Storyboarding

Core teams (A), comprised of an instructional designer and one or more subject matter experts, use lesson specifications to write instructional text and specify placement of all graphics, audio and video components for a lesson. The product of this process is a storyboard. Upon completion, the core team submits the first draft of a storyboard to a team of reviewers who ensure the quality and integrity of its components.

The review team (B) consists of specialists who review the storyboard guided by criteria in checklists for the following areas:

- instructional design
- technical content
- graphics and video production requirements
- text composition, spelling, and grammar
- CBI production feasibility

Figures 5 and 5A are sample review checklists. This team then either approves the storyboard (C), makes minor changes required for approval (C), or returns the storyboard to the core team for corrective action (D). The storyboard is passed between the core team and review team as many times as required to bring it to acceptable baseline standards.

Once the storyboard is approved by the review team, it is put under control of the data librarian (E) and a baseline is achieved (F). As a lesson moves through the different phases of the process, its status is tracked by a data librarian for control purposes. Sign-out sheets are used to track the physical location of the lesson at any given time prior to delivery, and are monitored periodically by the QA function. Review team sign-off sheet for the storyboard, and the storyboard itself are available for the first QA checkpoint (G).

Production

Next, the storyboard goes to production. Production includes the development of graphics, audio, video, and coding required to meet storyboard specifications. A team of computer graphics artists draws the images and diagrams to accompany the text presented to the student. Likewise, the video production team, under the supervision of a video coordinator, shoots the scenes and motion sequences that will demonstrate the actual performance of a given task.

All corrective actions are handled via the CCP process (H). Proposed changes and actual changes are documented and the storyboard is returned to the data librarian. The final step in production is a post production check (I). This review is to ensure that material was produced as specified in the storyboard.

This review is conducted by a team member who is familiar with production techniques and acceptable visual standards. This person should not be directly involved in the actual development and integration of the video, graphics, audio and programming elements. Any corrective actions which emerge as a result of this production check, are addressed per the CCP process (H). Problems are discussed, documented, and corrected. Once again, the lesson is placed under control of the data librarian. Production sign-off of the storyboard and CCPs are supporting documentation for the second QA checkpoint (J).

GRAPHICS REVIEW CHECKLIST LESSON:

	YES	NO
1. Is there a request form for each primary graphic?		
Is a drawing or sketch included or referenced? Description, colors, and all other necessary information on sheet?		
2. Is the graphic to be used for interactions?		
Indication on form? Are necessary supporting graphics called out for the interactions indicated? Touchzone(s) identified (specific area)?		
3. Is a primary graphic request form referenced for each overlaying secondary graphic?		
4. Are the notes clear enough to complete the graphic and the interaction?		
5. Are references to existing graphics included?		
6. Will the graphic fit into the visual area for the screen type (oriented correctly)?		
7. Is the draw time estimated to be 10 seconds or less?		
8. If narration is used to support the graphic,		
Is is really necessary?		
Is it cost effective?		

Figure 5. Sample Checklist

INSTRUCTIONAL DESIGN CHECKLIST LESSON:

	YES	NO
1. Has the lesson objective been met (to the extent possible using CBI)?		
2. Are the interactions meaningful and appropriate?		
3. Is the cueing consistent and effective?		
Appropriate level Consistent Effective Appropriate amount		
4. Are criterial components of instructional messages emphasized?		
Noncriterial elements de-emphasized? Does the text match the visual idea?		
5. Does the organization of the lesson support client's cognitive style?		
6. Are the video, audio, text, and graphics used appropriately?		
Do they support the learning objectives?		
7. Are video, audio, text, and graphics combinations used appropriately to emphasize criterial components of the message?		
8. Are questions written clearly and at the appropriate level?		
Relate to learning objectives? Follow format guidelines? At the appropriate knowledge and skill levels? Stem - unambiguous? Distractors - plausible, unambiguous, effective?		

Figure 5A. Sample Checklist

Final Review

This review is performed in two stages. The first stage is the instructional design/subject matter expert (ID/SME) review (K). It is conducted as a joint review performed at a shared terminal. The ID/SME team reviews the entire lesson, frame-by-frame, in an effort to uncover presentation problems. These problems may be technical inaccuracies, coding errors, misrepresentations, or instructional approaches that are for some reason not effective. Problems or issues are documented and corrected following the established CCP corrective action process (H). The necessary corrections are made and the lesson is forwarded to the second stage of the final review (L). The lesson, at this point, exists exactly as intended for the student.

This review is performed by two QA team members. One member has a technical background similar to that of the actual student. The second member is familiar with the operation of the CBT delivery system and able to proceed through the lesson.

The final QA team employs techniques to determine if the lesson "works." These two team members proceed by viewing the lesson exactly as the student would. They also intentionally answer questions and respond to prompts incorrectly to determine if the system reacts as intended. They conduct an overall inspection of the lessons, checking for instructional flow, grammar, and proper integration of graphics, video, audio and text. Corrective actions are handled via the CCP process (H) and changes are implemented as necessary.

Completion of the final QA review is the third QA checkpoint (M). Completed, up-to-date lessons can be monitored for compliance to established procedures at this point. All records and data maintained for effective production operations should be available for review, including storyboards, various sign-off sheets, checklists and documentation of corrective action issues. Copies of any individual records will be furnished to the client upon request. It is the responsibility of the final QA team to assure that records are up-to-date, complete and reliable. When all changes are incorporated and final QA team approves the lesson, it is ready for client review. The lesson is, again, placed under control of the data librarian (N).

External (Client) Review

Upon completion of the final QA review, the lessons are passed to external baseline (O). Lessons are ready for client review and, ultimately, course use. Client review is the fourth and final QA checkpoint (P) that provides an opportunity to audit the process. All accompanying documentation should be complete, accessible, and should support the lesson exactly as it was produced.

Any changes to a lesson beyond external baseline are subject to a CCP process (Q) administered by program management. Documentation of all CCPs submitted beyond the external baseline is made in a master control file (R). Use of a Master Control File (MCF) provides an efficient method to review corrective action proposals submitted by the client.

Lessons are maintained under control of the data librarian until delivery to the customer.

LESSONS LEARNED

- Process seems very cumbersome at times, but perseverance/adherence to it proves beneficial; the process is very thorough.
- Standards must be well-defined from the start. This facilitates/lends consistency to materials and eliminates subjective guesswork at various review stages. Also saves time and unnecessary debate in CCP meetings.
- Take no shortcuts in the paperwork trail; numerous times, due to the volume of material being produced and decisions being made, only the documentation told the story. Team members often couldn't remember why something was handled as it was, or where a particular storyboard or lesson was at a given time, and for what reason.
- Always assess the "domino effect" of a proposed change and the value and necessity of that change vs. the effort involved in making the change.
- QA is something to be addressed from start to finish; it's not a final stage in production. Team members need to be in this mindset from the very start.
- Strict adherence to standards and to the process from the first stages will save a lot of time at the final stages. Problems should be minimal by the time the lesson reaches final review. The time saved is actually money saved, and the quality is better if it's built in and maintained from the start.

SUMMARY

There are many variables when managing different computer-based training programs. Perhaps the two most important aspects are the unique requirements of different programs and the unique personalities of the CBT development team. It is the program manager's responsibility to orchestrate a successful program.

Use of the QA program presented here is a foundation to building a successful program. It should be molded to fit specific program needs, and the capabilities and personalities of team members.

Use of this QA plan has yielded favorable results. Development time for comparable CBT material was reduced by an average of 20%. In addition, the percentage of errors identified during the client review prior to course conduct was less than 1%.

REFERENCES AND SUGGESTED READING

1. MIL-Q-9858A-Quality Program Requirements

2. MIL-STD-1520B-Corrective Action and Disposition System for Nonconforming Material

3. MIL-STD-153A-Supplier Quality Assurance Program Requirements

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