The study of self-assessment with prompts, learning journal, and referencing through sharing for regulation of cognition in web-based computer programming learning

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ICALT 2012
• Regulation of cognition (Akyol and Garrison, 2011; Schraw and Dennison, 1994; Sperling et al., 2002)
  – Strategies
    • Planning
    • Information management strategies
    • Comprehension monitoring
    • Debugging strategies
    • Evaluation
  – Strategies and learning
Introduction 2/3

• Learning methods
  – Self-assessment (Boud, 1995; Milford and Brown, 2010)
  – Learning journal (Berthold, Nückles, and Renkl, 2007; Cowan, 1992)
  – Sharing notes (Berthold et al., 2007; Hicks, 2003; Hwang et al., 2011)

• Learning methods and learning
Introduction 3/3

• Web-based computer programming language learning (Hwang et al., 2012; Truong, Bancroft, Roe, 2003)
  – Thought-provoking student learning activities
    • programming problem solving
    • writing source codes, execution of a program, debugging practice and feedback activities
    • from simple to complex
    • enough practice opportunities with constructive and corrective feedback
The VPen system

• Web-based multimedia system (Hwang et al., 2012; Hwang et al., 2012)
  – Self-assessment with prompts
    • to assess the level of own understanding of a chapter
    • six questions
    • each question represents one level of cognition
  – Learning journal
    • to summarize important key concepts
  – Referencing through sharing
    • to share knowledge and experience with peers
    • to identify missed important concepts and/or expand own answers
Self-assessment with prompts

Q1: After the class, what kind of program can you write? (level 1)
- Writing the countdown program by the nested loop.

Q2: Please give your explanation or definition about programming code. (level 2)
- The countdown program concept is as the same as Traffic light, it will circulate lighting 3 colors periodically and continuously.

Q3: Would you give some examples, such as programming code, picture or text description to show what kind of concept did you learn? (level 3)

Q4: Would you please show weakness or strength of nested loop and show difference or similarity from other structure? (level 4)
- Using For-Next is the most convenient function for setting the frequency of loop’s execution, and also this function is the most understandable!

Q5: Please post the program and give the detailed explanation of the program. (level 5)

Q6: Can you write one complete program using the concepts you learn from this chapter? (level 6)
- This program can execute and show the complete Pyramid.
**3-1 The control component of TextBox and data entry**

TextBox (text block, tool box), this control component has the same functions as Label. All of them are dealing with text. The difference is that Label indicate the static text.

**3-2 The program of temperature conversion**

**3-3 Calculating the circumference and area of circle**

Writing one program of which input is radius R using InputBox, and output is circumference and area of circle using MsgBox.

(P.S. circumference = 2πR, the area of circle = πR^2, π=3.141593)

```vbnet
Public Class Form1
    Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button1.Click
        Dim x
        x = TextBox1.Text
        TextBox2.Text = Val(x) * 2 * 3.141593
        TextBox3.Text = Val(x) * 2 * 3.141593
        End Sub
    End Class
```
Method 1/5

• Research purpose
  – strategies of regulation of cognition can be facilitated by the learning methods
  – the relationship of the learning methods and learning achievement

• Research questions
  – What are students' perceptions regarding usefulness of self-assessment with prompts, learning journal and referencing through sharing for the strategies of regulation of cognition?
  – Do self-assessment with prompts, learning journal, and referencing through sharing have relationship with each other and with learning achievement?
Method 2/5

• Research model
  – A questionnaire survey
  – Assessment of learning performance
  – Analysis of participation
  – Pearson correlation analysis
Method 3/5

- Participants and the subject
  - Sixty eight undergraduate freshmen students majoring in foreign language
  - Age ranged from 18 to 19 years
  - Most of students were female
  - Four-month course
    - Visual Basic programming design
Method 4/5

• Experiment procedure
  – Two-hour weekly face-to-face classes in form of lectures
  – One instructor
  – Students have studied learning material related to the course after class in the computer classroom or at home
  – Self-assessment with prompts, learning journal and referencing through sharing
  – A post-test, a questionnaire survey, and interviews
Method 5/5

• Data collection
  – A questionnaire survey
  – A taxonomy for assessment
  – Quantity of self-assessment with prompts and quantity of learning journal
  – Frequency of referencing
  – Frequency of being referenced
  – One-on-one semi-structured interviews
Results and discussion 1/6

• The questionnaire survey
  – Information management (Mean=3.22; SD=0.83)
    • to know what did they learn and what need to be learnt
    • facilitates strategies of regulation of cognition as well as cognition
  – Comprehension monitoring (Mean=3.18; SD=0.86)
    • to know what did they learn, which parts they understand, and which parts they did not
    • facilitates strategies of regulation of cognition as well as cognition
  – Debugging strategies (Mean=3.35; SD=0.88)
    • to review others self-assessment with prompts/learning journal, understanding learning material better, and improve own work
    • facilitates strategies of regulation of cognition as well as cognition
Results and discussion 2/6

• The questionnaire survey
  – some items were ranked low (Mean< 2.90)
    • no time to use the learning methods even they are useful
    • no relation to major in foreign language and low motivation
# Results and discussion 3/6

<table>
<thead>
<tr>
<th>Variables</th>
<th>Self-assessment with prompts</th>
<th>Learning journal</th>
<th>Referencing trough sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cognitive level</td>
<td>Quantity</td>
<td>Cognitive level</td>
</tr>
<tr>
<td>Self-assessment with prompts</td>
<td>0.927**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td></td>
<td>0.664**</td>
<td></td>
</tr>
<tr>
<td>Learning journal</td>
<td>0.733**</td>
<td>0.590**</td>
<td>0.732**</td>
</tr>
<tr>
<td>Cognitive level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td></td>
<td>0.652**</td>
<td></td>
</tr>
<tr>
<td>Referencing trough sharing</td>
<td>0.555**</td>
<td>0.576**</td>
<td>0.429**</td>
</tr>
<tr>
<td>Frequency of referencing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of being referenced</td>
<td>0.501**</td>
<td>0.469**</td>
<td>0.470**</td>
</tr>
<tr>
<td>Learning achievement</td>
<td>0.707**</td>
<td>0.581**</td>
<td>0.719**</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01
• Correlation statistics
  – All variables of the learning methods significantly correlate with each other
    • the better students perform in one independent variable the better they will perform in another
  – All variables of the learning methods significantly correlate with learning achievement
    • the better students perform in one of the independent variables, the better is learning achievement
  – Cognitive level of learning journal has the most significant correlation with learning achievement (0.719**)
Results and discussion 5/6

• Paired t-test
  – cognitive level of learning journal was significantly higher comparing to cognitive level of self-assessment with prompts (t=5.787, p<.001)

• Multiple regression analysis
  – cognitive level of learning journal has predictive ability on learning achievement
  – cognitive level of learning journal had 51% explanatory power with regard to predicting learning achievement
Results and discussion 6/6

- Learning journal brings more effect on learning achievement
- Contrary perceptions
  - self-assessment with prompts is more useful
    - guidelines and scaffolding for learning
    - allow evaluating own understanding of learning material
    - facilitates cognition better
Conclusion

• The learning methods for facilitating the strategies of regulation of cognition

• The results demonstrated
  – Positive perception towards the learning methods
  – The learning methods significantly correlate with each other and with learning achievement
  – Learning journal brings more effect on learning achievement than self-assessment with prompts does

• Our recommendations

• Future study
Thank you for your attention!

Q&A