The Role of Choice in Children’s Learning: A Distinctive Cultural and Gender Difference in Efficacy, Interest, and Effort

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Abstract
A cross-cultural experiment testing the effect of personal choice on learning was conducted with fifth- and sixth-graders from Canada (n = 130) and Taiwan (n = 153) using a computerized foreign language learning task. The results showed that choice had no significant impact on children’s interest, effort, or learning outcome. Although comparable to their Chinese counterparts in efficacy beliefs, the Canadian children reported to be more interested but showed less effort and performed less well on the task. The Canadian boys had a lower efficacy belief and consistently showed less interest and effort than the girls; this gender gap, however, was not evident in the Chinese. Unlike the Canadians, Chinese children’s effort was unrelated to efficacy beliefs or interest. When told explicitly there would be no test, Chinese children became more interested in the task but the Canadians were unaffected. Implications of these findings are discussed and further studies are suggested.

Résumé
Une expérience transculturelle testant les effets du choix personnel sur l’apprentissage a été menée auprès d’enfants de cinquième et sixième année du Canada (n = 130) et de Taiwan (n = 153) à l’aide d’une tâche informatisée d’apprentissage d’une langue étrangère. Les résultats ont montré que le choix n’a pas d’incidence significative sur l’intérêt, l’effort ou le résultat de l’apprentissage des enfants. Bien que les convictions d’efficacité des enfants chinois et canadiens soient comparables, les enfants canadiens se sont dits plus intéressés, mais ont montré moins d’effort et une moins bonne performance de la tâche. Les garçons canadiens avaient une conviction d’efficacité plus faible et montraient de façon constante moins d’intérêt et d’effort que les filles; cet écart entre les sexes n’était toutefois pas évident chez les enfants chinois. Contrairement aux canadiens, l’effort des enfants chinois n’était pas lié aux convictions d’efficacité ou à l’intérêt. Lorsqu’on leur disait du test explicite qu’il n’y aurait pas de test, les enfants chinois devenaient plus intéressés dans la tâche, mais il n’y avait pas d’effet sur les enfants canadiens. Les implications de ces conclusions font l’objet de discussion et d’autres études sont suggérées.
Other research evidence, however, has raised questions about the assumption of the global positive effect of personal choice in learning. As Markus and Kitayama (1991) pointed out, current theories of motivation reflect an independent view of self, which may not apply to the interdependent view of self that is more prevalent in Eastern cultures. Indeed, Iyengar and Lepper (1999) reported that children with different cultural backgrounds respond differently to making personal choices. In Iyengar and Lepper’s experiments, children were given different “choice” conditions to solve anagrams and to work on a computerized mathematics learning program. For example, there were opportunities for the children to make a decision on which anagrams to work on and which markers to use for solving the anagrams, or which icon to use on the game board in the computer program and which name to give to their chosen spaceship. The researchers found that Anglo-American children in the study showed less intrinsic interest when choices were made for them by others than when they made their own choices, regardless of the status of the authority figures or peers. On the contrary, Asian-American children were most intrinsically motivated when choices were made for them by trusted authority figures (e.g., their mothers) or in-group peers. Thus, the stressing of the importance of personal choice may be more of a North American cultural phenomenon than a global human trait.

Moreover, the general positive effect of personal choice on students’ cognitive engagement in learning has also been called to question. After reviewing studies that tested the relationship between choice and engagement (e.g., Cordova & Lepper, 1996; Hannafin & Sullivan, 1996; Morrison, Ross, & Baldwin, 1992; Parker & Lepper, 1992; Pollock & Sullivan, 1990; Zuckerman, Porac, Lathin, Smith, & Deci, 1978), Schraw, Flowerday, and Reissetter (1998) pointed out that making choices has been reported to relate positively to self-reported affective engagement, such as interest, feelings of satisfaction, and reduced anxiety. For objectively measured cognitive engagement, such as strategy use, recalling main ideas and generating inferences, however, making personal choices appears to have less of an influence on learning.

In their own study, Schraw et al. (1998) conducted two experiments with college students and examined the effect of personal choice on students’ affective and cognitive engagement in the reading materials. Students were put into conditions where they either selected what they read or were assigned the readings. In both experiments, Schraw et al. found that unrestricted choice heightens favourable affective perceptions of the reading experience compared with denied-choice and control groups, but has no effect on cognitive measures of engagement. In a follow-up study, Flowerday and Schraw (2001) again reported that the act of making a choice by itself does not bring about differences in students’ cognitive engagement. Based on the review of the literature and their own research results, Schraw et al. concluded that the assertion that choice invariably enhances all manners of performance is more of a folk-psychological belief and that the “strong claims about the relationship between choice and cognitive engagement are inflated” (p. 711).

Thus, the distinctive direct advantage of giving students personal choices in their learning may only lie in its possible positive influence on students’ interest. Earlier research evidence examining the link between individual interest and academic achievement, however, indicated that the correlations between interest and academic achievement in various studies are small, mostly below the .3 level (Fishman & Pasanella, 1960; Lavin, 1965; Super, 1960). More recently, Schiefele, Krapp, and Winteler (1992) conducted a meta-analysis on the results from 16 publications, which contain 121 independent random samples from 18 different countries. They found that average across different subject areas and age groups, the level of interest accounts for about 10% of observed achievement variance. Moreover, a clear and significant gender difference has emerged from this analysis: Male students’ performance is associated with their interest level more than is the case for female students. Schiefele et al. (1992) found that interest explains 12% of observed achievement variance for males, but only 6% of the variance for females.

In short, educators in North America commonly believe that personal choice promotes learning, which is supported by the self-determination theory. Existing empirical evidence, however, casts doubt in the assumption of global positive effect of personal choice in learning, showing that culture is an important factor to consider and that the influence of personal choice may be mostly on students’ affect but not on cognition. Moreover, the relationship between students’ interest and performance has been shown to be small especially for the female students. The present study proposes to test the impact of choice on children’s learning experimentally, to examine students’ interest, effort, and performance on a learning task concurrently, and to investigate how cultural and gender factors may interact with the choice effect.

In addition to students’ interest and effort, the
present study is also interested in the concept of students’ self-efficacy belief in learning. As Pintrich, Marx, and Boyle (1993) described, there are two major factors affecting students’ motivational beliefs in learning, which could influence their cognitive processes. One is students’ beliefs about the reasons for choosing to do a task, including their goal orientation, and their value and interest in the task. The other is students’ beliefs about their capability to perform a task, namely, students’ self-efficacy belief (see Bandura, 1986). The construct, self-efficacy belief, has received much attention in educational research in North America, especially in the area of academic motivation (see Pintrich & Schunk, 1995). Students’ efficacy beliefs have been found to influence students’ effort, persistence, and perseverance, which consequently affect performance (see Pajares, 1996).

The design of the present study as described below allows for an examination of how students’ self-efficacy may relate to students’ interest, effort, and performance and whether the inter-relationships amongst these variables are moderated by cultural and gender factors.

In the present study, Canadian and Chinese children were given an opportunity to learn the names of some animals, colours, and numbers in a foreign language. Of interests are students’ efficacy, interest, effort, and learning outcome on these computerized learning tasks. The tasks were programmed into three separate sessions. The first task, animal-naming, was a practice run to familiarize students with the learning task. With a built-in manipulation, the second task, colour-naming, was designed to test the immediate effect of choice on students’ learning. Finally, the third task, number-naming, was used to test the effect of choice on students’ intrinsic interest.

Before engaging in the number-naming task, students were told explicitly that they would not be tested afterwards. The assumption is that without the external pressure of testing, the interest and effort shown in learning would be an indicator of how much students are intrinsically motivated. The following are research questions examined in this study: a) Are there any cultural and gender differences in children’s level of efficacy, interest, effort, and learning outcome? b) Are there any cultural and gender differences in how children’s efficacy, interest, and effort relate to each other? c) Is “making a choice” an important factor in children’s learning, and are culture and gender important moderators in how “mak-
ing a choice” affects learning? d) Does “making a choice” have an effect on children’s intrinsic motivation in subsequent learning? and finally, (e) Does external pressure, such as testing, play a significant role in Chinese and Canadian children’s learning?

Method

Participants

One hundred and thirty students (47 boys, 82 girls, 1 child missing gender data) from Canada and 153 students (84 boys, 68 girls, 1 child missing gender data) from Taiwan participated in this experiment. Children from the two countries are of comparable age, with an average age of 11.32 (SD = 0.37) for the Chinese children and 11.35 (SD = 0.60) for the Canadian children. The Canadian children are from three different schools, one from the Waterloo Catholic District School Board and two from the Waterloo Region District School Board in the province of Ontario, whereas the Chinese children are all from one school that is located at the heart of Taipei city.

Design

A computerized foreign language learning program was designed for the present study (see Figure 1). The program comprised three sections: The Animal-Naming task, the Colour-Naming task, and the Number-Naming task. It was programmed to measure each individual child’s efficacy beliefs and interest level for the learning tasks via self-report, as well as to assess each individual child’s effort expenditure and learning outcome via objective measurement. The Animal-Naming task was used as a baseline measure and a practice run to familiarize the children with the operation of the computer. The Colour-Naming task was used to test the effect of choice by assigning the children randomly to one of the following four different conditions: 1) Self-choice group, 2) teacher-choice group, 3) computer-choice group, and 4) no-choice control group. Finally, the Number-Naming task was used to test the possible carry-over effect of choice under a no external pressure condition. It was designed to assess the children’s subjective reported interest level and to gauge objectively children’s intrinsic interest in the learning task by measuring the effort the children were willing to exert for learning after being told explicitly that there would be no test afterwards.

The variables measured in this study included students’ efficacy belief in their ability to learn a foreign language well (self-efficacy), students’ self-reported interest level and actual effort exerted (the amount of time spent and the number of mouse clicks applied) during the learning session for each of the three tasks, and students’ learning outcome for the Colour-Naming task.

The two computerized learning programs used in these two cultural settings were identical except for the languages used in the instruction and the foreign language to be learned in the task. The foreign language for the Canadian children to learn was Mandarin Chinese whereas for Chinese children, French was the foreign language to be learned in the task. Special precautions were taken to ensure that the recorded instructions were equivalent and of the same length for both designed programs. None of the participating students in this study were familiar with the foreign language to be learned.

Procedures

The participating children were greeted and told that all instructions and the experimental tasks were computer-programmed and that they could direct any questions to the experimenter, who remained in the same room throughout the experiment. Once the children sat in front of the computer screen, the computer program generated all the instructions, presented all the learning activities, and recorded all the responses generated by the children (see Figure 1). The children used the computer mouse to respond to the instructions and to direct their own learning throughout the experiment.

The children first responded to some questions about personal information (e.g., gender and birth date) using the computer mouse. None of the children had difficulties following the instructions and/or responding to the questions using the mouse.

The nature of the task in this experiment was briefly explained; the children were told that they would be learning some words in Mandarin Chinese/French. The Animal-Naming task was then presented as a practice run for the children to become familiar with the learning part of the program. Prior to the presentation of the learning materials, each child was asked to rate his/her level of confidence in his/her ability to learn the foreign language well on a scale ranging from 1 (not at all confident) to 5 (very confident). As well, each child also reported his/her level of interest in learning animal names using a similar 5-point scale ranging from not at all interested to very much interested.

During the learning session, pictures of the learning materials (6 animals in the Animal-Naming task, 8 colours in the Colour-Naming task, and 10 numbers in the Number-Naming task) were shown on the screen. When the children clicked on the picture, they would hear the corresponding object names spo-
TABLE 1
Means (Standard Deviations) of the Dependent Variables in the Computerized Foreign Language Learning Tasks

<table>
<thead>
<tr>
<th>Variables</th>
<th>Canada</th>
<th></th>
<th>Taiwan</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Boys (n = 47)</td>
<td>Girls (n = 82)</td>
<td>Total (n = 129)</td>
<td>Boys (n = 84)</td>
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<td>Self-Efficacy</td>
<td>3.98 (0.99)</td>
<td>3.62 (1.00)</td>
<td>3.39 (1.04)</td>
<td>3.35 (1.04)</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Interest</td>
<td>3.87 (1.08)</td>
<td>4.50 (0.84)</td>
<td>4.27 (0.97)</td>
<td>3.76 (1.07)</td>
</tr>
<tr>
<td>Time (s)</td>
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<td>46.76 (26.72)</td>
<td>44.08 (26.37)</td>
<td>89.39 (72.71)</td>
</tr>
<tr>
<td>Mouse Clicks</td>
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<td>12.09 (7.51)</td>
<td>11.99 (7.38)</td>
<td>32.42 (23.07)</td>
</tr>
<tr>
<td>Effort Index *</td>
<td>44.70 (3.31)</td>
<td>45.24 (3.60)</td>
<td>44.99 (3.54)</td>
<td>52.98 (10.28)</td>
</tr>
<tr>
<td>Performance b</td>
<td>5.13 (2.27)</td>
<td>4.47 (0.89)</td>
<td>4.18 (1.02)</td>
<td>5.00 (1.22)</td>
</tr>
<tr>
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<td></td>
</tr>
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<td>4.45 (0.90)</td>
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<td>4.00 (1.22)</td>
</tr>
<tr>
<td>Time (s)</td>
<td>42.26 (30.93)</td>
<td>66.95 (52.15)</td>
<td>58.53 (45.80)</td>
<td>75.25 (69.44)</td>
</tr>
<tr>
<td>Mouse Clicks</td>
<td>15.45 (8.32)</td>
<td>22.66 (20.09)</td>
<td>20.03 (17.10)</td>
<td>37.24 (29.89)</td>
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<tr>
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<td>45.24 (3.60)</td>
<td>44.99 (3.54)</td>
<td>52.98 (10.28)</td>
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<td>The Number-Naming Task</td>
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<td></td>
</tr>
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<td>Interest</td>
<td>3.77 (1.24)</td>
<td>4.45 (0.90)</td>
<td>4.20 (1.09)</td>
<td>4.00 (1.22)</td>
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<td>5.00 (1.22)</td>
</tr>
</tbody>
</table>

* Each child’s Effort Index is calculated for each learning task based on the standardized scores from the time and the mouse click measurements across the whole sample. The average Z scores for each child are then transformed into an Effort Index with a mean of 50 and a standard deviation of 10.

b Number of correct answers in the Colour-Naming test.

ken in Chinese/French. The children were told to click on the pictures as many times as they thought necessary to learn the words. When they were ready to quit learning, they could then click on a patch indicating “I am done.” The computer program was designed to measure the amount of time (in seconds) the children actually engaged on the learning task, as well as the number of mouse clicks applied during each of the learning sessions. The Colour-Naming task was introduced following the Animal-Naming task. The children were randomly assigned to one of four experimental conditions. For the self-choice group, the children were presented with 12 colour patches and were told, “You have a choice of which eight colours you will learn,” with the sentence “Your home room teacher/The computer chose eight colours for you” appearing on the monitor in red. Children in the control condition were simply shown eight colour patches on the monitor and were told, “These are the eight colours you will learn.” Except for the self-choice group where the children selected their own eight colours, the computer program randomly selected 8 out of the 12 possibilities for each individual child to learn.

After the instruction, the children were asked again to indicate their level of interest in learning the eight colour names. All children were then reminded that they could terminate the learning session whenever they wanted to by clicking the “I am done” patch on the monitor. The children then proceeded to initiate their learning session whenever they were ready to start.

Following the Colour-Naming learning session was a filler task, where the children answered some
simple multiplication questions. A test was then
given to measure the children’s learning outcome on
the Colour-Naming task. During the test, the chil-
dren listened to the colour names generated from the
computer and gave their answers by clicking on the
corresponding colour patch (out of four possibilities)
on the monitor. The eight colour names were pre-
sented in a random sequence twice with a total of 16
items.

After the test, the children were offered an oppor-
tunity to learn some number names. With “No test”
shown on the computer screen in red, all of the chil-
dren were told that there would be no test on this
task. Again, the children reported their level of inter-
est for this learning session on a 5-point scale, pro-
ceeded to learn the number names, and terminated
the learning session as they wished. As promised, no
test was administered after the Number-Naming task
and the children were thanked for their participation
in the study.

With the permission of their teachers, Canadian
children were taken away from their class time and
tested individually in a quiet room in their school, on
a laptop computer attached with an external mouse.
I could not, however, follow the same procedure with
the Chinese children due to the school administra-
tors’ unwillingness to let me take individual students
away from important class time. Because of the time
constraints, I decided to test Chinese children in
groups in their school computer lab. The children

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### TABLE 2
The Intercorrelations Among the Dependent Variables in the Three Computerized Foreign Language Learning Tasks by Culture and Gender

<table>
<thead>
<tr>
<th>Variables (Task)</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<td>.27**</td>
<td>.45**</td>
<td>.21**</td>
<td>.25**</td>
<td>.38**</td>
<td>.26**</td>
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<tr>
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<td>.19*</td>
<td>.73**</td>
<td>.31**</td>
<td>.28**</td>
<td>.57**</td>
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<tr>
<td>7. Interest (Number)</td>
<td>.27*</td>
<td>.32**</td>
<td>-.07</td>
<td>.44**</td>
<td>-.19</td>
<td>-.03</td>
<td>.30*</td>
<td></td>
</tr>
<tr>
<td>8. Effort (Number)</td>
<td>.04</td>
<td>.07</td>
<td>.48**</td>
<td>.09</td>
<td>.49**</td>
<td>.44**</td>
<td>.19</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Correlations for the Canadian sample are above the diagonal and correlations for the Chinese sample are below the diagonal.  
* p < .05, two-tailed;  ** p < .01, two-tailed.
were tested either during their nap time after lunch or during their Tuesday afternoon school-wise play period. Although gathered in groups, each student wore a set of headphones and sat in a separate cubicle with a computer terminal in front of him/her. The students were seated one cubical apart from each other; the interference from others was kept at a minimum. The testing session lasted about 30 minutes.

Table 1 shows the means and standard deviations for all of the dependent measures from the experiment by culture (country) and gender. Because the amount of time spent and the number of mouse clicks applied during each learning session were both indicators of students’ effort in learning, the two measurements were combined to derive a relative effort index for each child.

The first research question, “Are there any cultural and gender differences in children’s level of efficacy, interest, effort and learning outcome?” is a general question that applies to all three tasks; it is addressed throughout this Results section with data from each of the three tasks tested and presented sequentially. An alpha level of .05 was used for all omnibus tests of main effects and interactions effects. In the case of a significant interaction effect, the Dunn’s procedure was applied in simple main effect tests to control for the Type I error rate; the same error rate allotted to the family was assigned to the collection of tests (Kirk, 1982).

Relationship Between Self-Efficacy, Interest and Effort

The second research question to be addressed is “Are there any cultural and gender differences in how children’s efficacy, interest and effort relate to each other?” Table 2 depicts the intercorrelations of the dependent variables from the Canadian and the Chinese sample separately as well as within each gender group. As seen in Table 2, although there was a significant correlation between students’ efficacy level and students’ interest levels reported for the three tasks in both the Canadian and the Chinese sample, it appeared that the relationship between efficacy and interest was stronger in the boys than in the girls in both countries. Further testing with the AMOS 4.0 program using data from the combined sample confirmed that in all three tasks, the impact of self-efficacy (β) on interest for the boys (βs = .56, .54, .44) was consistently and significantly stronger than for the girls (βs = .36, .30, .26), with Zs = 2.09 (p < .05), 2.51 (p < .05), and 2.60 (p < .01), respectively.

Furthermore, there were interesting contrasts in how students’ reported efficacy and their effort expenditure were related in the two countries. For the Canadian sample, there was a significant positive correlation between students’ efficacy level and students’ effort index, with rs = .27, .21, and .26 for the three tasks, respectively (all ps < .01). On the contrary, there was virtually no relationship between Chinese students’ reported efficacy and their effort for any of the three tasks, with rs = -.06, .05, and .00, respectively (all ps > .05). A further examination of the correlation pattern by gender groups showed that the positive relationship between efficacy and effort was most evident in the Canadian boys, with rs = .45, .33, and .46 for the three tasks, respectively (all ps < .01).

There were similar cultural differences in the relationship between students’ reported level of interest and students’ effort expenditure in each task. For the Canadian students, a significant relationship was found between their reported interest and their effort level in all three tasks, with rs = .19, .23, and .34, respectively (all ps < .05). For the Chinese sample, on the contrary, students’ effort appeared to be unrelated to students’ interest, with rs = .02, .02, and .13 for the three tasks, respectively (all ps > .05).

Self-Efficacy

Children from both countries first reported their confidence level in their ability to learn a foreign language well. A 2 (Culture) x 2 (Gender) ANOVA on students’ self-efficacy beliefs showed that culture did not have a significant main effect, F(1, 277) = 0.16, p = .90 (MSE = 1.01); the Canadian children (M = 3.38, SD = 1.04) and the Chinese children (M = 3.35, SD = 1.00) reported a similar level of self-efficacy. There was, however, a significant gender main effect, F(1, 277) = 5.61, p < .05, η² = .02, and a significant Gender x Culture interaction, F(1, 277) = 6.68, p < .01, η² = .024. Further simple main effect testing showed that the Canadian boys (M = 2.98, SD = 0.99) reported a signif-
significantly lower level of self-efficacy than the girls (M = 3.62, SD = 1.00), F(1, 277) = 12.29. This gender gap, however, was nonexistent in the Chinese sample (Ms = 3.35 and 3.35, SDs = 1.04 and 0.97 for the boys and the girls, respectively), F(1, 277) = 0.00.

**Interest and Effort in the Animal-Naming Task**

The Animal-Naming task was used as a practice run in this experiment. As no manipulation occurred prior to this task, no differences among the four choice groups were expected. To examine the cultural and gender differences in children’s effort and interest in this task, a 2 (Culture) x 2 (Gender) ANOVA was applied. The results showed that culture had a significant main effect on both students’ reported interest, F(1, 277) = 23.26, p < .01, η² = .077 (MSE = 1.01), and students’ effort expenditure, F(1, 277) = 87.03, p < .01, η² = .239 (MSE = 72.09), with the Canadian students reporting a significantly higher level of interest (Ms = 4.27 and 3.63, SDs = .97 and 1.06 for the Canadian and the Chinese, respectively), but exerting significantly less effort on the task (Ms = 44.99 and 54.28, SDs = 3.54 and 11.13 for the Canadian and the Chinese, respectively). As shown in Table 1, during the animal-name learning session, the Chinese students spent twice as much time (M = 98.56, SD = 75.03) and applied almost three times as many mouse clicks (M = 34.93, SD = 25.88) as the
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Canadian students (Ms = 44.08 and 11.99, SDs = 26.37 and 7.38 for the learning time and the mouse clicks, respectively).

The gender main effect and gender by culture interaction effect on students’ effort expenditure were both nonsignificant, with $F(1, 277) = 3.49$, $p = .06$ and $F(1, 277) = 1.15$, $p = .28$, respectively. On the other hand, for students’ reported interest level, both the gender main effect and the culture by gender interaction effect were significant, with $F(1, 277) = 4.66$, $p < .05$, $\eta^2 = .017$, and $F(1, 277) = 7.04$, $p < .01$, $\eta^2 = .025$, respectively. Further simple main effect testings revealed that the cultural difference in interest level was only significant for the girls, $F_{15/4;1,277} = 28.71$, but not for the boys, $F_{15/4;1,277} = 1.57$. As shown in Figure 2, the Canadian boys ($M = 3.87$, $SD = 1.08$) reported a significantly lower level of interest than the girls ($M = 4.50$, $SD = 0.84$), $F_{15/4;1,265} = 11.68$ ($MSE = 1.01$), whereas the Chinese boys ($M = 3.64$, $SD = 1.12$) and the Chinese girls ($M = 3.62$, $SD = 0.99$) reported a comparable level of interest on this task, $F_{15/4;1,277} = 0.02$.

**Interest, Effort, and Performance in the Colour-Naming task**

Students were given four different instructions prior to the Colour-Naming task. Thus, the results from this section answer the question whether “making a choice” is an important factor in children’s learning, and whether culture and gender are important moderators in how “making a choice” affects learning. Table 3 shows the means and standard deviations from the experimental tasks by culture (country) and by experimental conditions. A 2 (Culture) x 2 (Gender) x 4 (Choice) ANOVA was conducted for each of the three dependent variables: students’ interest, effort, and performance.

The results showed that choice was not a significant factor in any of the three dependent variables: $F(3, 265) = 0.51$, $p = .68$ ($MSE = 1.00$) for interest; $F(3, 265) = 0.83$, $p = .48$ ($MSE = 83.11$) for effort; and $F(3, 263) = 1.16$, $p = .33$ ($MSE = 11.75$) for performance. Choice did not show any significant interaction effects on any of the three dependent variables either.

There was, however, a significant difference between the Canadian and the Chinese students on all three dependent measures. As shown in Table 1, Canadian students reported a significantly higher level of interest, $F(1, 265) = 8.69$, $p < .01$, $\eta^2 = .032$, but exerted significantly less effort, $F(1, 265) = 40.01$, $p < .01$, $\eta^2 = .131$, and performed significantly less well, $F(1, 265) = 10.78$, $p < .01$, $\eta^2 = .039$, on this task.

The testing on gender effect showed that boys and girls were also significantly different in their interest, $F(1, 265) = 5.29$, $p < .05$, $\eta^2 = .02$, effort expenditure, $F(1, 265) = 13.13$, $p < .01$, $\eta^2 = .47$, and performance, $F(1, 263) = 4.26$, $p < .05$, $\eta^2 = .016$. In general, on this Colour-Naming task, the girls were significantly more interested ($M = 4.13$, $SD = .97$), worked significantly harder ($M = 51.27$, $SD = 10.38$), and performed significantly better ($M = 6.89$, $SD = 3.43$) than the boys ($Ms = 3.77$, 48.59, and 6.25, $SDs = 1.09$, 8.75 and 3.53 for interest, effort, and performance, respectively).

The Culture x Gender interaction on students’ reported interest level was also significant, $F(1, 265) = 6.30$, $p < .05$, $\eta^2 = .023$. Simple main effect testing showed that the culture effect on reported interest was only significant for the girls, $F_Z = 14.62$ ($MSE = 1.00$), but not for the boys, $F_{15/4;1,265} = 0.03$. As in the previous task, the Canadian boys reported a significantly lower interest level than the girls, $F_{15/4;1,265} = 11.51$, but this gender difference was not present in the Chinese sample, $F_{15/4;1,265} = 0.00$ (see Figure 2).

**Interest and Effort in the Number-Naming Task.** The results from the Number-Naming task were analyzed to examine the cultural and gender differences in children’s learning and to address the following research question: Does “making a choice” have an effect on children’s intrinsic motivation in subsequent learning?” Using a 2 (Culture) x 2 (Gender) x 4 (Choice) ANOVA, the results showed that the four choice groups did not differ in their interest level, $F(3, 263) = 1.24$, $p = .30$ ($MSE = 1.08$), nor in their effort expenditure, $F(3, 264) = 2.21$, $p = .09$ ($MSE = 88.12$) on this task. The reported interest levels for the Canadian students and the Chinese students were not significantly different either, $F(1, 263) = 0.11$, $p = .75$. Nonetheless, the Chinese students still exerted a significantly higher level of effort on this task than the Canadian students, $F(1, 264) = 10.98$, $p < .01$, $\eta^2 = .04$.

The gender effect, again, was significant in this task for both reported interest level and actual effort expenditure, with $F(1, 263) = 15.83$, $p < .01$, $\eta^2 = .057$, and $F(1, 264) = 10.09$, $p < .01$, $\eta^2 = .037$, respectively. The girls in both countries reported a significantly higher level of interest ($M = 4.40$, $SD = .85$) and exerted significantly more effort ($M = 51.35$, $SD = 10.16$) in learning the number names than the boys ($Ms = 3.91$ and 48.52, $SDs = 1.22$ and 8.94 for interest and effort, respectively). None of the interaction effects were statistically significant in these testings.

**The Effect of Testing on Students’ Interest**

After the performance test on the Colour-Naming task, students were told explicitly that there would be no tests on the Number-Naming task. Students were then asked how interested they were in learning
some number names. To examine the final research question, “Does external pressure, such as testing, play a significant role in Chinese and Canadian children’s learning?” a 2 x 2 x 2 (Task Interest x Culture x Gender) analysis of variance was conducted with a special focus on the effect of the within-subject factor: Task Interest (colour-naming vs. number-naming).

The results showed a significant task interest main effect, $F(1, 275) = 10.67, p < .01, \eta^2 = .037$ ($MSE = .57$) and a significant task interest by culture interaction, $F(1, 275) = 9.35, p < .01, \eta^2 = .033$. Further simple main effect testings showed that Chinese students’ interest level increased significantly after being told that there was no tests on the task, $F_{15/4; 1, 275} = 18.50$, whereas the Canadian students were not affected by this announcement, $F_{15/4; 1, 275} = 0.03$ (see Figure 2).

Discussion

The present study is designed to test the interrelationships between students’ self-efficacy, interest, effort, and performance in learning and to examine how provision of choices impacts students’ learning, with a special focus on culture and gender as important moderators. The computerized foreign language learning sessions designed in the present study also allow for an examination of the effect of testing on children’s interest in learning.

The results from the present study have shown some interesting cultural and gender differences in students’ learning. I find that although children’s interest in a task is generally related to their reported level of self-efficacy, the relationship between self-efficacy and interest is significantly stronger in the boys than in the girls. As described earlier, past research showed that male students’ performance accords with their interest level more than the female students. Schiefele et al. (1992) suggested that this observed gender difference in the interest-performance link is mainly because female students are more conformist than male students and that they are more likely to invest effort regardless of their interest. The results from the present study on the gender difference in the self-efficacy-interest link, however, offer a viable alternative explanation: The observed stronger link between interest and performance in boys may be mainly due to the fact that boys tend to determine their interest level on a task based on their efficacy belief. In other words, when boys are showing interest in something, it is more of an ability-based affect response than the girls.

Moreover, the results also show that although Canadian children, especially the boys, tend to give more/less effort when they think that they are good/not good at the task or when they are more/less interested in the task, this relationship between self-efficacy belief, as well as interest level, with effort expenditure does not seem to hold true with Chinese students. I found that a lower level of self-efficacy or a lower level of interest is not related to a lower level of effort in Chinese students. Indeed, although Chinese students’ reported level of interest is significantly lower than that of the Canadian students, Chinese students’ effort exertion in these tasks actually far exceed their Canadian counterparts. Not surprisingly, the high level of effort also leads to a better learning outcome for the Chinese children as evident in Chinese children’s better test performance in the Colour-Naming task.

Why did students from Taiwan behave so differently from their Canadian counterparts? What drove them to spend so much more time in a learning task disregarding their self-efficacy and their interest level in the task? One plausible answer for these findings is that Chinese students may see learning more as a matter of value or responsibility, something that they think they should or ought to do, whereas the Canadian students tend to determine how much effort they are willing to exert based on their interest and their self-efficacy beliefs on the task. In other words, when confronted with a learning task, self-regulation may be a stronger determinant for Chinese children, whereas interest appeal may be a stronger factor for the Canadian children, especially the Canadian boys. This assumption can be supported by the differences in the interest-effort link in the two countries as observed in this study.

In addition, it is also possible that when confronted with a learning task, testing is one thing in the back of Chinese students’ minds, which may not be the case for the Canadian students. Thinking that they may be tested after the learning task may have driven Chinese students to work that much harder than their Canadian counterparts. This testing effect thesis can be supported by the fact that Chinese students became significantly more interested in the learning task when told that there would be no test on the task. On the other hand, learning that there would be no test did not seem to have any impact on Canadian students’ interest level in the task.

It is a common practice in Taiwan to give elementary school students many quizzes weekly. Furthermore, all students are given a school-wide formal test monthly for all of their academic subjects. By comparison, Canadian students are much less subjected to testing. The only formal testing they are exposed to during their elementary school years are the recently implemented provincial standardized tests that occur once while they are in Grade 3 and
Once in Grade 6. The Chinese students’ high exposure to testing may be one of the reasons for their high exerted effort in learning situations.

Although the testing effect offers some plausible explanation for the discrepancy observed between the Chinese and the Canadian samples in the Animal-Naming and the Colour-Naming tasks in this study, it still cannot account for the significantly higher effort exerted by the Chinese students in the Number-Naming task, as students are under no pressure for testing here. This difference in effort expenditure observed between the Canadian and the Chinese children in the last task may very well result from a more successful learning experience for the Chinese students in the previous learning tasks, as shown in their better learning outcome. It may also be due to an internalized cultural belief in the value of effort in learning in the Chinese students (Hess, Chang, & McDevitt, 1987; Holloway, 1987; Tuss, Zimmer, & Ho, 1995; Yan & Gaier, 1995). In a recent study on Chinese children’s motivation orientations in learning, I have found that the external and internalized types of motivation orientations, such as rules and values, are the main motivators for Chinese students’ academic performance (d’Ailly, 2003). Further comparative studies will help us further understand how students from different cultures may be motivated differently.

Another interesting cultural difference observed in this study is the gender gap. I find that in the Canadian sample, girls tend to report a higher level of interest than boys throughout the study. This gender gap, however, does not appear in the Chinese sample until toward the end of the experiment where students are told explicitly that there would be no test. Of the four groups compared in this study, Canadian boys are the least motivated; they consistently exert the least effort in learning. Further research is required to test whether this observation is specific to the kind of task, a foreign language learning task, as presented in the present study, or whether this pattern of behaviour can be generalized to other types of tasks. One applicable comparison in looking at the parallel of this gender difference, is in the results of the 1999 Grade 6 system-wide testing in Ontario. Within the Waterloo Region, gender differences are very pronounced in the results of Reading and Writing, with 55% of girls reading at or above the provincial-set grade level (Level 3 or 4), but only 40% of boys reaching the standard. Similarly in writing, 56% of girls are at or above the provincial standard, but only 37% of boys reach the standard. Indeed, this gender gap has been found across the province (Education Quality and Accountability Office, 2000). Findings from the present research as well as from the provincial testing results point to the need for more studies into motivational factors that may affect boys and girls differently and cultural practices that may widen or narrow the gender gap in students’ academic performance.

As proposed by self-determination theory, giving students choices in their learning environment should enhance their sense of autonomy and bring about positive effects in their learning. The results from the present experiment, however, show that this manipulation does not produce any significant impact in students’ learning. Both students’ reported level of interest and the actual effort exerted in learning are not influenced by the manipulation of different choice conditions. Neither is students’ learning outcome affected.

There are two plausible explanations for this observation. One is that the manipulation in this experiment is not strong enough to result in different levels of perceived autonomy in students. The other possible explanation is that although there is a difference in the perceived level of autonomy in students, this factor is not important enough to create a difference in students’ motivation in the learning tasks as presented in this study. In general, students’ reported interest levels for the learning tasks are quite high, implying that the computerized learning tasks used in this study elicit a high level of intrinsic interest in most students. As pointed out by Flowerday and Schraw (2001), the effect of choice on learning is mainly mediated by interest. The fact that students are already quite interested in the task may explain why the manipulation in the present study is not as effective in detecting the possible impact of perceived autonomy on students’ learning.

Thus, personal choice as an intervention may only be relevant in a learning context where it is able, and the circumstance requires it, to elicit a higher level of interest in students. In the present study, the positive effect of personal choice is neither evident during the learning task where the manipulation is implemented, nor in the subsequent Number-Naming task where possible external pressure is explicitly eliminated. Furthermore, this noneffect of personal choice is observed cross-culturally. With these findings, I would have to concur with Schraw et al. (1998) that the strong claims in the theory and the firm beliefs held by education practitioners in North America about the relationship between choice and students’ cognitive engagement in learning are generally inflated and unsubstantiated. In fact, a recent study on the effect of autonomy and perceived control in Chinese students’ learning showed that without the support
of perceived control, autonomy could be a negative factor in students’ academic performance (d’Ailly, 2003). A more refined theory is needed to specify the learning conditions under which the possible positive effect of making personal choices can be observed. Moreover, further cross-cultural testing of the theory is required.

In short, the results from the present study cast doubt on the generalized and assumed power of making personal choices in students’ learning environment. The findings also reveal some distinctive cultural influences and gender differences in students’ motivation in learning. Further understanding into how boys and girls from different cultures may be motivated differently and react to educational interventions in a varied way will prove fruitful in our search for an optimal learning environment for each individual child.

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