DEVELOPING EFFECTIVE MEDICAL PHYSICS KNOWLEDGE STRUCTURES MODELS and METHODS

Project CONET
A Resource for Medical Physics Educators

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This presentation can be viewed at
www.sprawls.org/ipad
Natural Learning of Physics

Development of Sensory Concepts

By Sensing and Interaction

Sound
Sight
Smell
Taste
Feel
Water
Highly Effective Physics Lesson

Sensing

Guiding

Interacting

STUDENT

TEACHER
Medical Physics Knowledge
Development and Application

Medical Imaging Physics Universe

In The Mind

A Network of Sensory Concepts
Gagne’s Hierarchy of Learning

- Problem Solving
- Rule Learning
- Concept Learning
- Discrimination Learning
- Verbal Association
- Chaining
- Stimulus Response
- Signal Learning
Sensory Concept Networks

Mental Representation

PHYSICAL UNIVERSE
Sensory Concept Networks

Mental Representation

PHYSICAL UNIVERSE

Natural Learning

Sprawls
Sensory Concept Networks

Mental Representation

PHYSICAL UNIVERSE

Natural Learning

Highly Effective

CLINICAL APPLICATIONS

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Sensory Concept Networks

Mental Representation

Natural Learning

PHYSICAL UNIVERSE

Highly Effective

CHALLENGE TO HELP DEVELOP (TEACH)

CLINICAL APPLICATIONS
Sensory Concept Networks
THE CHALLENGE, TO HELP DEVELOP (TEACH)

You, the teacher
Student
Sensory Concept Networks
THE SOLUTION, TO HELP DEVELOP (TEACH)
Medical Imaging Physics Universe

CONET

Contrast
Anatomical Environment
Digital Processing
Display Controls

X-ray Spectrum
Scatter
Receptor Characteristics

Guidance
Knowledge
Experience
Organization
Motivation

Provides
Medical Physics Educator

Learner
A comprehensive collection of visual resources to be used by Medical Physics Educators in helping Medical Physics Learners develop highly effective knowledge structures.

Provided with open and free access by the Sprawls Educational Foundation
www.sprawls.org/CONET
Project CONET
(Concept Network Developer)

Elements

Modeling of medical physics knowledge structures.

Association of structural elements with task or functions to be performed.

The educational process for developing effective knowledge structures.

Tutorials for medical physics educators on the concepts development of effective knowledge.

An open and shared resource (CONET) that can be used by medical physics educators around the world.

Distribution of the CONET resource both within the AAPM and around the world.
Project **CONET**
*(Concept Network Developer)*

**Value and Expected Outcomes**

A better understanding of physics knowledge structures for medical physics educators.

An enhancement to traditional medical physics educational programs.

Provide medical physics educators with opportunities to function at a higher professional level by sharing knowledge and experience.

Increased understanding of physics concepts (sensory, not symbolic).

Provides for increased interactivity between educators and learners.
Sensory Concept Networks

Developing Physics Concepts

- New Concept
- Existing Concepts
- Prior Knowledge
Project CONET

Who will benefit from an enhanced sensory conceptual knowledge of medical physics?

MEDICAL PHYSICS STUDENTS

Understanding

Foundation for

Symbolic
Project CONET

Who will benefit from an enhanced sensory conceptual knowledge of medical physics?

RADIOLOGISTS & RESIDENTS
Project CONET

Who will benefit from an enhanced sensory conceptual knowledge of medical physics?

RADIOGRAPHERS & STUDENTS
FUTURE

Available with Open Access

Expanding Topics

Enhanced

On The Web

NOW

Project CONET

Extensive Experience In:
Medical Physics Teaching
Material and Media Development
Program Development & Direction
The Science of Learning and Teaching
Faculty Development

BACKGROUND and FOUNDATION
CONCEPT NET WORK DEVELOPER

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Radiographic Image Quality
Opening Screen

Artifacts
Concept of Noise
Effects of Noise
Sources of Noise
Controlling Noise
Receptor Exposure
Processing
Digital Pixel Size
Patient Dose
Effects of Spectrum
Relation to Noise

Distortion
Detail and Blur
Effects of Blur
Sources of Blur
Focal Spot
Receptor
Digital Pixel Size
Optimization
Physical Contrast
Image Contrast
Contrast Sensitivity Concept
Clinical Requirements
Spectrum
Scatter
Receptor
Processing
Viewing
NOISE SOURCES IN RADIOGRAPHY

Visibility of Low Contrast Anatomy Limited By:

- Noise
- Electronic Noise
- Receptor/Display Structure

X-Ray Beam
Receptor Exposure
Reduced Beam (Pixel Size)

X-Ray Image Noise

Objects Not Visible
Objects Visible
Publication in *Medical Physic International Journal* (IOMP)
Add to *Sprawls Resources* Website (Now used in 50+ Countries)
Add to AAPM Educators Resource Guide
This will be followed by additional publications & presentations.
Medical Physics Knowledge

Using and Applying

Learning and Developing

The Physical Universe

Network of Sensory Concepts

Analyze
Solve Problems
Create
Innovate

Observation
Interaction
DEVELOPING EFFECTIVE
MEDICAL PHYSICS KNOWLEDGE STRUCTURES
MODELS and METHODS

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