ACCESS ed
PROJECT

Classroom Environment AUDIT 1.6

(Accessibility and Universal Design Information Tool)

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COMPATIBILITY

All AUDITs have been tested for compatibility with Excel 2004 in Mac OS X and Excel 2003 in Windows XP and Windows Vista.

Note: If you are a PC user in order to use the AUDITs, Macro Security must be set to Medium (recommended) or Low (not recommended). The AUDITs will run on a Mac system without needing this adjustment.

BACKGROUND

Universal design (UD) is a process that ensures that a newly created product is useful to the broadest possible array of people, particularly those with disabilities. UD of testing allows all students to have a better opportunity to express what they know through a system that allows for a variety of learning styles and abilities.

DIRECTIONS

This AUDIT has been tested for compatibility with Excel 2004 in Mac OS X and Excel 2003 in Windows XP and Windows Vista.
Note: If you are a PC user turn the "Macro security" down in Excel to "Warn", or the spreadsheets won't work. The AUDITs will run on a Mac system without needing this adjustment.

To perform an AUDIT:

- Open the Excel file: click on “enable macros”.
- The AUDIT will open in “Page Break Preview” view. You may change to another view mode if you wish.
- Save your file with a new name.
- Identify classroom environment for the AUDIT and clearly label it (along with your name and date) at the top of the worksheet by double clicking on “AUDIT Target”, “AUDIT Date”, and “Auditor” to enter data in these cells.

- (The AUDIT Target, in this case, could be Charlie Hall room 450.)
- Print a copy of both the Accessibility and Usability worksheets,
  (or, you may enter scores into the AUDIT directly on your computer).
- You may use the print features of Excel, or you may click on the buttons at the bottom of the page to print individual sheets or the entire workbook.
- Carefully observe each relevant feature of the classroom environment.
- Score the AUDIT/enter data.
- You can move from sheet-to-sheet by using the buttons across the top or by clicking on the Excel worksheet tabs at the bottom.
- Examine and interpret the graphical data.
- Write comments about the route, or specific issues related to the Classroom Environment AUDIT, in the comments section.

For most AUDITs (e.g. doing an AUDIT of an architectural feature) it is easiest to print a paper copy of both the accessibility and usability worksheets. Take the paper copy to the location, score the items, and then transfer your scores to the computerized spreadsheet. Some AUDITs may be scored directly on the spreadsheet. The method you use depends on the item you are auditing and the computer you use.

The AUDITs are formatted in an Excel workbook with 3 spreadsheets. You may use arrow keys to facilitate the entering of data. Double click on the boxes where you will enter text (e.g. “Comments”, “Auditor”). The spreadsheets for both the accessibility and usability sections will tally the scores and provide a numerical score based on the degree of demonstrated accessibility or usability. Graphical data are presented on the 3rd sheet.

Trichotomous scoring (e.g. “Yes”, “Partial”, “No”) is used to rate each item in the AUDIT. The spreadsheet converts these to numerical scores.

A **“Yes”** score indicates the item is present and effective
. This should not be selected if there is any doubt if the item is present.

A **“Partial**” score indicates that the item is present to some extent. If the item is only present in some cases, or is present but not in an effective way, you mark “Partial”.

A **“No”** score indicates that the specified item is not present. If a feature is present, but not readily “discoverable,” the typical user will not benefit from it. If you are not sure that an item is present, it should be marked “No.”

“NA” will remove the item from scoring.

The Accessibility and Usability scores compute the “demonstrated” levels of accessibility and usability. Thus, items that are not scored are considered not to have been demonstrated. If you do not score all items the final score will be lower because the spreadsheet will interpret any unscored items as zero.

CLARIFICATION ON INDIVIDUAL ITEM SCORING

Accessibility Items

Accessibility Section 2, item 1: The classroom has the "Maximum Class Size for Accessibility" listed and available to faculty and students. (e.g. The maximum size of class that allows wheelchairs to maneuver with students and their belongings in place. Some professional organizations calculate that the "accessible seating capacity" is 60% of the standard seating capacity.)

- ✓ Because a wheelchair requires more space than an ambulatory person for seating and maneuvering, accessible seating must be considered to be less than conventional. A room capacity list should be available for room assignments, and should include accessible seating capacity in addition to typical room capacity.
- ✓ This list should be available to faculty and students, so that members of an over-crowded class have information on which to base a complaint. (Note that this protects the facility that is following the rules from spurious complaints.)

Accessibility Section 2, item 2: The classroom has headroom of at least 80 inches throughout. If any barrier is present between 80 inches and 29 inches above the floor, it is indicated by a cane detectable barrier. (e.g. low televisions suspended from the ceiling)

- ✓ A blind person navigating with a cane or even a service animal will be warned of barriers that are near the floor before they walk into it. However, a cane does not warn of overhead obstructions. When a sign, stairway, or suspended audio-visual device projects below 80 inches, it is a potential source of injury for a person walking under it.

Accessibility Section 2, item 4: An accessible path connects the accessible door to all areas of the classroom, including the teaching area. (e.g. accessible seats, podium, AV controls, and equipment service area.)

- ✓ Providing access in the classroom must include accommodating faculty as well as students with disabilities. This means that all areas of the classroom, including the presentation areas must be accessible to those with mobility limitations.

Accessibility Section 2, item 4: Accessible paths within the classroom are wide enough to allow 36 inches of clearance while students are seated at the adjacent seats.

- ✓ An accessible path within the classroom must be wide enough to accommodate passage of a wheelchair. If this width is measured with the seats pushed in and no student paraphernalia in the aisles, a student with a wheelchair will have access only if the first to enter the classroom and the last to leave.
- ✓ Note that not all passages must be of this width, only those that connect the accessible features of the classroom.

Accessibility Section 2, item 5: Accessible paths within the classroom are wide enough to allow 32 inches of clearance while students are seated at the adjacent seats.

- ✓ If the accessible paths within the classroom are measured with the seats fully under the tables, it will not reflect accessibility while students are in the classroom. Under such conditions, a student with a disability would have to be the first into the

classroom, and the last out, and would not be able to leave the room during class, should the need arise.

Accessibility Section 2, item 6: Wall-mounted black/white/bulletin boards have a lower edge no more than 30 inches from the floor.

- ✓ A person in a wheelchair has a maximum useful reach of 48 inches above the floor. If black or white-boards are to be accessible, they must provide a functional righting surface that is within reach.

Accessibility Section 2, item 7: Seat spacing allows storage of backpacks, coats, and other personal possessions without blocking accessible paths.

- ✓ While faculty cannot mandate that students store backpacks and coats out of the accessible paths, if no space is provided for student belongings, the room will not be accessible when occupied.

Accessibility Section 2, item 9: The required evacuation route signage is accessible to students/faculty with low vision and blindness. (e.g. Tactile maps are provided in each room)

- ✓ The legal requirement to post evacuation routes in each classroom is typically implemented in a way that is visually dependent. (Often printed maps mounted behind plastic.) To provide equivalent information to the student with vision impairments, the same information must be provided in a multisensory form, such as a tactile map.

Accessibility Section 2, item 10: The classroom provides a tactile map of fixed features within the room at each accessible doorway..

- ✓ When a blind student enters an unfamiliar room, especially one as complex as a typical classroom, orientation can be very difficult or impossible. Providing a tactile map of the location of fixed features (podium, seating, etc.) can allow independent

navigation of the space. The student or lecturer must still be wary of mobile barriers such as student backpacks, however.

Accessibility Section 4, item 1: When the empty classroom doors and windows are closed, the sound level does not exceed the noise level of a quiet home (50 decibels) at any seat within the room.

- ✓ The ability of students with hearing or attention deficits to benefit from classroom activities can be substantially reduced by high levels of background noise. If the background noise level of heaters, air conditioners, or presentation systems exceeds the level of a quiet home, it may drown out or otherwise interfere with the presentation. The preferred ADA standard is that the room have a noise level below 35 db, but this can be hard to measure with available assessment tools.

Accessibility Section 4, item 2: The sound level from the presenter, in an empty room, can be clearly heard above the background noise level at each seat in the classroom. (Note: unless the room has a specific sound source this can be measured at the back of the room.) (The ADA-ABA guidelines suggest that the sound of the presenter be 15 db above the background level.)

- ✓ If the sound level from the presenter is not sufficiently above the noise level of the classroom, the ability of the student with hearing or learning disabilities to learn from the presentation will be impaired.
- ✓ The recommended sound level difference is 15 db. To assess this, the auditor can run the sound file included with this audit at the level of a typical conversation (60 to 65 db) when the sound is playing. At each seat, the difference in sound level between the tone periods and the silent periods should exceed 15 db.

Accessibility Section 4, item 3: The combined sound levels of the presentation and sound levels does not exceed that of a person speaking in a loud voice at any seat in the

room. (The ADA standards suggest that the sound level in a room in use not exceed 70 db.)

- ✓ There is substantial evidence that high noise levels impede learning for all students, and especially for those with cognitive limitations. In general, if the overall sound level exceeds 70 db, the student will have difficulty learning from the presentation. This limitation applies even if the sound is an undistorted but amplified voice.
- ✓ Sounds are cumulative, but not additive. To assess this item, the sound level during lecture, AV presentation, and other typical classroom activities should be measured while a typical class is in session.

Accessibility Section 4, item 7: Room reverberation (the time between the end of a sound and the time its echoes are inaudible) is no more than one half second. (This can be measured using the pulse sound sample provided with the audit.)

- ✓ Room reverberation can greatly impede student understanding of classroom presentations. A hard-surfaced room (bare walls, hard floor and ceiling) may have substantial echo or sound decay.
- ✓ To assess this item, use the pulse sound sample provided with this audit. Play the sound at a level of 60 to 65 db from the podium. If the sound does not become inaudible almost immediately at the end of a pulse (during the time required to say “thousand,” as when counting seconds “one, one-thousand, two, one-thousand, …”, the room reverberation should be addressed.

Accessibility Section 4, item 8: Sound of typical use from adjacent rooms are inaudible or barely audible within the classroom when the doors are closed. (The sound level should be reduced by at least 10 db in passing through the walls of the room.)

- ✓ Sounds of activities in adjoining classrooms can interfere with learning for a student with attention limitations. When the doors are closed in adjacent classrooms, the typical sounds in one room should not be intrusive in nearby rooms.
- ✓ To assess this, the pulse sound should be played at a level of 70 db in the classroom, and the doors closed. In adjacent classrooms and hallways, the sound level should not exceed 60 db during the pulses, if it can be heard at all.

Accessibility Section 5, item 1: When room lights are on, the room has the illumination level of a typical retail store (at least 50 foot candles).

- ✓ Light levels can be measured as "incident," the amount of light falling on a surface, or "reflected," the amount of light bouncing off a surface. All AUDIT values are to be measured in terms of incident light, so when measuring, the sensor should be directed upward.

Accessibility Section 5, item 2: When projected media are used, the area around the projection screen can be dimmed (through lights, blinds, etc.) to a level of no more than 20% of the screen brightness.

- ✓ The apparent contrast of a projected image, which determines its visibility to many people with visual limitations, depends on the difference in brightness between the brightest part of the screen, and the adjacent dimmer parts. The dimmer part of a projected image cannot be lower than the ambient light, so it is important that the area around the projection be low. For an image to be bright and readable (adequate contrast) a ration of 5:1 is required.
- ✓ To assess this, an image with typical content (e.g. text with colored background, not a pure white screen) should be projected, and the incident light of a typical part of the screen measured. (not the brightest part of the screen) This can be compared with the light levels to the side of the screen.

Accessibility Section 5, item 3: When projected media are used, the area for the speaker and sign-language interpreter remain illuminated at a level of not less than the typical lighting level for bedrooms (8 foot-candles).

- ✓ Providing a sign-language interpreter is of little value if the area used is too dark to be seen. In order for both the speaker and interpreter to be visible, these areas should have local lighting levels of at least 8 foot-candles. For a bright projector, this may be within the allowable ambient light levels. If the area around the screen is required to be below this level, zone lighting (a spot or directed light) should be used.

Accessibility Section 5, item 5: Windows either use translucent materials (to transmit light but not images) or are provided with sight-obscuring coverings (blinds).

- ✓ Individuals with attention or focus problems may be distracted by events outside the classroom. To accommodate distractibility, it should be possible to obscure the view outside the classroom. The view obscuring treatment (blinds or translucent materials) should not reduce room lighting below the required levels.

Accessibility Section 6, item 2: The floor material does not produce glare under illumination from built-in lighting.

- ✓ If a floor is highly polished it can reflect the overhead lighting. In such a case, there will be bright spots that move as a person walks over the floor (as opposed to pools of light that remain under the fixtures). Such moving bright spots (glare) can be disorienting to those with visual deficits.

Accessibility Section 8, item 1: In rooms with fixed projectors, room signage includes posted minimum font size for accessible projected media. (This minimum size will produce projected media that is equivalent, from the most distant seat, to 16-point font viewed at 20 inches.)

- ✓ The minimum font size is a function of both the distance from the seat to the screen and the magnification ratio of the projector. While faculty may not be required to

perform these calculations, it is reasonable to have the minimum size posted, so that materials can be prepared or edited for accessibility.

- ✓ This audit includes a PowerPoint compatible Minimum Font Size slide. To determine the minimum font size for accessible media, the distance from the most distant seat to the screen should be measured in inches. This number, multiplied by .011 will give the minimum projected height of an accessible font. (e.g. In a room where the farthest seat is 20 feet (240 inches) from the screen, the minimum projected height is 2.64 inches) The smallest number on the Minimum Font Size slide that exceeds this size is the minimum font size for accessible projected media in this room.
- ✓ Faculty who use the same slides in multiple rooms are advised to create their materials with fonts no smaller than the largest "minimum" size of any of those rooms.

Accessibility Section 8, item 2: AV system volume can be adjusted to provide sound levels from the level of a conversation (60 db) to curbside at a busy street (80 db) at the most distant fixed seat without causing feedback or audible distortion.

- ✓ When trying to play sound at a higher level than a device is capable of, the signal will be distorted, either through warping of the speakers or electronic clipping of the sound. In either case, a sample sine wave, which should sound smooth, will "buzz." If playing the sine-wave sound sample (a 440 Hz sine wave) included with this AUDIT at any volume between 60 and 80 db results in a buzzing sound, the signal is being distorted.

Accessibility Section 8, item 3: The projection screen is at least 1 foot tall for each 6 feet from the most distant student seat when text will be projected, 1 foot for each 4 feet when images will be projected.

- ✓ If a screen is too small, it will be difficult to attend to from seats at the back of the room, regardless of brightness or font sizes. Designers of projection systems have developed the "4 6 Rule" cited here.

- ✓ If a room is expected to be used only for text-based projections (following the font size standards of this audit), the screen should be 1 foot tall for each six feet from the farthest seat. When images are expected to be included, the screen should be one foot for each four feet from the farthest seat to be visually accessible.

Accessibility Section 8, item 4: The viewing angle between any seat in the usual classroom layout and the screen is no more than 30 degrees.

- ✓ When a projection screen is viewed from an angle, the brightness of the project decreases. Beyond the "half-angle," the brightness drops below 50% of the light from directly in front of the screen. Because of the physiology of human vision, this drop becomes noticeable, and the legibility of the projected information decreases. This is particularly a problem for students with visual deficits.

Usability Items

Usability Section 3, item 1: Room signs for class size, emergency contact, and other room features are located on the latch side of the door, or on the adjacent wall.

- ✓ Important room information, such as maximum seating capacity and emergency evacuation routes are more usable if they are easy to locate. By standardizing on the location of such information, access is improved.

Usability Section 4, item 1: The room allows, with or without the use of a microphone, the presenter's voice to be heard throughout the room, in the range of normal conversation (60 db) to the sound level of a home vacuum cleaner (70 db).

- ✓ If the room size or surface materials do not allow an instructors voice to be heard from each seat at normal lecture volumes, microphones and room sounds systems should be provided.

Usability Section 4, item 2: When presenter microphones are provided, both podium and portable (lavaliere) types are available.

- ✓ Podium microphones are useful for the presenter who remains in one place, but are restrictive to a presenter who moves while presenting. The sound system should accommodate different teaching styles.

Usability Section 4, item 3: When presenter microphones are provided, the user may move throughout the presentation space with a sound level at 80 db (curbside on a street) without producing audio feedback.

- ✓ When a presenter requires amplification in order to be heard, speaker feedback (squeal) can impede or prevent effective learning. Good balance of microphones and speakers allows the speaker to be heard without distracting howls and squeals.

Usability Section 4, item 5: The provided sound amplification system (whether accessed through a microphone or AV source) are able to produce sound without audible distortion (less than 5% THD) at sound levels up to curbside of a busy street. (80 db)

- ✓ At times, ambient noise will be quite high. (e.g. when a large class is walking past or construction is occurring in neighboring spaces.) The sound system should be sufficiently powerful to produce undistorted sound that can be understood over such background levels.

Usability Section 5, item 2: In the event of a power failure, internal rooms (those without windows) and hallways have emergency lighting systems which a) activate automatically on loss of mains power, b) provide a lighting level of at least the level of a parking garage (5 candle power), and c) have sufficient power reserve to maintain lighting for at least 30 minutes.

- ✓ In the event of a power failure, interior spaces must provide sufficient emergency lighting to allow those inside to evacuate. The lighting must remain on long enough to allow complete evacuation.

Usability Section 5, item 3: Room lighting over the speaker area, the seating area, and the projection area is even, so that an opaque object (a hand, for example) held 12 inches from a working surface does not produce a visually discernable shadow.

- ✓ For individuals with some types of visual limitations, the contrasts produced by shadows can be difficult to process. Shadow-free lighting reduces the stress experienced by those working in the space (both the lecturer and the students).

Usability Section 7, item 3: Lab spaces meet OSHA standards for ventilation and pollution level even during class.

- ✓ It is not contemplated that a typical auditor will be familiar with the OSHA requirements. Instead, any lab space that is notably “musty” or that has strong chemical smells should be recommended for formal evaluation. If any space produces watering of the eyes or tightness of the throat, it should be evaluated immediately.

AUDIT SCORE SHEET

The AUDIT summary graphs display the accessibility and usability scores for both parts of the AUDIT. The graphs help determine the perceived levels of accessibility and usability for the item under review based on the percentage of possible points. Behind the scenes a score of “Y” = 2 points, a score of “P” = 1 point and a score of “N” = 0 points. A score of “NA” removes the item from consideration, reducing the total number of possible points for the section of the AUDIT.

Accessibility interpretation: A one hundred percent score suggests full, basic access to people with disabilities. Any "no" or "partial" scores indicate that some people with disabilities will not be able to use the AUDIT target. They flag major problems.

Usability interpretation: The usability scores illustrate the "friendliness" of the AUDIT target. This usability affects all users, including people without disabilities, but difficulties are often amplified for people with disabilities. The higher the "yes" and "somewhat" scores, the more usable the AUDIT target is for everyone. "No" responses signify less access for everybody.

The score sheet **"comments"** section is provided for your notes and/or recommendations.

The ACCESS-ed Project considers all AUDITs to be live/working documents. Please share any comments, feedback or suggestions that you may have through the "Contact Us" feature of our website.

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