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Pairing craft-making with Mandarin eBooks: An investigation into the use of craft for language learning by preschoolers

Wil-kie.Tan^{1*}, Stephen Jia Wang¹ and Jeffrey Janet¹

¹Department of Design, Faculty of Art Design & Architecture, Monash University, Melbourne 3145, Victoria, Australia

Abstract

Bilingual ethnic Chinese parents are concerned about their preschoolers' learning of their mother tongue. Many allow their children to learn Mandarin by accessing language applications on mobile devices. However the effectiveness of solely using mobile devices as a learning tool for preschoolers is debatable. This paper presents a field investigation on how adult-facilitated craft-making, generates greater interest the reading of Mandarin eBooks and retention of the stories. The data suggests pairing of activities may be useful to children from across language abilities. This also highlights a need for designers and educators to formulate a holistic design approach in the development of preschool mobile learning content.

Keywords: Craft, Design, eBooks, Education, Mandarin Learning, Mobile Devices, Preschool, Reading, Tangible Interaction

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1. Introduction

In Singapore, despite an academic emphasis in the learning of both English and Mother Tongue, many families struggle with the use of their Mother Tongue both at home and in school [1]. While Mother Tongue might be spoken prior to preschool, there would be an increase in the use of English once the child starts formal schooling. Bilingual families' cultural hybridity [2] sparks a negotiation of meaning and representation [3] on their perceived value of Mother Tongue. For a child from a bilingual family, home, where two or more cultures interact readily, is an ambiguous area to grow up in.

Many bilingual ethnic Chinese parents use "edutainment" (blend of educational and entertaining) Mandarin language applications to engage their children's interest, in hope of retaining of Mandarin as their Mother Tongue. But the effect of mobile devices usage within their home space or when coupled with another activity

such as craft-making is much less understood, as much of present research on language learning and technology pertains to technological and curricular integration of devices for literacy learning [4] or with references drawn from studies of more than 40 years of educational television programs [5].

This paper presents an investigation of the researchers' hypothesis that a more structured adult involvement in shared reading of Mandarin eBooks and complementary craft-making, with its materiality, tangibility and interaction; and within the child's familiar context of home, can help foster the learning of Mandarin. It includes the theoretical considerations, methodology, data from 15 preschoolers and correlations of collated findings.

2. Theoretical Considerations

The researchers take the view that an adult-child interaction is central to preschoolers' learning. Familiarity

*Corresponding author. Email: wilkie.tan@gmail.com

and trust of the child towards his/her attached adult helps build confidence in learning from his/her immediate environment and reaching out to others [6]. Traditionally home is the primary space for transmission of knowledge, where the child also makes meanings from a setting that offers a cultural context to who he/she is, especially for one growing up in a bilingual family.

Vygotsky opined that the child is not a blank slate [7] but is seen to be constructing his/her own knowledge with the amalgamation of previous experiences and cultural influences to every new situation. Hence, Vygotsky placed learning within social situations and the role of language and cultural transmission as core to social constructivism. His notion of “scaffolding” proposed that a child learns from a more experienced person and it occurs within a “zone of proximal development (ZPD)” [8]. He also saw ZPD as being formed through play in the early childhood as the child’s internalization of social rules, formation of real-life plans and intentions [9]. However for ZPD to be effective, the child has to be an active rather than a passive learner and it is often the quality of interpersonal relationships between the child and the adult, that creates a more fruitful interaction and better learning outcomes [10].

Existing research on English-speaking children has found that knowledge of print during preschool may be correlated to their later performance in word recognition, spelling, and reading comprehension [11] [12]. In a study conducted in Taiwan, the results indicated that Taiwanese/Chinese parents placed an emphasis on print in their interaction with their children, and suggested the explicit use of print referencing interaction strategies during shared reading as being helpful in the development of print concepts skills in children [13].

EBooks’ popularity means that stories continue to be an essential part of cultural and language transmission and storytelling is still important to language acquisition milestones. But there are some researchers who are unsure that shared book reading between adults and children would contribute to the development of children’s literacy skills [14]. There are also concerns that adults now have a diminished role to share-read once automated media-rich reading features are enabled in the eBooks, leading to comparisons made between adult–child interaction when they share a paper-based or eBook [15].

On the other hand, craft-making is recognized to be beneficial for the development of visual-processing skills, fine motor skills and building executive function, such as concentration, in young children [16]. Hence this coupling of the craft-making with the eBooks provides the contextualization necessary within the child in his/her learning process [17]. Adult-facilitated craft-making, while not spontaneous or self-directed by the child, when elaborated with age appropriate resources, may become sustained play episodes [18]. However, craft-making is regarded more as qualitative expression than in economic objectives [19] these days, and adults tend to dismiss it to be activities done in day care centres or that they do not have time for it at home.

3. Research Methodology

The methodology for this investigation included collaboration with an e-learning resource publisher, selection of suitable eBooks from them, and designing complementary craft activities with different levels of difficulties, before packaging them for the participants. These were then made accessible to them on a secure test site online. The adult volunteers facilitated the activities and assisted with the logging of observations and photo/video documentation of the prescribed activities with their children.

3.1. External Collaboration and Design of Craft Activities

Collaboration was sought with Commontown[†], an e-learning service provider from Singapore, in early 2015. They had developed *Dudu Town*[‡], a subscriber-based portal, offering browser-based Mandarin eBooks to primary schools and preschools. When approached, they expressed an interest to know how subscribers can better understand their stories, and maintain or improve their motivation to read and learn.

A proposal was made to integrate craft making as a means to extend the currency of their eBooks. 4 preschool-level titles (Figure 1) were shortlisted by the researchers from *Dudu Town*’s repository. The selection criteria included diversity in themes, illustration style and potential for integration of craft activities. Commontown offered technical assistance in hosting the test site with the craft-eBook packages. Subsequent activities and data collation were conducted without their further involvement, but they were briefed on the data collated at the end of the investigation.

The eBooks selected were:

- (i) Friends and the Bear, a story about being true to your friends in the face of danger.
- (ii) Goldfish is Asleep, a story about why fishes do not close their eyes when sleeping.
- (iii) The Rain Drop, a story about the water cycle.
- (iv) Rabbit & Snail, a story about the importance of keeping promises.

4 story-specific craft activities were then designed for the investigation (Figure 2). Their visual elements were inspired from the stories so that the children can relate to what they read. They were also designed with ascending levels of technical difficulties:

- (i) For Friends and the Bear, a memory flip-card game, to simulate Bear hunting Friends (Level 1).

[†] <http://www.commontown.com>

[‡] *Dudu Town* was designed for self-paced reading and incorporates an Automated Reading Programme (ARP) that provides adaptive learning and matching of the reader’s ability to appropriate levelled changes in the readers’ content. <http://dudu.town/>

- (ii) For Goldfish is Asleep, a cardboard aquarium with mobile goldfish (Level 2).
- (iii) For The Rain Drop, a PVC bottle mini simulation of 'water cycle tank' (Level 4).
- (iv) For Rabbit & Snail, a date-matching card game, to simulate counting down the days to a week (Level 3).



Figure 1. Top 4 screenshots of eBooks show title pages with designated tabs (bottom right of each title page) for downloading craft activities. First and third screenshots from second row show mid-story prompts for craft activities.

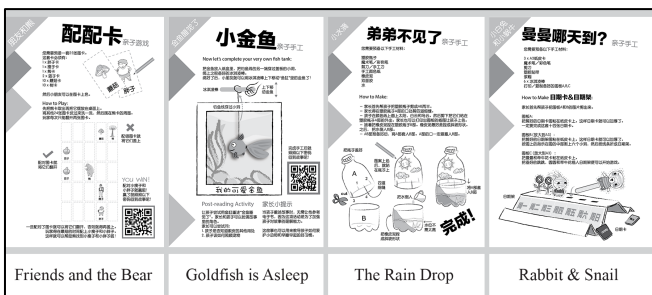


Figure 2. Sample pages of craft instructions in Mandarin.

These were then packaged as PDF files, accessible from the books' title pages. Sample craft designs were provided to the participants and the adults were advised that they served only as guidelines as the craft objects should be created within the constraints of using any available material at home.

The adults were to prepare the material prior to the shared reading and the children were to start on the craft activities midway, when they were prompted by audio-visual cues in the eBooks. Upon completion of the craft objects, the adults could scan designated QRcodes on the instructions sheets to return to the stories, if they had printed them out prior to the activities.

3.2. Field Activities

Adults were sought as facilitators and documenters. Being 'gatekeepers' to the 'field' [20] provided both familiarity to the children and also a degree of control and participation that an external researcher would take a while to cultivate. Before starting on the activities, they provided background information on their use of

Mandarin and their children's exposure to craft-making at home and with immediate family members. They then logged down the time taken to complete each activity and documented their observations of the children during the sessions, from reading, craft making to post-reading activities (refer to Appendix A for the survey questions). They were to also provide their own devices for the activities and respective documentation. This was to ensure that the participants were familiar with the handling of their devices and to minimize the need for the researchers to troubleshoot hardware issues remotely.

The shared reading of eBooks on mobile devices and all 4 craft activities were compulsory. Then the children attempted the post-reading activities, by answering simple questions in the eBooks and retelling the stories, with the aid of their craft objects. The adults were advised to set aside approximately an hour for each set of eBook-craft activity. The timing remained as a guideline and the adults should consider their children comfort level at all times. Most importantly, the children were allowed to respond by code switching - alternating of Mandarin and English. Even when a child could not fully remember the stories, they were encouraged to string together fragments of the stories, with the aid of the craft objects. A stylistically different retelling meant the child grasped what was read (refer to Appendix B for sample transcripts of the retelling).

Upon completion, each child answered a simple questionnaire with a series of 5 Yes/No answers regarding his/her experiences in reading, crafting and retelling, and was given a "Certificate of Completion" to encourage further reading and crafting.

4. Data Collation and Correlated Analysis

A total of 15 children aged 3 to 5 from bilingual (English & Mandarin-speaking) Singaporean families based in Singapore and Melbourne participated in the activity. Selected correlated analysis from part of the data collated will be highlighted in this paper.

The first set of responses from the adults showed how the participants took to craft as an activity and whether Mandarin is featured prominently in their day-to-day activities (Figure 3). It also indicated the half the children needed encouragement to speak the language and all of the adults noted that they spent time on craft activities with their children with DIY craft toys as part of the range of toys they play with. The adults' implied desire to have greater exposure to the language and a confidence of doing craft with children was important in the progression of the rest of the investigation.

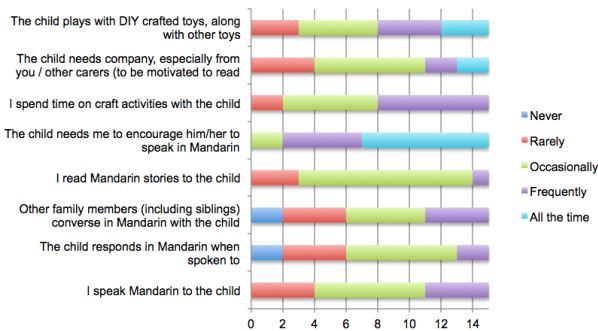


Figure 3. Background survey of participants for Dudu eBooks.

When the respondents' answers from 2 key background questions: *The child responds in Mandarin when spoken to* and *The child needs me to encourage him/her to speak in Mandarin* were correlated, it showed that most adults still saw the need to encourage their children to speak in Mandarin despite that they were already responding in Mandarin when spoken to (Figure 4). This implies that the adults in this sample group must have felt the same anxiety towards the maintenance of Mandarin.

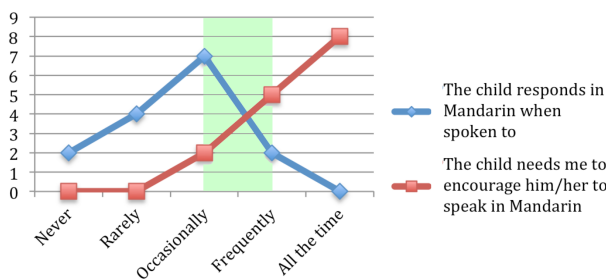


Figure 4. Correlation between adults' encouragement and children's response in Mandarin.

The children who were noted to “never”/“rarely” respond in Mandarin were compared to those who responded “occasionally” and “frequently” (no adults indicated “all the time”), in their interest to start reading the eBooks (Figure 5). Almost all the children, regardless of their willingness to respond in Mandarin, were keen to start reading the Mandarin eBooks, possibly due to the visual appeal of the characters in the stories and/or the opportunity to access or “play” with the mobile devices.

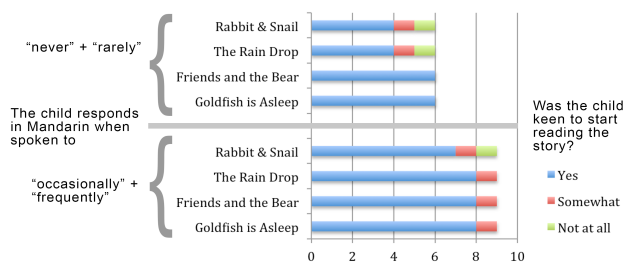


Figure 5. Correlation between whether the children were keen to start reading the respective stories and their willingness to respond in Mandarin.

Next, the focus is on adults who said they spent time on craft-making with their children. Children of adults who indicated “rarely” and “frequently” to spending time on craft-making, are investigated to see if they related the craft object with the eBooks, and if they used the craft object to aid in their retelling of stories. The correlated result of the children with the adults who quoted “rarely” was too small to be read effectively. However, children of the 7 adults who cited “frequently” gave interesting results (Figure 6) about their choice of craft. *Goldfish is Asleep* topped their list for being the most relatable craft object to the eBooks, followed by *Friends and Bear*, *The Rain Drop* and *Rabbit & Snail*. This matches the difficulty level of the craft activities designed. *Goldfish is Asleep*, despite being slightly more difficult, could have topped due to its whimsical factor. This same group of children was also using the craft object when attempting to retell the stories. Most of them indicated “yes” and “somewhat” to using what they made in the post-reading activities, so perhaps prior experience with the adults had affected their actions here.

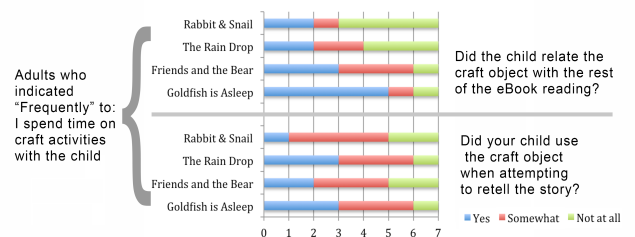


Figure 6. Correlation between whether the children were keen to start reading the respective stories and their willingness to respond in Mandarin.

It was initially thought that the differences in maturity, language abilities, fine motor skills and cognitive development in the children would determine how well the reading and craft activities were received. However the adults observed that most children exhibited interests in doing the craft activity and had little or no problem following through them. The photo documentation (Figure 7) demonstrated that the children were able to manipulate the material, and with adult guidance, completed the craft activities. The most significant result presented crafting as being well received and an average of 13 children continued to play with their craft objects after the activities.

In the end, 4 out of 6 of the children who “never”/“rarely” respond in Mandarin at home were noted to be “somewhat” able to engage in the retelling of the story in Mandarin. All other children who “occasionally”/“frequently” respond in Mandarin at home, expectedly were able to (“yes” and “somewhat”) engage in Mandarin retelling. While it was not conclusive that the children warmed up to the use Mandarin after going through the

activities, it was helpful to know that the children were not adverse to the experience. These sentiments were also captured in the final children questionnaire, with 13-15 of them noted that they liked reading and retelling the stories (with the craft objects), playing the toys they made and liked making them with the adults.



Figure 7. Participants accessing the eBooks and playing with their craft objects.

5. Limitations and Strengths of the Investigation

The results are not definitive that a structured adult involvement in shared reading and craft-making, can help foster the children’s interest in the learning and use of Mandarin. While the children were introduced to Chinese print in the form of eBooks, the recognition of characters was not an emphasis in the field activities conducted with the children. The differences or limitations of individual adults’ approach when facilitating the activities might have affected how the children responded or went about their activities. Neither was there a consistent use of Mandarin in the communication between the adults and children from some of the video documentation submitted. However, this may be seen as adults using code-switching to engage rather than to negate the efforts of the children.

The reading of the eBooks, facilitated as the provenance for subsequent craft activities and the documentation showed that the children were able to inject certain degree of their own individuality to the objects created. What might have been solely an alterity relation between the child and the technology/device is positively affected by the introduction of the craft activity. The craftwork, designed to complement the themes and moral lessons behind the stories, helped the children to consolidate what they read and perhaps provided a better impression on them. The active participation of the child in the craftwork probably ingrained the stories in the minds of the child, thus helping them with the retelling at the end of the activities.

The craft object, once created, became the next provenance for the retelling of stories by those children

who attempted the post-reading activity. The transcription of sample video footage of the children’s retelling in Appendix B demonstrated that they understood what they read and a retelling clearly helped them to learn how to verbalize their experiences of reading [21]. From the video documentation, most were retelling with their craft object in hand and there were evidence of the objects being played with or referred to.

Some of the children were seen code-switching between English and Mandarin during parts of their retelling while others who were hardly proficient relied mostly on their parent/carer to structure their retelling and they could only plug in certain short Mandarin phrases (e.g. names of characters) during these adult-led sessions. Dewey rightly pointed out “the role of tools is subject to a condition supplied by language, the tool of tools” [22]. He also noted that the invention and use of tool is significant in helping to associate meanings as it is a mean to an end and that is “relational, anticipatory and predictive” [23]. Hence in young children, it is evidential that the provision of the physical artefact of a toy object is secondary to the language from adult-child interactions, as it would later manifest as their own language of thinking and learning.

Future in-depth investigations, with a larger pool of participants, different family demographics, more varied stories and a control group exercising without craft-making activities, would certainly provide a better picture on how the role of adults, adult-child interaction and craft-making’s materiality and tangibility, can help retain interest and knowledge. The documentation from this investigation did however shed light on how the children were injecting their own individuality into the craft objects, and that they were at ease when reading and crafting within their homes.

From the perspective of design research, this indicates that the development of screen-based edutainment preschool resources requires more than just better narratives and audio-visual content. The understanding of child development, play, the recognition of their creativity, the engagement of adults and even site specificity should be key considerations for any designer, developer and manufacturer instead of piling on enhancements that do not relate to the stories or enrich the reading experience.

Appendix A. Outline of survey

The survey was divided into 4 sections. Section 1 were the Pre-activity Questions that helped the researchers understand the child’s immersion of Mandarin and his/her attitudes to play and craft toys. Section 2 required the adults to log the time taken for the shared-reading, craft activities and post reading activities. Section 3 posted Post-activity Questions that detailed the adults’ observations of the children throughout the activities. Section 4 posted Post-activity Questions to the children, gauging their responses to the experience.

A.1. Section 1 – Pre-activity Questions

Adults were required to check only 1 of the responses – *Never, Rarely, Occasionally, Frequently, All the time*, as their answer to the following questions:

- (i) I speak Mandarin to the child
- (ii) The child responds in Mandarin when spoken to
- (iii) Other family members (including siblings) converse in Mandarin with the child
- (iv) I read Mandarin stories to the child
- (v) The child needs me to encourage him/her to speak in Mandarin
- (vi) I spend time on craft activities with the child
- (vii) The child needs company, especially from you / other carers (to be motivated to read and play)
- (viii) The child plays with DIY crafted toys, along with other toys

A.2. Section 2 – Time Log for completion of entire set of activities

Adults were required to log the number of sessions, dates, and time taken (in minutes) for the shared-reading, crafting, post-craft reading, and child-driven post reading activities, for all 4 eBooks. The volunteers were briefed that it would take about an hour to complete each of the eBook-craft activity. However “The Raindrop” and “Rabbit and Snail” took longer due to the complexity of their craft instructions.

A.3. Section 3 – Post-activity Questions (for adults)

Adults were required to check only 1 of the responses – *Yes, Somewhat, Not at all*, as their answer to the following questions regarding each eBook:

- (i) Was the child keen to start reading the story?
- (ii) Was the child enthusiastic when using the portable device?
- (iii) Did it take long for the child to learn how to navigate through the pages?
- (iv) Was the child keen to create the craft object?
- (v) Was the child able to follow through the craft activity?
- (vi) Did the child play with / express an interest to play with the craft object after the activity?
- (vii) Did the child relate the craft object with the rest of the eBook reading? Example, holding up the craft object when the story is being read.
- (viii) Was the child keen to finish the rest of the story?
- (ix) Did the child express interest to read the story again?
- (x) Was the child able to retell the story without the use of your smart device?
- (xi) Did your child use the craft object when

attempting to retell the story?

- (xii) Was the child able to respond adequately to the tasks/questions in the post reading activity?
- (xiii) Was the child able to engage in this activity with the use of Mandarin?

A.4. Section 4 – Post-activity Questions (for children)

The children were asked to respond to these questions that are being read out to them by the adults. The choices were visually represented as a smiling and frowning face, and the children were to circle or colour in their answers to the following questions:

- (i) Do you like the stories?
- (ii) Did you like making the toys?
- (iii) Did you like making them with me?
- (iv) Did you like playing with the toys made?
- (v) Did you like telling stories with these craft toys?

Appendix B. Sample transcripts of selected story retelling by child participants

The post craft and shared reading activity required of the child participants was the retelling of their favourite stories from the 4 eBooks. The following transcripts were chosen from the video recordings of children retelling the stories. The recordings showed the children attempting their retelling with the craft objects that they had created and also captured verbal prompts by the adults in helping the children progress through their retelling. Where applicable, the sentences within < > are the English translation accompanying the original speech articulated in Mandarin.

B.1. Child 1 – Female (4 years old) retelling <Friends and Bear>

Child: 有一天有两个小朋友，一个是胖子，一个瘦子。。。。 <One day there are 2 friends, a Fat boy and a Thin Boy>

Adult: Then 他们做什么呢? <Then what did they do? >

Child: 他们去篮子。。。。 <They went basket. >

Adult: 森林里 <Into the forest. >

Child: 森林里找蘑菇。有一天，有一只熊。他们不知道那个熊在那边。 <Into the forest to find mushrooms. One day, there is a bear. They didn't know the bear was there. >

Adult: 那他们做什么呢? <So what were they doing? >

Child: (Mumbles and moves cards around to indicate the movement of the characters in the story) Then 熊很靠近了 (Moves Bear card around Thin Boy card) <Then the bear gets nearer.>

Adult: 哦，那熊绕一绕是吗？那熊走掉（Child moves the Bear card away and brings over the Fat Boy card）
<So, the bear circles around Thin Boys and walks away?>
>, 那胖子来了，（Child takes Thin Boy card and Fat Boy card in each hand and actions with them）他们讲话是吗？
<So comes Fat Boy. Are they talking? >

Child: 他说你为什么，告诉我你为什么他的朋友，不管我了，他说不要管他的那个朋友。。。<Fat Boy ask what, Thin Boy tells him why as his friend, he did not care about him. He says he does not want to care. He does not want to care about Fat Boy.>

Adult: 不要跟他做朋友是吗？<Thin Boy doesn't want to be friends with Fat Boy right?>

Child: 不要跟他做朋友，是。<Thin Boy doesn't want to be friends with Fat Boy. Yes.>

B.2. Child 2 – Female (4 years old) retelling <Goldfish is Asleep>

Child: Cos I don't know Chinese what's "Once upon a time"

Adult: Ok 你 try <Ok, you try>.

Child: Once upon a time...

Adult: Then?

Child: 金 I don't know....

Adult: 金鱼。<Goldfish.>

Child: 金鱼在睡觉了。我不要睡觉。<Goldfish is sleeping. I don't want to sleep.>

Adult: 然后呢？<Then? >

Child: 妈妈说金鱼在睡觉。好，金鱼睡觉了，我也是要睡觉。<Mama says goldfish is sleeping. Good, goldfish is asleep, I want to sleep to.>

Adult: 还有吗？没有啦？讲完了？<Anything else? Is that it? Finished telling the story? >

Child: 讲完了。<Finished>.

Acknowledgements.

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