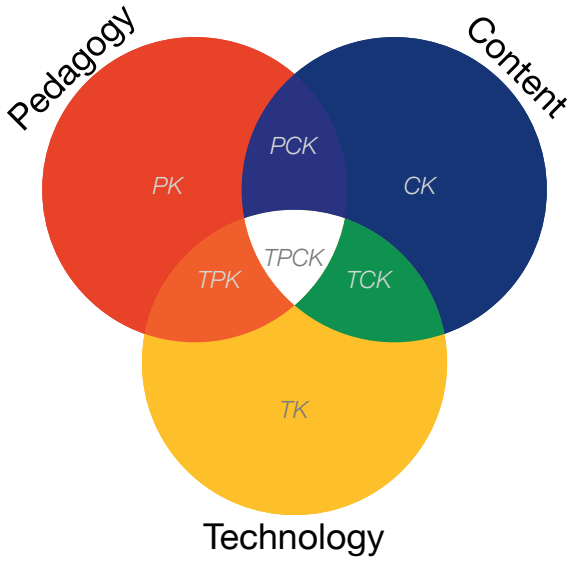
Game and Learn:
An Introduction to Educational Gaming
14. TPCK, SAMR, and Games

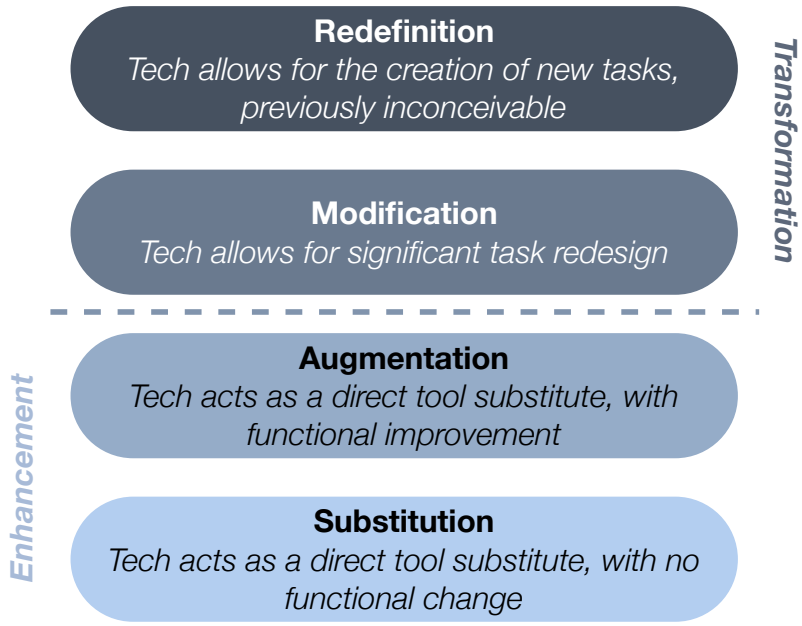
Ruben R. Puentedura, Ph.D

The Models

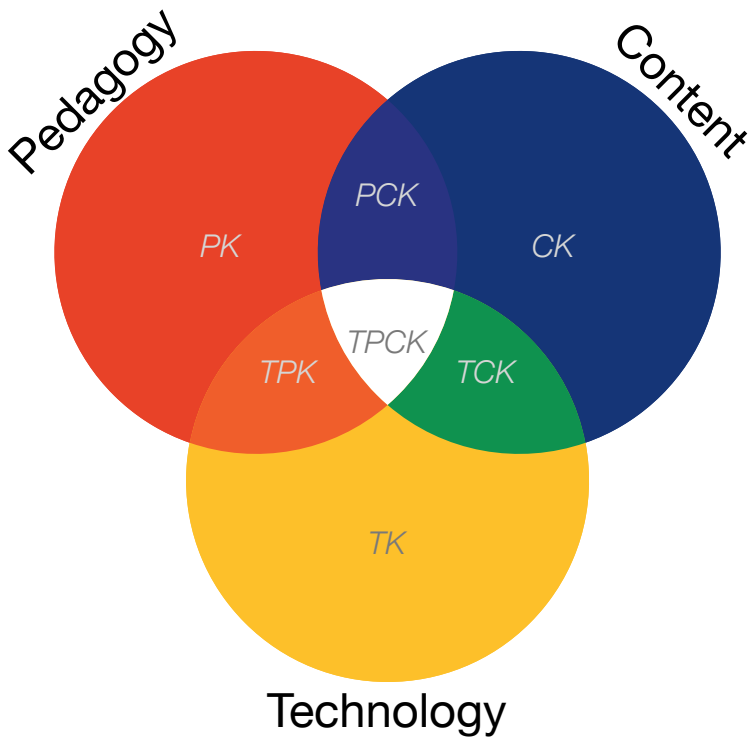
TPCK (Mishra & Koehler)



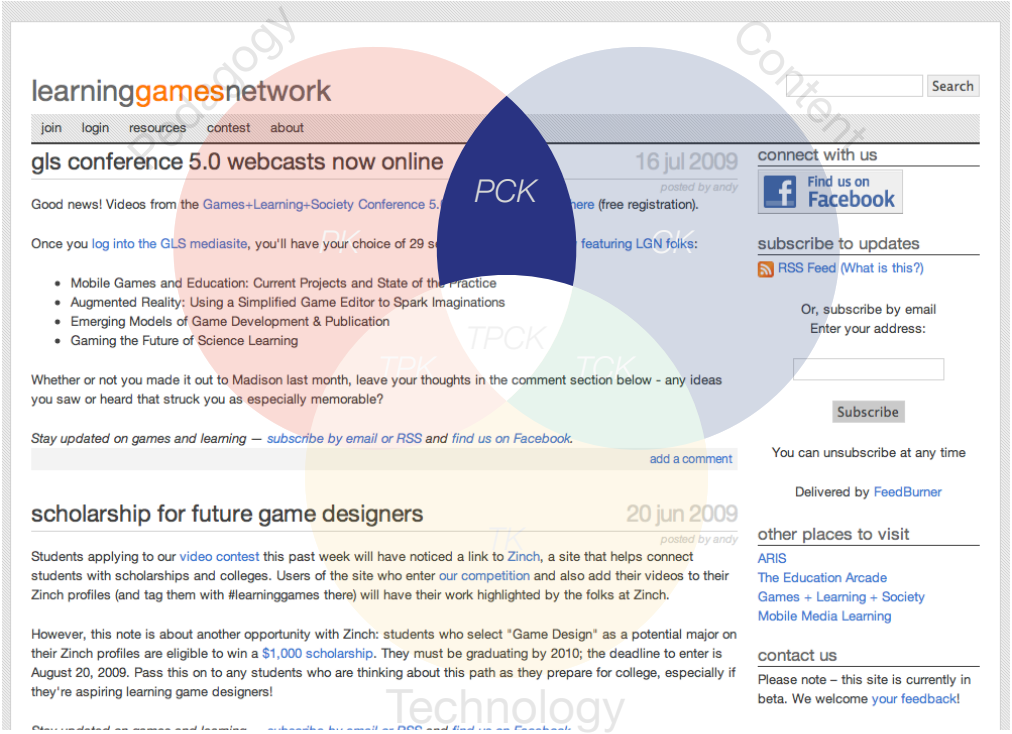
SAMR (Puentedura)



TPCK and Educational Games

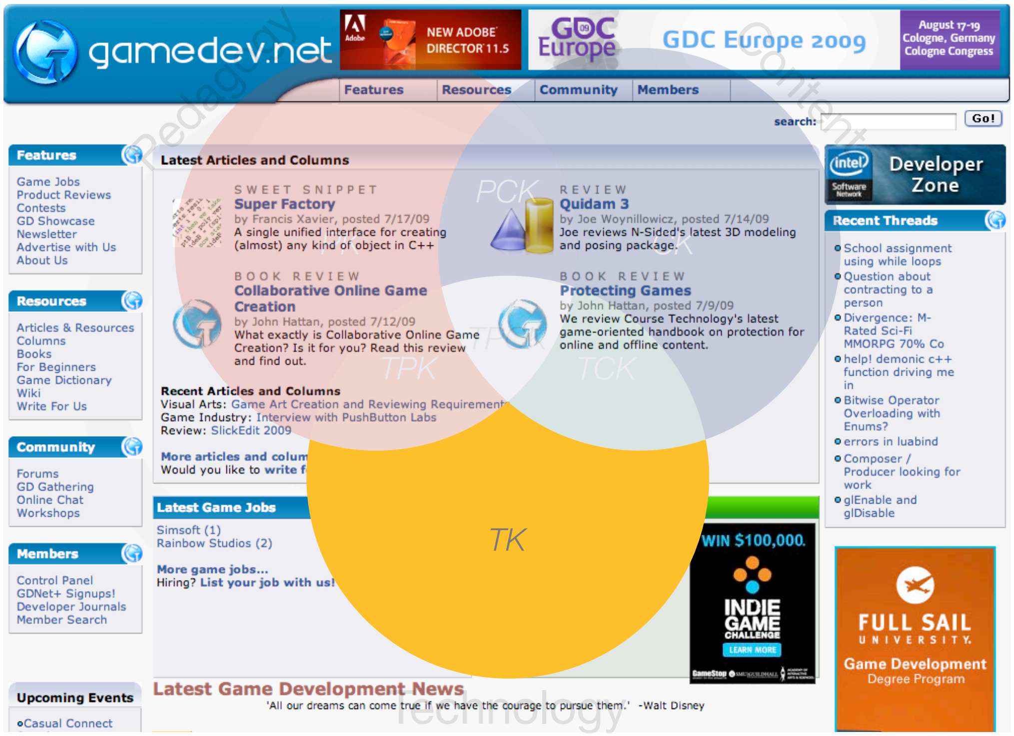



The Ludologist
CK
PCK
PK
Technology
Content
Pedagogy
New Collection on the Semiotics of Com
Games
June 23rd, 2009
Computer Games
between Text and Practice
edited by Dario Compagno and Patrick Coppock
From the Italian Association for the Study of Semiotics, the collection Computer Games between Text and Practice looks at games from, yes, a semiotic perspective!
Cover (pdf, 488 Kb)
Index and acknowledgements
half-real
Jesper Juul
» gambit game lab
» half-real
» jesper juul publications
» www.jesperjuul.net
Recent game writings
» A Certain Level of Abstraction


learninggamesnetwork
Search
join login resources contest about
gls conference 5.0 webcasts now online
16 jul 2009
posted by andy
Good news! Videos from the Games+Learning+Society Conference 5.
here (free registration).
Once you log into the GLS mediasite, you'll have your choice of 29 s
featuring LGN folks:
Mobile Games and Education: Current Projects and State of the Practice
Augmented Reality: Using a Simplified Game Editor to Spark Imaginations
Emerging Models of Game Development & Publication
Gaming the Future of Science Learning
Whether or not you made it out to Madison last month, leave your thoughts in the comment section below - any ideas you saw or heard that struck you as especially memorable?
Stay updated on games and learning — subscribe by email or RSS and find us on Facebook.
add a comment
scholarship for future game designers
20 jun 2009
posted by andy
Students applying to our video contest this past week will have noticed a link to Zinch, a site that helps connect students with scholarships and colleges. Users of the site who enter our competition and also add their videos to their Zinch profiles (and tag them with #learninggames there) will have their work highlighted by the folks at Zinch.
However, this note is about another opportunity with Zinch: students who select "Game Design" as a potential major on their Zinch profiles are eligible to win a $1,000 scholarship. They must be graduating by 2010; the deadline to enter is August 20, 2009. Pass this on to any students who are thinking about this path as they prepare for college, especially if they're aspiring learning game designers!
connect with us
Find us on Facebook
subscribe to updates
RSS Feed (What is this?)
Or, subscribe by email
Enter your address:
Subscribe
You can unsubscribe at any time
Delivered by FeedBurner
other places to visit
ARIS
The Education Arcade
Games + Learning + Society
Mobile Media Learning
contact us
Please note – this site is currently in beta. We welcome your feedback!
PCK
TPCK
TPK
TCK
Technology
Content
Pedagogy


Building the Field of
Digital Ma rning
MACARTHUR
The John D. and Catherine T. MacArthur Foundation
Home
Search
PK
Latest News
Edutopia Announces the Digital Generation Project
The MacArthur-supported project aims to help educators and parents understand how digital media are changing today's youth.
Read the press release.
Visit the project's Web site.
MacArthur Island Opens in Virtual World of Second Life
The island is a new laboratory for MacArthur's two-year exploration of virtual worlds, led by the University of Southern California and the nonprofit Global Kids.
Read the press release.
About MacArthur's grantmaking in virtual worlds.
The MacArthur Foundation launched its five-year, $50 million digital media and learning initiative in 2006 to help determine how digital technologies are changing the way young people learn, play, socialize, and participate in civic life. Answers are critical to developing educational and other social institutions that can meet the needs of this and future generations. The initiative is both marshaling what is already known about the field and seeding innovation for continued growth.
On this website you can find:
information about ongoing projects and emerging research;
a link to the Spotlight blog, where visitors can


Alice
An Educational Software that teaches students computer programming in a 3D environment
FREE!!
About Alice
Downloads
Teaching
Community
Publications
Support
The SIMS 2
Turning abstraction into animation
Java
Sun
read more...
TPK
Alice 3 News
2009 DUKE'S CHOICE AWARDS
Java
WINNER
Alice 3 wins Duke's Choice Award at JavaOne 2009!
Read more...
Alice
Read more...
Teaching Materials
Alice is a teaching tool designed as a revolutionary approach to teaching and learning introductory programming concepts. The Alice team has developed instructional materials to support students and teachers in using this new approach. Resources include textbooks, lessons, sample syllabuses, test banks, and more. Other authors have generously joined our efforts, creating additional textbooks.
Read more...
Downloads
Alice 2.2, Alice 2.0
Designed for High School and College
Alice Blog
Check out the Alice blog! The Alice team discusses the latest in Alice development. View screencasts
Community Forums
Share and gather knowledge about Alice through our community forums. Students, teachers and enthusiasts are all welcome! If you have a question or


gamedev.net
NEW ADOBE DIRECTOR 11.5
GDC Europe
GDC Europe 2009
August 17-19 Cologne, Germany Cologne Congress
Features
Resources
Community
Members
search:
Go!
Pedagogy
Content
Technology
PCK
TPK
TCK
TPCK
TK
Features
Game Jobs
Product Reviews
Contests
GD Showcase
Newsletter
Advertise with Us
About Us
Resources
Articles & Resources
Columns
Books
For Beginners
Game Dictionary
Wiki
Write For Us
Community
Forums
GD Gathering
Online Chat
Workshops
Members
Control Panel
GDNet+ Signups!
Developer Journals
Member Search
Upcoming Events
Casual Connect
Latest Articles and Columns
SWEET SNIPPET
Super Factory
by Francis Xavier, posted 7/17/09
A single unified interface for creating (almost) any kind of object in C++
REVIEW
Quidam 3
by Joe Woynillowicz, posted 7/14/09
Joe reviews N-Sided's latest 3D modeling and posing package.
BOOK REVIEW
Collaborative Online Game Creation
by John Hattan, posted 7/12/09
What exactly is Collaborative Online Game Creation? Is it for you? Read this review and find out.
BOOK REVIEW
Protecting Games
by John Hattan, posted 7/9/09
We review Course Technology's latest game-oriented handbook on protection for online and offline content.
Recent Articles and Columns
Visual Arts: Game Art Creation and Reviewing Requirements
Game Industry: Interview with PushButton Labs
Review: SlickEdit 2009
Latest Game Jobs
Simsoft (1)
Rainbow Studios (2)
More game jobs...
Hiring? List your job with us!
WIN $100,000.
INDIE GAME CHALLENGE
LEARN MORE
Latest Game Development News
'All our dreams can come true if we have the courage to pursue them.' -Walt Disney
Developer Zone
Recent Threads
School assignment using while loops
Question about contracting to a person
Divergence: M-Rated Sci-Fi MMORPG 70% Co
help! demonic c++ function driving me in
Bitwise Operator Overloading with Enums?
errors in luabind
Composer / Producer looking for work
glEnable and glDisable
FULL SAIL UNIVERSITY.
Game Development Degree Program


GAMASUTRA
The Art & Business of Making Games
Our Clients EA Bizarre Creations
9+ Years of Outstanding Art Services
Sony Microsoft Codemasters Ubisoft Disney
DHRUVA INTERACTIVE
NEWS
FEATURES
BLOGS
JOBS/RESUMES
CONTRACTORS
STORE
RSS
SEARCH
GO
Pedagogy
Content
Technology
PCK
TPK
TCK
Member Login [Newsletters]
Email:
Password:
LOGIN
Forgot Password? | Sign Up
PROGRAMMING
ART
AUDIO
DESIGN
PRODUCTION
Latest Blogs
View All Post RSS
July 21, 2009
The +1 Road to Happiness [1]
This Developer's Life: The Universal Game [7]
Make Your Bed, Eat Your Veggies, and Comment Your Code [8]
Latest Jobs
View All Post a Job RSS
July 21, 2009
News
View All Submit News RSS
Exclusive: U.S. Year-To-Date Console Top 5s Reveal 2009's Victors So Far
As part of Gamasutra's June NPD analysis, we're revealing the Top 5 year-to-date rankings for PlayStation 3, Xbox 360, and Wii games in the U.S. - with some notable games and surprises within. [3]
Valve's Newell: How About Community Financing For Games?
Valve boss Gabe Newell has been discussing ideas for alternative game funding, suggesting that "financing from the community" to make games is something he's "super interested in" right now. [14]
GDC 2010 Opens Call For Submissions, Adds Advisory Board Members
The call for submissions for next March's 2010 Game Developers Conference in San Francisco, the pre-eminent game creation conference, has opened and will be available through August 14th.
Features
View All RSS
NPD: Behind the Numbers June 2009
The History and Theory of Sandbox Gameplay [6]
Anatomy of a Combat Zone [11]
advertisement
JOBS ON GAMASUTRA
THE WORLD'S LARGEST
Preregister Now!

Electromagnetism Supercharged! Learning Physics with Digital Simulation Games

Kurt Squire[1], Mike Barnett[2], Jamillah M. Grant[2], Thomas Higginbotham[2]
[1]Curriculum & Instruction, School of Education, University of Wisconsin-Madison, Madison, WI 53706
Tel: 608-263-4672, FAX, 608-263-9992
E-mail: kdsquire@education.wisc.edu
[2] Department of Curriculum and Instruction, Lynch School of Education, Boston College

Abstract: Learning scientists are increasingly turning to computer and video games as tools for learning. Simulation might not only motivate learners, but provide accessible ways for students to develop intuitive understandings of abstract physics phenomena. This study examines what learning occurs when an electromagnetism [illegible] game is used in a school for underserved students. Students in the experimental [illegible] better than students in the control group (guided discovery-based science) on [illegible] derstanding. Game mechanics enabled students to confront weaknesses in under[illegible] physics representations became tools for understanding problems. Implications for [illegible] of educational digital media are discussed. Yet, it was also these very same game mecha[illegible]sed significant challenges in terms of student engagement, motivation, and learning of physics [illegible]ncepts.

Keywords: computer games, simulation, electromagnetism, physics education.

Introduction

Many science educators advocate conceptual or qualitative physics, the notion that physics is best taught not by mathematical formulae, but rather through experiments, labs, demonstrations, and visualizations which help students understand physical phenomena conceptually (diSessa, 2000; Forbus, 1997; Hewitt, 2002). Consistent with the *Physics First* curricular movement, this perspective maintains that a deep, fundamental understanding of physics provides a solid basis for future science learning. How to engage younger students in complex physics thinking is a challenge, but computer simulations provide one intriguing way to engage students in the study of abstract, complex physical phenomena (diSessa, 2000; Dede et al., 1999). Digital technologies can immerse the learner in worlds that not only represent scientific phenomena, but behave according to the rules of physics. Simulated worlds can be programmed to behave by Newtonian or Maxwellian rules (Dede et al., 1999). By representing the simulation through digital gaming conventions, educators can potentially increase engagement while also fostering deeper learning, as learners engage in critical and recursive game play, whereby they generate hypotheses about the game system, develop plans and strategies, observe their results and adjust their hypotheses about the game system (Cordova & Lepper, 1996; Gee, 2003; Squire, 2003). Experiences in game worlds become experiences that students

SAMR and Educational Games

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Transformation

Enhancement

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Transformation

Enhancement

DimensionM

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Transformation

Enhancement

Immune Attack

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Transformation

Enhancement

Industry Giant 2

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

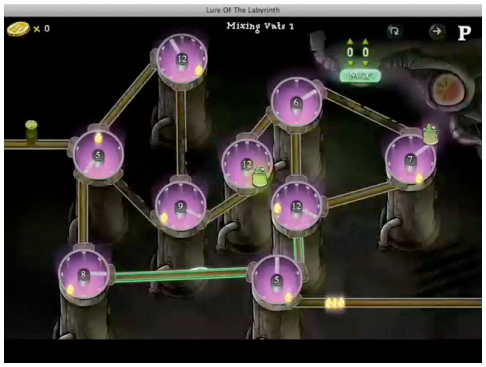
Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Transformation

Enhancement

Lure of the Labyrinth



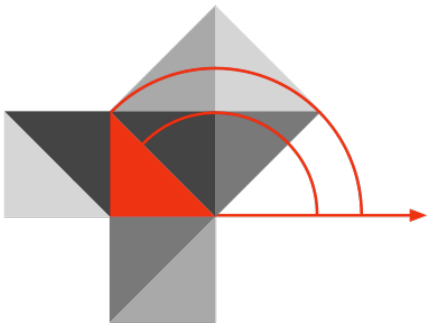
Resources Cited

- **The Models:**
  - **The TPCK Model:**
    - *TPCK - Technological Pedagogical Content Knowledge*
      http://www.tpck.org/tpck/index.php?title=Main_Page
    - AACTE (Eds.) *The Handbook of Technological Pedagogical Content Knowledge for Educators*. Routledge. (2008)
  - **The SAMR Model:**
    - Puentedura, R.R. *Transformation, Technology, and Education*. (2006) Online at:
      http://hippasus.com/resources/tte/
  - **Integrating TPCK and SAMR:**
    - Puentedura, R.R. *As We May Teach: Educational Technology, From Theory Into Practice*. (2009) On iTunes U at:
      http://deimos3.apple.com/WebObjects/Core.woa/Browse/education-maine.gov.1835411146

- **TPCK and Educational Games:**
  - **CK:** *The Ludologist*
    http://www.jesperjuul.net/ludologist/
  - **PCK:** *Learning Games Network*
    http://www.learninggamesnetwork.org/
  - **PK:** *MacArthur Digital Media & Learning Initiative*
    http://digitallearning.macfound.org/
  - **TPK:** *Alice*
    http://www.alice.org/
  - **TK:** *GameDev.net*
    http://www.gamedev.net/
  - **TCK:** *Gamasutra*
    http://gamasutra.com/
  - **TPCK:** Squire, K., M. Barnett, J.M. Grant, T. Higginbotham. “Electromagnetism Supercharged! Learning Physics with Digital Simulation Games” in *Proceedings of the 6th International Conference on Learning Sciences*. (2004) Online at:
    http://www.educationarcade.org/files/articles/Supercharged/SuperchargedResearch.pdf

- **SAMR and Educational Games:**
  - **Substitution:** *DimensionM*
    http://www.dimensionm.com/
  - **Augmentation:** *Immune Attack*
    http://fas.org/immuneattack/
    http://www.youtube.com/watch?v=KtpvjZGaufw
  - **Modification:** *Industry Giant 2*
    http://ig2.jowood.com/
    http://www.youtube.com/watch?v=ZkmaxkOt-dw
  - **Redefinition:** *Lure of the Labyrinth*
    http://labyrinth.thinkport.org/www/

Hippasus



http://hippasus.com/rrpweblog/
rubenrp@hippasus.com