiar it was easy. Might want to consider always having a next button that takes you all the way through rather than always going back to the main menu.
- I found the course very easy to go through and it allowed me to move at my own pace and was very in depth.
- Some of the pages were hard to follow where you supposed to go next.

Figure 12. Navigation Comments.

Case Studies

Much of the lesson content was provided in practical applications called "Case Studies." In fact the case studies formed the core around which many of the learning activities were organized. The validation team wanted to know if participants actually used the case studies and whether they were helpful to them in understanding the material. Participants reported that the case studies were relevant and helpful (Q16, "*The Case Studies were relevant to module content.*" 5.25, S .577). They also indicated that the case studies helped them think about how they would react in a similar situation (Q14, "*The Case Studies made me think about how I would perform in a similar situation.*" 4.938, S .854).

Support Materials

Some of the other features that we built into the courseware were not so well received. Three other features of the courseware were included to provide an enhanced learning environment and to enable a smoother transition of the learned material to the workplace. These features were: 1) technical references - which were included as a document, or as a link to let learners get more details on certain topics if necessary; 2) job aids - which were available to be downloaded to a PC, laptop, or PDA for use on-the-job; and, 3) cognitive maps of the treatment protocols - which provide learners with the ability to look at the complexity of treatment protocols from multiple levels so as not to be overwhelming. Three questions related to these items received rather low ratings compared to all other items. Job aids (Q19, "*I found the Job Aids helpful.*" 4.563, S 1.031), protocols (Q17, "*I found the Protocols helpful in understanding the course material.*" 4.5, S .966), and technical references (Q18, "*I found the References (documentation, links, bibliography) helpful.*" 4.375, S .885) all received a relatively lukewarm reception from the participants. We anticipate that there may be two causes of these lower ratings. The first reason may be attributable to the fact that these features were not integrated completely into the case studies, so participants didn't get to use them and see how they could be applied on-the-job. The other reason may be that participants were not ready to find items like these that they could *take away* to their jobs.

Free Trial Results

As part of a promotion for EMT-PLUS™ courses, the developer provided on-line EMS continuing education to individual EMS personnel and to members of Fire/EMS Departments on a free trail basis during May-June, 2006. While results from these free trials was

never intended to be included as part of the validation, it does provide additional anecdotal evidence as to the robustness of the MCI courseware. As of May 26 fifty eight (58) people had registered for the free trial of the MCI course. Of these fifty eight, twenty six (26) had completed the course. Test results from the free trial group show that 96% passed the course with an average score of 79.8. Only one person (EMT-B, 3-5 years experience) failed to pass the course.

Specific Items

We also found serious issues with four questions on the MCI test. These questions were high miss items that will need closer examination by the development team (see Table 3).

Table 3. High Miss Questions.

Question Item	Topic	Miss %
54941	Responsibilities of functional area managers when utilizing NIMS ICS	47
55007	Recognize the elements of an MCI	35
55064	Specific dangers to responders for scenarios involving mass casualties	41
55256	Protocols for making transport decisions	65

Follow-up Interview

With the success of the validation trials for the second course under our belt, we decided to interview the participants to see if they could tell us a little more about what was good and what was not so good with the course. We did this because we got very few open-ended responses from the participants on the critique item that allowed for this. Post validation interviews were conducted with those participants who completed the course. We asked them twelve questions. Six of the questions were structured just as the critique questions, and used the same scale. One question was a simple multiple choice asking them about the time spent on the course. Five questions were open-ended to allow the participants to express their feelings freely.
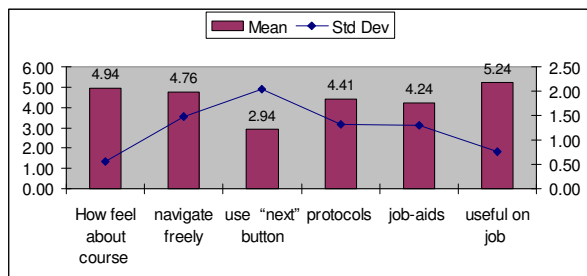
Figure 13. Interview Results.

Responses to the interview question: "*How do you feel about the MCI course now that you've completed it successfully?*" appear to be in line with previous results. What may be more interesting, however, are the results from two questions concerning course navigation: "*Do you like how the MCI course enabled you to navigate around freely?*" and "*Would you have preferred that the MCI course reduce your navigational freedom by making much more use of a "next" button?*" It appears that participants who like to navigate freely are satisfied without the "next" button, while those who prefer a "next" button are less inclined to be satisfied with the free-form navigation. This inverse relationship is attested to in the strong inverse correlation between the two questions of -0.79. Some of the participant comments in the open-ended portion of the interview bear out this result. Participants either really liked the navigation method or really disliked it. Very few neutral comments were found.

Like Best
- Course was easy to go through; all info and resources were available.
- Especially like the drop down menus at top of page. They allow rapid access to items of interest in the course.
- Easy, navigation around the course was easy.

Like Least
- I don't like the navigation method. I much prefer a directed path.
- Change the method of navigation.
- Navigation not real intuitive.

Figure 14. Interview Comments.

Participant reactions to the extended features of the course were also explored. As we encountered before, participant satisfaction with the job-aids, protocols, and reference materials was lower than we had expected. We suspect the cause may be that the design team had not integrated these features fully into the case studies requiring the participants to actively use them throughout the course.

CONCLUSIONS

The validation team was satisfied with the results of the MCI course validation. Procedures in place worked well. MCI course software appeared to operate as expected (no adverse comments were received from the participants). Best of all, each participant passed the course, and the group showed an exceptional gain in knowledge. Some minor refinements will be made to the courseware as a result of the validation. The development team will look closely at the results to determine if there needs to be a better integration of support materials such as the protocols and job-aids in

course learning activities. Such involvement of learners with these tools may improve their opinion of them and enable a smoother transition to the work environment.

On a broader scale, we might reflect on the results from the two trials and use them as a learning experience. First, no matter how much planning goes on ahead of time, there will be circumstances that test the flexibility of any plan. Since validation activities involve many participants from student volunteers, to supervisors and managers, to members of the validation and development teams, each of these groups can have an effect on the implementation of a validation plan. The WMD/HazMat validation trial can witness to that. Next, one cannot prepare student volunteers too much for validation activities. Additional preparation of the student volunteers during the WMD/HazMat validation trial may well have changed the amount of time participants spent with the course materials and, therefore, their test scores and the final results of the validation as well. Finally, be prepared to analyze results. While the goal of the validation study is to ensure that the course is able to teach students the required subject matter, there are many individual elements that work together to enable that outcome. By checking carefully, validation will point up those items that need improvement to enable the learning goals to be reached. We found that several of the learning principles we used in designing the course need to be tailored for specific audiences.

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