

# **Knowledge Visualization for Self-Regulated Learning**

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May 12, 2011



- Minhong Wang and Michael J. Jacobson (Guest Eds.),  
Special Issue on Knowledge Visualization for Learning  
and Knowledge Management, *Educational Technology &  
Society*, Vol.14, No.3, 2011 (in press)
  - ❖ Visualizing Topic Flow in Students' Essays
  - ❖ Concept Maps as Cognitive Visualizations of Writing  
Assignments
  - ❖ Knowledge Visualization for Self-Regulated Learning
  - ❖ Using Computer-Assisted Multiple Representations in  
Learning Geometry Proofs
  - ❖ Learning as 'Knowing': Towards Retaining and Visualizing  
Use in Virtual Settings

# Today's Learning Environment

- Resource-abundant
- Freedom and flexibility in learning and knowledge construction
  - Self-directed and life-long learning
- Cognitive overload
  - Information and learning content scattered in various resources and under disparate topics
  - Complexity in knowledge and knowledge structures
- Conceptual and navigational disorientation
  - “lost-in-cyberspace”

# Why the Problem

- Novices are lack of sufficient knowledge and deep understanding of the subject domain (Bransford, et al., 2000)
  - Especially for complex or ill-structured subject content
- Traditional education tends to break wholes into parts, and focus separately on each part
  - Without a big picture to learners
- Difficult to understand complex knowledge

# Required Learning Support

- Reify cognitive structures or mental models
  - ▣ Deep and visible understanding
    - Knowledge & Structures
    - Abstraction, interpretation, multiple perspectives, big picture
  - ▣ Meta-cognition
    - Learners can become more independent if they have the awareness of their own knowledge and the ability to understand, control, and manipulate their cognitive processes

# Knowledge Visualization (KV)

- Use visual imagery to construct and convey complex insights
  - Improve understanding and communication
  - Foster conceptual change and knowledge transfer
  - Help learners develop an awareness of their mental representations (meta-cognition)
  - Develop and manage intellectual assets in explicit formats (for knowledge retention, reuse, update, ...)

# KV for Self-Regulated Learning

- Visualization of domain knowledge structure
  - Reducing cognitive load of novices
  - Learning with a solid foundation and good start point
- Integration of information processing and KV
- Facilitation of Self-Regulated Learning via KV
  - Individual learning
    - Access to learning content, self-assessment with feedback, guidance on learning process
  - Social learning
    - Resource sharing, Q&A

From “Knowledge Visualization for Self-Regulated Learning” of the Special Issue

# Online Learning System- “JAVA E-Teacher”

- Java-programming course for novices
- Syllabus according to
  - National Computer Rank Examination of China (NCRE)
  - an examination and certification system administered by the Ministry of Education of China
- Course design with experts
  - 10 units, each containing more or less 10 knowledge components



## 用户信息中心

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## 综合表现排名

-  第1名: 0
-  第2名: 0
-  第3名: 匿名
- 第4名: 0
- 第5名: 0
- 第6名: 0
- 第7名: 0
- 第8名: 0
- 第9名: 0
- 第10名: 0

## 小组排名

-  第1名: 0

## 专题学习

[更多](#)



站内搜索:

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## Java e-Teacher平台简介



在线学习Java e-Teacher是km&el lab研发出的新一代网络学习平台。在Java e-Teacher可以获得有效复习、查漏补缺重要的java知识点;每一节课都是一线教师制作的动画,每一章节都能得到系统复习,每一难点都能迎刃而解。还配有所有的知识点测试试题、模拟试卷等完整的考试体系,帮助学生检查评估成绩。

Java e-Teacher的试题库中有近一千道计算机国家二级考试的模拟题,所有的题目都有参考答案,其中近400道题目有详细的解析。除此之外,系统还准备了30道挑战题和经典例题给同学们练习,挑战题和经典例题的数目将逐步增加。

## Java e-Teacher本体推理系统

系统对java学习的各个章节进行了知识点之间的分类,而且定义了各个知识点之间的内涵与外延的各种关系,这样对知识点之间的学习情况也有科学性的控制

系统可对学生的学习情况与测试情况进行推理,系统推理得出学生的知识掌握情况,科学的得出结论给学习者和老师掌握近对学习者的学习进度提出



## 例题精选



[经典例题](#)



[挑战题](#)

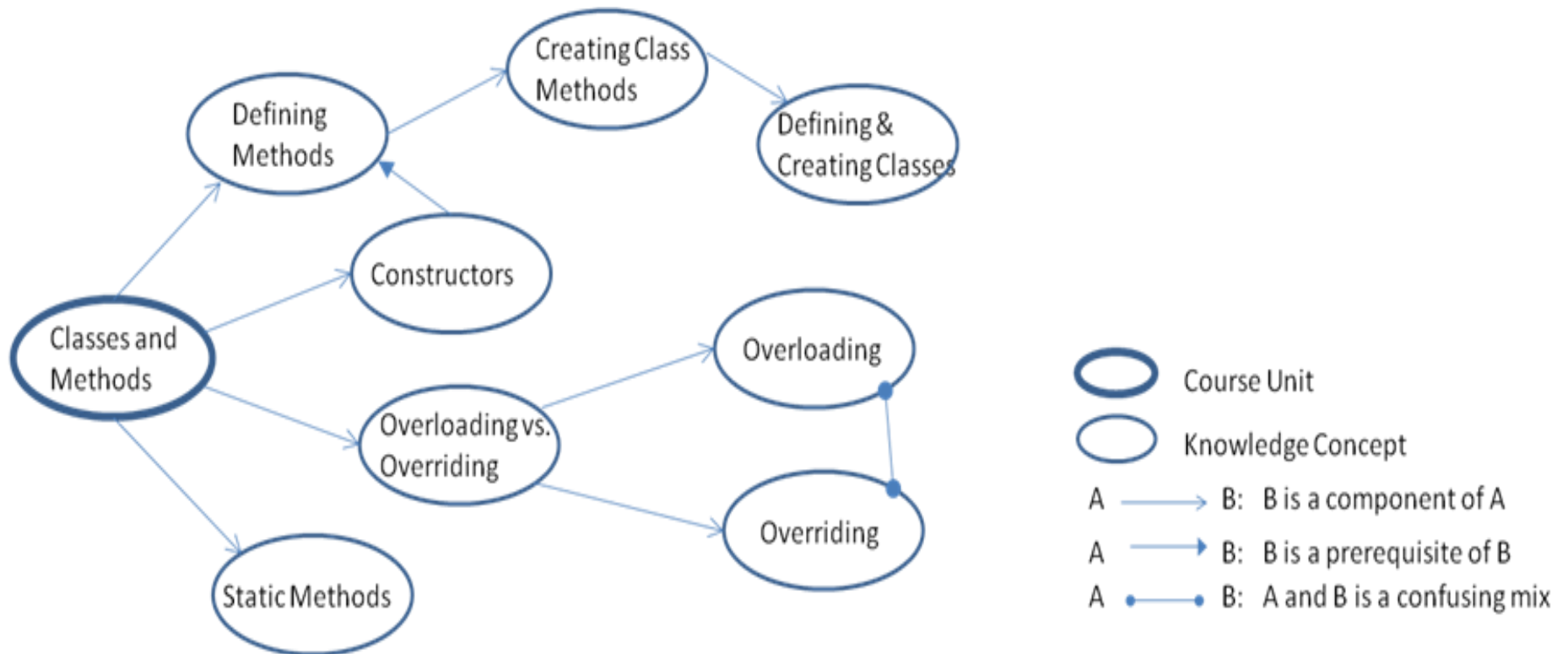
## 网站公告

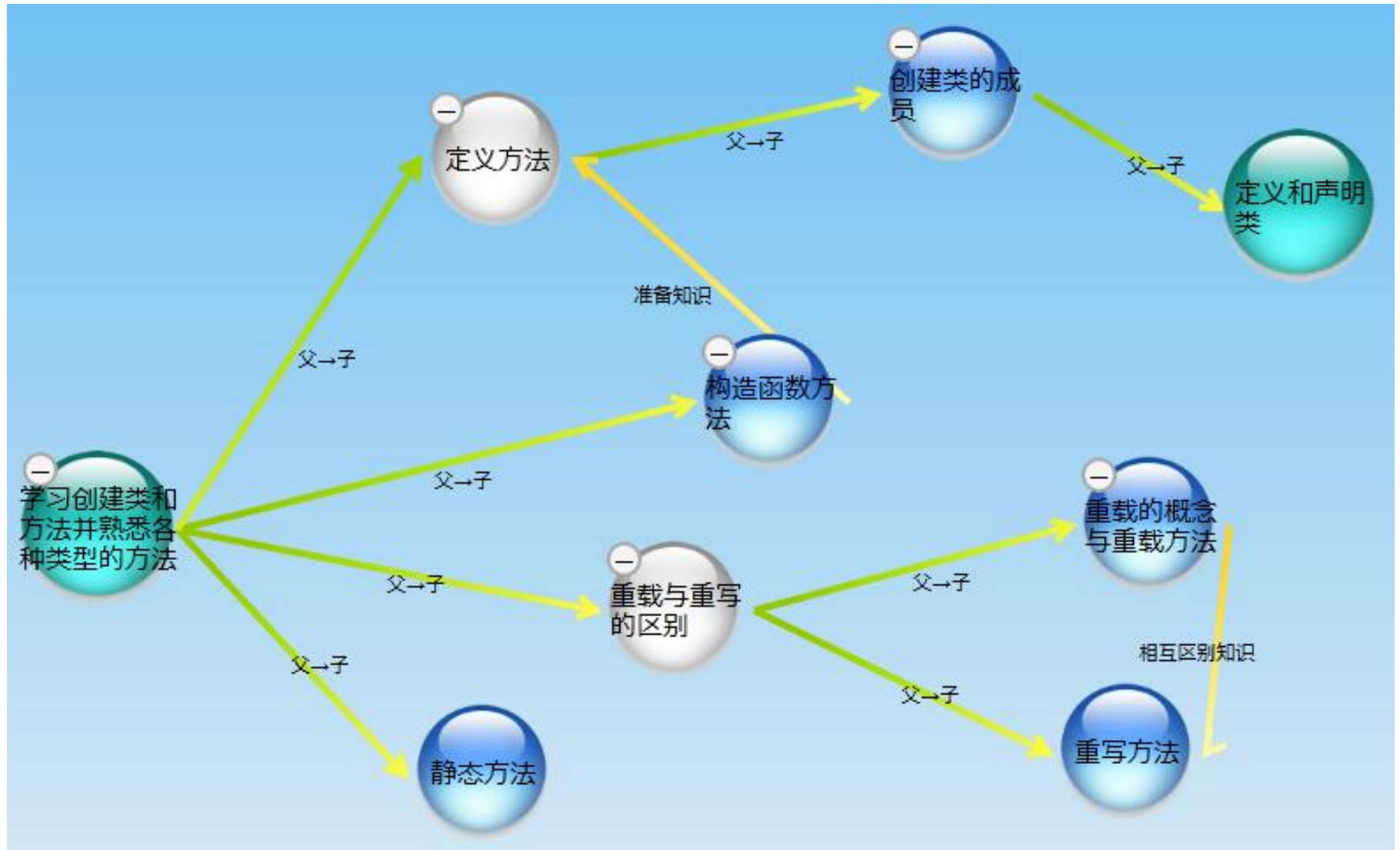
抱歉呀, 本来计划以一条龙来到的现场暴扣得分, 将双方的分差缩小到了只有1分。

## 最新问题

- ▶ 处理对象传输的接口是什么。
- ▶ 关于章节测试
- ▶ 求几本关于java进阶的书籍
- ▶ 怎样比较两个类型为String
- ▶ 小程序Apple的编译问题
- ▶ 关于构造函数
- ▶ 系统扣分
- ▶ 一个关于JAVA的初级问题2
- ▶ 怎样将浮点数(float)相加
- ▶ 怎样用 Win95 的记事本
- ▶ Servlet的生命周期
- ▶ String是最基本的数据类型

# Visualization of Knowledge Structure





A visualized knowledge structure for a Unit

# Integration of KV with other Learning Functions



KV integrated with access to learning resources, self-assessment, ...





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## 疑难解答

请输入您的问题

Unresolved questions

## 资源 共享

Resource sharing

欢迎同学们踊跃上传好的学习资源与其他人分享，我们将对资源进行审核，隐私的文件！

资源名称	上传者	上传时间
· 9条编程带给程序员的好习惯.doc	梅嘉琦	2010/10/4 20:48:59
· Penh Jun_PRD.doc	1	2010/8/31 16:41:55

## 问题分类

已解决问题数: 204

待解决问题数: 8

疑难问题数: 97

ANNOUNCE

## 公告信息

Resolved questions

Difficult questions

Java-e-Teacher已全新改版，欢迎大家提问，相互交流，共同进步！

## 待解决的问题

· 程序运行问题 [编写与运行类程序/类与对象]

· 请问方法在内存中是怎样的存储结构? ...

· 请教 [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

· 问个白痴java问题, 怎么把SQL ... [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

· 我编了个java为什么在命令提示符... [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

· 求JAVA打包成EXE文件的程序 [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

## 新解决的问题

· Java的主类与子类 [其他问题/学习经验]

· 请教高手。 [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

· 我在编译的时候遇到什么"depre... 各

· 作用域public, private... [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

## 问题分类

- Java语言的特点和实现机制  
在各种操作系统中安装与配置JDK | JDK的概念 | 什么是跨平台 | Java程序结构 | >>..
- Java简单数据类型及运算  
各种表达式与运算符 | 变量和常量 | 字符串运算 | 基本数据类型及转换 | >>..
- 可灵活运用各种java语言中的语句编写程序  
异常处理语句 | 单维数组 | 条件运算符 | 循环的零界值 | >>..
- 在网页上使用和运行插件开发小应用程序  
了解小应用程序和应用程序的区别 | 在网页上包含一个小应用程序 | 小应用程序的

## 疑难问题

· 求助 [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

· 为什么applet启动成功, 但in... [编写与运行类程序/面向对象的概念和特征]

· 在Java语言中, 如何列出PC机文... [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

· 视频资源, 请注意 [其他问题/学习经验]

· 为何网页自动跳转 [其他问题/学习经验]

· 附件 [Java语言的特点和实现机制/在各种操作系统中安装与配置JDK]

## 用户等级排行榜

薛蓉 192

周全策 126

All the questions linked to units and knowledge concepts

编写与运行类程序  
面向对象的观念和特征 | 对象和类的概念 | 接口与包的概念与其特性 | 类与对象的属性与行为 | >>..

处理对象  
基本类型和对象之间的转换 | 比较对象 | 调用方法 | public类的成员及访问限制 | >>..

学习创建类和方法并熟悉各种类型的方法  
静态方法 | 构造函数方法 | 重写方法 | 定义和声明类 | >>..

java编程技术基础  
Collections操作 | 多线程的概念实现以及线程的生命周期 | 串行化的要点的以

KV integrated with resources sharing, discussions, ...

# Initial Evaluation

- What
  - learners' perceptions and reactions towards the overall system and KV related functions
- Why
  - Learner reactions have been found to have a much larger impact on learning in technology-mediated learning environments (Sitzmann et al.,2008)
  - Unless the proposed approach is properly implemented to the extent that learners find it acceptable and satisfactory, further investigation on the effect of the approach on learning may not produce reliable and meaningful results.

# Initial Evaluation (cont')

- Environment
  - Online self-study + online consultation
  - 20 volunteers from a mainland university
- Evaluation of the System
  - Survey on easy of use, usefulness, satisfaction
    - Overall system
    - Knowledge maps, self-assessment, system guidance, Q&A
    - Others: content, learning support, technical support
  - Interview for open comments to the system and its effect on learning
  - Survey on change of attitudes and intentions regarding using online learning systems



# Findings from the Survey

- Positive results on easy of use, usefulness and satisfaction
- Positive impact on change of attitude and intention
- Correlation analysis
  - knowledge maps – usefulness
  - Q&A discussion around knowledge concepts - ease of use
  - Online consultation – satisfaction
  - learning guidance for navigation – all
  - self-tests around knowledge concepts – all
  - learning support, learning contents - satisfaction

KV related

# Findings from the Interview

## □ Comments

- “Learning is usually boring in many situations; however, visual knowledge maps with well-designed and user-friendly interfaces make our learning enjoyable and more fun.”
- “In case I want to know more about specific knowledge, I just click it. It is so simple and direct, saving both time and effort.”
- “The system tells me what is basic knowledge, or what I should learn at the current stage. This helps novices like me feel comfortable and learn easily.”
- “The tests can pinpoint my weak points at anytime, instead of at the end of the course. This helps me consolidate my knowledge step by step.”

# Findings from the Interview (cont')

- Comments (cont')
  - “I enjoy visiting the Q&A forum, especially using my knowledge to answer other students’ questions, which finally improves my own learning.”
  - “JAVA e-Teacher is the best learning system that I have ever used.”
  - “The maps are like a reference system, making it easy for us to engage in a new learning environment with more flexibility.”
  - “What we learnt from several maps is not less than what we learnt from a large number of texts.”

# Findings from the Interview (cont')

- **Summary of advantages**
  - scaffolding conceptual understanding, improving memorization and thinking, facilitating access to learning resources, and supporting individual and social learning
- **Suggestions on further improvement**
  - More simulations, project examples, different level of materials, exam papers
  - Other types of assessment, e.g. program coding and analysis