



# HAMMING *DISTANCE* LEARNING TO LEARN YOU AND YOUR RESEARCH

Design Considerations for  
Continuing Course Development:  
Asynchronous Online Distance Learning

Don Brutzman, 11 July 2023

A photograph of a lecture hall. In the foreground, the back of a person's head and shoulders are visible, looking towards a stage. On the stage, a man in a suit stands at a podium. A large screen behind him displays text. The room is dimly lit, with a spotlight on the speaker. A blue circuit board graphic with white lines and circles is overlaid on the left side of the image.

RICHARD W. HAMMING

LEARNING TO LEARN: ART OF  
SCIENCE AND ENGINEERING

NAVAL POSTGRADUATE SCHOOL (NPS)  
MONTEREY CALIFORNIA, USA  
SPRING 1995

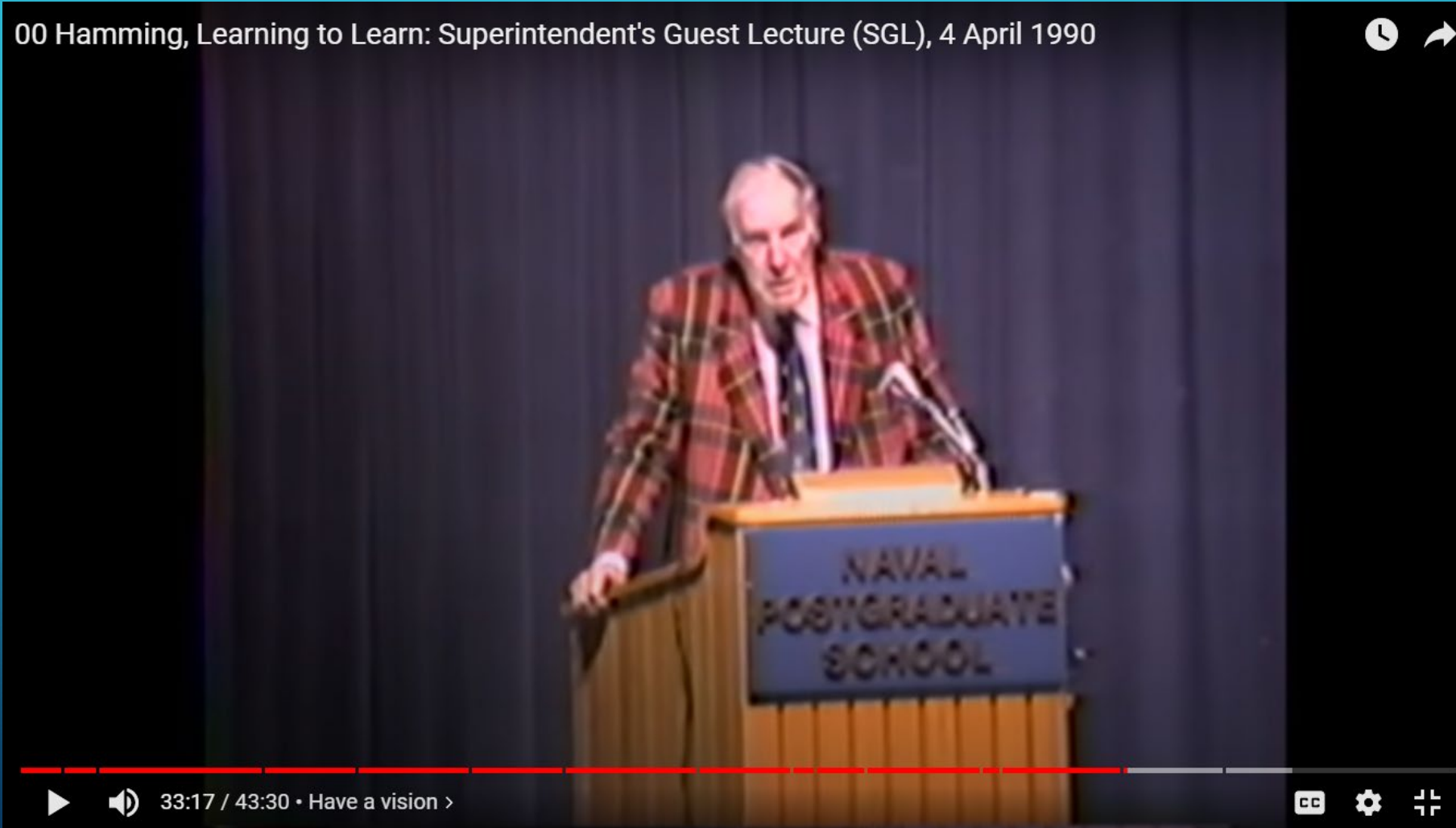
PM 12:50

MAY. 8 1995

# VISION: WHAT SHOULD YOU MAKE HAPPEN?

HAMMING  
ON  
HAMMING

00 Hamming, Learning to Learn: Superintendent's Guest Lecture (SGL), 4 April 1990



SGL, 33:12-36:16 <https://www.youtube.com/watch?v=2hhXS6cODQg?start=1992&end=2176>



# COURSE STATUS AND CURRENT OBJECTIVE



- This highly developed course currently offers many benefits, but still needs instructor moderation to help guide students through a vast set of concepts and information assets.
- Current objective for continuing course development: how to adapt course for Asynchronous Online Distance Learning suitable for remote study by prospective NPS students.

# OVERALL GOALS FOR COURSE OUTCOMES



- Study *Learning to Learn, the Art of Doing Science and Engineering* by Richard W. Hamming, eminent mathematician and scientist.
- Provide insights into challenges and discovery process facing all scientists and engineers who attempt to perform important work.
- Explore broad and deep range of topics from Hamming's career that together describe technical basis for the modern world.
- Perform self-examination and introspection on strategic pursuit and personal achievement of worthy research objectives.

# STUDENT MOTIVATION



- Learn Hamming's broad impact, a great American thinker + doer
  - Learn more about graduate study, applied research thinking
  - Learn more about many critical topics in 21<sup>st</sup> Century
  - Learn how to learn
- 
- Well suited for preparing prospective Ph.D. students
  - Of potential interest to motivated master's students



# ONGOING EFFORT: ONLINE DEVELOPMENT



Long history exploiting and adapting technology for course development

- First course recorded and multicast live on the Internet, 1995
- Theses explored potential use of course digital assets for learning
- Group authoring of presentations distilling key points for each chapter
- Online distribution of assets, assist establishment of Hamming Archive

Continuing course improvement, as tandem technique for adapting new technology, remains useful for exploring innovation themes by Hamming

# OFFERING NUMEROUS ONLINE ASSETS



- [YouTube videos](#) of original lectures, ongoing course discussions, Mandelberg biography, guest presentations, related topics
- [Scanned copies of original chapters](#) from final author proofs, with Hamming's permission
- [A.M. Turing Award](#) Association for Computing Machinery (ACM)
- [nps.edu/hamming](#) Calhoun archive has extensive assets, growing
- [gitlab.nps.edu](#) archival version control for all supporting files
- [cle.nps.edu](#) Sakai Continuous Learning Environment (CLE)



# GETTING COURSE CREDIT AT NPS, IF ENROLLED



- Course can be taken over any time interval, which is helpful for active-duty students at remote locations
- Deadlines and deliverables help students fully engage in comprehending and applying timeless concepts presented
- How to provide credit to students completing requirements?
  - Student attestation, submission of essays or project work
  - Individually assessed for students enrolling in NPS as students
  - Eventual enrollment and completion as NPS student



# INVITED AND ANTICIPATED PARTICIPANTS

- Enrolled NPS MV4000 students, synchronous
- Enrolled NPS MV4000 students, asynchronous
- Navy/USMC/DoD civilians, connected and remote
- University partners elsewhere (possibly)
- General public, life-long learners, returnees
- Guest lecturers – almost anyone interested, maybe...

# EXAMPLE ACTIVITY BY STUDENTS



- Write down initial impressions, goals for You and Your Research
- Read and watch three chapters of Hamming book each week
- Journal notes of reactions, questions, points for class discussion
- Note specific Hamming video segments as connecting threads
- Explore a technology for pedagogic value in general course use
- Watching videos of prior group discussions - useful?
- Record new talk describing Hamming influence on your research



# CANDIDATE CONTRIBUTIONS OF CONTENT



Usable course contributions have following characteristics:

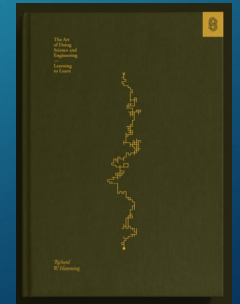
- Archivally publishable, persistent, repeatable
- Unrestricted access, open-source licensing
- Results independent of licensed or expirable technology
- Encourage search capabilities for all course assets
- Innovative approaches welcome, feedback often helps



# CURRENT GAPS, OPPORTUNITIES



- Public access to courseware for individual use, group dialog
- Evaluation of asynchronous students for credit
- Acknowledged participation by external students
- Possible partnership with Stripe Press ?
- Enhanced presence for YouTube Hamming videos ?
- Project for NPS Teaching Learning Commons (TLC) ?



An abstract graphic on the left side of the slide, consisting of a network of white lines and small circles on a blue gradient background. The lines and circles resemble a circuit board or a neural network, with some lines extending vertically and others branching out horizontally and diagonally. The circles are of varying sizes and are connected by thin lines, creating a complex, interconnected pattern.

BACK TO THE PRESENT...

AND THE FUTURE...



# THANKS NPS FOUNDATION FOR SUPPORT!

HAMMING  
ON  
HAMMING



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Foundation

18 July 2022

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Dear President Rondeau,

The NPS Foundation is pleased to offer \$70,000 in Phase 1 SEED funding for 2022. These funds are intended to support Seed Program research by the principal investigators listed below. Each PI is allocated \$10,000 with a period of performance ending 31 December 2023.

#### Investigators

Dr. Miriam Alves and Dr. Dennis Lester

Dr. Don Brutzman

Dr. Wenschel Lan

Dr. Ray Madachy

Dr. Giovanni Minelli and Noah Weitz

Ben Reeder and John Joseph

Dr. Weilan Su

#### Project Title

Building Education Programs from  
Required Competencies using AI  
Asynchronous Distance Learning  
for Naval Students **for Hamming!**  
Leveraging Commercial Capabilities  
for Spacecraft Design  
Open Source System Modeling  
Library  
Autonomous Small Satellite Ground  
Station Environmental Modeling  
Cryophones: Air Deployable  
Arctic ASW Sensors  
Communication and Disinfection  
Lighting System

Our goal outcome for January 2024  
quarter will be making MV4000 course  
“ready in all respects” for asynchronous  
distance learning by remote students.

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Sincerely

Rich Patterson  
Chief Executive Officer  
NPS Foundation

# OPEN CHALLENGES STILL REMAIN

HAMMING  
ON  
HAMMING

00 Hamming, Learning to Learn: Superintendent's Guest Lecture (SGL), 4 April 1990



Watch later



36:16 Open questions



# CONTACT



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