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Thai visitors' expectations and experiences of explainer interaction within a science museum context

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Abstract

In Western literature, there is evidence that museum explainers offer significant potential for enhancing visitors' learning through influencing their knowledge, content, action, behaviour and attitudes. However, little research has focused on the role of explainers in other cultural contexts. This study explored interactions between visitors and museum explainers within the setting of Thailand. Two questionnaires were distributed to 600 visitors and 41 museum explainers. The results demonstrated both potential similarities and differences with Western contexts. Explainers appeared to prefer didactic approaches, focussing on factual knowledge rather than encouraging deep learning. Two-way communication, however, appeared to be enhanced by the use of a 'pseudo-sibling relationship' by explainers. Traditional Thai social reserve was reduced through such approaches, with visitors taking on active learning roles. These findings have implications for training museum explainers in non-Western cultures, as well as museum communication practice more generally.

Keywords

science and popular culture, science communication, science museum

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1. Introduction

> Many of our Thai students do not participate in lessons; they sit quietly and do not raise their hands to answer questions. Is this behaviour part of being 'Thai' or is it just shyness?
>
> Deveney (2005: 164)

There is evidence to show that Thai students can behave in a different manner from Western students; formal educational settings in Thailand retain a focus on traditional teaching and learning (Deveney, 2005; Hongladarom, 1999), and Thai students are taught to be quiet and to refrain from speaking in class in order to pay attention to the teacher. Students are not encouraged to question or to have discussions, even though they are keen to learn (Nguyen, n.d.). Shyness can be one reason for non-participation, but students are also afraid of making mistakes or replying with incorrect answers. This article explores, via a questionnaire survey of visitors and explainers, whether an informal educational setting such as a science museum provides opportunities for Thai people to interact with science in a more expressive manner.

Social interaction is an important aspect of museum learning (Dewitt and Hohenstein, 2010; Hein, 1998; Hooper-Greenhill, 1999; King, 2009), and though museum exhibitions focus the attention and time of visitors, they are not the only aspects which attract visitors' attention. Visitors' recollections are often influenced by social interactions that they have experienced during a visit to a museum (Falk, 2009). Experience in a museum can vary according to who the visitor interacts with, across different age groups (Melber, 2007; Puchner et al., 2001), among solitary visitors compared to those with company (Packer and Ballantyne, 2005) and in respect of personal situations such as economic and social factors ('Culture has influences on explainer needs', personal communication, Rodari, May 2011). However, it is also likely that there are cultural variations in such experiences: 'the Western assumptions of behaviour are not necessarily mirrored by Eastern assumptions' (Deveney, 2005: 169), and this is worthy of further exploration.

Most of the existing social context research focuses on family groups (Falk and Dierking, 1992). Over 10 years ago, Falk and Dierking (2000) noted that '... it is amazing how little research exists on the role that museum staff-volunteers, guides, explainers ... play in facilitating learning from museums' (p. 107), and suggested that 'a better understanding of how social interaction between staff and visitor effects learning and under what circumstances could lead to significantly better practice' (p. 108).

This study not only explores such social interactions between visitors and museum explainers but also explicitly investigates the outcomes of that interaction within the Thai context. There is substantial evidence that science explainers can enhance visitor museum experience within Western museums (see, for example, Ash et al., 2012; Castle, 2001; King, 2009), and there is a small amount of existing research by Thepthepa (2007) demonstrating that Thai science explainers both attract and hold visitors' attention. Building on this work, this article will particularly explore the interaction of explainers with visitors in a Thai context.

2. Who are the explainers?

Explainers have multiple functions and their definition can require explanation. Typical labels used in English-speaking museums include 'explainer, interpreter, pilot, educator, demonstrator, presenter, enabler, interactor, host'; their roles can be similar at different locations (Rodari and Xanthoudaki, 2005: 2), though the definitions of their roles can differ. Explainers often welcome, facilitate and encourage visitors to be actively involved in activities. In museums and science

centres with science laboratory facilities, they might prepare material, facilitate visitors to conduct experiments and ensure the safety of visitors. Their specific tasks vary depending on their contract or the purpose of their role; however, explainers – regardless of the specifics of their role – are the main group of people that directly interact with the majority of science museum visitors (Massarani et al., 2008; Richard, 2010).

Rodari and Xanthoudaki (2005) point out that the role of teacher-educator in a formal context like a school is different from the role of an explainer-educator in a museum or science centre. Explainers should not see themselves as a teacher (Ash et al., 2012), but they do facilitate visitor learning. Similarly, some teachers take on facilitator roles to actively encourage students (Hooper-Greenhill, 1999). It is frequently expected that explainers should motivate rather than explain (Gomes da Costa, 2005) and an active learning approach is commonly favoured.

Active learning provides the learner with an opportunity to interact, explore and experiment while engaging the mind (Hein, 1998). In contrast, passive learning infers the mind receives, absorbs and learns facts; the learner is seen as 'the empty vessel to be filled' (Hooper-Greenhill, 1999: 68). In the museum's context, explainers often facilitate 'active learning through the handling and questioning of objects, and through discussions linked to concrete experiences' (Hooper-Greenhill, 1999: 68). Posing questions is one important way to encourage visitors to find answers for themselves; in some centres, there is a belief that explainers should answer a question by asking another question (Johnson, 2005).

Previous research has identified a variety of other mechanisms that allow explainers to interact more effectively with visitors, such as linking science to visitors' daily lives (Johnston and Rennie, 1994; Mullahy, 2004). Almost 20 years ago, Johnston and Rennie (1994) highlighted that learning occurred most effectively when the science demonstrated by an exhibition linked to the visitors' experience. Where it associated to their work or profession, for example, visitors were seen to have a better understanding. More recent work by Mullahy (2004) supported this approach, noting that if the visitors could see how science relates to them, they were more likely to want to learn science. Furthermore, she suggests that storytelling is a particularly useful technique when communicating science to a wide-ranging audience (e.g. in terms of demographics and background experience); the trick is to put the science into context and make it more relevant for the visitor. The use of analogy can also be helpful when visitors have difficulty in understanding the scientific concepts of an exhibit (Johnston and Rennie, 1994).

It is noticeable that all of the above 'effective' approaches to communication between explainers and visitors were identified within Westernised contexts. In the context of this Special Issue of *Public Understanding of Science* (*PUS*) it is crucial to ask, 'are such approaches and advice valid within other cultures?'

3. Cultural perspectives to Thai communication

With regard to the context in Thailand, prior work has suggested that Thai communication styles and social interactions are unique (Holmes and Tangtongtavy, 2003; Thapatiwong, 2011). In brief, Thai people are perceived to be friendly and often smiling. Being polite, calm and considerate and to show care for the feelings of others are highly valued attributes within Thai society. Thai communication styles seek to avoid conflict or complaint and to demonstrate respect for people in higher social or professional positions.

Within their wider cultural framework, Hofstede and colleagues (2010) describe such qualities as being associated with *femininity*[1] and *high power distance*.[2] Within this framework, Thai people are seen to recognise and see as important qualities on the femininity dimension, whereby they seek strong social harmony and avoid disagreement or criticism when communicating with others

(Hallinger and Kantamara, 2010; Pimpa, 2012). Thai people consider non-verbal communications that are attributed to 'positive' responses in other cultures, such as smiling, appropriate when disagreeing with the opinions of others (Holmes and Tangtongtavy, 2003). It is frequently difficult for Thai people to verbalise disagreement and it would be unusual to hear a Thai person say 'NO', especially with those who are considered superior to their own position. Thai people often compromise as much as possible in order to be sensitive and respectful to the feelings of others; this concept is called *Rak Sa Nam Jai*.[3]

Thai people show sensitivity in protecting the feelings and respecting others (face-saving) as a key way to maintain their relationships socially. For example, Thai students are seen to prefer sitting quietly and listening to their teachers (Deveney, 2005), reluctant to signal a contribution even through their body language. Whereas in Western classrooms it would not be unusual for students to highlight or discuss mistakes, in Thai culture, a student would be reluctant to highlight any form of error on the part of others. Despite social acceptance that errors should not be highlighted, students avoid answering questions, even when they are confident of a correct answer, in case they feel foolish and 'lose face' to their friends if the answer is incorrect. Therefore, a contradiction of social pressures is in operation: on the one hand, mistakes and confusion are to be avoided, while, at the same time, they would not be socially acknowledged should they occur.

Thai culture also values a hierarchy system, which influences the communication process and is described as a *high power distance* (Bogart, 2012; Deveney, 2005; Hofstede et al., 2010; Thapatiwong, 2011). This concept refers to the extent to which individuals with 'less' power accept and/or respond to perceived social or professional inequalities (Hofstede et al., 2010). Within a 'high power distance' society such as Thailand, children are taught to be respectful to their elders from childhood, and the way people talk to elders, teachers or those in superior positions is governed by social norms which emphasise respect and deference. Social position could be based on a variety of factors, such as age, knowledge level, social class or, more specifically, the individual's position within the family, workplace or social setting (Pimpa, 2012). People who are seen to have a lower social position are culturally encouraged not to disagree or argue with those in a higher position; within Thailand, such behaviour is traditionally known as the *Krang Jai*[4] concept.

This hierarchy system has been seen to have an impact on the learning of Thai students in classroom environments. Bogart (2012) reiterates that students do not like to ask or answer teacher's questions and Thai students are taught to be respectful, non-aggressive, accepting, tolerant, non-confrontational team-players, who are positive in their learning interactions with teachers (Deveney, 2005). Previous studies (e.g. Bogart, 2012; Deveney, 2005) have found that this is also the case in some other Asian cultures; for instance, students in China are often quiet and diligent and do not like to disturb the classroom environment, while such behaviour does not appear as frequently in students from more Westernised countries such as Taiwan, Japan or Korea.

Burapharat's (2009) study found that *Krang Jai* and face-saving behaviours can be released by the building of pseudo-sibling[5] relationships, and this is common practice in Thai contexts. Such sibling social bonding is facilitated through the formation of *Pii* (see Note 5, big brother/sister) and *Nong* (see Note 5, little brother/sister) relationships. This relationship creates trust, and a friendly environment for communication, releasing any tensions and concerns of losing face during conversation as it adopts a supportive familial style in relationships. When two people start interacting in a conversation, and one of them wishes to create a more informal relationship, then they can begin to use the *Pii/Nong* labels within that conversation (Burapharat, 2009). While such an approach would not be appropriate in all circumstances (e.g. where professional or social respect needs to be maintained), the use of *Pii/Nong* acts as an icebreaker, reducing the perceived distance and/or reserve. Such mechanisms are just one social tool that Thai people use to negotiate their communicative interactions.

The adoption of science in Thailand occurred from the middle of the 19th century through trade and economic routes, though its history of communicating science is less extensive. The Science Society of Thailand originated in 1948 to promote the development of science and works closely with the Ministry of Education and the Ministry of Science and Technology, who are the two main organisations directly responsible for promoting public awareness and interest in science and technology through learning within science museums/centres (National Science and Technology Development Agency, 2005). Thailand has mechanisms to strengthen people's knowledge of science; however, Thailand has far to go when it comes to scientific thinking (Hongladarom, 1999; Tinnaluck, 2005), as people are still seen to hold considerable superstitious beliefs (Tinnaluck, 2005; Wongchalee, 2007), which can be challenging to overcome in a science communication context.

Within this Thai cultural context, it is of interest then to explore the relationships between visitors and explainers. How do Thai visitors perceive the explainers' roles and do those perceptions differ between visitor groups? How do Thai visitors want to interact with explainers and does this differ among different types of visitors? What learning experiences do Thai visitors report and does this differ between visitor groups? Such questions have formed the stimulus for this work, involving investigations with both visitors and explainers via two surveys within a specific science museum context in Thailand.

4. Methods

The data that this article draws upon originate from a study that in part aimed to investigate Thai visitors' expectations, communication approaches and experience of explainer interactions during their visit to a Thai science museum. In particular, the research explored wider cultural aspects of museum interactions: whether there was evidence of *Krang Jai* in the contact between explainers and visitors or examples of other elements unique to the Thai context.

In this article, we focus on the data collected via two predominantly electronic face-to-face surveys (survey completed with the researcher/s on an iPad) conducted over a period of 10 days (8–30 June 2011) at the National Science Museum (NSM), Thailand. A total of 600 visitors and 41 explainers completed the questionnaires while visiting or working at the Museum during the data collection period. The questionnaires covered aspects relating to the perceived role(s) of explainers, the respondents' experiences of interaction and what explainers and visitors felt were the outcomes of such interactions. Both questionnaires were ***tran***slated to the Thai language; back ***tran***slation was then used to check the validity of the survey phrasing (Cantor et al., 2005).

Questionnaires were selected as the most appropriate medium due to their potential to gather broad yet comparable information from a relatively large group (Bell, 2005; Buckingham and Saunders, 2004). The ability of questionnaires to quickly collect a range of data, including the demographics of the respondents, their social environment and activities and their opinions and attitudes, was also highly advantageous to the present work (Bell, 2005; Buckingham and Saunders, 2004; Fink, 2009), but questionnaires of course have limitations in the type of data that can be collected; for instance, they included few open questions. Inclusion of separate questionnaires for visitors and explainers enabled a greater understanding of both perspectives regarding the interaction of visitors and explainers in the museum (Diamond et al., 1987). The questions used within the surveys built upon recommendations from previous work and adapted where appropriate to the NSM/Thai context (see, for example, Diamond et al., 1987; Johnston and Rennie, 1994; Mullahy, 2004; Museums, Libraries and Archives Council (MLA), 2008; Richard, 2010). For example, some questions used directly comparable response categories based on existing work, a question

on impacts of interacting with explainers was framed around Generic Learning Outcomes (GLOs) or results raised in prior qualitative research were used to frame survey questions.

A quota sampling approach was utilised in recruiting visitors to respond to the study. The population was divided by gender, with an equal population selected from each in order to provide a representative demographic spread (Blaikie, 2000; Fink, 2009). Visitors of each gender stratum were selected at random to ensure individuals had an equal chance to participate in the study. Every fifth visitor who passed the information desk was invited to contribute. If the visitors were in a group, the protocol was to select the person who was positioned fifth within the group. This randomised sampling procedure was followed until the quota for each gender was filled (approximately 30 males and 30 females each day), resulting in a total of 600 participants over the 10 days. Data were deliberately collected at both weekends and weekdays in order to avoid bias due to possible differences in visitor backgrounds on different days. All respondents were of Thai origin to ensure that the results appropriately reflected Thai cultural perspectives.

In terms of demographics, respondents were approximately representative of visitor profiles to the museum more broadly. Similar numbers of 'Youth' (15–24 years) and 'Adults' (more than 25 years) participated in the survey, with 42% and 41% of the overall sample respectively (n = 251 and n = 243). Children (less than 15 years) made up the final 18% of respondents (n = 106). In terms of educational backgrounds, the highest proportion of participants were degree educated, with over 40% (n = 260) of visitors holding a 'Bachelor' degree. However, there were also a large number of survey respondents (22%, n = 130) who had qualifications at a level 'less than high school', and a further 21% had 'high/vocational school' (n = 125) as their main qualification; 14% (n = 85) of visitors had studied to 'Master/PhD' level. The data collection period selected was also able to uncover visitors who attended the museum in a variety of social groupings. Just over 35% (n = 223) of visitors came with a 'school/university trip'; similar numbers attended with their 'family' (35%, n = 207), and just over a quarter of visitors came with 'friend/s' (26%, n = 157). Only 2% (n = 13) of visitors came alone to their visit. One reason for the low number of visitors attending alone may be that the museum is not very accessible by public transportation. Most visitors therefore choose to attend in pre-organised groups.

The explainers were recruited via self-selection sampling methods. It was important that explainers were able to consent to participate of their own accord (Laerd, 2012); some explainers may have been concerned that their responses might affect their work despite the project's confidentiality procedures. Via the ethics process for the research, and following some prior data collection carried out at the NSM in 2009, we anticipated that explainers could be nervous that the survey was compulsory and/or that the results of the study could have a negative impact on their employment. Therefore, the explainers participated in this study voluntarily.

The statistical significance of differences in response between groups of visitors was investigated using Chi-squared tests when there were two visitor groups and using Kruskal–Wallis tests when there were three or more. These tests were used because they test for differences between groups of non-parametric data (Pallant, 2007), such as those we aimed to investigate.

The project had received ethical approval from the University of the West of England, Bristol, with particular care taken around consent procedures for children and young people.

5. Results

Visitors' perceptions of the role of explainers

Data from this study suggest there are a range of expectations on the part of Thai people as to the explainers' roles. Many visitors expect explainers will take on some form of presentation role

Table 1. Visitors' expectations of explainers' roles (values provided are percentage). Category headings were developed from the results of Diamond et al. (1987).

	Introduce the highlights or major concepts of the exhibition	Explain every part of the exhibition	Leave you alone because you can explore and learn by yourself
Age			
Child (n = 106)	52	43	5
Youth (n = 251)	52	40	8
Adult (n = 243)	69	24	7
Education			
Less than high school (n = 130)	49	46	5
High/vocation school (n = 125)	59	35	6
Bachelor's degree (n = 260)	58	31	10
Master's/PhD (n = 85)	73	25	2
Who they came with			
Alone (n = 13)	38	46	15
Family (n = 207)	63	29	9
School trip (n = 223)	58	38	4
Friend/s (n = 157)	55	36	8
Total	59	34	7

within their interactions (see Table 1); over half of the visitors (59%, n = 352) said explainers should 'introduce the highlights or major concepts of the exhibition', followed by 'explain every part of the exhibition' at 34% (n = 206). However, a small proportion (7%, n = 42) of visitors were happy for the explainers to leave them alone to explore and learn by themselves. This suggests that although many visitors saw the explainers' role as being to communicate *to* them, rather than necessarily *with* them, very few visitors preferred to avoid contact completely.

It is unsurprising that over half of 'Family' visitors (63%, n = 130), those on a 'School trip' (58%, n = 130) and visitors with 'Friend/s' (55%, n = 87) indicated in the visitors' questionnaire that the explainers' role should be to 'introduce the highlights or major concepts of the exhibition' as this would perhaps contribute to their learning experience from each other and discussions they might have around an exhibit. Interestingly, however, visitors who attended 'Alone', though far fewer in number, also suggested that they would like explainers to 'explain every part of the exhibition' (46%, n = 6). It is possible that those who visited alone were particularly open to the opportunity to talk with someone during their museum visit. Only two of the 13 visitors in the 'Alone' group felt that the explainers should leave them alone to learn by themselves. However, there were no statistically significant differences between the 'Alone' group and those accompanying others in terms of desirability to be left to explore independently.

There were some significant differences in preferences to interact based around age groupings (df = 4, n = 600, p < .001) and education, (df = 6, n = 600, p = .001). 'Adult' respondents (69%, n = 167) demonstrated a higher preference to simply have the explainers 'introduce the highlights or major concepts of the exhibition' than any other age and were much less inclined than the other groups to be interested in having every part of the exhibition explained to them. 'Child' (43%, n = 46) and 'youth' (40%, n = 101) visitors preferred the explainers to 'explain every part of the exhibition' compared to 'adults' (24%, n = 59). This is perhaps not an unexpected outcome, as with increased age and education it is likely that visitors might require less support in their understanding of an exhibition. Within a Western context, adults have their own interests and choose

Table 2. Visitor preferences regarding where they would like to interact with explainers (values provided are percentage).

Museum activity	Proportion of visitors (n = 600)
Science laboratory	49
Game	47
Science show	46
Guided tour the whole exhibition	28
Science demonstration	26
Lecture	26
Science theatre	24
Workshop/event	20
Explaining in exhibitions	19
Training (of teachers)	6

Survey question (visitors): In which of the following ways do you wish to interact with the explainers during your visit to the museum? (Multiple selections allowed).

voluntarily to participate in museum activities during their leisure time (Falk et al., 2007), and it would appear that adults are also independent during their visit within a Thai context.

Visitors who had a level of education 'less than high school' were split between preferring the explainers to 'explain every part of the exhibition' (46%, n = 60) or to simply 'introduce the highlights or major concepts of the exhibition' (49%, n = 64). This latter proportion was far lower when compared to those who had been educated to postgraduate level, with 73% (n = 62) of visitors who had a 'Master's/PhD' feeling that explainers should just 'introduce the highlights or major concepts of the exhibition'. These data suggest that the majority of visitors felt they wanted some information from explainers but different approaches were apparent in different visitor demographics. Such differences are not surprising on an initial inspection.

As with most modern museums, NSM provides a variety of activities during the museum visit which offer opportunities for more interactive experiences than merely the explanation of a particular exhibit. These include activities where visitors can experiment by themselves such as in the science laboratory, or via games, workshops and science shows. We were keen to explore respondents' thoughts about these different types of approach. Visitors were asked in which scientific activities they would like to interact with explainers, based on lists of scientific activities developed from the Pilots project (Richard, 2010).

Nearly half of the respondents felt that they would *like to* interact with explainers in 'Science laboratories' (49%, n = 292), through 'Games' (47%, n = 282) and 'Science shows' (46%, n = 277) (see Table 2). 'Explaining in exhibitions' was rated very low in comparison, with about 20% (n = 112) despite previous answers suggesting this was often desirable.

Interestingly, the activities with high percentage responses were those that involved active participation with explainers rather than passive participation. For example, 'Explaining in exhibitions', where visitors tended to take on a 'listener' role, was less popular (19%, n = 122), whereas nearly half of the visitors (49%, n = 292) appeared open to interact with the explainers in a 'Science laboratory' setting. Such interactions involve not only listening to the explainers but also allowing the visitors to communicate both with the explainer and other people. It is possible that visitors are more open to interaction in settings where interaction is more permissible and likely. For example, due to *Krang Jai* a visitor might feel more relaxed to ask questions or request direction from an explainer in a laboratory or interactive setting, compared to an experience where the explainer is seen to be presenting information around an exhibition in a didactic fashion.

Table 3. Visitors' experiences of different interaction approaches (values provided are percentage).

	Proportion of visitors (n = 382)
Type of interaction approach	%
Using non-complicated language	60
Telling science stories	50
Using activities to engage the visitor	37
Using analogies to facilitate understanding	30
Demonstrating how science is related to everyday life	25
Using body language	22
Asking questions and encouraging the visitor to find out the answer themselves	13

Survey question (visitors): What approaches have you experienced explainers using to communicate with you? (Multiple selections allowed).

Visitors' experience of and approach toward interaction

In order to understand the potential of interaction between visitors and explainers, it is important to know more regarding the details of the interactions between them. In this study, visitors and explainers were asked for their views regarding approaches and behaviour during interaction. Visitors were given a list of different approaches that the explainers might have used to communicate, and explainers were asked about visitors' behaviours that they commonly encounter when interacting with visitors.

These lists (see Table 3) were developed from existing literature (see Gomes da Costa, 2005; Johnson, 2005; Johnston and Rennie, 1994; Mullahy, 2004), and had been previously applied within a similar Thai context (Kamolpattana, 2009).

As highlighted in Table 3, visitors reported that explainers most often used simple, uncomplicated language as a technique to interact verbally with them (60%, n = 229). Narrative principles such as 'telling science stories' (50%, n = 190) were also used to relate information to visitors. Perhaps most notable here though were other aspects that appeared less readily utilised; for example, only around a quarter of visitors (25%, n = 97) noted any demonstration of how 'science is related to everyday life'. 'Using body language' (22%, n = 85) and 'asking questions and encouraging the visitor to find out the answer themselves' (13%, n = 49) also appeared to be less well utilised in terms of encouraging interaction with the explainers. It is possible that all three of these approaches might be useful in the Thai context, in terms of encouraging people to suggest their own ideas and feel relaxed to both ask and answer questions. However, it is important to remember that the approaches suggested have emerged from a Western setting. It may also be the case that explainers are avoiding such techniques to prevent discomfort with forced interaction among explainers and visitors alike.

With regard to explainers' views on visitors' behaviour, a list of possible Thai visitors' behaviour (see Table 4) was developed from the results of previous observations conducted with NSM staff (National Science Museum, 2001). Within this study, the explainers mentioned that they found visitors could at times both 'avoid' but also 'approach' explainers. In terms of 'avoidance', 63% (n = 26) of explainers agreed that 'visitors avoid interacting with the explainer' (see Table 4). There are two possible interpretations of this 'avoidance'. It is possible that visitors tend to prefer to reflect on their experience independently, without the aid of an external facilitator. Although some of the visitor data collected would suggest other intentions, it is feasible that intention to interact does not necessarily translate to behaviour. Alternatively, it might also be the case that, in

Table 4. Explainers' views on visitors' behaviour (values provided are percentage).

Observed visitor behaviour	% of agreement (n = 41)
Visitors avoid interacting with the explainer	63
Visitors test the explainer's understanding of scientific knowledge	61
Visitors would like to have fun rather than learn in a scientific way	46
Visitors ask questions to provoke the explainer	44
Visitors would like explanations of every exhibit	44
Visitors don't believe the explainer's suggestions	27
Visitors have a high level of knowledge and explain the content back to the explainer	17

Survey question (explainers): Which of the situations below do you commonly encounter when interacting with visitors? (Explainers were asked to tick 'Yes' or 'No' to each statement.)

the Thai context, visitors feel shy and cautious in asking for assistance and feel they will lose face if they request help.

It was then surprising to see that despite the sense of avoidance among some visitors, many explainers also noted that 'visitors test the explainer's understanding of scientific knowledge' (61%, n = 25) and 'visitors ask questions to provoke the explainer' (44%, n = 18) from the explainer's perspective. These results could suggest that there are more active learners present within the Thai museum context than might be expected, as, from the explainer's perspective, when they do interact, over half of the visitors are engaging with materials and asking questions. Such findings contrast evidence from a formal learning environment which suggests that Thai people have a passive learner culture, and are taught to respect and adhere to social norms rather than question content presented to them (Deveney, 2005; Holmes and Tangtongtavy, 2003). However, it is also important to remember that in contrast to Western, for example, Australian, American or many European countries, visitors and explainers will have been taught not to question individuals in a teacher role (Holmes and Tangtongtavy, 2003) and to ask for advice or information from someone who is younger than you is inappropriate (Thapatiwong, 2011). Therefore, provocative questions in a Thai content might be much more passive than how they would be interpreted in other locations.

Additionally, the use of pseudo-sibling relationships leading to a friendly communication environment may result in a reduction of *Krang Jai* at least where question asking is concerned. Visitors who are younger than the explainer were called *Nong*, while elder visitors were called *Pii*. Within this environment, the majority of visitors did not appear to see explainers as a teacher or professional, but instead identified them as someone comfortable to talk with as indicated by the high response from the explainer's perspective on visitors' engagement in question asking. This might suggest, from the explainer's viewpoint, that visitors avoided *Krang Jai* in some circumstances and were less concerned about losing face if they did not know something related to the museum content. Such interactions between explainers and visitors could imply that in entering the lower power distance of the science museum environment, some Thai visitors appear to take active learning roles when compared to traditional patterns of Thai behaviour in educational contexts.

Visitors' learning experiences

Finally, visitors were asked a series of questions about their learning experiences from interacting with the explainers. A list of impact indicator statements was provided, based on the GLOs five

Table 5. Visitors' self-reported impacts from interacting with the explainers (values provided are %).

Impact indicator statement	Strongly agree	Agree	Disagree	Strongly disagree
Knowledge and understanding				
I learned some interesting new things	30	67	2	1
I understand a lot of scientific content	30	66	3	1
Enjoyment, inspiration and creation				
I enjoyed the experience of interacting with the explainer/s	20	74	5	1
The explainer/s raised my curiosity in science during the visit	21	69	8	2
Attitudes and values				
The explainer/s inspired me to find out more scientific information when I go back home	12	75	11	2
Action, behaviour and progression				
I would like to visit again because of the explainer/s	31	62	5	2
Skills				
I had a chance to share my knowledge with the explainer/s	11	73	14	2

Survey Question (Visitors): What would you say you obtained from interacting with the explainers?

categories: knowledge and understanding, enjoyment-inspiration-creativity, attitudes and values, action-behaviour-progression and skills (MLA, 2008).

The results (see Table 5) suggest that more than 90% of visitors within NSM that interact with explainers gain 'knowledge and understanding', for instance, learning new scientific facts, and 'action, behaviour, progression'. The majority of respondents indicated that they 'agreed' with all of the impact indicator statements provided (Table 5), with relatively high proportions additionally indicating they 'strongly agreed'. It seems useful to initially explore the areas where visitors reported somewhat fewer personal gains. Those experiences included 'I had a chance to share my knowledge with the explainer/s', where 16% of visitors ($n = 64$) disagreed with the statement in some way, of whom 27 visitors were educated to Bachelor degree level (and therefore might be assumed to have some level of knowledge to offer). This result suggests that some visitors did not identify an opportunity to share their own understandings, though it does not tell us why that might be the case. Additionally, 'the explainer/s inspired me to find out more scientific information when I go back home' (13% 'disagree' or 'strongly disagree', $n = 49$) and 'the explainer/s raised my curiosity in science during the visit' (10% 'disagree' or 'strongly disagree', $n = 37$) were also relatively low in number. This suggests that a minority of Thai visitors may need more reassurance that the science featured in the museum is relevant and accessible to them and their sustained interest, though the vast majority reported positive reactions.

There was a statistically significant difference according to age ($df = 2$, $n = 600$, $p = .01$) and education ($df = 3$, $n = 600$, $p = .008$) for 'I learned some interesting new things'. Children rated the importance of interaction with the explainers in this context significantly higher than older people.[6] Similarly, visitors who had 'less education than high school' rated the importance of interactions with explainers significantly higher than those who had higher education.[7] Age group ($df = 2$, $n = 600$, $p = .009$) and education level ($df = 3$, $n = 600$, $p = .008$) also produced significant differences in whether respondents agreed that 'I would like to visit again because of the explainer/s'. Children were more likely to feel that the interaction with explainers was an important contribution to their

interest in returning to the museum again.[8] In the same way, visitors who had 'less education than high school' were more like to rate the importance of interactions with explainers in encouraging them to return than those who had experienced higher education.[9]

Additionally, the group with whom a visitor had attended the museum (i.e. alone or with a school trip, friend/s or family) had a statistically significant effect on whether the respondent agreed that 'I had a chance to share my knowledge with the explainer/s', ($df = 3$, $n = 600$, $p = .01$). Visitors who attended the museum 'alone' were more likely to feel that their interaction with the explainers provided them with the chance to share their own knowledge than visitors attending as a group.[10]

6. Discussion

Interactivity and creating two-way communication

The results from this research suggest that while Thai visitors demonstrate some wariness around interacting in a multi-directional fashion, there are signs that they prefer to interact with the explainers via activities that naturally adopt two-way communication styles. Thai people's behaviours are conditioned to be quiet and relatively passive (Deveney, 2005), and it is therefore possible that when interacting in sessions which are mindful of more traditional communication formats, similar styles of behaviour are likely to be deemed appropriate.

The results of this study show that activities that include the chance for audience participation and input to occur naturally, such as science laboratories, can sanction a style of interactive communication. Science museums in Thailand are thus potentially creating a situation where there is a lower power distance relationship (Hofstede et al., 2010) in certain activities, when compared to a Thai classroom. Western literature (see, for example, Bell et al., 2009; Bultitude and Sardo, 2012; MacDonald, 2004) identifies that activities occurring in relaxed environments can promote participants' willingness to learn, as well as their intention to continue learning. The same trends appear to hold true within Thailand. Explainers are using the pseudo-sibling relationship to create a perceived 'friendliness' of the environmental setting; for instance, visitors attending alone appear particularly encouraged to speak to an explainer. However, the social and environmental setting needs to be considered at a much deeper level to explain the success (or otherwise) of such activities within Thailand. By actively taking into account local cultural perspectives, explainers can encourage visitors to express their curiosity more freely. It is therefore very important that museums and science centres take such cultural aspects into consideration when designing activities and opportunities for explainer interactions with visitors.

Thai Visitors: what do their learning experiences reveal?

Our analysis suggests that from the explainers' perspective, visitors' behaviour in the NSM did not always conform to Thai cultural norms; visitors were not always quiet, they asked questions to test explainers' knowledge and they did not always believe explainers' suggestions, though there were still groups of visitors who avoided interacting with explainers completely. These findings suggest some evidence of active learners in the Thai museum context, but as these analyses have been conducted only within the Thai context, it is not clear how this would compare with behaviours of visitors in other settings.

This raises a wider point regarding methods within this research and the challenges of seeking to make comparisons across different cultural contexts. First, it was noticeable in responses to certain questions that cultural factors were at play. For instance, returning to the relatively high

proportion of explainers who reported visitors asking probing questions, what these data do not provide is a comparison as to how this provocation and exploration of knowledge is framed. It is possible that Thai explainers' conceptions of 'questioning' are informed by cultural upbringing, and it would be useful to compare the exact nature of the questioning with the experiences of explainers in other cultural contexts. Similarly, there were high responses among visitors (93%), suggesting they would visit the museum again due to explainers. It is possible that such responses, while not dishonest, were influenced by *high power distance* factors within the process of research. Such cross-cultural comparisons form part of ongoing work by the lead author, but are worthy of more extensive consideration within the field.

Explainer-enhanced visitor experiences in NSM Thailand

The results from this work demonstrate visitors' self-reported positive learning experiences and other beneficial impacts from their interactions with explainers at NSM. Such findings are consistent with previous studies within various Western science museums, for example, those described by Diamond et al. (1987) and Tran (2006). However, if we link back to visitors' experiences of different interaction approaches (Table 3), the data suggest that explainers were less likely to be asking questions, using body language, making connections to everyday life or encouraging the visitors to find out the answers themselves, and they tended to use traditional one-way communication methods. What is less clear is whether explainers were doing this purposely, as a traditional Thai approach to education, or reactively, when working with visitors who might be more passive and accepting of particular types of formats for communication. The focus on one-way communication styles, lesser use of examples from everyday life or activities which we know to be important (Johnston and Rennie, 1994; Mullahy, 2004) may explain why for some visitors it was difficult to see how science learning could be sustained, relevant or continued after the museum visit. Such reactions would no doubt lead to less development of 'attitudes and values' and 'skills' regarding science within the visitor cohort.

7. Conclusion and implementation

Visitors' experiences of explainers in this study revealed very positive feedback, with some specific key areas identified for further improvement. NSM, as well as science centres and museums working in similar cultural settings, could continue to enhance visitors' experiences through their interaction with explainers in a variety of ways. First, the Thai pseudo-sibling relationship appears to have some influence on building a friendly environment, reducing the 'power distance' between visitors and explainers, increasing trust and reducing concerns related to 'saving face'. Some visitors feel able to express their ideas and to question and participate in science-related activities. This suggests an informal education setting such as a science museum might be one place to encourage Thai people to interact with science in an expressive manner.

In addition, in order to achieve visitors' deep learning, museums can provide training to explainers focusing on relating scientific issues to everyday life and identifying and asking questions of visitors; at present, such questions appear to be used minimally. However, such approaches would need to be conducted sensitively, in a manner mindful of Thai cultural norms, in order to avoid setting up a *Krang Jai* situation and/or making visitors uncomfortable. While this study appears to show that many Westernised approaches are relevant in Thailand, there were also particular cultural contexts that would not be apparent in other countries.

In conclusion, this study demonstrates that Thai visitors do take on active learning approaches when science museums, centres and explainers are mindful of the cultural context in operation. If

Thai explainers use naturally interactive and informal mechanisms and activity styles, are conscious of key cultural factors such as *Krang Jai* and employ the pseudo-sibling relationship when approaching visitors, there are excellent opportunities for interaction. However, from a research perspective, there is still work to be done to acknowledge, respect and apply non-Western framings within science communication settings. It is important that any such observations and recommendations do not in themselves become reflections of a *high power distance*, encouraging the adoption of a Western model alone, but vocalise the existing effective cultural practices occurring in museums and centres around the world.

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Notes

1. Hofstede et al. (2010) describe a feminine society as one which sees the value of woman, and is caring, nurturing and modest. In contrast, masculine societies are seen to be driven by competition and achievement and to associate success with dominance.
2. Power distance relates to the degrees of accepted difference between those who are more and less powerful within a social system (Hofstede et al., 2010).
3. *Rak Sa Nam Jai* means that Thai people are careful to word things so as to avoid hurting others and/or to cause conflict.
4. *Krang Jai* again involves taking care of people's feeling and refers to feelings of diffidence, deference and consideration combined with respect (Holmes and Tangtongtavy, 2003; Thapatiwong, 2011).
5. Pseudo-sibling relationships refer to a basic relationship among Thai people where a big brother/sister is called *Pii* and a younger brother/sister is called *Nong*. The words are usually attached in front of the name as in, for example, Pii-Paul or Nong-Ann. This is used in other social contexts where both terms are determined by age or ranking of jobs and is used in all levels across society (Burapharat, 2009).
6. With a mean rank of 218.30 for child, 197.30 for youth and 179.43 for adult.
7. With mean rank of 212.26 for less than high school, 201.78 for high/vocation school, 173.25 for Bachelor's and 197.01 for Master's/PhD.
8. With mean rank of 219.00 for child, 195.25 for youth and 178.45 for adult.
9. With mean rank of 215.67 for less than high school, 200.15 for high/vocation school, 173.49 for Bachelor's and 194.24 for Master's/PhD.
10. With mean rank of 232.45 for alone, 205.16 for school trip, 187.71 for friend/s and 176.73 for family.

References

Ash DB, Lombana J and Alcala L (2012) Changing practices, changing identities as museum educators: From didactic telling to scaffolding in the zpd. In: Davidsson E and Jakobsson A (eds) *Understanding Interactions at Science Centers and Museums: Approaching Sociocultural Perspectives*. Rotterdam: Sense Publishers, pp. 23–44.

Bell J (ed.) (2005) *Doing Your Research Project: A Guide for First Time Researchers in Education, Health and Social Science*, 4th edn. Cambridge: Open University Press.

Bell P, Lewenstein B, Shouse AW and Feder MA (eds) (2009) *Learning Science in Informal Environments: People, Places, and Pursuits*. Washington, DC: National Academy Press.

Blaikie N (2000) *Designing Social Research*. Cambridge: Polity Press.

Bogart VW (2012) *Child Development Issues Related to Thailand's Tablet Computer Policy within the ASEAN Community*. Bangkok, Thailand: Bangkok University.

Buckingham A and Saunders P (2004) *The Survey Methods Workbook*. Cambridge: Polity Press.

Bultitude K and Sardo AM (2012) Leisure and pleasure: Science events in unusual locations. *International Journal of Science Education* 34(18): 2775–2795.

Burapharat C (2009) The adoption and adaptation of the work-team concept in urban Thai workplaces. In: Maclean R and Wilson D (eds) *International Handbook of Education for the Changing World of Work*. Bonn: Springer, pp. 659–672.

Cantor SB, Byrd TL, Groff JY, Reyes Y, Luna GT and Mullen PD (2005) The language translation process in survey research: A cost analysis. *Hispanic Journal of Behavioral Sciences* 27(3): 364–370.

Castle CM (2001) *Interpreter, docent and educators: Ways of knowing, ways of teaching in a history museum, an art gallery and a nature centre*. Unpublished PhD Thesis, University of Toronto, Toronto, ON, Canada.

Deveney B (2005) An investigation into aspects of Thai culture and its impact on Thai students in an international school in Thailand. *Journal of Research in International Education* 4(2): 153–171.

Dewitt J and Hohenstein J (2010) Supporting student learning: A comparison of student discussion in museums and classrooms. *Visitor Studies* 13(1): 46–66.

Diamond J, St. John M, Cleary B and Librero D (1987) The exploratorium's explainer program: The long-term impacts on teenagers of teaching science to the public. *Science Education* 71(5): 643–656.

Falk JH (2009) *Identity and the Museum Visitor Experience*. Walnut Creek, CA: Left Coast Press.

Falk JH and Dierking LD (1992) *The Museum Experience*. Washington, DC: Whalesback Books.

Falk JH and Dierking LD (2000) *Learning from Museums: Visitor Experiences and the Making of Meaning*. Walnut Creek, CA: AltaMira Press.

Falk JH, Storksdieck M and Dierking LD (2007) Investigating public science interest and understanding: Evidence for the importance of free-choice learning. *Public Understanding of Science* 16(4): 455–469.

Fink A (ed.) (2009) *How to Conduct Surveys: A Step-by-Step Guide*, 4th edn. Thousand Oaks, CA: SAGE.

Gomes da and Costa A (2005) Should explainers explain? *Journal of Science Communication* 4(4): 1–4.

Hallinger P and Kantamara P (2010) Education change in Thailand opening a window onto leadership as culture process. *School Leadership & Management* 20(2): 189–205.

Hein G (1998) *Learning in the Museum*. London: Routledge.

Hofstede G, Hofstede JG and Minkov M (2010) *Cultures and Organizations: Software of the Mind: Intercultural Cooperation and Its Importance for Survival*, 3rd edn. New York: McGraw-Hill.

Holmes H and Tangtongtavy S (2003) *Working with the Thais: A Guide to Managing in Thailand*. Bangkok, Thailand: White Lotus Press.

Hongladarom S (1999) Science, civil society, and Thai culture. Paper presented at the Seventh International Conference on Thai Studies, Amsterdam, 4–8 July.

Hooper-Greenhill E (1999) Museum learner as active postmodernists: Contextualising constructivism. In: Hooper-Greenhill E (ed.) *The Educational Role of the Museum*, 2nd edn. London: Routledge, pp. 67–72.

Johnson C (2005) Training science centre explainers: The Techniquest experience. *Journal of Science Communication* 4(4): 1–5.

Johnston JD and Rennie LJ (1994) Explainers' perception of visitors' learning at an interactive science and technology centre. *Research in Science Education* 24: 173–181.

Kamolpattana S (2009) *Science communication: A study of communication skill of the explainers in relation with their education background*. Unpublished Master's Dissertation, University of Glamorgan, Treforest.

King H (2009) *Supportive natural history enquiry in an informal setting: A study of museum explainer practice*. Unpublished PhD Thesis, King's College London, London.

Laerd (2012) Non-probability sampling. Available at: http://dissertation.laerd.com/non-probability-sampling.php (accessed 21 April 2013).

MacDonald S (2004) Exhibitions and the public understanding of science paradox. Available at: http://www.pantaneto.co.uk/issue13/macdonald.htm (accessed 11 May 2013).

Massarani L, Rodari P and Merzagora M (2008) Trained to interact: Echoes from the workshop sul-americano de mediação em museus e centros de ciência. *Journal of Science Communication* 7(4): 1–4.

Melber ML (2007) Maternal scaffolding in two museum exhibition halls. *Curator: The Museum Journal* 50(3): 341–354.

Mullahy B (2004) *Science communication: A study of the emerging profession of science communication in Australia*. Unpublished Master's Dissertation, RMIT University, Melbourne, VIC, Australia.

Museums, Libraries and Archives Council (MLA) (2008) Generic learning outcomes. Available at: http://www.inspiringlearningforall.gov.uk/toolstemplates/genericlearning/ (accessed 2 February 2011).
National Science and Technology Development Agency (2005) *Research Report: Development of National Policy to Promote Public Awareness and Interest in Science and Technology*. Bangkok, Thailand: National Science and Technology Development Agency.
National Science Museum (2001) *Preliminary Questionnaire for Science Communication*. Bangkok, Thailand: National Science Museum.
Nguyen TH (n.d.) Thailand: Cultural background for ESL/EFL teachers. Available at: http://hmongstudies.org/ThaiCulture.pdf (accessed 10 October 2010).
Packer J and Ballantyne R (2005) Solitary vs. shared learning: Exploring the social dimension of museums learning. *Curator: The Museum Journal* 48(2): 177–192.
Pallant J (2007) *SPSS Survival Manual: A Step by Step Guide to Data Analysis using SPSS for Windows*, 3rd edn. Maidenhead: Open University Press.
Pimpa N (2012) Amazing Thailand: Organizational culture in the Thai public sector. *International Business Research* 5(11): 35–42.
Puchner L, Rapoport R and Gaskins S (2001) Learning in children's museums: Is it really happening? *Curator: The Museum Journal* 44(3): 237–259.
Richard O (2010) *Report on the profile of European explainers*. Pilots D3.3. Available at: http://www.ecsite.eu/sites/default/files/project_docs/D3_3_Report_on_the_profile_of_European_explainers_0.pdf (accessed 7 January 2011).
Rodari P and Xanthoudaki M (2005) Beautiful guides: The value of explainers in science communication. *Journal of Science Communication* 4(4): 1–4.
Thapatiwong A (2011) *An empirical analysis of national culture and performance-related pay in multinational and local companies in Thailand*. Unpublished PhD Thesis, Cardiff University, Cardiff.
Thepthepa N (2007) *A Study of Visitor Behaviour and the Effectiveness of Communication by the Exhibits and Media*. Bangkok, Thailand: National Science Museum.
Tinnaluck Y (2005) *Knowledge creation and sustainable development: A collaborative process between Thai local wisdom and modern sciences*. Unpublished PhD Thesis, Université de Poitiers, Poitiers.
Tran LU (2006) Teaching science in museums: The pedagogy and goals of museum educations. *Science Education* 91(2): 278–297.
Wongchalee S (2007) Shifting paradigm regarding illness and medical practices in Thai society. *Asian Biomedicine* 1(4): 429–433.

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Supara Kamolpattana has worked for the National Science Museum (NSM), Thailand, for 15 years. She has key responsibility for the Explainer Programmes within NSM and is currently on secondment to complete her PhD in the Science Communication Unit at the University of the West of England, Bristol. Her research explores international practices in science museum explainer training, especially focusing on exploring the influence of national culture in enhancing visitor–explainer interactions. The research is funded by the Royal Thai Government.

Ganigar Chen is the Director of the Office of Public Awareness of Science of the National Science Museum (NSM), Thailand. Ganigar is involved in developing a number of science communication training programmes for museum volunteers and university students as well as researchers. For over 7 years she has led the Young Thai Science Ambassador project, which motivates university students to participate in science communication activities. Ganigar also plays a major role in organising NSM's outreach programme and a number of national and international science events including the National Science and Technology Fair, international youth camps and national science competitions. Her interest in research focuses on the study of the impact of science activities and media on public perceptions and attitudes towards science, technology and the environment.

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