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# Level K

# C12 - 0024

# Consultant's Report

#### Virtual-Hub

#### Introduction

The Mn/DOT Office of Civil Rights (OCR) outreach efforts could be improved with additional online services. An effective solution in helping visitors is to offer a central information hub which provides connections outward to key services and detailed information. We envision this to grow organically and be a consistent source of reliable information for DBEs, prime contractors, and Mn/DOT OCR staff. Availability of Virtual Hub will allow OCR to have a sustained online strategy to retain and recruit DBEs that are able, willing, and ready.

#### Articles

Articles about updates and new information can be offered online. OCR already uses occasional newsletters, but a place for online articles would allow immediate publishing of topical issues and announcements. Some of these articles might later be repeated in the larger newsletter. If the OCR program has a public relations worker, that person would probably create or approve most articles.

#### Blogs or topic newsletters

If there are topics for which several public comments a year would be helpful, a blog or topicoriented newsletter could be established. Some sites use a blog format as a means for an executive or public relations position to briefly address topical issues which aren't covered elsewhere, or to cover temporary issues. The MN DOT is using similar methods to keep people informed about the status of major construction projects.

#### Forums

This could be new area to build the knowledge base by service category. Allows new DBEs to learn about project expectations and allows Prime to share success with DBEs.

#### **RSS feeds**

RSS feeds of recently changed articles, blogs, and newsletters would help DBEs and other users monitor when changes have been made to the information on the site.

#### Social media use

Social media uses were considered, but the only obvious use is a Twitter feed which repeats new RSS feed announcements. This would offer announcements to the many Twitter users.

#### Online training (e-learning)

An online training area accessible through the hub would allow routine training to be offered to more people at times which are convenient to the students. (Also see e-learning sections below)

Certain information presentation methods should be avoided, such as a Flash slide show which can only be edited by an artist with expensive tools. If OCR staff are able to alter the training materials, the lessons can be improved to reduce common problems.

Conversion of existing workshop materials may require an e-learning lesson creator to invest from an equal amount to as much as two dozen times the time it takes to present the course. For a fully automated course the teacher time is eliminated until the teacher's expertise is needed for updating the course. Once an electronic workshop exists, it can be modified to deal with frequently asked questions and it can evolve to use suitable additional technologies.

We suggest that improvement of training material be expected. It should be expected that some courses will need improvement with video tools, interactive technologies, and tools which have not been developed yet. Many topics can presently be well covered with the use of text, images, quizzes, and surveys. Some topics will be able to be improved with video additions, when those are available. Some topics, such as those which generate the most questions, may benefit from interactions such as group discussions or instructor email.

Topics to consider for online training, or directing people to available courses:

- Compliance and procedures training:
  - Mini-DBE training (already available).
  - How To Become a DBE:
    - Training in how to complete MN/DOT OCR DBE registration and requirements.
    - Training in how to do business as a DBE.
    - Prime contractor guidance in using DBEs to comply with contract requirements.
- Contracting process training:
  - Understanding Legal Aspects of Bidding, Bidding Conventions, and Successful Interaction with the Prime
  - Overview of how to participate in MN/DOT project and contract procedures.
  - MN/DOT procedures which are specific to DBEs.
  - MN/DOT procedures which are specific to prime contractors.
  - Overview of non-MN/DOT DBE procedures (MAC, federal, etc).
- Contract project training:
  - Overview of Mn/DOT project and contracting methods.
  - Training in project management methods which assist in completing contracted work.
- Business development workshops:
  - Mentor-Protégé program

- Business planning
  - Quick and Effective Business Planning
- Finance and accounting
  - Accounting Fundamentals Simplified
  - Critical Financial Skills for Small Business Owners
  - QuickBooks Skills for Small Business
- Business management
- Marketing and advertising
  - Sales and Presentation Skills for Business Owners
- Sales skills
- Risk management
  - Successful Risk Management in Construction
- Personnel management
- Developing partnerships
  - Partnering, Team Projects & Ways to Increase Your Capacity in the Changing Landscape of Highway Heavy Construction
- Bidding and estimating
- Project management and costing

#### Online surveys

Online surveys could be used to gather opinions about the characteristics of OCR programs and the online services. The purpose and design of surveys may vary, as the purpose and difficulty of surveys varies.

For example, asking for feedback about a web page doesn't require the stricter controls of a random survey of known users of a specific service. Feedback about a web page may be intended to provide a low-quality trickle of information to help find problem areas in a web site, while a more detailed study of specific clients will require more information and effort in order to ensure that the proper clients will be queried about the relevant information.

Similarly, more thorough focus group analysis could be done with the assistance of suitable web tools, but that is more complicated than more casual feedback.

#### Report library

If the DBE office issues public reports, a section on the web site could make those reports available. There presently is a "Forms" section for disseminating forms.

#### Collaborative

The OCR web site presently links to a "Collaborative" section, but there is no clear explanation of the Collaborative. A new description should be added, whether as part of a Hub or within the existing Collaborative pages.

#### **Contracting process**

There does not seem to be a summary on the web site of the contracting process as a whole, and where the DBE services fit in the process. A section could be added which explains the contracting process, with links to both OCR procedures and MN DOT contracting and Request for Proposals information. Much of this information is buried in training materials, but is not presently easy to spot.

#### **DBE repository**

An online service could assist potential DBEs through the certification process and assist certified DBEs. DBEs could describe their services and renew their DBE certification. Prime contractors would be able to find relevant DBEs and contact them.

#### Web directory

The DBE web site currently has some links to other sites. A tool for categorized web links could be used, so links can be stored in a database and visitors can browse by categories. This would only be useful if OCR intends to increase its collection of links or needs a tool for managing the links.

#### **E-learning**

Electronic learning includes all electronically-enhanced educational methods. Distance learning also includes other methods such as paper correspondence courses, but generally electronic communications are faster and less expensive. E-learning methods are of two types: communication and automation technologies. The communication technologies only extend a teacher's reach to distant students, while automation technologies will automatically perform some of a teacher's tasks.

#### Communication technologies

Communication technologies which can be used for education include: Voice teleconferencing, video conferencing, web conferencing, and broadcast technologies. Conferencing technologies allow a student to communicate with a teacher, while broadcast technologies do not allow live discussion with a teacher.

Communication technologies only extend a teacher's reach to distant students. They are mostly used to reduce the travel time of teachers and students. Methods which allow interaction tend to be slowed down by having to respond or wait for all students, while broadcast technologies require students to move at the teacher's pace or the student may miss information.

### Automation technologies

Educational automation technologies will have technology do some of a teacher's tasks. The tools used can be as simple as a recording of a presentation, or as complex as a fully automated teaching and grading system.

As with communication technologies, these tools reduce the travel time for teachers and students. Also, they often have additional advantages:

- Self-paced, so students can slow the pace of the learning to the student's rate of learning.
- Self-scheduled, so students can study at a time which is convenient to them.

A *Learning Management System (LMS)* includes course presentation, testing, and grading components. An LMS often provides some fully automated lesson presentation, testing, and grading abilities. A lesson creator can create automated or partially-automated classes or workshops. An example of a partially-automated workshop is the presentation of lesson material, and an essay assignment which must be manually graded by the teacher.

#### Combined and blended methods

E-learning methods are sometimes combined and blended with traditional class and workshop methods. Blending may involve e-learning before or after classroom or individual teaching. For example, an automotive mechanics course might require e-learning of a procedure before physically performing the procedure in a classroom setting.

## **E-learning best practices**

Electronic learning, or computer-assisted instruction, has many potential benefits: convenience for students, allows better use of human resources, saves money, and consistently deliver the same information. There are possible problems: some students may not have used similar tools, outside authors of lessons might not create lessons the same way the present staff does, and internal staff might not be familiar with the tools.

#### Workshop formats

There is no single workshop format which is best for all situations, because there are such a wide variety of topics and learning styles. However, the constraints of electronic teaching technologies do place some limits on the formats which are available.

Formats which are available:

- Single-student, self-paced lessons.
- Presentation of text, images, video, or audio material.
- Group discussions about a class topic.
- Pre-lesson testing, whether to compare progress or to affect presentation of lesson material.
- Post-lesson testing, whether to confirm progress, to reinforce material, or to require passing the test before proceeding.
- Multiple types of testing: True/false, multiple choice, automated essay, or teacher-reviewed essay.
- Automated or teacher-reviewed grading.

Workshop design guidelines:

- Define the objectives.
- Know the audience (general public, businessmen, skilled workers?).
- Explain the objective so the student will be properly focused.
- Encourage active participation.
- Provide relevant information, while allowing for varied learning styles.
  - Teach toward the desired change in the learner's skills.
  - Lean and tight information works best (electronic lessons also allow optional details to be provided to people who need more detailed information).
  - Engage the student's emotions. Start with an introduction which will show why they want to learn the skills which the lesson will provide.
  - Connect the concepts in the lesson. Make it easier for the student to form a mental map of the lesson material and connecting it to what the student already knows.
  - Provide examples so the many uses of the material become apparent.
  - Provide pragmatic practice by applying the new knowledge to situations which are of interest to the student.
  - Help the student reflect on the material with summarization and considering broader contexts.

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- Avoid external web links, to reduce student distraction. Links, such as ones for advanced study or reference, might be best placed in a "For Further Study" page at the end of the lesson.
- Reinforce, summarize, and test as appropriate.

Some lesson styles will require group or teacher involvement, and that will affect student and staff scheduling. Fully-automated lessons may be offered at any time, but there should be a way for the student to request assistance.

#### Curriculum presentation methods

As mentioned above, the structure of the lesson can be arranged in several ways. The material can be presented using text, images, video, or audio material, depending upon the technologies which the lesson uses and which the student is able to use. A lesson might offer video or audio information, but the student's equipment or body might not be able to use that type of format.

There are common guidelines for creation of lesson material:

- Present information in relatively small pieces, for easier comprehension.
- Use several types of presentation, because some people learn visual information better than in text form. However, text format is required for accessibility by all students.
- Use appropriate methods of presentation. Some information is best presented as text, and adding a video can be a distraction. Indeed, one study found that a video which only showed text and read the text aloud was worse for learning than either the audio or the text alone.
- Avoid putting a video on the first page of the course, as slow loading can give a student a poor first impression of the course.
- When converting a presentation to course text, consider changing bullet points which list steps in a process into text which tells the student what actions to take, using action words such as "create", "remember", and "look".
- Existing course material may use methods which are not suited for individual learners, such as group activities. Additional information and simplified test questions may need to replace the discussion and reinforcement which was originally used.

## **E-learning Recommendations**

General issues to consider when evaluating e-learning technologies:

- Web browser lessons or single-lesson computer programs: Where Internet service is available, online technologies are easier to access and have fewer technical difficulties than do programs which only run on specific types of computers.
- Use more general tools: Use of specialized tools such as custom plugins, .NET, and Flash will limit the audience which can use the tools. Java and Flash do have some generalpurpose uses, such as Flash as a video player, but lessons should be designed so they are usable if such tools fail. For example, a student with a slow Internet link might not be able to use a video.
- Accessibility requirements call for text alternatives for information which is presented in video or audio forms.
- Creating new material is simpler and cheaper if specialized tools are not required.
- Maintenance is simpler and cheaper if specialized tools are not required.

The technologies which are described below are recommended so as to provide students and staff the best combination of features, ease of maintenance, and future growth.

Major factors behind the technology recommendations:

- Self-paced workshops/courses should be supported. This type of use is expected to be the most useful. This requires some automated workshop courses.
- Self-scheduling of when to take a course should be available, as that offers the most flexibility to students. This requires automated workshop courses.
- A Learning Management System will help supervise student status, help organize learning materials, and provide management tools.
- Internet access and web technologies are widely available in Minnesota. Use of the Internet will reduce communication and travel difficulties. Web technologies will allow students to access these educational services from many locations.
- For ease of maintenance, few additional tools should be required for creating and altering course material. Creating a simple course should be possible with a computer, Internet access, and a web browser.
- Several types of tests/quizzes should be supported. This provides flexibility for course material and design.
- The Learning Management System should be available for installation in commercial or State of Minnesota servers. This protects the State's investment in the workshop lessons by not locking the LMS and lessons within a single hosting company. The cost of purchase and installation of the LMS is not examined in this document.

• Many methods of teaching advanced courses require discussions or essay assignments, so those abilities should be available.

General course improvement process:

- Phase I: Create main version of course, using text and images.
- Phase II: For courses which can be improved with video, add video material.
- Phase III: For courses which can be improved with interactivity, add group discussions or instructor email.
- Phase IV: When new technologies become available, evaluate technologies and courses.

#### E-learning technology recommendations

Recommended technologies for online e-learning:

- Use of a Learning Management System able to present lesson material, conduct some automated testing, and which is optionally able to track student grades.
- Web browser technologies.
  - HTTP and HTTPS support.
  - Can be used by web browsers from at least two suppliers (ie, Internet Explorer, Firefox, Opera, Chrome).
- ADA Section 508 support.
- Communication:
  - Internal email support.
  - Allow students to redirect email to external address.
  - Group discussion support, to allow some group activities when appropriate.
- Lesson authoring can be done through a web browser.
- Lessons should at minimum be able to consist of presentations of text and images, combined with test questions. Some types of test questions can be automatically graded.
- Testing and grading:
  - Multiple choice questions.
  - Multiple answer questions.
  - String matching of answers.
  - Fill-in-the-blank answers.
  - Essay questions.

- Questions can use images, video, or audio.
- Students can be allowed to upload files, such as for an essay assignment.
- More questions can be defined than will be used in a test.
- The order of questions can be randomized.
- Lesson can be configured to show the correct answer.
- Lesson can be configured to allow tests to be repeated.
- Lesson can be configured to allow students to rate or comment on submissions by other students.
- Teachers can add grades from assignments which were outside the automated system.
- Teachers can export grades to an external spreadsheet.
- Authentication and authorization:
  - Internal authentication system, so an external login service is not mandatory.
  - More than one user can be authorized to create users.
  - User authorization by permission roles, such as administrator, teacher, student.
  - Users can have different roles on different lessons, so a user can have a role as a teacher on one lesson and a student role on a different lesson.
  - Lessons can optionally require a student user to have a password to register.
  - Lessons can optionally allow a student user to self-register to take a lesson.
  - Access to a lesson can be optionally restricted to a start and end date.
- The e-learning software should be available for MN DOT to install, so the state's investment in the lessons is not locked into a specific hosting service.
- A copy of a lesson can be exported to a compatible server, through a personal computer, so lesson material can be backed up or transferred between hosting services.
- Allow use of lessons in SCORM format, so material in SCORM format can be added from other sources.
- The server requires one database, and supports at least two of the following types of servers: Oracle, MySQL, or PostgreSQL. Support for multiple types of servers provides greater options for future needs.

#### Conclusion

This research document covers the technology choices that exist for Mn/Dot OCR to drive outreach, recruitment, training, and retention of DBEs more effectively. This document is intended to evolve over time as new meaningful Web 2.0 and Web 3.0 technologies unfold and are available to integrate in the OCR model and priorities. This approach fits well into the lean six sigma approaches; i.e. to build in the context of needs and anticipated ROI.

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