On the use of the computer to deliver Processing Instruction

Input Processing Theory and Processing Instruction

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The majority of studies from 1990 to 2000 attempted to show the advantages of using computers in the classroom ... Rather than focusing on the benefits and potentials of computer technology, research needs to move toward explaining how computers can be used to support second language learning (i.e. the kinds of tasks or activities that should be used and in what kind of settings). (Liu et al., 2003; p. 264)

In the early 1990s, some critics still questioned the value of computer technology and of implementing it in the foreign language classroom. At present, the focus is not on whether to accept computer technology, it is on how to integrate technology more effectively into the learning and teaching of languages. (Liu et al., 2003; p. 262)
Literature Review

Technology and Language Learning

- Studies comparing classroom and computer environments
  - Chang & Smith (1991) compared students in working in two environments (i.e., computer and in the classroom) and working in pairs as well as alone. They found no differences in language gains on either variable.
  - Sciarone & Meijer (1993) compared classroom and computer environments for completing language learning tasks. They found that full autonomy to use the technology did not ensure completion of tasks because students needed feedback and structure to complete the assignments.
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<td>Causitive</td>
<td>copula</td>
<td>subjunctive</td>
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<td>preterit tense</td>
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<td>PI vs. Other Instruction</td>
<td>TI, Control</td>
<td>TI, Control</td>
<td>MOI</td>
<td>TI, Control</td>
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<td>PI Effective?</td>
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<td>Interpretation</td>
<td>PI &gt; TI &gt; C</td>
<td>--</td>
<td>PI = MOI</td>
<td>PI &gt; (TI = C)</td>
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<td>*</td>
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<td>PI --&gt; T1 &lt; (T2 = T3)</td>
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<td>(PI = TI) &gt; C</td>
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<td>*</td>
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<tr>
<td>Production</td>
<td>(PI = TI) &gt; C</td>
<td>(PI = TI) &gt; C</td>
<td>PI &gt; C</td>
<td>(PI = TI) &gt; C</td>
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<td>paper &amp; pencil</td>
<td>paper &amp; pencil</td>
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</tr>
</tbody>
</table>

* Time was and was not a significant factor based on the constraints analyzed.

**PI** = Processing Instruction

**TI** = Traditional Instruction

**MOI** = Meaning Output

**C** = Control

**T** = Time
## PI compared to Itself

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<tr>
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<td>future</td>
<td>subjunctive</td>
<td>object pronouns</td>
<td>object pronouns</td>
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<tr>
<td><strong>Component of PI</strong></td>
<td>PI, SI, EI, C</td>
<td>PI, SI</td>
<td>PI, SI</td>
<td>SI, SI + EFB</td>
<td>PI, SI, EI</td>
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<tr>
<td><strong>Interpretation</strong></td>
<td>PI = SI &gt; EI = C</td>
<td>(PI = SI) &gt; EI</td>
<td>PI &gt; SI</td>
<td>SI = SI + EFB</td>
<td>(PI = SI) &gt; EI</td>
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<td></td>
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<tr>
<td><strong>Production</strong></td>
<td>PI = SI &gt; C; PI &gt; EI; EI = SI; EI = C</td>
<td>(PI = SI) &gt; EI</td>
<td>PI &gt; SI</td>
<td>SI = SI + EFB</td>
<td>(PI = SI) &gt; EI</td>
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<tr>
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<td>paper &amp; pencil</td>
<td>paper &amp; pencil</td>
<td>computer</td>
<td>paper &amp; pencil</td>
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</table>

**PI** = Processing Instruction  

**SI** = Structured Input activities  

**EI** = Explicit Information  

**EFB** = Explicit Feedback  

**C** = Control
The present study

Research Questions

- Are there differential effects for delivering Processing Instruction in different modes?
  - computer
  - paper and pencil
  - textbook/classroom

- Are there differential effects for delivering Processing Instruction in different modes for different linguistic items?
  - preterite/imperfect distinction
  - negative tú commands

- Are there differential effects for delivering Processing Instruction in different modes for different linguistic items across time?
  - pretest
  - immediate posttest
  - delayed posttest (1 week)
Literature Review

Variable 1: Mode of Delivery

- Liu, Moore, Graham & Lee (2003; p. 264) put forward the following issues that need to be addressed when planning future studies in computer-based SLA.
  - Research needs to have a solid foundation in theories
  - To be effective, software needs to be based on relevant pedagogical and design principles
  - Studies need to use well-established, valid, and reliable measures
  - Research should focus on more than anxiety, attitudes, vocabulary acquisition, and language production
Literature Review

Variable 1: Mode of Delivery

- Salaberry (2000).
  - The way in which specific pedagogical objectives are achieved when manipulating specific characteristics of the technological tools should be the foundation of such critical assessments.
Literature Review

Variable 1: Mode of Delivery

- Computer
- Paper-and-Pencil
- Textbook/Classroom
Literature Review

Variable 2: Linguistic Items

• Preterite / Imperfect distinction (A)
  – individual forms previously instructed
  – two forms not seen together
• Negative tú commands (B)
  – new form
Literature Review

Variable 3: Time

• Pretest
  – 2 tests (Preterite/Imperfect, Negative tú Commands)
  – given 2 weeks prior to 1st treatment

• Immediate Posttest
  – given immediately after treatment
  – order of test items changed from pretest

• Delayed posttest - 1 week
  – given 1 week after treatment
  – order of test items different from pretest and posttest
## The Study

### Data Gathering

<table>
<thead>
<tr>
<th>Processing Instruction Mode of Delivery</th>
<th>Computer (Group 1)</th>
<th>Paper and Pencil (Group 2)</th>
<th>Textbook (Group 3)</th>
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<tr>
<td></td>
<td>Informed Consent</td>
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<td>Week 2</td>
<td>---</td>
<td>---</td>
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<td>Treatment A</td>
<td>Treatment A</td>
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<td>Delayed-Post A</td>
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<tr>
<td></td>
<td>Treatment B</td>
<td>Treatment B</td>
<td>Treatment B</td>
</tr>
<tr>
<td></td>
<td>Post B</td>
<td>Post B</td>
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<tr>
<td>Week 5</td>
<td>Delayed-Post B</td>
<td>Delayed-Post B</td>
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</table>
The Study

Tests

[Pre-Test; Post-Test; Delayed Post Test]

Name ___________________________ Section # ___________ Code ___________

A. To the best of your ability, circle the appropriate response for each of the following sentences.

1. Yo ___________ (mirar) la televisión cuando Pablo ___________ (llevar) a la puerta.
   a. miro
   b. miro
   a. lleva
   b. lleva

2. Ayer, ___________ (comprar) y ___________ (comer) un saco de arroz en mi clase.
   a. compro
   b. compre
   a. como
   b. como

3. Aunque ___________ (llover) tanto que no ___________ (poder) andar en bicicleta.
   a. llueve
   b. llueva
   a. puede
   b. podria

4. Mientras yo ___________ (estudiar), Rosa ___________ (hablar) por teléfono.
   a. estudio
   b. estudio
   a. habla
   b. habla

5. Cuando ___________ (llegar) a la fiesta ___________ (ser) las diez de la noche.
   a. llega
   b. llego
   a. es
   b. es

B. The following is a short passage about Pablo and his bad luck. To the best of your ability, circle the appropriate response for each of the following sentences.

(Hoy nuestro amigo Pablo tenía una muy mala suerte [Chile]. Ustedes tienen que a la clase de español. Tuvieron mucho suerte porque la noche anterior salió/ésta con unos amigos. En la clase mientras le profesor explicaba la lección. Pablo se durmió durante. Luego, empezó a escuchar y se despertó despertaron. La profesor decidió finalmente, todo por el desborde en el clásico. Fuera de aquí Pablo salió/salió y se marchó/marchó a casa.)

[Pre-Test; Post-Test; Delayed Post Test] ANSWER KEY

Name ___________________________ Section # ___________ Code ___________

To the best of your ability, circle the appropriate response if you were recommending a friend not to do something that was added to alcohol using the verb in parentheses.

1. comprender [(compre) comprar] (a) No compres chocolate.
   b. No compre chocolate.
   a. No compres chocolate.
   b. No compre chocolate.

To the best of your ability, circle the appropriate response if you were recommending a friend not to do something that was added to coffee using the verb in parentheses.

1. leer [(lei) leer] (a) No leas chocolate.
   b. No lea chocolate.
   a. No leas chocolate.
   b. No lea chocolate.

Imagine that your news has been spread to India in January. The students were asked from you on what NOT to do on their trip. To the best of your ability, circle the appropriate response if you were recommending your country not to do something while attending.

7. saber [(sabe) saber] (a) No sabes chocolate.
   b. No sabes chocolate.
   a. No sabes chocolate.
   b. No sabes chocolate.

8. mirar [(mira) mirar] (a) No mires chocolate.
   b. No mires chocolate.
   a. No mires chocolate.
   b. No mires chocolate.

9. escuchar [(oy) escuchar] (a) No escuches chocolate.
   b. No escuches chocolate.
   a. No escuches chocolate.
   b. No escuches chocolate.

10. llamar [(llama) llamar] (a) No llames chocolate.
    b. No llames chocolate.
    a. No llames chocolate.
    b. No llames chocolate.

Imagine that you are your younger brother or sister going to stick out this year. Here are some words from you on what NOT to do. To the best of your ability, circle the appropriate response if you were recommending your country not to do something while attending.

11. recargar [(recarga) recargar] (a) No recargues chocolate.
    b. No recargues chocolate.
    a. No recargues chocolate.
    b. No recargues chocolate.

12. hacer [(haga) hacer] (a) No hagas chocolate.
    b. No hagas chocolate.
    a. No hagas chocolate.
    b. No hagas chocolate.
The Study

Participants

- 9 intact S105 classrooms
- Syllabus restricted
- Pretest cut score of 60%
- Only participants that completed all 6 tests included
- Attrition
The Study

Materials

- A learning environment created with Macromedia Dreamweaver 6.0 & Flash 6.0
  - Included: Grammar explanations, Video, flash interactions, voice, production exercises.
  - It was directly transferred from the textbook “Vistazos: Un curso breve” (VanPatten, Lee & Ballman, 2000) in order to comply with the departmental syllabus and maintain consistency across groups.
  - Transparencies of the computer screens were created as teaching materials.
The Study

Materials: Demonstration

The Computer Environment I

Lección 11: Pretérito e Imperfecto
The Study

Materials: Demonstration Paper from Computer

Narración en el pasado: Utilizando ambos el pretérito y el imperfecto.

**Pretérito**

- Cuando mi mamá llamó,
  - yo meditaba. No hacía buena tiempos. Llovia y no quería salir de mi casa.
- Ayer fui al gimnasio. Levanté pesas y luego corrí dos millas.
- Mientras yo hacía ejercicio, mi compañera de cuarto trabajaba en el jardín.

**Imperfecto**

As you know, there are two past tenses in Spanish: the preterite and the imperfect. Both tenses are needed and are used in combination when narrating events in the past because Spanish encodes what is called aspect.

**Aspect** refers to when an event happened, but to whether or not the event was in progress at the time referred to. As such, the use of the preterite and imperfect depends on how a narration unfolds and what relationship each event has to a time reference in the past.

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**Actividad B**

La última vez que me reí a carcajadas

1. **estaba en mi casa**
2. **estaba con otra persona(s).**
3. **hice alguna cosa.**
4. **hice algo.**

Después de lo que... 

5. **me dije: veamos.**
6. **me enteré de algo.**
7. **fui al médico (a) (llamado, llamado).**

---

**Actividad C**

...y mi marido deja de fumar, gracias a la acupuntura...
The Computer Environment II

Lección 12: Negative tú commands
The Study

Materials: Demonstration

"La mayoría de la gente que llega a Estados Unidos de otros países nota una preocupación tremenda -- para algunas personas, quizás una preocupación superflua, demasiado grande-- respecto a _______..."

¿Cómo completa Ud. su oración? ¡Adivina!
1. ... el dinero.
2. ... la popularidad.
3. ... la salud.

Los Hispanos Hablan

CÓMO SALIR DE LA ADICCIÓN

1. Admita que eres una adicta. Según los médicos, nadie puede salir de una adicción si no admite que realmente la tiene. Hace la siguiente pregunta: ¿Tu tiempo que empleas para hacer ejercicios, NO está balanceado con el resto de tus actividades? Si la respuesta es sí, eres una adicta.
2. Empieza a «cortar» tu entrenamiento gradualmente. Si te sientes dependiente de tu rutina, empieza a eliminar actividades lentamente. Si practicas una hora y media diaria, empieza a cortar 30 minutos. Si te entrenas 5 días a la semana, corta un día.
3. Cambia tus actividades. Sustituye los ejercicios de relajación, toma clases de yoga o ensaya con un ejercicio que te permita socializar, como el tenis, el raquetbol o el baile.

Negative tú commands

Negative tú commands are formed by taking the yo form of the present tense indicative, dropping the -o or -oy, and adding what is called the opposite vowel + s.

The opposite vowel is e if the verb is an -ar verb.
The opposite vowel is i if the verb is an -er or -ir verb.

Any stem changes or irregularities of the yo form in the present tense indicative are retained. And of course, reflexive verbs have the pronoun se.

vengo ➔ veng- + -es
me acuesto ➔ acuest- + -es
doy ➔ doy + -es

no vengas
no te acuestes
no des

Vistazos:
Unidad 12
Sobre la adicción

Situación

Trabajas en una empresa de informática (un negocio de computadoras). Has notado (You have noticed) en varias ocasiones que un compañero de trabajo huele a (smells like) alcohol. Este compañero parece trabajar bien y pocas veces falta al trabajo. Durante las próximas cuatro semanas tú y él tienen que trabajar juntos en un proyecto. Hoy viene a hablarte en la oficina y otra vez huele a alcohol. ¿Qué haces?
The Study

Results: Preliminary Determinations

• Pretest scores: Mode
  - No significant difference in pretest scores across Mode.
  - Computer  27.3%  N=8
  - Paper      27.2%  N=7
  - Textbook  27.0%  N=10
The Study

Results: Preliminary Determinations

- Pretest scores: Linguistic Item
  - Significant difference in pretest scores across Linguistic Item.
    - Pret/Imp 46.3% N=25
    - Neg tú 6.02% N=25
  - Pret/Imp > Neg tú (p = .000)
  - Linguistic Item retained as a variable in all statistical analyses.
The Study

Results: Preliminary Determinations

- **Subject Characteristics: Language Background**
  - 19 of 25 were native speakers of English and had studied only Spanish
  - 6 of 25 were native speakers of English and had studied another language

- No significant difference for other language study, F (1, 19) = .003; p = .958.

- No significant interactions with other language study.

- All 25 subjects remained in all statistical analyses. Language Background was removed from all statistical analyses.
The Study

Results: Statistical

- 3 x 2 x 3 Repeated Measures ANOVA
- 1 between group factor: Mode (3)
- 2 within group factors: Linguistic Item (2) and Time (3)
The Study

Results: Statistical

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<tr>
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<td>.301</td>
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<tr>
<td>Time</td>
<td>46.203</td>
<td>.000*</td>
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<td>Mode x Linguistic Item</td>
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<tr>
<td>Mode x Time</td>
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<td>Linguistic Item x Time</td>
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</tr>
<tr>
<td>ModexLinguisticItem x Time</td>
<td>.212</td>
<td>.811</td>
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- No significant main effect and no significant interactions for Mode of delivery of Processing Instruction. All modes of delivery are equally effective.
- No significant main effect for Linguistic Item.
- Significant main effect for Time.
- Significant interaction between Linguistic Item and Time.
The Study

Results: Post hoc Analyses

• Significant interaction between Linguistic Item and Time

• Paired Samples t tests (2 tailed)

<table>
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<tr>
<th>Pair</th>
<th>df</th>
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<tr>
<td>Time 1 P/I vs Neg</td>
<td>24</td>
<td>.000*</td>
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<tr>
<td>Time 2 P/I vs Neg</td>
<td>24</td>
<td>.008*</td>
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<td>Time 3 P/I vs Neg</td>
<td>24</td>
<td>.161</td>
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<td>24</td>
<td>.001*</td>
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<td>24</td>
<td>.000*</td>
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<tr>
<td>Neg Time 2 vs Time 3</td>
<td>24</td>
<td>.053</td>
</tr>
<tr>
<td>Neg Time 1 vs Time 3</td>
<td>24</td>
<td>.000*</td>
</tr>
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</table>

• The differences between scores on the two linguistic items are significantly different from each other only at Times 1 and 2, but not at Time 3.

• Learners improve significantly on the Preterite/Imperfect distinction from Time 1 to Time 2 and retain that knowledge through Time 3.

• Learners improve significantly on Negative tú commands from Time 1 to Time 2 and retain that knowledge through Time 3.

• We note that the difference in scores at Time 3 on Negative tú commands approaches significance.
The Study

Results: Plots

Graph showing the comparison of scores over time for different methods:
- Computer
- Paper-and-Pencil
- Textbook/Classroom

Time:
- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90

Scores:
- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
Negative tú commands: Time 2 vs. Time 3
Visually, we do not perceive why $p = .053$. 
## The Study

### Results: p=.053

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<th>Pretest</th>
<th>Post</th>
<th>Delayed Post</th>
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<tr>
<td>1</td>
<td>35.7%</td>
<td>14.3%</td>
<td>7.1%</td>
</tr>
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<td>2</td>
<td>21.4%</td>
<td>92.9%</td>
<td>35.7%</td>
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<tr>
<td>2</td>
<td>7.1%</td>
<td>28.6%</td>
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<tr>
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<td>0.0%</td>
<td>7.1%</td>
<td>0.0%</td>
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<tr>
<td>3</td>
<td>14.3%</td>
<td>0.0%</td>
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Discussion and Conclusions

- Are there differential effects for delivering Processing Instruction in different modes for different linguistic items?
  - preterite/imperfect distinction
  - negative tú commands

- Are there differential effects for delivering Processing Instruction in different modes for different linguistic items across time?
  - pretest
  - immediate posttest
  - delayed posttest (1 week)