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AUTHOR d'Ailly, Hsiao
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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 show 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 that they were more interested, but showed less effort and performed less well on the task. The Canadian boys had lower efficacy beliefs and consistently showed less interest and effort than did the girls; this gender gap was not evident among the Chinese children. Among the Chinese children, unlike the Canadians, 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. (Contains 3 tables, 3 figures, and 28 references.) (Author/SLD)

A DISTINCTIVE CULTURAL AND GENDER DIFFERENCE

A Distinctive Cultural and Gender Difference in Children's Interest and Effort in Learning: The Impact of Choice and Testing

Hsiao d'Ailly

Renison College
University of Waterloo

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Correspondence concerning this article should be addressed to Hsiao d'Ailly, Renison College, Waterloo, Ontario, Canada N2L 3G4. E-mail: hdailly@renison.uwaterloo.ca

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Abstract

A cross-cultural experiment testing the effect of personal choice on learning was conducted with 5th and 6th graders from Canada (130) and Taiwan (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.

A Distinctive Cultural and Gender Difference in Children's Interest and Effort in Learning: The Impact of Choice and Testing

Large scale multinational testing (e.g., TIMSS, The Third International Mathematics and Science, see website http://nces.ed.gov/timss/) has been held in recent years to examine students' academic performance in various learning subjects. The cross-national comparison in children's learning is a direct manifest of the globalization of the world. As our world becomes more globalized, the need for further understanding of the cultural differences both within and across nations becomes more and more pressing. The present study is a cross-cultural experiment examining the impact of choice and testing on students' interest and effort in learning. Parallel experiments are conducted with children in Taiwan and in Canada, which allows for a cross-cultural comparison on the impact of the different motivational factors in children's learning.

Teachers in North America appear to hold a common belief that giving students an opportunity for *personal choice* promotes learning and motivation. In their interview with 36 practising American teachers, Flowerday and Schraw (2000) found that when asked specifically about the effects of choice on student learning, nearly all of the teachers indicated that they believe their students learn more when choices are offered. Most teachers believe that giving students personal choice leads to personal empowerment and a higher level of interest, that students tend to spend more time and effort on the learning task if they were offered choice, and that giving students choice helps build learning skills, such as self-regulation (Flowerday et al., 2000).

The idea of *choice* as an important factor in learning has also been strongly advocated in Deci and Ryan's (1985) Self-Determination theory, in that it assumes that *provision of choice* increases students' sense of autonomy and hence leads to positive effects on learning. In their paper on motivation and education, Deci, Vallerand, Pelletier, and Ryan (1991) called for a promotion of greater self-determination in school, asserted that a greater sense of choice, more self-initiation of behaviour and greater personal responsibility are an important avenue to attaining positive learning outcomes.

Recent 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 responded differently to personal choice. In their experiments, children were given different "choice" conditions on solving anagrams as well as on a computerized mathematics learning program. For example, there were opportunities to make a decision on which one of the six piles of anagrams to work on, which markers to use for solving the anagrams, which icon to use on the game board in the

computer program and which name to give to their chosen spaceship. Iyengar and Lepper found that Anglo American children in their 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 shown to be 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 rather 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 the few 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 Reisetter (1998) pointed out that choice has been reported to relate positively to affective engagement, which is mostly self-reported perception of engagement, such as interest, feelings of satisfaction, and reduced anxiety. However, choice appears to have less of an influence on cognitive engagement, which is mostly measured objectively, such as strategy use, recalling main ideas and generating inferences.

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 choice in their learning may be only in its possible positive influence on students' interest. Earlier research evidence examining the link between individual interest and academic achievement, however, found 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, & Winteler (1992) conducted a metanalysis on the results from 16 publications, which contain 121 independent random samples from 18 different countries. They

found that on average and across different subject areas and age groups, the level of interest accounts for about 10% of observed achievement variance. Moreover, Schiefele et al. (1992) reported that a clear and significant gender difference has emerged from their analysis, in that male students' performance accords with their interest level more than is the case for female students. They found that interest explains 12% of observed achievement variance for males, but only 6% of the variance for females.

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). Thus, in addition to interest, the effect of self-efficacy in students' effort and performance within the context of the present study will also be examined.

In short, the empirical evidence shows that the influence of personal choice in learning may be mostly on students' affect but not on cognition. Furthermore, its impact is most likely moderated by students' social learning context, which affects students' perception and interpretation of the event. The present study is designed to examine how provision of choice impacts students' reported interest level, their actual effort expenditure, as well as their learning outcome on a computerized foreign language learning session, with a special focus on culture and gender as a possible moderating factor. Furthermore, the interrelationship between self-efficacy, interest, effort, and performance are also examined.

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=.37) for the Chinese children, and 11.35 (SD=.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 was comprised of three sections: an Animal-Naming Task, a Colour-Naming Task, and a 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 on 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), their 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 the 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.

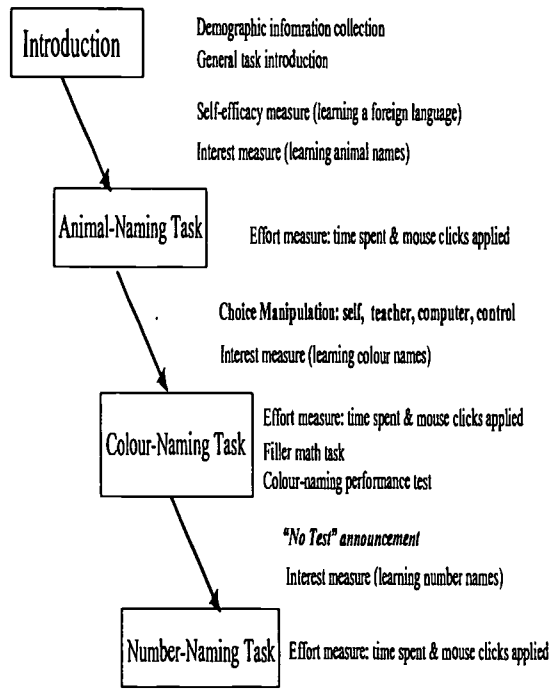
Procedures

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 would remain in the same room throughout the experiment. The children were instructed to use the computer mouse to respond to the instructions and to direct their own learning during the experiment. The computer program generated all of the instructions, presented all of the learning activities, and recorded all of the responses generated by the children (see Figure 1).

The children were first asked to provide some personal information (e.g., gender, birth year, birth month and birth date) using the computer mouse. None of the children had any difficulties following the instruction 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 five point scale ranging from *not at all interested* to *very much interested.*

Figure 1. A Flow chart of the computerized foreign language learning tasks and the manipulation and measurements applied in the process



During a 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 Colour-Naming Task) were shown on the screen. When the children clicked on the picture, they would hear the corresponding object names spoken in Chinese/French. The children were told to click on the pictures as many times as they thought necessary to learn the words and to click on a patch that says "I am done." when they were ready to quit learning. 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 the four experimental conditions and were given different instructions. 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 "You have a choice." appearing on the monitor in red. They were then directed to use the mouse to choose 8 colours, which subsequently appeared in their learning session. Children in the teacher-choice and computer-choice condition were also presented with 12 colour patches, but were told either their home room teacher or the computer had chosen 8 colours out of the 12 for them to learn, with the sentence "Your home room teacher/The computer chose 8 colours for

you." appearing on the monitor in red. Children in the control condition were simply shown 8 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 8 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 8 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 children listened to the colour names generated from the computer and gave their answers by clicking on the corresponding colour patch (out of 4 possibilities) on the monitor. The 8 colour names were presented in a random sequence twice with a total of 16 testing items.

After the test, the children were offered an opportunity to learn some number names. With "No test" shown on the computer screen in red, all of the children were told that there would be no test on this task. Again, the children reported their level of interest for this learning session on a five-point scale, proceeded 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. We could not, however, follow the same procedure with the Chinese children due to the school administrators' unwillingness to let the experimenter take individual students away from important class time. Because of the time constraints, we decided to test Chinese children in groups in their school computer lab[1]. The children 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 cubical with `a computer terminal in front of him/her. The students were seated one cubical apart from each

[1]We are aware of the possible social facilitation effect by testing Chinese students in groups. According to Zajonc (1965, 1980), however, social facilitation effect would only bring about a higher level of general arousal, but would not enhance new learning. A follow-up study with 66 Canadian students was conducted to exclude the social facilitation effect as a possible confound in the present study. We tested students in small groups and found that although these students on average reported a higher level of interest than those Canadian students who were tested individually, they did not exert a significantly higher level of effort, nor did they perform better on the performance test. Given that the individually-tested Canadian students in general reported a higher level of interest in the learning tasks than the group-tested Chinese students as reported in this study, we are confident that social facilitation cannot explain away any of the findings in the cross-cultural comparison as presented in the present study.

other; the interference from others was kept at a minimum. The testing session lasted about 30 minutes.

Results

Table 1 shows the means and standard deviations for all of the dependent measurements from the experiment by country and gender. Since 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. alpha level of .05 was used for all statistical tests.

Table 1 Means (standard deviations) of the dependent variables in the computerized foreign language learning tasks

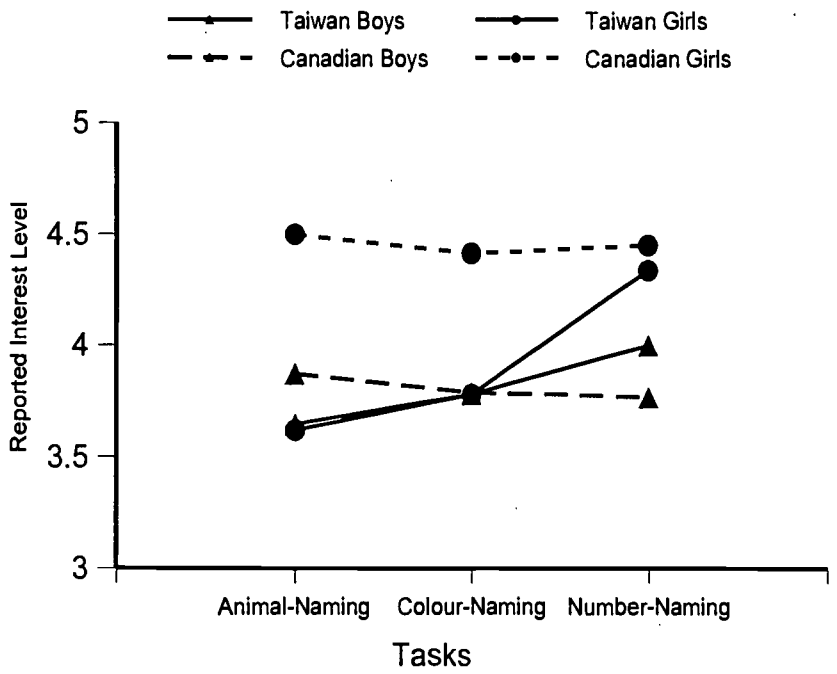
Variables	Canada		Taiwan	
	Boys (n=47)	Girls (n=82)	Boys (n=84)	Girls (n=68)
Self-Efficacy	2.98 (0.99)	3.62 (1.00)	3.35 (1.04)	3.35 (0.97)
		The Animal-Naming Task		
Interest	3.87 (1.08)	4.50 (0.84)	3.64 (1.12)	3.62 (0.99)
Time (sec.)	39.43 (25.35)	46.76 (26.72)	89.39 (72.71)	109.88 (76.82)
Mouse Clicks	11.83 (97.21)	12.09 (7.51)	32.42 (23.07)	38.00 (28.83)
Effort Index [a]	44.56 (3.43)	45.24 (3.60)	52.98 (10.28)	55.90 (11.97)
		The Colour-Naming Task		
Interest	3.79 (1.12)	4.41 (0.89)	3.76 (1.07)	3.78 (0.96)
Tim (sec.)	43.85 (26.50)	66.95 (52.15)	75.25 (69.44)	113.06 (84.91)
Mouse Clicks	15.45 (8.32)	22.66 (20.09)	37.24 (29.89)	49.88 (35.40)
Effort Index	44.70 (3.31)	47.66 (7.09)	50.76 (10.02)	55.62 (11.99)
Performance [b]	5.13 (2.27)	6.40 (3.13)	6.88 (3.95)	7.49 (3.69)
		The Number-Naming Task		
Interest	3.77 (1.24)	4.45 (0.90)	4.00 (1.22)	4.34 (0.78)
Time (sec.)	42.26 (30.93)	63.99 (53.87)	57.25 (55.98)	77.34 (54.96)
Mouse Clicks	17.87 (12.10)	25.67 (19.28)	30.65 (24.45)	38.05 (28.81)
Effort Index	45.96 (5.13)	49.62 (8.97)	49.95 (10.24)	53.47 (11.15)

[a] 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.

Self-Efficacy. Children from both countries first reported their confidence level in their ability to learn a foreign language well. The results from a 2 (culture) x 2 (gender) ANOVA test on students' self-efficacy beliefs showed that culture did not have a significant main effect, $F(1, 277)=.157$, $p=.69$ ($MSe=1.01$); 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, $F(1, 277)=7.01$, $P<.01$, and a significant Gender x Culture interaction, $F(1,277)=6.68$, $p<.01$. Simple main effect testing using the Dunn's procedure showed that the Canadian boys reported a significantly lower level of self-efficacy than the girls, $F_{15/4;\,1,\,277}=12.36$. This gender gap in self-efficacy level, however, was non-existent in the Chinese sample, $F_{15/4;\,1,\,277}=0.00$. (See Table 1.)

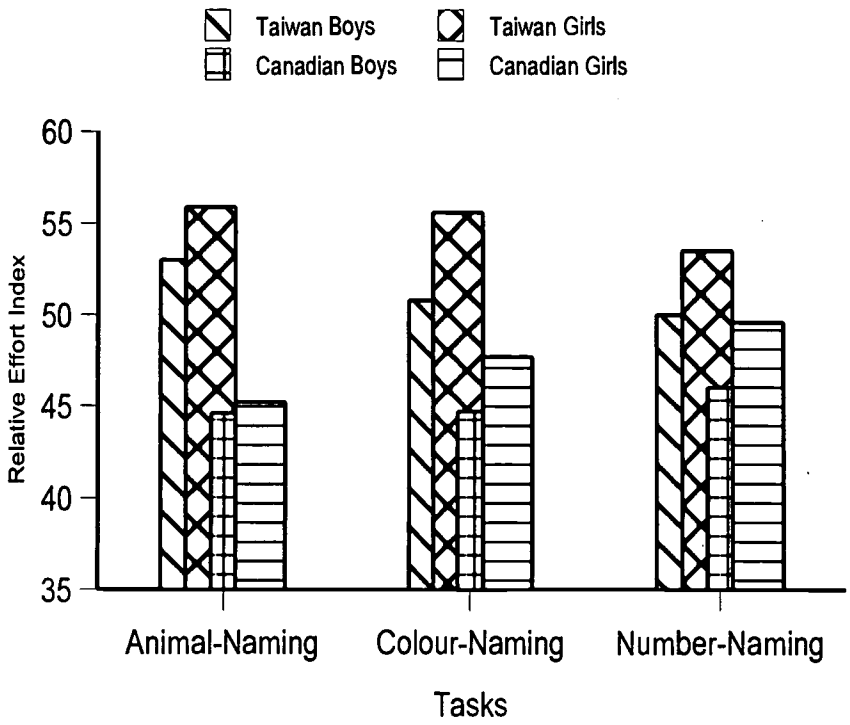
Interest and Effort Across the Three Tasks. As seen in Figure 2, the Canadian girls consistently reported a high level of interest on the tasks. The Chinese children's reported level of interest became progressively higher throughout the experiment with the Chinese girls' level of interest reached to a comparable level of that of the Canadian girls' on the Number Naming Task. On the other hand, the Canadian boys' interest level stayed consistently lower than their Canadian female counterparts throughout the study, and did not increase even after being told that there would be no test on the Number-Naming task.

Figure 2. Children's Reported Interest Level Across Three Tasks.



As seen in Figure 3, Chinese students' effort expenditure was higher than the Canadian students throughout the experiment, and the female students tended to exert more effort on the learning tasks than their male counterparts. The difference between the two cultures, however, seemed to become smaller toward the end of the experiment.

Figure 3. Children's Relative Effort Index Across Three Tasks.



Note: Since each child's effort index is calculated in relation to others and separately for each task, it is not appropriate to compare the effort index at a face value across tasks.

Reported in the following are the results of the significance testing for each of the three learning tasks on the effect of culture, gender, and the choice manipulation.

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, we did not expect differences among the four choice groups. A 2 (culture) x 2 (gender) x 4 (choice) MANOVA was applied with children's reported interest and their effort index on the learning task as the dependent variables. The results showed that indeed there was no significant

difference among the four choice groups, F(6, 530)=1.65, p=.13. There was, however, a significant culture main effect and a significant gender main effect, with F (2, 264)=53.72, p<.001 and F(2, 264)=4.42, p<.05 respectively. Furthermore, the Culture x Gender interaction was also statistically significant, F(2, 264)=3.89, p<.05.

Further ANOVA analyses revealed a significant culture effect on both students' reported interest, F(1,265)=19.65, p<.001, (MSe=1.00); as well as their effort expenditure on the task, F(1,265)=86.62, p<.001, (MSe=70.31); with the Canadian students reporting a significantly higher level of interest, but exerting significantly less effort on the task than the Chinese students. As shown in Table 1, the Chinese students spent twice as much time and applied almost three times as many mouse clicks as Canadian students during the learning session in the Animal-Naming task.

The gender main effect and the Culture x Gender interaction on students' interest level were both statistically significant as well, with F(1, 265)=6.09, p<.05 and F(1,265)=6.54, p<.05 respectively. The simple main effect testings using the Dunn's procedure revealed that the culture effect on interest level was only significant for the girls, $F_{15/4;\,1,\,265} = 27.19$, but not for the boys, $F_{15/4;\,1,\,265} = 1.61$. As shown in Figure 2, the Canadian boys reported a significantly lower level of interest than the girls, $F_{15/4;\,1,\,265} = 11.44$, on the Animal-Naming task, whereas the Chinese boys and the Chinese girls reported a comparable level of interest, $F_{15/4;\,1,\,277} = .00$.

Interest, Effort, and Performance in the Colour Naming Task. Students were given four different instructions prior to the Colour-Naming task. Table 2 shows the means and standard deviations from the experimental tasks by country and by experimental conditions. A 2 (culture) x 2 (gender) x 4 (choice) MANOVA was conducted on students' interest, effort, and performance on this learning task. The multivariate tests showed that the manipulation on students' choice conditions did not produce a significant impact, F(9, 789)=.87, p=.55. There was however a significant culture effect, F(3, 261)=15.29, p<.001, and a significant gender effect, F(3, 261)=5.84, p<.001. Moreover, the interaction effect between culture and gender was also significant, F(3,261)=2.75, p<.05.

Table 2. Means (standard deviations) of the interest, effort and learning outcome for the four experimental groups in the colour-naming and the number-naming tasks

Choice Groups	The Colour Naming Task			The Number Naming Task	
	Interest	Effort	Performance	Interest	Effort
Canada (N=130)					
Self (n=34)	4.32 (0.77)	46.95 (8.39)	5.76 (3.20)	4.05 (1.10)	47.21 (5.96)
Teacher (n=34)	3.97 (1.24)	46.24 (5.14)	5.79 (2.66)	4.15 (1.06)	47.57 (7.80)
Computer (n=31)	4.32 (0.87)	46.73 (5.19)	5.68 (2.69)	4.58 (0.85)	49.36 (9.16)
Control (n=31)	4.13 (1.12)	46.28 (5.29)	6.37 (3.19)	4.05 (1.26)	49.19 (8.76)
Taiwan (N=153)					
Self (n=42)	3.76 (1.14)	53.35 (10.14)	7.24 (3.59)	4.14 (1.06)	51.94 (11.18)
Teacher (n=42)	3.76 (0.98)	51.68 (9.54)	7.67 (3.97)	3.98 (1.21)	49.17 (8.22)
Computer (n=32)	3.56 (0.84)	51.10 (10.72)	6.09 (3.41)	4.13 (0.87)	49.52 (8.78)
Control (n=37)	3.97 (1.04)	55.29 (13.95)	7.44 (4.21)	4.39 (0.99)	55.15 (13.32)

Further ANOVA testing showed that there was a significant difference between Canadian students and Chinese students on all three dependent variables, interest level, effort, and performance. As shown in Table 1, Canadian students reported a significantly higher level of interest, $F(1,263)= 6.47$, $P<.05$ (MSe=.99), but exerted significantly less effort, $F(1,263)=37.20$, $p<.001$ (MSe=83.61), and performed significantly less well, $F(1,263)=10.51$, $P<.001$ (MSe=11.75), on the Colour-Naming task.

In general, the girls (M=51.62, SD=.76) worked significantly harder in learning the colour names than the boys (M=47.68, SD=.84), $F(1, 263)= 12.15$, $p<.001$. Moreover, they also performed better (M=6.93, SD=.29) than the boys (M=6.00, SD=.31) on the performance test, $F(1,263)=4.73$, $p<.05$.

Again, the Culture x Gender interaction on students' reported interest level was statistically significant on this task, $F(1, 263)=5.96$, $p<.05$. Simple main effect testing showed that the culture effect on reported interest was only significant for the girls, $F_{15/4;\,1,\,263} = 13.68$, but not for the boys, $F_{15/4;\,1,\,263} = 0.00$. As in the previous task, the Canadian boys reported a significantly lower interest level than the girls, $F_{15/4;\,1,\,263} = 10.85$; but this gender difference was not present in the Chinese sample, $F_{15/4;\,1,\,263} = 0.00$.

Interest and Effort in The Number Naming Task. Students were all told explicitly that there would be no test following the Number-Naming task. Thus, the effort students showed in this task could be seen as an objective indicator of students' intrinsic interest in learning in this study. A 2 (culture) x 2 (gender) x 4 (choice) MANOVA was conducted on students' reported interest level and their observed effort expenditure on this learning task. The multivariate tests showed that the manipulation on students' choice conditions again did not produce a significant impact, $F(6, 524)=1.56$, $p=.16$. The culture and the gender main effects were both statistically significant, with $F(2, 261) =5.13$, $p<.01$ and $F(2, 261)=11.40$, $p<.001$ respectively. No interaction effects were statistically significant.

Further ANOVA testing revealed that, unlike the previous two tasks, the reported interest levels for the Canadian students and the Chinese students were not significantly different on this task, $F(1, 262)=.23$, $p=.63$, MSe=1.09. Nonetheless, the Chinese students still exerted a significantly higher level of effort on this task than the Canadian students, $F(1, 262)=10.29$, $p<.01$ (MSe=88.78).

The gender effect, again, was significant in the Number-Naming task for both reported interest level and effort expenditure, with $F(1,262)=16.87$, $p<.001$ and $F(1,262)=9.48$, $p<.01$ respectively. The girls in both countries reported a significantly higher level of interest in learning the number names and exerted significantly more effort than the boys. Although the gender gap in the reported interest level was not evident in Chinese students in the previous two

tasks, knowing that there would be no test, the girls from Taiwan, like their Canadian counterparts, reported a significantly higher level of interest on the task than the boys (see Figure 2.)

Relationship between Self-Efficacy, Interest and Effort. Also of interest are the inter-correlations among the dependent measures in the present study. Table 3 depicts the inter-correlations of the dependent variables from the Canadian and the Chinese sample separately as well as within each gender group. As seen in Table 3, although there was a significant correlation between students' efficacy level and their 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. Further testing with the AMOS 4.0 program confirmed that controlling for culture, the impact of self-efficacy on interest (β) was consistently and significantly stronger for the boys than for the girls for all three tasks, with $Z=3.08$ ($p<.01$), $Z=3.08$ ($p<.01$), and $Z=2.57$ ($p<.05$) respectively.

Table 3 The inter-correlations among the dependent variables in the three computerized foreign language learning tasks by culture and gender

Variables (Task)	1	2	3	4	5	6	7	8
				Chinese\Canadian Children				
1. Self-Efficacy		0.55**	0.27**	0.45**	0.21**	0.24**	0.38**	0.26**
2. Interest (Animal)	0.45**		0.19*	0.73**	0.31**	0.26**	0.57**	0.27**
3. Effort (Animal)	-0.06	0.02		0.14	0.46**	0.23**	0.12	0.43**
4. Interest (Colour)	0.43**	0.58**	-0.09		0.23**	0.15	0.58**	0.26**
5. Effort (Colour)	0.05	0.01	0.64**	0.02		0.43**	0.25**	0.44**
6. Performance (Colour)	0.14	0.02	0.33**	0.10	0.47**		0.31**	0.21*
7. Interest (Number)	0.37**	0.34**	0.08	0.38**	0.06	0.07		0.34**
8. Effort (Number)	0.00	0.02	0.43**	0.01	0.56**	0.42**	0.13	
				Chinese\Canadian Boys				
1. Self-Efficacy		0.61**	0.45**	0.60**	0.33**	0.09	0.44**	0.46**
2. Interest (Animal)	0.58**		0.25	0.79**	0.32**	0.11	0.65**	0.25
3. Effort (Animal)	-0.11	0.15		0.27	0.62**	0.12	0.20	0.74**
4. Interest (Colour)	0.52**	0.56**	-0.22		0.23	0.01	0.61**	0.20
5. Effort (Colour)	-0.02	0.09	0.56**	-0.07		0.35*	0.26	0.53**
6. Performance (Colour)	0.16	0.15	0.27*	0.02	0.51**		0.32**	0.17
7. Interest (Number)	0.43**	0.37**	0.15	0.37**	0.17	0.10		0.34*
8. Effort (Number)	-0.03	-0.01	0.36**	-0.07	0.60**	0.40**	0.13	
				Chinese\Canadian Girls				
1. Self-Efficacy		0.44**	0.14	0.25*	0.11	0.19	0.25*	0.13
2. Interest (Animal)	0.25**		0.11	0.62**	0.27*	0.31**	0.40**	0.22**
3. Effort (Animal)	0.00	0.03		0.16	0.43**	0.27*	0.03	0.34**
4. Interest (Colour)	0.31**	0.60**	0.56		0.17	0.18	0.49**	0.23*
5. Effort (Colour)	0.07	-0.10	0.69**	0.13		0.40**	0.21	0.39**
6. Performance (Colour)	0.11	0.04	0.41**	0.20	0.42**		0.21	0.15
7. Interest (Number)	0.27*	0.32**	-0.07	0.44**	-0.19	-0.03		0.30*
8. Effort (Number)	0.04	0.07	0.48**	0.09	0.49**	0.44**	0.19	

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.

Furthermore, there were interesting contrasts in how students' reported efficacy and their effort expenditure were related in the two countries. Canadian students who reported a higher level of efficacy in learning a foreign language tended to exert more effort in their learning as well, showing a small but significant positive correlation between efficacy level and effort index for all three tasks, with $r=.27$ ($p<.01$), $r=.21$ ($p<.01$), and $r=.26$ ($p<.01$) respectively. On the contrary, there is virtually no relationship existing between reported efficacy and effort for any of the three tasks in the Chinese sample, with $r=-.06$ ($p>.05$), $r=.05$ ($p>.05$), and $r=.00$ ($p>.05$) respectively. 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 $r=.45$ ($p<.01$), $r=.33$ ($p<.01$) and $r=.46$ ($p<.01$) for the three tasks respectively.

Similar cultural differences were observed in the relationship between students' reported level of interest and their effort expenditure for each task. For the Canadian students, there was a significant relationship between their reported interest and their effort level for all three tasks, with $r=.19$, $r=.23$, and $r=.34$ respectively. For the Chinese students, however, their effort level had no significant correlation with their reported interest level on each of the three tasks, with $r=.02$, $r=.02$, and $r=.13$ respectively.

Discussion

The present study set out to manipulate different types of choice conditions and to test their effects on students' interest and effort in learning, as well as students' learning outcome. As proposed by self-determination theory, giving students choice 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. Both students' reported level of interest and the actual effort that students 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, we found that 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 et al (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 be only 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 non-effect of personal choice is observed cross-culturally. With these findings, we 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. A more refined theory is needed to specify the learning conditions under which the possible positive effect of personal choice can be observed. Moreover, further testing of the theory is required.

The results of the present study have revealed some very interesting cultural differences and gender differences in students' learning behaviours though. We found that although children's interest in a task is generally related to their level of self-efficacy, the impact of self-efficacy on interest is significantly stronger in the boys. 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 mainly be due to the fact that the 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, we also find 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. The results of the present study show 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, their effort exertion on 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 their better test performance in the Colour-Naming task.

Why would 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 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 determiner 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' mind, 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 much harder than their Canadian counterparts. This *testing effect* thesis is supported by the fact that Chinese students, especially the girls, 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 [2].

The postulated testing factor that appears to be significant for Chinese students but not for the Canadian students could be due to the differences in the educational practice in the two countries. 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 which 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-

[2] To examine the effect of testing on students' interest, a Task (Colour-Naming vs. Number-Naming) x Culture x Gender MANOVA was conducted with Task as a within factor. The results showed a significant Culture x Task interaction, $F(1, 275)=8.536$, $p<.01$, $MSe=.565$. The Chinese students showed a significant increase in interest in the Number-Naming task after being told that there was no test; whereas the Canadian students were not affected.

Naming Task 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 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). Further research is required on these issues.

Another interesting cultural difference observed in this study is the gender gap. We found that in the Canadian sample, the girls tend to report a higher level of interest than the 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 the learning task. 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, only 37% of boys reaching the standard. Indeed, this gender gap was found across the province (Education Quality and Accountability Office, 2000). The 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.

In short, the results from the present study cast doubt in the generalized and assumed power of personal choice 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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