Key to the success of e-learning studies-
Strategies of finding innovative research topics

National Taiwan University
of Science and Technology
Graduate Institute of Digital Learning and Education
Gwo-Jen Hwang, Chair Professor
gjhwang.academic@gmail.com
Criteria for implementing successful research of e-learning

- **Determine a good research topic**
- Have a proper experimental design
- Write a quality paper to present the research findings and implications
- Submit the paper to a suitable journal
A paper is directly rejected owing to the following reasons:

- No innovation (i.e., no academic contribution)
- Problematic experimental design
- Out of the scope of the journal
- Poor written
- Failing to follow the format or rules (e.g., length limitation) of the journal
Key to the success of a study—adding innovations to the study

Two problems:

- How to Judge whether a research topic is innovative or not?
- How to find innovations for our studies?
# A simple test

- Examples of research projects approved by MOST in 2010

| 姓氏 | 項目 | 執行起迄 | 研究項目 | 語言
|------|------|----------|---------|------|
| 謝隆 | 從WEB 2.0到WEB 3.0：資訊科技對學習動機、歷程與評量的影響 | 20100801～20130731 | From Web2.0 to Web 3.0: Impacts of information technologies on students’ learning motivation, learning process and performances | 繁體中文
| 陳溥 | 遊戲式學習之動機設計與成效評估 | 20100801～20130731 | Motivation-oriented Design and performance evaluation for game-based learning | 英文
| 邱慧 | 導入「惡魔代言人（故意唱反調的人）」角色對學童參與線上合作論證及發展論證能力的影響 | 20100801～20110731 | Impacts of the lead-in of Demon spokesperson (a character who always proposes opposite opinions) on young students’ participation in collaborative argumentation and development of argumentation ability | 繁體中文
| 洪昭 | iPhone之互動式行動學習系統遊戲開發計畫 | 20101001～20110930 | Development of iPhone-based interactive mobile gaming systems | 英文
<table>
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<tr>
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<th>項目說明</th>
<th>執行起迄</th>
<th>英文說明</th>
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| 魏貞 | 數位化幼兒情緒能力發展系統檢測平台建置及效益評估 | 執行起迄： 20100801～20110731  
Implementation and evaluation of an emotional intelligence assessment platform for preschool children |  |  |
| 莊嚴 | 認知風格對數位遊戲中推理能力訓練之影響 | 執行起迄： 20100801～20130731  
Impacts of students’ cognitive styles on their reasoning performances in digital games |  |  |
| 林鏘 | 運用眼動分析於無所不在擴增實境數位學習系統之使用性評估 | 執行起迄： 20100801～20110731  
The Usability Evaluation of Employing Eye Movement Analysis in AR-based Digital Learning System |  |  |
| 林志 | 擴增實境融入之教學發展與成效評估 | 執行起迄： 20100801～20110731  
Evaluating the effectiveness of incorporating AR into teaching design |  |  |
Add innovations to e-learning studies

- Adopting **new technologies** (e.g., IOT, wearable devices) or **using technologies in an innovative way** (AR in flipped classrooms)
- Proposing **new learning strategies** or **using the existing strategies in new contexts** (e.g., concept map-based gaming approach)
- Applying e-learning approaches to **seldom-considered subjects** (e.g., gifted students, working adults, students with different high anxiety)
- Applying e-learning approaches to **seldom investigated domains** (e.g., art, design, business, nursing education, and enterprise training)
- Investigating **seldom-discussed issues** (e.g., problem-solving ability, reasoning performance, learning behaviors)
Impacts of an augmented reality-based flipped learning guiding approach on students’ scientific project performance and perceptions

- Course unit: magnetic force
- A combination of AR + flipped learning
- In-class team-based learning activity: develop a motor
- Evaluating students’ learning achievement, critical thinking tendency, group self-efficacy, motivation and cognitive load

Before-class: watching instructional videos-electromagnetic theory and the process of developing a motor

Students can make a note on the video

Video of the learning activity
Before-class: complete a learning sheet

3. Is it necessary to wrap the magnet wire with the same direction?
   - Yes, it is.
   - No, it is not.

Multiple choice questions
In-class (control group): develop a motor following the instruction of a mobile learning system
In-class (experimental group): develop a motor following the instruction of an AR system
AR information showing the current flows of the real object
# Results - learning motivation

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<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Adjusted Mean</th>
<th>SE</th>
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*** $p<.001$
## Results - Critical thinking tendency

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***p < .001
## Results- Group self-efficacy

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<td>Post-test Experimental Group</td>
<td>56</td>
<td>4.12</td>
<td>0.71</td>
<td>4.17</td>
<td>0.84</td>
<td>57.75***</td>
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<td>55</td>
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<td>0.57</td>
<td>2.24</td>
<td>0.85</td>
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</table>

***p<.001
An Interactive Concept Map Approach to Supporting Mobile Learning Activities for Natural Science Courses

- proposing an interactive concept map approach for mobile learning
  - The students are asked to submit a concept map developed based on their observations in the field
  - The m-learning systems instantly provides hints or guidance to the students

Provide instant comments on students’ concept maps

Hint: Are you sure that the relationship “pupas belong to chrysalis” is correct?

Press the “GO” button to access the supplementary materials.
A prompt-based annotation approach to conducting mobile learning activities for architecture design courses

Tips and strategies for publishing SSCI papers
Influences of an inquiry-based ubiquitous gaming design on students’ learning achievements, motivation, behavioral patterns, and tendency towards critical thinking and problem solving

- Location: Campus of an elementary school
- Measuring students’
  - learning achievements
  - learning motivation
  - behavioral patterns
  - tendency toward critical thinking and problem solving

The real-world learning environment

A real-world learning park, in which each plant is a gaming target in the game.

Observe the real world targets
Scans a QR code to obtain information of the target
Observe follow the gaming contexts
The gaming interface

- Location of the students
- A gaming target associated with a plant in the real world
- Discussion forum
- Current score of each group
- Prompt of the gaming task
The Experiment Procedure

101 sixth graders from 4 classes

Learn basic concepts of Biodiversity

Take pre-test and questionnaires

Experimental group
Mobile gaming approach

Control group
Conventional mobile learning

Receive post-test, questionnaires and interview

2 weeks

1 week

3 weeks

1 week
<table>
<thead>
<tr>
<th>Code</th>
<th>Behavior</th>
<th>Description</th>
<th>Example</th>
<th>Record</th>
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<tbody>
<tr>
<td>S1</td>
<td>Selection of a task</td>
<td>Scan a QR-Code and start a new gaming task.</td>
<td>Choose the stage of the “Hostile Water”.</td>
<td>Touch a “game stage” button</td>
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<tr>
<td>S2</td>
<td>Field observation</td>
<td>Observe the key characteristic of the creature or environment.</td>
<td>Please pay attention to the growth of algae and the color of the water.</td>
<td>Touch a blue shield</td>
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<tr>
<td>S3</td>
<td>Clue search</td>
<td>Obtain some key clues.</td>
<td>Please observe the circumstance of the territorial waters, including surface waters and deep waters.</td>
<td>Contact a sage</td>
</tr>
<tr>
<td>S4</td>
<td>Comparison</td>
<td>Observe a comparative creature or environment with counter characteristic.</td>
<td>Please scan the QR code next to the aquarium in the natural science classroom.</td>
<td>Touch a red shield</td>
</tr>
<tr>
<td>S5</td>
<td>Data search</td>
<td>Start a web search engine.</td>
<td>Look for the solutions to the problem on the Internet</td>
<td>Touch a crystal ball</td>
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<tr>
<td>S6</td>
<td>Reading supplementary materials</td>
<td>Provided with the relationship between the creature and environment.</td>
<td>Illustrates the relationship between Algal Blooms and Eutrophication</td>
<td>Read a treasury</td>
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<tr>
<td>S7</td>
<td>Review the task</td>
<td>Review the task of the stage.</td>
<td>Please explain the cause or effect of eutrophication</td>
<td>Contact an owl</td>
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<tr>
<td>S8</td>
<td>Pose a method</td>
<td>Submit an answer.</td>
<td>Reducing phosphates</td>
<td>Press the “submit” button</td>
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<td>S9</td>
<td>Correctly recognize a creature / environment</td>
<td>Correctly answer a multiple-choice question of the basic relationship between the creature and environment.</td>
<td>What is the color of the water with eutrophication?</td>
<td>Submit a right answer</td>
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<td>Mean</td>
<td>Control group (n)</td>
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<td>Comparison</td>
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<td>Data search</td>
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<td>Reading supplementary materials</td>
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**p < 0.01; ***p < 0.001
Experimental group' behavior transfer relationships
Control group’ behavior transfer relationships
Effects of the use of interactive e-books by intensive care unit patients’ family members: Anxiety, learning performances and perceptions

- seldom-considered subjects: patients’ family members

Content in the e-book

Table of Contents

- Rules of wards
- Medical instruments and equipment
- Comfort the patient

Tips and strategies for publishing SSCI papers
Medical instruments and equipment

Physiological monitor

Assist in the presentation of various instruments and equipment
Small test- identify the equipment

Drag the instrument to the correct position.

Infusion pump
Physiological monitor
Ventilator

Tips and strategies for publishing SSCI papers 34
Brainstorming

- Try to find 10 different ways of using concept maps in a class
  - Different purposes (e.g., summarize the learning content, brainstorming)
  - Different forms (e.g., fill-in-blank)
  - Different applications (e.g., Science vs historical course)
A time sequence-oriented concept map approach to developing educational computer games for history courses

Hui-Chun Chu, Kai-Hsiang Yang & Jing-Hong Chen

Pages 212-229 | Received 20 Jan 2014, Accepted 16 Oct 2014, Published online: 17 Nov 2014

**A Votable Concept Mapping Approach to Promoting Students’ Attentional Behavior: An Analysis of Sequential Behavioral Patterns and Brainwave Data**


1Institute of Education, National Chiao Tung University, Taiwan // 2Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, Taiwan // csun@ntcu.edu.tw // gjhwang.academic@gmail.com // aoisora.nagi@gmail.com // logotowa@gmail.com // bulaike1234@gmail.com // Ariel.Chen1216@gmail.com

*Corresponding author

**ABSTRACT**

This study explores the effects of integrated concept maps and classroom polling systems on students’ learning performance, attentional behavior, and brainwaves associated with attention. Twenty-nine students from an Educational Research Methodology course were recruited as participants. For data collection, in-class quizzes, attentional behavior analysis, and a 20-minute structured interview were applied, and the attention-associated brainwaves of the participants were measured. In the first week, a group-polling method was introduced in class; in the second week, participants were asked to draw concept maps using pen and paper (PnP concept mapping); and in the third week, the polling system and concept maps were integrated (votable concept mapping) and applied. The results showed that the PnP concept mapping method and the single student with lower attention activation point to the issue, while the...
Knowing more learning strategies via reading papers

Concept mapping, Game-based learning, Two-tier test, Problem posing, Aggressive prompting, WATA (Web-based Assessment and Test Analysis), WSQ (Watch, Summarize, question), Repertory grid, Collaborative learning, Project-based learning, Inquiry-based learning, WebQuest, Peer assessment, Self-regulated learning, Flipped learning, Problem-based learning, Video sharing, Digital storytelling, Competitions, Jigsaw II, Spreadsheet as Mindtool, Web issue-quest, Adaptive learning, Role-play strategy, active learning-promotion mechanism, collaborative issue-quest promotion mechanism, Creative thinking strategy
Peer-assessment


Knowing more research issues via reading papers

learning achievement, learning motivation, learning attitude, critical thinking, problem-solving, communication, collaboration, creative thinking, Metacognition, skills, self efficacy, learning anxiety, flow experience, self-regulation ability, learning satisfaction, cognitive load, technology acceptance, learning behavioral patterns, interactive patterns, questioning ability, self-directed learning, learning styles, cognitive styles, oral ability, writing ability, hearing ability, reading comprehension, art performing, approaches to learning science, scientific epistemic beliefs

How to measure?
Knowing more educational theories via reading papers

- Scaffolding Theory
- Cognitive apprenticeship
- Constructivism
- Situated learning
- Social constructivism
- Cognitive theory of multimedia learning

What are the connections between the theories, issues and strategies?
Check list of a research design

- What are the innovations and contributions in this study?
  - Innovative technology, strategy, application, subjects or issues?
- What are the learning content and objectives (e.g. course unit)?
- Who are the participants or subjects of the experiment (e.g., age, grade, number, gender)?
- What are you going to measure? What are your research questions?
- What are the educational theories supporting your strategies or findings?
Professor Gwo-Jen Hwang is currently a Chair Professor at the Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology. His academic expertise includes mobile and ubiquitous learning, game-based learning, and applications of artificial intelligence in education. He has presided over more than 100 projects and received numerous research awards, including 2007, 2010, and 2013 National Science Council Distinguished Research Awards, and the 2019 Ministry of Education National Excellent Teacher Award.

Professor Hwang has published more than 750 papers, including more than 400 journal articles, of which nearly 280 have been published in SSCI journals. He is currently on the review board of more than 40 SSCI/SCI/EI academic journals, as well as the Associate Editor of IEEE Transactions on Education (SCI), the Editor-in-Chief of the International Journal of Mobile Learning and Organisation, and Journal of Computers in Education. Times World University Ranking announced the 10 most prolific and most cited researchers in 2016 (based on statistics from 2011 to 2015) and Professor Hwang is the world's top-ranked scholar in social sciences. [https://www.timeshighereducation.com/news/ten-most-prolific-and-most-cited-researchers](https://www.timeshighereducation.com/news/ten-most-prolific-and-most-cited-researchers)
### 10 most prolific and most cited researchers in 2011-2015


<table>
<thead>
<tr>
<th>Subject area</th>
<th>Name</th>
<th>Institution</th>
<th>Country</th>
<th>Research area</th>
<th>Publications</th>
<th>Citations per publication</th>
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<tr>
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<td>Peng Shi</td>
<td>Victoria University</td>
<td>Australia</td>
<td>Computational intelligence</td>
<td>250</td>
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<tr>
<td>Biochemistry, genetics and molecular biology</td>
<td>Cornelia van Duijn</td>
<td>Erasmus University Rotterdam</td>
<td>Netherlands</td>
<td>Genetic epidemiology</td>
<td>195</td>
<td>52.5</td>
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<tr>
<td>Business, management and accounting</td>
<td>Kee Hung Lai</td>
<td>Hong Kong Polytechnic University</td>
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<td>Logistics and shipping</td>
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<td>Chemistry</td>
<td>Michael Grätzel</td>
<td>École Polytechnique Fédérale de Lausanne</td>
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<td>Photonics and interfaces</td>
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<td>Daron Acemoglu</td>
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<td>Hadron collider physics</td>
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Thank you