Aviation Industry CBT Committee

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AICC

GUIDELINES and RECOMMENDATIONS

AGR 002
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VERSION
9.1

COURSEWARE DELIVERY STATIONS

AICC TRAINING INFRASTRUCTURE SUBCOMMITTEE

SCOPE

This document contains recommendations for the acquisition of Computer Based Training (CBT) student delivery systems, also referred to as the "platform." The platform includes computer, monitor, operating system, and peripheral devices. This AGR contains both hardware-related recommendations and software-related recommendations. The objective of the recommendations is to enable an airline to assemble a training delivery system with the ability to deliver the widest range of aviation CBT courseware. During development of the recommendations, the AICC kept the following in mind:

1. Flexibility

   The platform recommendations are designed to allow changes that may be necessary to run alternative courseware, as well as customized installation options.

2. Expandability

   The recommendations are designed to allow future hardware upgrading at minimal cost.

3. Changing Technologies

   The computers used in today's CBT are part of a rapidly evolving market. What is "mainstream" this year was "trend setting" last year and will be "behind the times" next year. More and more of our students are acquiring computers for their homes and demand comparable systems for their training. It is the desire of AICC to suggest a platform that will run all of today's software as well as look forward to the future.

   The AICC is committed to reviewing and evaluating emerging technologies as appropriate to the enhancement of CBT. The recommendations are therefore periodically updated and reissued.

4. Fiscally Responsible

   The recommendations try to stay in the mainstream of computing power. With an obsolescence factor of 3-5 years, the recommendations attempt to extend the hardware investment as long as possible.

The AICC recognizes that the first consideration for any CBT platform is that it runs the courseware for which it is purchased. Thus it is often the recommendation of the Courseware vendor that carries the most weight in the purchasing decision. However, once into CBT, most companies will grow in their usage of it. Often this means purchasing courseware from more than one vendor. The recommendations presented in this AGR are to help an organization purchase equipment that can grow into the future.

Purchasing a computer to run both Windows and DOS courseware can be very difficult. Please contact the vendor of your DOS based courseware for guidance on special hardware that may be required, especially if you already use DOS courseware and plan to upgrade or acquire new hardware. DOS courseware may no longer run on newer systems due to changes in operating systems.

Caveats...
Review Cycle

This document and earlier versions are available on the AICC Internet Web Site (www.aicc.org). This document combines AGR 002 and AGR 004 (Windows and Operating Systems). AGR004 is withdrawn but all versions remain available as archived documents.

Types of Platform

The common feature of all training platforms recommended by the AICC is that they will all run Microsoft Windows[1] as the operating system. However, there are different variants, as well as versions, of Microsoft Windows. The choice of Windows may often be determined by corporate IT policy, and sometimes as a requirement of special programs (such as simulations).

Learning Center CBT Station Specification

Learning centers will normally be equipped to deliver the most sophisticated training applications. The platform described in Table 1 lists three levels of configuration:

1. **Optimum**. The hardware is currently available, is considered "mainstream" and cost effective. It provides the maximum assurance of handling future sophisticated training applications.

2. **Recommended**. The hardware will meet the needs of current Windows based courseware and should meet the needs of courseware currently in development for future delivery.

3. **Repurposed**. This is considered to be the minimum platform for effective training, but which will be limited for some media. Equivalent hardware may no longer be available. Older hardware or operating systems are not recommended by the AICC.

COMPONENT	OPTIMUM	RECOMMENDED	REPURPOSED	R#
CPU (or equivalent)	Pentium 4 1.4 GHz	Pentium III 750 MHz	Pentium II 233 MHz	R.1
Memory (RAM)	256 MB	128 MB	As specified for installed Windows	R.2
Hard Drive	50 GB or more	16 GB or more	Minimum for courseware	R.3
Video card	AGP 16MB	AGP 8MB	PCI	R.4
Display (Resolution)	1024x768 pixels			R.4
Display (Color depth)	64-bit	32-bit	16-bit	R.4
Display (Monitor)	20" Multisync Flat Screen	19" Multisync	17" Multisync	R.4
Audio	Suitable sound Card			R.5
Standard	Keyboard, Mouse, 3.5" FDD (Floppy)			R.6
CD-ROM/DVD (Option)	DVD	DVD	CD-ROM	R.7
Modem (Option)	As available	56Kbps	28.8Kbps	R.8
Network card (Option)	As available	100Mbps	10Mbps	R.9
High-density Storage (Option)	As required, e.g. CD-RW, Iomega® Zip, etc.			R.10

Table 1 Learning Center Platform Configurations

[1] Microsoft and Windows are registered trade names of Microsoft Corporation

Learning Center Windows Versions

Like the hardware, the operating system used in learning centers will often be determined by corporate IT policy. Within this constraint, the AICC recommends the following:

1. Windows 2000 Professional, Windows NT 4 Workstation or later. These "New Technology" operating systems may be required for advanced programs, including simulations Windows NT versions preceding NT 4 (i.e. NT 3.51) are not recommended due to limited multi-media support.

2. Windows 98, Windows ME. Succeeding versions of the 9.x family are recommended for general purpose and multimedia programs, which encompasses most tutorial style and general purpose CBT. Windows versions preceding Windows 98 are not recommended due to stability and word-width issues.

3. Windows XP. The latest family of Windows based on an NT core and ranging from home editions to 64-bit server operating systems.

The AICC acknowledges a wide range of reasons for selecting a particular version of Windows, and recommends only that user needs are compared to product descriptions on the Microsoft Web site, and elsewhere on the Internet.

Courseware vendors should at all times assume responsibility for testing product in all relevant versions of Windows, and the AICC recommends that vendors be requested to provide warranty as to performance in the current Learning Center version of Windows.

Internet Browser

For maximum operating system compatibility, the AICC recommends Microsoft Internet Explorer for delivery of increasingly common browser-based courseware. The browser should be at least version 4.0 to support scripting; as Internet Explorer is freely upgradeable, Learning Center administrators are encouraged to maintain the latest version.

However, as for all dynamically changing system software, some browser features upon which courseware may depend may not be supported in evolving versions of Internet Explorer. **As for Windows versions, the AICC recommends that the customer compare required browser features against the published specifications for new browsers, and vendors are requested to provide warranty as to performance in the current Learning Center Internet browser.**

Home Study CBT Stations

Home study platforms should conform to the "Recommended" configuration in Table 1 where practicable, and at least to the "Repurposed" configuration.

Home Study Windows Versions

The same principles apply as for Learning Center Windows. However home users may have a variety of operating system variants and versions, and browsers, which Learning Center administrators should take into account when distributing courseware.

Laptop and Notebook Delivery

Laptop and Notebook computers are usually less capable than desktop or tower configurations, but may be fully capable of courseware delivery. The platform described in Table 2 lists three levels of configuration:

1. **Optimum**. The hardware is currently available, is considered "mainstream" and cost effective. It provides the maximum assurance of handling future sophisticated training applications.

2. **Recommended**. The hardware will meet the needs of current Windows based courseware and should meet the needs of courseware currently in development for future delivery.

3. **Repurposed**. This is considered to be the minimum platform for effective training. Equivalent hardware may no longer be available. Older hardware or operating systems are not recommended by the AICC.

COMPONENT	OPTIMUM	RECOMMENDED	REPURPOSED	R#
CPU (Equivalent)	Pentium III 866 MHz	Pentium III 550 MHz	Pentium 300 MHz	R.1
Memory (RAM)	128 MB	64 MB or recommended for installed Windows	Minimum specified for installed Windows	R.2
Hard Drive	30 GB or more	9 GB or more	Minimum for installed software	R.3
Display (Resolution)	1024x768 pixels			R.4
Display (Color depth)	64-bit	32-bit	16-bit	R.4
Display (Monitor)	Active Matrix			R.4
Audio	Integrated Sound			R.5
Standard	Keyboard, 3.5" FFF			R.6
Input device	Mouse Touch pad/eraser			R..6
CD-ROM/DVD (Option)	DVD	CD-ROM	CD-ROM	R.7
Modem (Option)	As available	56Kbps	28.8Kbps	R.8
Network card (Option)	As available	100Mbps	10Mbps	R.9
High-density Storage (Option)	As required, e.g. CD-RW, Iomega® Zip, etc.			R.10

Table 2 Laptop and Notebook Computer Specification

Hand Held ("PDA") Delivery

Short for ***personal digital assistant***, a PDA is a handheld device that combines computing, telephone/fax, and networking features. A typical PDA can function as a cellular phone, fax sender, and personal organizer. Unlike portable computers, most PDAs began as pen-based, using a stylus rather than a keyboard for input. This means that they also incorporated handwriting recognition features. Some PDAs can also react to voice input by using voice recognition technologies. PDAs of today are available in either a stylus or keyboard version.

PDA technology has yet to become sufficiently mature for the AICC to make enduring recommendations, but at the date of this AGR it is considered probable that the "Pocket PC" solution will gain recommended status, as it may offer simplified conversion of Windows courseware.

Network Delivery

If delivering courseware over a local area, use any network protocol supported by Microsoft windows.

1. The choice of communication protocols for server and links is large enough to accommodate any user requirement.
2. Protocols for Novell, the AICC's early recommendation, are supported by Windows 98 and later.
3. Server and workstation computers must use the same protocol to communicate.
4. Use TCP/IP for any Internet/Intranet connection and functionality.

If delivering courseware on an internet/intranet use HTTP-based (i.e. Web browser) delivery.

HTTP clients (i.e. Web Browsers) are freely available and widely supported for most major computing platforms and operating systems.

1. HTTP protocol can travel freely through most corporate network firewalls allowing courseware to be more easily shared between widely dispersed organizations.
2. Courseware management communication should be implemented using AICC-conformant techniques detailed in AGR-010.

RATIONALE

The following paragraphs explain the rationale behind these AICC guidelines and recommendations.

R.1 INTEL PENTIUM CENTRAL PROCESSOR UNIT (CPU)

RATIONALE:

- Windows applications using 3D graphics, real-time simulation, and media-rich presentation require higher processing power than earlier, simpler training applications. The faster the CPU, the smoother will be the presentation.
- The end user should consider the recommended CPU as a minimum. When acquiring new computers, purchasing at the high end of available processing power will help to keep up with rapidly changing technology and the associated high rate of hardware obsolescence.
- Alternatives to the Intel Pentium CPU are available, and reference to the Pentium in this AGR is made to provide a level of performance, rather than list all equivalents and make comparisons.

R.2 MAXIMUM COMPUTER MEMORY WITH CAPABILITY OF FURTHER EXPANSION

RATIONALE:

- Memory is where your computer does its work. Programs are run and data is processed in memory. More memory will also allow a greater amount of data to be processed at a faster rate, improving the performance of your machine, and allowing more applications to be run at once.
- While the Windows 9x environment will run with at least 16MB, a significant improvement in speed is attained with 128MB or more.
- The latest courseware, because of sophisticated interactions, high-resolution graphics, high color depth, complex simulations, digitized audio and video requires more memory.
- Current memory costs are at an all time low. Future software and courseware is anticipated to use even more memory.

R.3 A LOCAL HARD DRIVE

RATIONALE:

- Networked systems may require no more than a low capacity hard drive for system files. However, stand-alone systems will require a hard drive sized to courseware requirements and system files. The recommended minimum may still not be sufficient for large multimedia courses.
- Windows Swap Files require a fast local hard drive for optimum performance.

R.4 VIDEO DISPLAY OF 1024 BY 768 GRAPHICS RESOLUTION OR MORE, WITH 65K COLORS

RATIONALE:

- This resolution supports quality display graphics and video, and is supported by many vendors with a large variety of hardware.
- 19” Multisync monitors provide the most cost-effective Learning Center display, particularly for shared use. 17” monitors are adequate for use by single user, and for home use.
- For laptops and notebooks, active-matrix displays use transistors to keep their diodes in an on or off state, unlike their passive-matrix cousins, which rely on the diodes' persistence. As a result, active-matrix displays are brighter and produce better color than passive-matrix displays.

NOTE:

- New multimedia applications and the advent of DVD drives will bring more MPEG video into courseware. A video card with hardware MPEG playback may become more common and necessary to the training function.
- Future courseware driven by simulator code may require higher resolutions.
- Not all video cards operate equally, therefore, be sure to test the video card with your courseware.
- Some legacy courseware may not run with these configurations. Consult your CBT vendor. True Color cards may cause problems with DOS based CBT which uses Palletized color, however, they have considerably more color depth in Windows applications.
- Different training activities within a Windows 16-bit color depth, perhaps running concurrently as synchronized applications, may produce different shades of the dame color due to the way RGB values are derived in the range 0 ~ 255 with 5, 6, 5 bit values. A 32-bit or 64-bit color depth avoids this problem.

- There may be touch screen considerations for DOS courseware.

R.5 SOUND CARD

RATIONALE:

- As more multimedia is placed into courseware, the audio requirements increase.
- DOS courseware may require Sound Blaster compatibility.

R.6 INPUT DEVICES

- Any windows compatible x-y pointing device may be used instead of a mouse, such as monitor touch panel, trackball, touch pad, etc.
- Standard QWERTY keyboard, or national variant (e.g. AZERTY).

R.7 IF A CD ROM IS REQUIRED, 32X SPEED

RATIONALE:

- This speed is required for retrieving audio/video files without gaps in the playback.
- Faster CD-ROM drives take time additional to spin up.

R.8 OPTIONAL MODEM

RATIONALE:

- A modem provides for connection to the Internet. As web-based courseware becomes more common, Internet connection will become routine.
- A 56Kbps modem is the fastest simple connection and will still only give passable performance for on-line training.
- Alternative, and faster, means of communication are preferred, e.g. ADSL, T1, Cable, or connection through a LAN to a fast shared connection.

R.9 IF NETWORKING, A NETWORK ADAPTER CAPABLE OF 10MB/s AND 100 MB/s

RATIONALE:

- Multimedia courseware puts a tremendous amount of traffic on the wire. A 10MB/s card is minimum and is currently in place in many network installations. However, when planning for the future, 100MB/s should be implemented. Many network cards are currently available that support both speeds.

- An embedded network may be used if it can be disabled to allow for future technology changes.

R.10 FOR SOME STANDALONE COMPUTERS, A HIGH DENSITY REMOVABLE MEDIA DEVICE MAY BE NEEDED

RATIONALE:

- In some cases, such as internal company courseware, it may be more economical to deploy on media other than CD-ROM. Several devices on the market today feature removable media with large storage capacities.