Fire Alarms and At-Risk Populations: Information from Literature and One-on-One Interviews

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Outline

- Origin of study
- Background
- Literature Review
- Survey Results
- Preliminary Findings
- Future Work

Origin of Study

- Audible and visual alarms typically required
  - Limited visual ability
  - Limited hearing ability
- Fire alarms intended to help all people to be aware of fire
  - Benefits should outweigh the risks
  - Exceptions exist in NFPA standards based on ambient conditions

Origin of Study

- Questions raised regarding autism and similar disorders
  - Flashing lights
  - Disruptions
- Student research project sponsored by Fire Protection Research Foundation

Background: At-Risk Populations

- As of Fall 2012 there were 36,429,431 students in ages between 3 to 21 with a special need
- Categories include:
  - Hearing impairments
  - Deaf-blindness
  - Learning disabilities
  - Orthopedic impairments
  - Traumatic brain injury
  - Speech or language impairment
  - Visual impairments
  - Emotional disturbance
  - Intellectual disabilities
  - Health impairments
  - Developmental delays
  - Autism

Background: At-Risk Populations

- Many special education classrooms throughout the United States house between 5-20 of these categories
- Common categories include:
  - Autism
  - Epilepsy
  - Deaf-blindness
  - Emotional disturbances
  - Intellectual disabilities

Background: Research Aims

- To understand the current effects that fire alarms have on this population
- To develop possible alternatives
- Research questions include:
  - What are current practices
  - How do students respond to current alarms and strobes
  - How can practices be improved

Literature Review: Autism

- CDC predicts that 1 in 68 children are affected
- Common symptoms include:
  - Avoiding eye contact and wanting to be alone
  - Appear to be unaware when people talk to them, but respond to other sounds
  - Repeated actions
  - Difficulty adapting to changing routines
  - Difficult to control when loud noises or unusual sounds are present
  - Instances where individuals hide when frightened

Literature Review: Epilepsy

- At least two seizures that were not preventable
  - Events can range from a few seconds to minutes
- Seizure activity can be caused by:
  - Sleep deprivation
  - Flashing bright lights
  - Unusual amounts of stress
  - Poor eating habits associated with low blood sugar
  - Certain medication use
  - Caffeine or other food products

Literature Review: Emotional and Behavioral Disorders

- Can be linked to a number of previous situations
- Commonly problematic in the classroom:
  - Constantly getting out of chairs, running, yelling
  - Have a tendency to hit and fight with others
  - Persistently ignore instruction from staff
  - Difficulty complying with directions
  - Tantrums and negative attitude towards superiors

Survey Results

- Survey sent to parents and teachers
- Consisted of approximately 25 questions about different scenarios for classroom changes
- Findings:
  - High importance was noted for formality and regularity of practiced live fire drills
  - Participants maintained high predictability for scenarios when practiced and understood
  - Strobes and audible notifications that are currently in use are areas of concern

Survey Results: Areas of Concern

- Loud and unpredictable notification systems cause the students to have panic and anxiety attacks
- Bright white strobes and frequency/rate cause panic and anxiety
- The combination of strobes and alarms cause situations to escalate quickly, causing time delays

Survey Results: Areas of Concern

- Classrooms with 1-2 teachers sustaining 10-20 students
  - Difficulty in evacuating and maintaining order during evacuation
  - Need to transmit message in non disruptive manner

Preliminary Findings: Strobes

- Change color of strobes to a blue or green
  - Blue and green are both soft colors, do not create panic and distress when viewed
  - 80% of surveyed participants indicate that a blue or green strobe would create a calming effect in times of emergency.
- Slower frequency of strobes in these facilities
  - Calmer, slower rate will help to maintain order for teachers and aides

Preliminary Findings: Alarms

- Voice alarm preferred to single sound
  - Instructive alarms help keep the students calm, while also informing occupants of the fire danger
- May consider coded alarm
- Choice of voice of lesser importance
  - 50% would prefer female voice
  - 50% would prefer a male voice
- Pitch of the message of higher importance

Preliminary Findings: Other Suggestions

- Possibly discuss vibrating furniture alarm
- Longer strobes instead of small high frequency strobes

Future Work

- Contacting organizations
- Collecting more data
  - Any suggestions or recommendations highly appreciated

Questions?