Badges for Visualization
Micro-Certification

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SDSC Education
XSEDE Workforce Development
Webinar Agenda

- Background
- Motivation: XSEDE Badges
- About XSEDE
- ADDIE
- Gamification in Professional Development
- MOOCs and “Micro-Certification”
- Open Badges and Issuing an Open Badge
- Learning Management Systems which support Badges
- The HPC Community
- About the XSEDE Data Visualization Badges
Background

- **Physics**
  - SDSU, Condensed Matter/Solid State

- **Graduate Research, Neurophysiology**
  - Biophysical basis of movement disorders such as Parkinson’s Disease
  - Loma Linda University, School of Medicine

- **Scientific Visualization of electrophysiological data**
  - EEG
  - ECG
  - EMG

- **Hyperglyphs**
  - See my Blue Waters Webinar at:

  https://www.youtube.com/watch?v=Bq-b2yc0Tig&list=PLO8UWE9gZTIAMRvvVfS7-6q3x1DrXKmkR
Background

- Master’s Degree in Education Technology
  - Online degree from SDSU (renamed Learning Design & Technology)
- Emphasis on *Organizational Performance Analysis*
The Organization?
High-Performance Computing (HPC) Community

- XSEDE, the latest incarnation of the HPC Community
  - Community Engagement
  - Workforce Development
  - User Training
Why Badges?

“Badges?? We don’t need no stinkin’ badges... “

.... or do we?
ADDIE

- Analysis already completed by XSEDE 1,
- Conclusion: there may be value in issuing badges as part of XSEDE 2
Design and Development

- OpenACC Badge already developed and implemented
  - Thanks to Sandie Kappes, the XSEDE HPC Moodle’s awesome Admin and
  - Jon Urbanic and the folks at Pittsburgh Supercomputer Center

- Data Viz Badge design based on the OpenACC badge
  - Simple ‘low-stakes’ Beginner Badge quiz
    User is allowed 5 attempts to get 80% correct, no time limit
  - More challenging Intermediate Badge with quiz and practical.
    User is allowed 2 attempts, time limit
Implementation & Evaluation

- **Implementation via XSEDE HPC Moodle**
  - Thanks again to Sandie Kappes, the XSEDE HPC Moodle’s awesome Admin

- **Evaluation included visualization expert reviews**
  - Thanks to the viz experts who helped!
Micro-Certifications

‘Just-in-time Learning’

- LinkedIn and Lynda.com
- Coursera
- EdX
- Udemy
- Many others...
Gamification in the Workplace

- Motivation
- Incentives
- Examples
  - New Employee Orientation
  - Sales quotas
  - Professional Development
  - Workforce training
Badges – Symbols of Authority or Honor

- Law Enforcement
  - Sheriff’s Badge
  - Police Officer’s Badge
- Military Medals
- Badges of Appreciation
Badges – Symbols of Achievement

- Girl Scout Badges
- Boy Scout Badges
- Gaming Badges (Pokemon, Minecraft)
- Fitness (Quantified, Self, Fitbit, Stackup)
Badge Services

- Chrome Warrior – ‘Gamify Your PD’
- Credly
- Open Badge Factory
Open Badges

- Started by Mozilla in 2011
- Funding from Macarthur Foundation (“Genius Grants”)
- Mozilla Backpack alone hosts 967,966 badges
- **Issuing a badge can be complex process**
Learning Management Systems to the Rescue!

- Moodle Badges
  - Integrated with Open Badges Backpack
About the Data Viz Badge

● Assessment of Visualization Expertise
● Typically aligned with f2f or online workshops
● However, visualization workshops are:
  ○ Infrequent
  ○ Application-specific
‘Generic’ Data Viz Badges

- We took a generic approach to assessing visualization expertise
- Focus on principles and practices common across most applications
- Assessment questions aligned with learning outcomes based on
What Type of Visualization are we Assessing and Rewarding?

- Data?
- Scientific?
- Information?
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Data Viz Badge “Learning Objectives”

- Guided in part by the Computational Science Undergraduate Competency list provided by the HPC University at:

  http://shodor.org/media/content/hpcu/website/educators/undergradCompetencies

- Sorted elements from *Area 7: Visualization* into Beginner/Intermediate/Advanced.
- Extracted and modified Beginner competencies to incorporate *recently-emerging visualization methodologies*. 
Data Viz Badge “Learning Objectives”

“In order to pass this assessment, Learners must be able to...”:

● Define the purpose of visualizing scientific data.
● Differentiate between the different types of visualization (e.g. information visualization, scientific visualization, etc.).
● Give examples of data visualization.
● Explain the basic neurophysiology of the visual system as it pertains to perception of information.
Data Viz Badge “Learning Objectives”

● Describe basic principles which a good visualization leverages.
● Explain the differences between the various visualization, and identify the types of data for which they are most appropriate and why.
● List coordinate systems relevant to visualization.
● Explain the difference between scalar data and vector data and describe visualization methods which may be applied to either.
Data Viz Badge “Learning Objectives”

- Be aware of the many different visualization resources and applications available to them.
- Describe a ‘glyph’ and explain why glyphs are useful.
- Differentiate between 2D and 3D visualization applications and explain when one is more appropriate than the other.
- Explain what a GPU is and describe its advantages/disadvantages.
Data Viz Badge “Learning Objectives”

- Explain why polygon count can significantly impact performance in a 3D visualization.
- For a specific 3-dimensional dataset, describe what point, surface, and volumetric visualization techniques might be appropriately applied and why.
- Determine whether a dataset is univariate or multivariate and how that impacts visualization decisions.
- Demonstrate how to add dynamic animation and interactivity and determine when it is appropriate.
If You Can do That, You Win a Badge!
We Need Beta Testers!

- Send email to Jeff Sale if you are interested in beta testing our Beginner and/or Intermediate Data Visualization Badge:

  esale@ucsd.edu
Quick Demonstration

http://www.hpc-training.org/xsede/moodle/

Thanks!

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Conclusion

- Badges offer incentives and motivation because they are a recognized form of honor, authority, and accomplishment.
- The use of digital badges in workforce and professional development is growing and is here to stay.
- Micro-certification for ‘just-in-time learning’ is the future of online education.
- Badges appeal to the younger generations. In fact, badges might replace or at least augment grades in K-12.
- The HPC community is venturing into badging with its first badges for visualization, big data, OpenACC, and more.