

**(Almost) Fifty Years of  
Education in Medical  
Physics**

**George Starkschall, PhD**

2022 Education Council Symposium  
Washington DC

---

---

---

---

---

---

---

---

**Disclaimers**

- No conflicts of interest noted
- Any opinions expressed are my own, and not of any organization
- Commercial products not intended to be promoted

---

---

---

---

---

---

---

---

**Learning Objectives**

**After attending this presentation, the participant will:**

- Identify developments in medical physics education from 1970's to the present
- Identify some directions AAPM could go in improving teaching quality
- Be able to guide new faculty members in the teaching of medical physics

---

---

---

---

---

---

---

---

## Learning Objectives

After attending this presentation, the participant will:

- Identify developments in medical physics education from 1970's to the present
- Identify some directions AAPM could go in improving teaching quality
- Be able to guide new faculty members in the teaching of medical physics

---

---

---

---

---

---

---

---

## My Entry Into Medical Physics

1972 – awarded PhD in chemical physics; started postdoc

1974 – completed postdoc; transitioned into medical physics

Education: Johns & Cunningham; clinical observation

1975 – sent to community hospital; half-day a week at main hospital

1977 – awarded ABR certification

---

---

---

---

---

---

---

---

## My "Training" Program

- Obtain PhD in some branch of physics
- No formalized syllabus
- No formalized program

---

---

---

---

---

---

---

---

**Changes in Medical Physics Education**

- **Specification of didactic knowledge and clinical skills**
- **Credentialing of educational programs**
- **Continuing education opportunities in education for medical physicists**

---

---

---

---

---

---

---

---

**Specification of Didactic Knowledge**

- **Report 44 (1993): Academic Program for Master of Science Degree in Medical Physics**
- **Report 79 (2002): Academic Program Recommendations for Graduate Degrees in Medical Physics**
- **Report 197 (2009): Academic Program Recommendations for Graduate Degrees in Medical Physics**

---

---

---

---

---

---

---

---

**Specification of Clinical Skills**

- **Report 36 (1990): The Clinical Training of Radiological Physicists**
- **Report 90 (2006): Essentials and Guidelines for Hospital-Based Medical Physics Residency Training Programs**
- **Report 243 (2013): Essentials and Guidelines for Clinical Medical Physics Residency Training Programs**

---

---

---

---

---

---

---

---

### Credentialing of Programs

- 1970's – Informal credentialing
- 1988 – formation of Commission on Accreditation of Educational Programs for Medical Physicists (AAPM)
- 1994 – concern over liability led to formation of independent accreditation body (CAMPEP)

---

---

---

---

---

---

---

---

### Continuing Education

- 1978 – AAPM Summer School
  - “The Teaching of Medical Physics” Santa Cruz CA
  - 29 sessions
  - 28 sessions on “What to teach”
  - 1 session on “How to teach”
    - Compared teaching of concepts vs teaching of facts
- 2008 – Workshop
  - “Becoming a Better Teacher of Medical Physics” League City TX

---

---

---

---

---

---

---

---

### Continuing Education

- 2010 – AAPM Annual Meeting
  - Ed Council Symposium: Use of web-based resources
- 2010 – AAPM Summer School
  - “Teaching Medical Physics: Innovations in Learning”
- 2014 – AAPM Annual Meeting
  - Ed Council Symposium: Online education
  - Symposium: “Stop Lecturing Me!”

---

---

---

---

---

---

---

---

### Continuing Education

- **2016 – AAPM Annual Meeting**
  - Ed Council Symposium: Revitalizing Your Medical Physics Classroom
- **2017 – AAPM Annual Meeting**
  - Ed Council Symposium: Future Trends in Medical Physics Education
- **2018 – AAPM Workshop**
  - Improving the Teaching and Mentoring of Medical Physics

---

---

---

---

---

---

---

---

### Learning Objectives

**After attending this presentation, the participant will:**

- **Identify developments in medical physics education from 1970's to the present**
- **Identify some directions AAPM could go in improving teaching quality**
- **Be able to guide new faculty members in the teaching of medical physics**

---

---

---

---

---

---

---

---

### Where Do We Go From Here?

- **Educators Resource Guide**
  - Medical Physics as Educators Committee wiki
  - Teaching workshop presentations

---

---

---

---

---

---

---

---

**Where Do We Go From Here?**

- **Shareable material – we collaborate with others in research, why not collaborate in education?**
  - Lecture recordings
  - Problem sets
  - Exam questions

---

---

---

---

---

---

---

---

**Where Do We Go From Here?**

- **Create library of modules for teaching medical physics students**
  - Analogous to AAPM/RSNA file for radiology residents

---

---

---

---

---

---

---

---

**Where Do We Go From Here?**

- **Library of video clips of techniques**
  - Relatively easy to generate
  - Need curator for library
- **Continue to reward (and publicize) Innovations in Education Symposium**

---

---

---

---

---

---

---

---

### Where Do We Go From Here?

- **Assist medical physicists in incorporating disruptive technologies into their educational methodologies**
  - Coined by CM Christensen (Harvard B School) in 1997
  - Defined to be a technology that causes a major paradigm shift in the way we do things
    - PC – replaced typewriter
    - Email – replaced snail mail
    - Smartphones – replaced cell phones, PDAs, pocket cameras, calculators, etc.

---

---

---

---

---

---

---

---

### Learning Objectives

**After attending this presentation, the participant will:**

- **Identify developments in medical physics education from 1970's to the present**
- **Identify some directions AAPM could go in improving teaching quality**
- **Be able to guide new faculty members in the teaching of medical physics**

---

---

---

---

---

---

---

---

### If You're Just Getting Started

- **Find a coach/mentor**
- **Get credit for your teaching efforts**
- **Leave your comfort zone**
- **Communicate with your students**

---

---

---

---

---

---

---

---

**Find a Coach/Mentor**

- **Use of coaching**
  - Gawande, “Personal Best,” New Yorker, October 3, 2011
  - <https://www.newyorker.com/magazine/2011/10/03/personal-best>

---

---

---

---

---

---

---

---

**Find a Coach/Mentor**

- **Use of coaching**
  - Observes teaching effectiveness
  - Identifies existence of plateau in acquisition of skills
  - Use of expert observer to enable moving beyond plateau
  - Currently used by world-class athletes, opera singers, etc.

---

---

---

---

---

---

---

---

**Get credit for teaching**

- **May be difficult in some settings**
- **“How is my teaching effectiveness going to be evaluated?”**

---

---

---

---

---

---

---

---



### **Leave Your Comfort Zone**

- **Try non-lecture methods of teaching – lectures can be pre-recorded**
  - Problem-Based Learning
  - Flipped Classroom
  - Peer Instruction
- **Write creative problems**
  - Avoid plug 'n' chug
  - Students need to determine input as well as output

---

---

---

---

---

---

---

---

### **Communicate with Your Students**

- Teaching is not a one-way street
- Get feedback from your students

---

---

---

---

---

---

---

---

### **Closing Thought**

- **Our role as medical physics teachers is not to teach our students medical physics.**

---

---

---

---

---

---

---

---

## Closing Thought

- **Our role as medical physics teachers is not to teach our students medical physics.**
- **Our role as medical physics teachers is to teach our students to learn medical physics.**

---

---

---

---

---

---

---



---

---

---

---

---

---

---