The Relationship between Patience in Teaching and Student Learning Success in Brazilian and Malaysian Children

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Abstract

Teachers who demonstrate patience, or the ability to wait calmly when faced with frustration, adversity, or suffering, is important for a child's academic success. Patience in children is also a positive skill that can benefit a child's academic and social growth and has a positive impact on peer relationships. However, there is little research on patience within similar-aged peer relationships when teaching. The aim of this study is to further investigate this relationship between patience in teaching and student learning in children in Western and non-Western populations. This study examined if higher patience among a peer teacher leads to a greater level of success in student learning. In addition, this study investigated if there are patience differences between males and females, Western sand non-Western societies, and the relationship status of the peers. In this study, male and female children ages 5-12 years old from Natal, Brazil and Mah Meri, Malaysia were paired with a younger student for a task in which the older peer had eight minutes to teach a novel knot to a younger peer, the younger peer had to be able to tie the knot on their own afterwards. Using an ethogram to track positive and negative patience behaviors in teachers, such as verbal encouragement (+), non-verbal encouragement (+), question asking (+), distraction (-), and frustration (-), we found that more patience in teachers does lead to more students being able to complete the task and at a quicker time. We also found that children from Brazil did significantly demonstrate more patience than children from Malaysia. Neither sex or relationship between the peers significantly impacted patience. These results suggest that cross-cultural differences between patience do exist and peer teachers who demonstrate higher levels of patience to their students can have a positive impact on that child's learning and success.

Patience is an important personality trait that leads to both intrapersonal and interpersonal skills (Comer and Sekerka 2014). Patience is particularly important in the context of teaching because previous research has shown that teachers who show patience and support to their students can have a positive impact on their students' success (Sherman, Rasmussen, & Baydala, 2008). Having a patient teacher is something that students have recognized to be important for them, primary school children valued patience in a teacher above all other personality traits (O'Hagan and Robertson, 1984). Previous literature has found that peer relationships are also important for students to have in school. Peer relationships provide friendship, help with problem-solving, emotional support, entertainment, and aid in identity formation (Wentzel, 2017). However, the effect of patience in children when teaching and whether it leads to student success is not as well researched. The knot task used in this experiment was based on a previous study by Caldwell, Renner, and Atkinson (2018) examining teaching knots in adults, and was modified for children.

In the review below, I consider the definitions and measurements of patience and teaching further as well as the importance of patience in teaching in humans. I will also address the roles and stereotypes of both males and females across the world and in respect to Malaysia and Brazil. According to the World Population Review (2020) Brazil is considered a Western country, but Malaysia is not because of the traditions, social norms, religious beliefs, technology, and political system present in each country. Therefore, I will examine the cultural differences between both Malaysia and Brazil, to understand how the significance of culture on teaching and how Western vs. non-Western societies differ in teaching patience. Finally, I will discuss the importance of peer relationships and the benefits of teaching patience to children.

The current study proposes to examine: (1) the relationship between patience in peer teachers and the success of students completing a task, (2) the difference in patience in female and male peers and if this varies in Brazil (Western culture) and Malaysia (Non-Western), (3) how patience differs in Brazil and Malaysia cultures, (4) and the effect of the relationship of peers on teacher patience levels. Data for this study was collected from Natal, Brazil and from a population in Malaysia known as Mah Meri.

Definition of Patience

A child who can handle frustration and is more patient is more likely to be successful in school, socially, and later in employment as well (Moss and Moses, 2018). Schnitker, and Westbrook, (2014) define patience as a positive skill with the ability to wait calmly when faced with frustration, adversity, or suffering. In addition, patience is important because patient individuals are less likely to appear angry when faced with delays and other unpleasant situations, such as waiting in line, being stuck in traffic and getting frustrated with a friend (Comer and Sekerka 2014). Learning how to cope and relax in these situations can improve one's well-being. While patience is certainly seen as a positive trait that can lead to positive consequences, research is lacking on the effects of receiving patience from another individual

Kunz (2002) described patience as total subordination of one's personal interests in order to put others first and alleviate suffering from another individual. Likewise, Kupfer (2007) referred to a patient person as one who not only understands the shortcomings of others, but also that one's own personal desires are not more or less important than the needs of others. In a previous study by Schnitker (2012) on measuring patience defined interpersonal patience as the ability to help someone who is having trouble learning something new without getting frustrated

or annoyed. These definitions were used to help generate the patient behaviors observed in the current study.

Patience in children has typically been measured by using the delay of gratification paradigms, which is the process of resisting an immediate reward in preference for a later reward that is often better (Lundquist et al., 2019). In such studies, measuring patience is fairly simple because participants only have two options, they either wait for the larger reward, or they don't. However, there are often moments that require patience even when there is not a direct reward present, for instance, waiting in traffic or dealing with relationship issues that demand patience without typically a direct reward. However, measuring patience in other circumstances is not as well researched.

Definition of Teaching

Caro and Hauser (1992) state that teaching occurs when a role model alters their actions in the presence of a pupil. They state that for teaching to occur the pupil must learn this information more quickly than they would have on their own and the act shouldn't be for the teacher's benefit. The figure 8 knot was chosen for this study because research has shown that this knot does require teaching in order for children to learn it. Eshcha & Fragaszy (2015) take a different approach to explain teaching by describing specific forms of it. One of those forms, teaching by stimulus or local enhancement, was used in the current study. Teaching by enhancement is when an adult directs a child's attention to a stimulus or location, potentially leading to the development of a new skill after the pupil learns on their own. For example, providing a human with a box and watching them try to open it. The current study has the teacher direct the child's attention to a shoelace in hope of the student developing a knot tying skill for their benefit.

A previous study of teaching a simple task to a student, by Caldwell, Renner, and Atkinson (2018) found that human teaching is unique from other animals because of its responsiveness in the student. In addition, the same study found that such benefits may be most apparent for more advanced learned skills, rather than simple skills one can learn on one's own, because these skills require more learning and guidance from a teacher. Because of the flexibility that is present in humans, humans are enabled to transmit novel traits and have the ability to respond to the teaching of more difficult skills compared to non-human animals. Some types of teaching behaviors are universal, such as pointing, and some vary in populations such as giving direct instructions and demonstrations (Clegg, Wen, Hartman, Alcott, Keltner, & Legare (in press). This study aims to examine specific patient teaching behaviors between populations.

Importance of Patience in Teaching

The attitudes and actions demonstrated by teachers can make a positive difference on the lives of their students (Goureau, 2005). There are some scenarios that require greater patience when teaching. One of these scenarios is working with individuals who have learning disabilities. While teacher patience could benefit any child, some students may require more patience and reassurance from their teachers. Due to the academic difficulties present in children with Attention Deficit/ Hyperactivity Disorder, high levels of patience are required of their teachers (Sherman, Rasmussen, and Baydala, 2008). Teacher patience can also effect student's self-confidence. Daniels and Werner (2002) found that the teachers who respond more negatively to a vignette study about disruptive behavior in children is related to students predicting that subjects in the vignette have lower self-esteem. In contrast, research has reported the positive effect of encouragement on student's performance, even when an instructor demonstrated only a single line of verbal encouragement during a task (Guéguen, 2015). This

research implies the importance of encouraging and reassuring students. Likewise, students who consider their teachers to be caring are likely to create pro-social goals at school which is related to student's engagement in academic activities (Ferreira, Soini, Kupiainen, & Salum, 2019). The relationship between students' perceptions of their teachers to be patient and caring can have a positive outcome on them socially and academically. O'Hagan and Robertson (1984) administered a questionnaire to 108 students in the UK and asked them to rank a series of personality traits that they most preferred. They found that students ranked patience as their most desired teacher personality trait out of six different personality items. Thus, in the UK, patience appears to be an important element of effective teaching.

One type of teacher behavior observed in the current study is verbal encouragement. Previous research has reported the positive effect of encouragement on student's performance, even when an instructor demonstrated only a single line of verbal encouragement during a task (Guéguen, 2015). This research implies the importance of encouraging and reassuring students. However, further research is needed in teaching and learning to examine this in non- Western populations.

Teaching in Western vs. Non-Western Societies

A study comparing Chinese to Western culture consisting of mainly citizens from the U.S., France, and Germany found that Western societies were more likely to use problem-focused coping strategies such as demonstrating tolerance and patience in business relationships (Selmer, 2002). In a study examining teaching behaviors in the U.S. and Vanuatu by Clegg, Wen, Hartman, Alcott, Keltner, & Legare (in press) found that U.S. caregivers encouraged student's participation in learning and delivered direct active teaching, such as providing encouragement and asking questions, demonstration of behaviors, and modifying tasks for

students. However, in Vanuatu caregivers taught more through observation and working with the students to complete the task.

Natal, Brazil. Participants in Brazil were recruited and from Natal, Brazil. Brazil is a Western and urban culture in North East Brazil. In urban industrialized societies, such as Natal, children mainly get their knowledge through formal education (Busch, Watson-Jones, & Legare, 2018). Schools typically design their own curriculum based on budget and local contexts, which has led to inequality in the country (Ferreira, et al., 2019). In attempt to decrease the inequality present, standardized assessments and national testing systems have been utilized. The sex roles and stereotypes of males and females in Brazil are similar to that of the U.S., in which males are expected to be extremely masculine and females are expected to be nurturing and passive (DeSouza, Baldwin, Koller, and Narvaz, 2004) Since females are supposed to be more caring and nurturing in Brazil, that may mean they are also likely to be thought of as more patient than men.

Mah Meri, Malaysia. In Malaysia participants were recruited from a group of indigenous people referred to as Mah Meri. Mah Meri is a tribe of people who live along the coast of Selangor in Malaysia (Duku and Abdulamin, 2019). The Mah Meri community generally belongs to the lower economic social class Ghazali, 2005). Education is seen as important in this community and all children are sent to school at least up till the primary level. The Mah Meri population believes in the equality of sexes. For example, if a man can have two wives, then a woman can have two husbands, according to Rashid, the founder of the cultural village (Duku and Abdulamin, 2019). In contrast, research has noted that in Malaysia there are labor differences between males and females, where the husband is seen as the provider and head of the household and the wife is seen in a domestic role (Ward, 1985). However, it is important

to note, that due to limited research in Mah Meri culture, this information is from Malaysia and therefore, caution should be taken when generalizing this to Mah Meri.

Sex Roles in Patience

A previous study used a self-report instrument to look at behavioral differences in patience between male and female undergraduates in the U.S., a Western society. (Gladue, 1991). There were four factors with significant sex differences in regards to patience: males self-reported to be more aggressive, impulsive, and less patient than women did. By contrast, females reported to be more likely to avoid confrontation when faced with a conflict. This research suggests that males are more likely to be less patient than females are, in western populations. Gränsmark (2012) studied impatience between males and females during a game of chess in Sweden. This study found that, on average, males play shorter games and perform worse during these games than females because they often grow too impatient if they cannot win quickly. In addition, females were much more likely to sit out the game and play a game that lasts longer in hopes of winning.

Previous research on sex stereotypes in children in Malaysia found that the male stereotype is established firmly at an early age, the female stereotype, on the other hand, only becomes strong at adolescence (Ward, 1985). Therefore, since patience is typically seen as a female trait means patience may not be expected more in females than males in children if they do not believe this stereotype yet. In contrast, Mah Meri promotes equality of sexes in their society (Duku and Abdulamin 2019). In Mah Meri, it is believed that females and males hold the same rights.

Sex roles are common in Western culture, and therefore, we assume that the current study will show females demonstrating more patience to their students than males. However, due to the lack of research in Mah Meri, this same prediction cannot be made there.

Importance of Peer Relationships

Patience with others is critical to maintain relationships as well as creating positive interpersonal interactions (Schnitker, S. (2012). In addition, peer relationships are very important for children, adolescents and adults. Relationships provide friendship, help with problem-solving, emotional support, entertainment, and aid in identity formation (Wentzel, 2017). Children who have positive relationships with peers have higher self-esteem and often do better in school compared to those who don't have peer relationships. Buzeta (2014) looked at a relationship in a mentoring program of students and found that the strong bond between the students was possible because of the respect and patience they had for each other.

Among Chinese adolescents, higher quality friendship has been found to be linked with a positive mental health and to influence anger coping strategies (Shi, Wang, Xie, Zhang, & Liu, 2019). The relationship between friendship and patience can be further supported by a cross-comparison study of U.S. and Colombian children with sharing candy (Pilgrim & Rueda-Riedle, 2002). In both countries sharing and patience was greater with friends than other classmates, and children from both countries reported friendships to be the reason as to why they shared. This further promotes the importance of peer relationships and the idea that patience and support will be positively associated with stronger relationships.

Conclusion

Patience is an important personality trait when working with others and for self-growth. Students have previously reported that patience is one of the most important factors for them

when deciding if they like a teacher (O'Hagan and Robertson 1984). There is also an abundance of research on the importance of peer relationships. However, despite the evidence on the importance of patience, peer relationships, and teaching children patience there is little research on patience in children with other children. This gives rise to many questions, such as are Western societies more patient than non-Western societies? Do sex roles vary in Western and non-Westernized societies? Are peers who have a closer relationship more likely to be more patient with each other compared to peers who barely know each other?

I intend to answer these questions by examining the patience exhibited by an older peer to a younger peer when teaching a simple knot task and its relationship to success in learning. I also intend to look at the relationship between patience and sex of both the teacher, culture, and the relationship between the two peers. I hypothesize that: 1) Teachers who demonstrate higher levels of patience to the younger peers (students) will result in faster knot tying success and produce more students being able to learn the knot compared to teachers who demonstrate less patience to their student peers. 2) Prior research in Western populations found sociological differences between sexes that result in females often demonstrating greater patience (Glaudue, 1991). Therefore, I predict that female teachers in Brazil will present greater levels of patience to their student peers than males. In contrast, I predict based on the equality of sexes among the Mah Meri group there will be little difference between males and females in patience levels of this group (Duku and Abdulamin 2019). 3) Likewise, I predict, that because of prior research found in Western societies as being more patient and are more likely to use copying behaviors than non-Western societies, the Brazil sample will demonstrate greater patience on average than individuals from the Mah Meri population 4) I predict that teacher patience will be related to the closeness of the peer relationship.

Methods

Design Overview

This study investigated whether patience when teaching a simple novel figure 8 knot to a younger peer (the student) predicts the success of students subsequently completing the figure 8 knot. Data collection in Brazil and Malaysia was a subset of a larger cross-cultural study examining variation and consistency in the development of teaching, social learning and innovation called project EvoLearn (Evolution, Variation and Ontogeny of Learning), at the University of Texas at Austin. A battery of tasks was used to collect data on teaching, social learning, and innovation, as well as cognition, biometric and demographic data that was collected for children and caregivers from 13 populations. Children from two cultures (Natal, Brazil and Meh Meri, Malaysia) aged five to twelve years-old had up to eight minutes to teach a younger peer (0-2 years younger) how to tie a figure-eight knot (see Appendix A for images of how to tie the knot). This knot task was based on a previous study by Caldwell, Renner, and Atkinson (2018) examining teaching knots in adults, and was modified for children. An ethogram, which shows the frequency or duration of a behavior in various activities (Reese, 1990), was used to measure displays of patience during the teaching phase of the experiment.

The experimental manipulations in this study were the cultures chosen and the counterbalanced sex composition of peers. There were three phases in this task- teacher training, peer to peer teaching, and student assessment. There were approximately the same number of males teaching males, females teaching females, males teaching females, and female teaching males peers in each location. Patience score was used as an independent variable predicting the dependent variable of teaching success as well as student task completion time. Sex, site, and

closeness of teacher-student relationship were used as the independent predictor variables of the dependent variable of teacher patience score, according to the ethogram (see Appendix Table 3). Age of the teacher, age of the student, and student experience in tying a figure 8 knot were used as control variables for all regressions.

I hypothesized that teachers who demonstrate higher levels of patience toward the younger peers (students) will be related to student success and at a faster time compared to teachers who demonstrate less patience to their student peers. I also predicted that sex, fieldsite, and relationship of peers are related to patience.

Participants

Participants included 82 children from Natal, Brazil (M=9.70, SD=1.91) and 90 children from Mah Meri, Malaysia (M=9.26, SD=2.01). From each site, two children who were familiar with each other were used as dyads, all of whom are typically developing 5-12 year-olds. Researchers excluded participants from the study if they appeared to have any kind of learning disability/cognitive disorder or showed signs of distress during any point of the study. Teachers were excluded from the study if they were unable to learn to tie the knot on their own during the teaching phase, dyads were also excluded from the study if while teaching the knot the teacher taught the wrong knot or forgot how to tie the knot. Participants were grouped into one of four categories, each with one younger peer: male teaching a male, female teaching a female, male teaching a female, and female teaching a male. For Natal, these categories sample sizes were 11, 9, 11, and 10 respectively. For Malaysia, there were 16, 17, 5, and 7 pairs of peers, respectively (See Appendix Table 1 and 2 for participant characteristics by dyad). Participants were recruited from schools and community centers by local researchers. Participants' and their caregivers' consent were collected for all children prior to testing. In Natal, a separate consent form for

videotaping was obtained as per local Ethical Committee requirements. All interactions between the student and teacher were live coded and videotaped for subsequent re-coding.

Materials

Peer teachers taught the peer students to tie a figure-eight knot using a red sneaker shoelace. A laminated step-by-step picture-only instruction manual of the figure-eight knot was provided for teaching purposes for the teacher participant (Appendix A). The experimenter used a stopwatch to document time performance.

Procedures

Phase 1: Teacher Training. In the first phase, the teacher is taught how to tie a figure-eight knot by the experimenter, while the student is out of the room. Data was first collected on teacher and students' prior experience with the knots in general and with the figure 8 knot. After this, the experimenter began to demonstrate how to tie the knot, regardless of the teacher's responses to these questions.

The experimenter then demonstrated how to tie the knot, in a predetermined and consistent sequence while flipping through the images in the booklet. The experimenter pointed to the picture and the actual string after key steps in order to emphasize that they are using the booklet. The experimenter then laid out the red shoelace and placed the instruction booklet in front of the teacher and started the stopwatch. The teacher had up to eight minutes to learn to tie the knot without looking at the instruction book for help. The experimenter could not interact with the teacher's string and for cross-site consistency was only allowed to provide limited feedback of: "Good job," "Only this," "Wait," "Keep trying," "Almost," "Like this," and "This one goes here." Once the teacher appeared comfortable with the knot, the experimenter

encouraged the teacher to try to tie the knot without the booklet. The experimenter moved the booklet out of the way and only returned it if the teacher appeared to be struggling.

Once the teacher had tied the knot once without using the pictures, the experimenter asked them to do it again. If they made an error on their second try, the experimenter gave corrective feedback and said asked them to try again. If the teacher was successful at tying the knot in the eight minutes the experimenter untied the existing knot (if any), and laid the shoelace out in front of the teacher while moving the booklet out of sight to get ready for the teaching phase. However, if the teacher was unsuccessful after the eight minutes was complete, the experimenter just thanked the participant for their time. The experimenter then recorded this as unsuccessful and gave the participant a small locally appropriate reward such as small toy or snack and stopped the experiment. Students were also given a reward, regardless of whether they were able to participate.

Phase 2: Teaching. In this phase of the task the experimenter was not allowed to give any feedback or assistance. The experimenter brought the student into the testing area and positioned them next to the teacher. If the experimenter did not know the relationship between the student and teacher, the experimenter asked the student or teacher how they knew each other, The experimenter then told the student that the teacher was going to show them how to tie the knot so that they could do it by themselves afterwards while gesturing towards the shoelace in front of the teacher. The teacher was given up to eight minutes to teach the student how to tie the knot in any way they wanted. They were able to stop at any point they believed the student had learned the knot. If the teacher appeared to be finished before the eight minutes was finished, but had not indicated that the student has learned the knot, the experimenter clarifies by asking the teacher if they thought the student is ready. If the teacher indicated no, the experimenter told the

teacher to tell them when they thought the student was ready. If the teacher indicated yes or the eight minutes was up, the experimenter thanked the teacher and asked them to wait outside. The experimenter then gave the participant a reward and escorted them out of the testing area.

Phase 3: Student Assessment. In the final phase of this experiment the student was asked to tie the knot on their own. The experimenter was seated to the right side of the student and placed the red shoelace in front of them. The student was given up to five minutes to complete the knot. The experimenter recorded the time taken and if the student was successful or unsuccessful. If five minutes pass and the student was unsuccessful in tying the knot, the experimenter showed them how to complete the knot. The experimenter was not allowed to give corrective feedback or assistance during any point in this phase. The final knot or attempt was captured on video. The experimenter then asked the student the same questions he/she asked the teacher before starting the experiment about participant knot experience. Lastly, the participant was thanked and given a reward (see appendix B and C for the complete protocol and scoresheet).

Coding

All task protocols were translated by native speakers. Likewise, all within task verbal utterances and videos were translated into English from their original language by research assistants who collected the data and was checked at least once by a native speaker. All videos were coded using an ethogram designed to capture a variety of verbal and non-verbal patience-related behaviors. The ethogram was used to quantify the patience demonstrated by teachers and to assess the relationship between patience and the other independent variables of sex of the teacher, culture, and the closeness of the peers (if they define themselves as classmates, friends, cousins or siblings) The ethogram consisted of three positive and two negative variables of

patience- verbal encouragement (+), nonverbal encouragement (+), questions (+), distraction (-) and frustration (+) (See Appendix Table 3). Verbal encouragement was anytime the teacher used words to encourage or reassure the student or used a calm voice to explain a mistake. For example, when phrased like “Great job! “You can do it,” and “Yay!” were observed they were counted as verbal encouragement. Nonverbal encouragement was recorded for every time the teacher used body language to encourage or reassure the student. Examples consisting of nonverbal encouragement clapping for the student, pausing mid demonstration to make eye contact and smile, and taking the time to re-demonstrate the knot. Question asking was recorded for every time the teacher asked a question that gauged the student’s understanding, for instance, asking the student if they understand or if they are ready to try to tie the knot on their own. The teacher appeared distracted every time their attention went elsewhere, for example, talking about something off topic, playing with a toy, or getting up and leaving. Lastly, the teacher appeared distracted every time the teacher appeared annoyed or upset with the student. Examples of frustration included tapping fingers, crossing arms, snatching the string away from the student, saying something discouraging to the student in an aggressive tone such as “you’re doing it wrong.” These items were chosen by polling classmates on examples of patience behaviors and from the definitions of patience in the review above such as methods of helping others while waiting calmly when frustrated, and understanding others needs and shortcomings. Patience scores were calculated for each teacher by recording the number of times the teacher displayed: verbal encouragement, non-verbal encouragement, asked comprehensive questions, appeared distracted, and appearing frustrated. Every time the teacher asked a comprehensive question, or showed signs of verbal or nonverbal encouragement they got +1 point and -1 every time they appeared frustrated or distracted. Patience scores were recorded by total patience score as well as

by total number of verbal encouragement events, non-verbal encouragement events, comprehensive questions asked, distracted, frustrated, and total number of positive and negative behaviors. The dependent variable of success of learning to tie the knot was recorded as 1 for yes or 0. The dependent variable of student learning time was recorded in seconds it took the student to complete the task on their own. Teacher sex was recorded as 1 for male and 2 for female. Fieldsite was recorded as 1 for Natal and 2 for Mah Meri. The strength of the relationship was recorded on a scale of 1-4, with 1 being for classmate, by sight or church member, 2 for friend, 3 for cousin, and 4 for sibling. The age difference between the teacher and student in months was also recorded for further analysis.

Statistical Analysis

All statistical analysis was done in JASP. A logistic regression for student success of tying the knot (1 = success, 0 = fail) and patience, with student experience teaching the knot, and age of both the teacher and student used as control variables was performed. A second logistic regression for types of patience significantly and student knot success by using all five behaviors (verbal encouragement, nonverbal encouragement, question asking, distraction, and frustration) as independent variables with student knot experience, age of teacher, and student as control variables was calculated. A third logical regression for the relationship between the total number of positive and negative events and student knot success, using the same control variables as the previous regressions, was performed. A multiple linear regression was calculated for student knot tying time and patience with the same control variables used as above. In addition, a multiple regression for patience with sex, site, and peer relationship status as the independent variables that included the same controls as above was also calculated to assess the relationship

between these variables and patience. An Independent Samples T-test was also calculated to assess patience differences by fieldsite.

Results

Inter rater reliability

Inter rater reliability coding was conducted for 18.6 % of all videos, by a coder blind to the study aims. Agreement was strong, coders showed 82% agreement.

Table 1
Means and SDs for individual measures of patience by fieldsite

	Natal *(N* = 41)		Mah Meri (*N* =45)		Independent Samples T-test statistics	
	M	*SD*	*M*	*SD*	*t*	*p- value*
Patience Score	12.78	16.31	10.04	8.53	.99	0.163
Verbal Encouragement	9.63	10.89	6.17	4.35	2.22	0.015*
Nonverbal Encouragement	6.17	4.35	5.78	3.20	0.48	.316
Questions	1.73	2.24	.533	0.69	3.42	< .001***
Distracted	1.85	2.83	1.02	1.34	1.77	0.041*
Frustrated	2.88	7.34	.578	1.42	2.06	0.021*
Total # of +	17.56	14.51	11.56	8.51	2.37	0.010**
Total # of -	4.73	9.53	1.60	1.97	2.16	0.017*

Note: *$p < .05$, **$p < .01$, ***$p < .001$

Relationship Between Patience Scores and Student Knot Success

To test the primary hypothesis that greater patience in teachers leads to students being able to complete the knot and at a faster time compared to teachers who demonstrated less patience, a binary logistic regression was conducted for patience on knot success with age of teacher, age of student, and student experience tying the knot as controls. The age difference in months between the teacher and student was used as a predictor variable. The majority of students were able to complete the knot from both field sites; 78% of participants from Natal were able to succeed and 82% of participants from Mah Meri did succeed. The logistic

regression was significant (Nagelkerke's R^2 =. 67, X^2 = 41.67, $p < .001$). Teacher patience was a significant positive predictor of student knot success (Odds Ratio (OR) = 1.16, Z= 1.97, p = .048), suggesting that higher patience scores was associated with knot success, therefore positive behaviors was positively associated with student success and negative behaviors were negatively associated with student success. The age difference between teacher and student was also a significant negative predictor of student knot success (OR= 0.24, Z= -2.08, p = 0.038), suggesting that smaller age differences between teacher and student was associated with greater knot success. Out of the control variables, age of teacher was significant of student knot success (OR = 6.35e + 7, Z = 2.15, p =.032) as well as age of student (OR = 5.36e -8, Z = -2.06, p = .039). However, student experience was not a significant control variable (OR= 8.34 +6, Z = 0.01, p = .995).

Analyses were also calculated to examine what types of specific patience contribute more to student knot success and if overall positive or negative behaviors have a larger effect on student knot success. A logistic regression was used to assess whether verbal encouragement, nonverbal encouragement, question asking, distraction, or frustration significantly impacted student knot success. The same three control variables were used in this regression as in the previous one. The regression model was significant (Nagelkerke's R^2 =.78, X^2 = 50.84, $p <$ .001). Out of the five traits only verbal encouragement (positively, OR = 1.53, Z = 2.09, p = .036) and frustration (negatively, OR = .30, Z = -2.35, p = .019) were significant (see Table 2). This suggests that more verbal encouragement and less frustration facilitated student success. Nonverbal encouragement was not a significant predictor of student knot success (OR = 1.08, Z = 0.41, p = .69). Question asking was also not a significant predictor of student knot success (OR = 1.10, Z = 2.45, p = .801). Likewise, teacher distraction was also not a significant predictor of

student knot success (OR = 0.63, Z = -1.12, p = .264). Out of the control variables, age of teacher was not a significant predictor of student knot success (OR= 4.60, Z = 1.64, p = .100). Age of student was also not significant (OR= 0.66, Z = -0.45, p = .656). Student experience of tying the knot was also not significant (OR= 1.24e +8, Z = 0.01, p = .996).

A separate logistic regression was calculated to examine if whether the total number of positive or negative behavior events have more of an effect on student knot success with using the same control variables for consistency as the other regressions. The regression was significant (Nagelkerke's R^2 =.74, X^2 = 47.75, p < .001). The total number of positive behaviors was positively significant at (OR = 1.29, Z = 2.52, p = .012). Similarly, the total number of negative behaviors was negatively significant at (OR= 0.44, Z = -2.90, p = .004), indicating that more positive behaviors and less negative behaviors facilitated knot success. Age of teacher was not a significant predictor of student knot success (OR= 5.54, Z = 1.91, p = .057). Age of student was also not significant (OR= 0.51, Z = -0.78, p = .438). Student experience of tying the knot was also not significant (OR= 7.15e +7, Z = 0.01, p = .996).

Table 2: *Results of types of patience on knot success*

	SE	*Odds Ratio*	*z*	*p*
Verbal Encouragement	0.20	1.53	2.09	0.036*
Nonverbal Encouragement	0.19	1.08	0.41	0.685
Questions	0.39	1.10	0.25	0.801
Distracted	0.41	0.63	-1.12	0.264
Frustrated	0.51	0.30	-2.35	0.019*
Age of Teacher	0.93	4.60	1.64	0.100
Age of Student	0.94	0.66	-0.45	0.656
Student Tied Knot Before	3385.32	1.24e +8	0.01	0.996

Note: * p < .05

Relationship Between Patience and Knot Time

The relationship between patience score and time (s) it took the student to complete the task on their own was also calculated with student experience tying the figure 8 knot, teacher and student as control variables in a multiple regression. Students who were unable to tie the knot in the given time were given the maximum time of 300s. The multiple regression model was significant, (Adjusted $R^2 = .30$, $p < .001$). In support of my hypothesis, higher teacher patience significantly positively predicted quicker student knot completion time ($\beta = -.24$, $p = .015$). Student experience tying the knot was not a significant predictor of student knot completion time ($\beta = -.09$, $p = .344$). Likewise, teacher and student age were also not significant predictors of student knot time, teacher age ($\beta = -.40$, $p = .127$) and student age ($\beta = -.08$, $p > .748$).

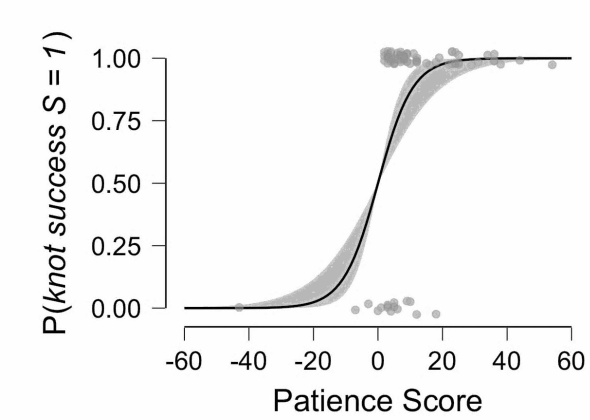


Figure 1.
The relationship between teacher patience score and student knot completion

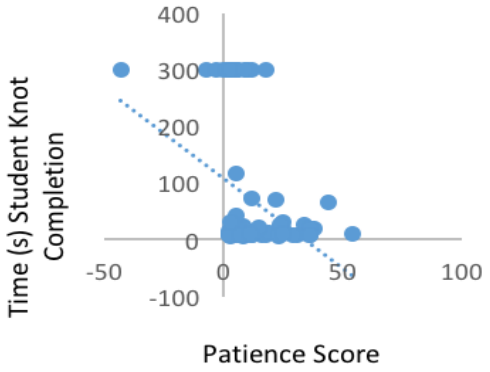


Figure 2.
The relationship between patience score and student knot tying time (s)

Assessment of Patience Scores

Figure 3 displays descriptive data of the mean and standard error for patience scores from each site broken down by students who did and did not succeed in the knot tying task, for all participants combined. A multiple regression model was calculated to predict patience outcomes based on sex, fieldsite, peer relationship status. Student experience in tying a figure 8 knot along with age of the teacher and student were used as control variables. The regression model was not significant (Adjusted $R^2 = .01$, $p = .384$). Contrary to my hypothesis, sex was not a significant predictor of patience for either fieldsite ($\beta = .060$, $p = .598$). However, in both field sites, females did display greater patience on average than males, which was hypothesized for Natal (see Table 3 for a breakdown of patience subcomponents by sex).

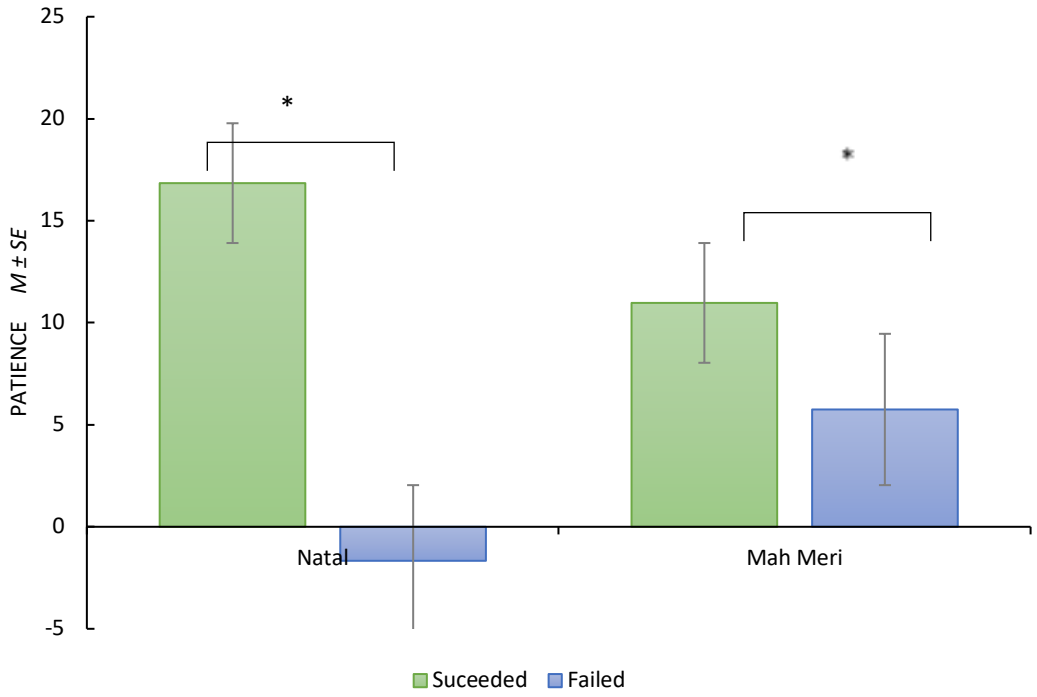


Figure 3. *Mean patience scores by fieldsite and student success.*

Table 3
Patient measures by site

	Natal (*N* = 41)				Mah Meri (*N* =45)			
	Male		Female		Male		Female	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Patience Score	11.91	16.67	13.79	15.79	8.76	7.07	11.17	9.63
Verbal Encouragement	8.82	7.96	10.58	13.58	4.45	5.33	6.08	7.87
Nonverbal Encouragement	6.95	4.24	5.26	4.31	5.57	3.14	5.96	3.32
Questions	2.14	2.49	1.26	1.76	0.48	0.60	0.58	0.78
Distracted	2.72	3.31	1.37	2.01	0.95	1.32	1.08	1.38
Frustrated	3.77	9.41	1.84	3.04	0.81	1.86	0.38	0.86
Total # of +	17.95	11.49	17.12	17.50	10.52	6.87	12.45	9.77
Total # of -	6.045	12.08	3.21	4.34	1.76	2.36	1.46	1.59

Fieldsite, as predicted, significantly predicted patience, with Natal overall demonstrating higher teacher patience than Mah Meri ($\beta = -.30$, $p = .036$, see Table 1). Independent Samples T-tests were calculated to determine any significant differences in subcomponents of patience across fieldsite. Most of the subcomponents of patience were statistically different by fieldsite, with Natal having a larger significant mean than Mah Meri, with the only exceptions being overall patience score and nonverbal patience (see Table 1). The relationship status of the peers was also not a significant predictor of how much patience the teacher demonstrated ($\beta = .11$, $p = .419$). Student experience tying the knot was not a significant predictor of patience ($\beta = .16$, $p = .202$). Teacher age was also not significant ($\beta = .29$, $p = .349$). Likewise, student age was also not a significant predictor on patience ($\beta = -.27$, $p > .390$).

Discussion

The purpose of this study was to examine the relationship between teacher patience and student learning success and various factors that might impact teacher patience. According to our findings, the amount of teacher patience is highly predictive of student learning success. Also, fieldsite significantly impacts the amount and kind of patience the teacher demonstrates. This may suggest that while culture impacts the way children act towards each other and their experiences in school, teacher patience is still a universally important contributor to student success.

Summary of Key Findings

The main research question, whether higher teacher patience is highly related to student learning and student task completion, was supported by the data. While predicted, this is important to study because of the effect and lasting impression that teachers can have on students when teaching (Gourneau, 2005). This is significant because it means that teachers do play a crucial role in student's understanding of material and achievement. While patience was significantly related to knot success, it wasn't the only significant predictor. We also found that the age difference between the teacher and student was also a significant predictor of student knot success. The closer in age the teacher and student were the more likely the student was to succeed at tying the knot. This could be due to a variety of reasons, such as the teacher may have felt closer to the student if they were closer in age because then they were likely in the same class, thus, making the teacher and student feel more comfortable when learning the knot, and the teacher more eager to have the student learn the knot. Another reason this might exist could be because teaching and learning behaviors are more closely aligned with lower age gaps. Surprisingly, student experience when tying the knot was not a significant predictor of student

knot success. It was expected that students who have had previously tied this knot would be more likely to be able to complete it again. This is likely because only a small number of students, fourteen out of 86, had previously tied the knot before. It is possible that with a larger sample size or if more students had previously tied this knot before it would be a more significant variable. As expected, the age of the teacher and student were both significant controls of knot success. This was expected because it is reasonable to assume that learning tasks would become easier with age.

Further analysis was also done on what specific types of patience were significant for student success. The results found that out of all five behaviors only verbal encouragement and frustration were significant factors in student success. The findings demonstrate that utilizing verbal encouragement to students such as saying expressions like “great job!”, explaining mistakes, or explaining the steps of the task significantly impacts student’s success. In addition, the findings also express the importance of diminishing frustration to students when they are not understanding the task. Compared to the other three behaviors of nonverbal encouragement, asking reassuring questions, and appearing distracted; verbal encouragement and frustration likely impact the student’s emotions and self-confidence the most which may be a reason as to why these have the largest effect on student success. While both the total number of positive and negative events were significant to student success, it is not surprising that the total number of negative events was more of a significant influence on student success. This is likely because behaviors that leave a student with low self-confidence can impact how well they perform more than patient behaviors or neutral behaviors (Kensinger and, Corkin, 2003). The results showed that Natal, Brazil had a higher mean average for all five behavior traits as well as higher mean averages for the total number of positive and negative behavior actions than Mah Meri and a

higher total patience score. This shows that not only did the participants of Natal demonstrate more acts of patience behaviors, but also on average they demonstrated more impatient behaviors as well than participants of Mah Meri. In addition, the percentage of students from each site that successfully completed the knot task was very close between both groups with approximately 80% of participants in each site being successful, demonstrating there were not significant differences in success between each fieldsite. This means that the knot chosen was a good fit for the task because it was not generally too challenging or easy for children to learn so there was little discrepancy in successful rates between countries.

As predicted in my first hypothesis, higher teacher patience was correlated with students being able to complete the knot on their own at a faster time. This is also likely due to the same reasons as above such as students feeling more confident in their ability to complete the task if the teacher demonstrated patient qualities to the student (Raskauskas, Rubiano, Offen, and Wayland, 2015). Teachers who appeared distracted or frustrated when teaching probably did not take the time to make sure the student not only understood what they were doing but may not have been paying attention to if the student was doing it correctly and did not use much encouragement and reassurance compared to teachers who did which would have resulted in the child being less confident in their work and might have taken them more attempts to complete it successfully.

The second research question of the study assessed variables that might impact teacher patience. The study examined sex, fieldsite, and peer relationship status on patience. The results found that out of the three, only fieldsite presented significant results, with Natal, as predicted, displaying greater patience than Mah Meri in my third hypothesis. Natal teachers were expected to reveal more patience than Mah Meri teachers because of the structure of society. As Desouza

et al. (2004) argues females are seen as more caring, patient, and nurturing in Brazil compared to males. While in Malaysia, this stereotype is also present however, it isn't typically formed until adolescence so it is possible that many of the female children did not feel this same obligation to be patient (Ward, 1985). Another reason why this difference in behavior may exist is because of the difference in the structure of schooling in each place. Busch, Watson-Jones, & Legare, (2018) found that in Western societies children's main source of knowledge is through formal education while in Non-western societies children learn mainly through nature and combined interactions. The school structure is different in each country and it is possible that in Natal, the children might go through more formal education where instructors might demonstrate greater patience to them with more reassurance and encouragement, while in Mah Meri the children may do more of their learning on their own in nature without someone reassuring and encouraging them. Similarly, past research has found that children in Non-Western societies are more likely to conform than children in Western societies (Clegg and Legare, 2016). Between those that did successfully complete the knot and those that did not in each site, Natal showed a much greater difference in patience compared to Mah Meri, it is likely then that children in Mah Meri might have been under more pressure to conform and do things in the same way the experimenter did. Teachers in Mah Meri might have been teaching the knot to the student in the same way that the experimenter taught them the knot that involved little reassurance and encouragement, compared to those in Natal who showed more acts of patient and impatient behavior that differed from what they were taught by the experimenter. A follow up study could look into the long-term outcomes that arise from students who received a patient teacher compared to students who did not.

The results showed that Natal, Brazil had a higher mean average for all five behavior traits as well as higher mean averages for the total number of positive and negative behavior actions than Mah Meri and a higher total patience score. This shows that not only did the participants of Natal demonstrate more acts of patience behaviors, but also on average they demonstrated more impatient behaviors as well than participants of Mah Meri. In addition, the percentage of students from each site that successfully completed the knot task was very close between both groups with approximately 80% of participants in each site being successful, demonstrating there were not significant differences in success between each fieldsite. This means that the knot chosen was a good fit for the task because it was not generally too challenging or easy for children to learn so there was little discrepancy in successful rates between countries.

My second hypothesis predicted that females would show greater patience in Natal compared to males, and that in Mah Meri there would not be significant sex differences. The findings showed that females displayed greater patience than males in both fieldsites, however, it was not significant in either fieldsite. While the results were not significant in Natal, the findings were in the expected direction, with females demonstrating greater patience to their students compared to males. It is possible that with a larger sample size these results may have been significant. The findings found that the mean for the total number of positive behaviors in Natal was approximately the same in each sex, but the mean number of negative behaviors was almost double in males compared to females. These findings show that males are more likely to become distracted and frustrated than females, which supports previous research by Gladue (1991), that found males to be more aggressive and impatient than females in a Western society. Mah Meri also did not have significant sex differences, however, unlike in Natal, this was expected. This

can be explained by the structure of their culture, according to Duku and Abdulamin (2019) Mah Meri promotes equality of sexes in their society.

Contrary to the hypothesis, stronger relationship of peers was not significantly related to teacher patience. However, the findings did go in the expected direction with closer relationship of peers resulting in higher teacher patience. Previous research by Pilgrim and Rueda-Riedle (2002) found that children were more likely to share candy with a friend than a classmate. It is possible that with a larger sample size this could have been significant. It is also possible that the children might have had a stronger or weaker relationship than what they self-identified. For instance, it is possible that peers who were actually close friends recorded themselves as being classmates because they were also in the same class together. Another reason why these results were not significant might have occurred is because the children all knew each other and were not strangers so there might have not been enough discrepancy between levels.

Limitations and Future Directions

There were several limitations present in this study. The first limitation is that due to a lack of research in patience examples when teaching, I generated an ethogram that attempted to resemble patient behaviors using common knowledge as patience being an act of doing more than is expected so the student can succeed and from polling classmates and peers about what they thought examples of patience when teaching is. However, it is possible that this method was subjective of my own meaning of patience. Inter rater reliability was used to lower the subjectivity of the results in regards to what is a patient or impatient behavior. However, more research should be done on specific patient behavior actions in teaching in both children and adults. Another limitation to this study is that even though Brazil is considered a Western country and Malaysia is considered non-Western country, caution should be taken when making

generalizations about this data to other Western and Non-western countries due to the cultural differences present in each country. Similarly, there are cultural and learning differences in each country that may not be comparable or equally relevant. Likewise, translation differences might also be present as it is difficult to translate something word for word as different languages speak differently. Finally, while the total sample size included 86 dyads, each fieldsite only had 41 and 45 dyads making the sample size relatively small when breaking down each difference by fieldsite and more research should be done in the future with a larger sample size in Western and Non-Western cultures in patience.

Conclusion

In conclusion, greater teacher patience is related to students being able to complete the knot task on their own and at a faster time. Teachers who express more patience to their students when they are trying to learn a task could lead to students not only having a better understanding of the material, but also be more efficient at what they learn. Children from Natal, Brazil did demonstrate more patience to their student peer compared to children in Mah Meri on average. This is in agreement with previous research that teaching behaviors are not only different in each country, but that children from Natal, Brazil are also more likely to demonstrate patience to their peers.

References

Busch, J. T. A., Watson-Jones, R. E., & Legare, C. H. (2018). Cross-cultural variation in the development of folk ecological reasoning. *Evolution and Human Behavior*, *39*(3), 310–319.

Buzeta, M. (2014). Social experiences of peer relationships between teenagers of diverse cognitive statuses. *Dissertation Abstracts International Section A: Humanities and Social Sciences*. ProQuest Information & Learning.

Caldwell, C.A., Renner, E. & Atkinson, M. Human Teaching and Cumulative Cultural Evolution. Rev.Phil.Psych. 9, 751–770 (2018). https://doi.org/10.1007/s13164-017-0346-3

Clegg, J. M., & Legare, C. H. (2016). A cross-cultural comparison of children's imitative flexibility. *Developmental Psychology*, *52*(9), 1435–1444.

Clegg, J. M., Wen, N.J., Hartman, P., Alcott, A., Keltner, E., & Legare, C.H. (in press). Teaching through collaboration: Flexibility and diversity in caregiver-child interaction across cultures. *Child Development.*

Comer, D. R., & Sekerka, L. E. (2014). Taking time for patience in organizations. *Journal of Management Development*, *33*(1), 6–23.

Daniels, L. and Wiener, J. (2002) Teachers' attitudes toward Attention Deficit/Hyperactivity Disorder (ADHD): Effects on student self-concept. Poster, Biennial Meeting of the International Society for the Study of Behavioral Development. August1–4, Ottawa, ON.

DeSouza, E. R., Baldwin, J., Koller, S. H., & Narvaz, M. (2004). A Latin American perspective on the study of gender. In M. A. Paludi (Ed.), *Praeger guide to the psychology of gender.* (pp. 41–67). Westport, CT: Praeger Publishers/Greenwood Publishing Group.

Duku, Peter, and Fatin Nabilah Abdulamin. (2017) Book Describes Life and Culture of the Mah Meri Tribe. *Malaysia Insights*,

Eshchar, Y., & Fragaszy, D. (2015). What is teaching? A clear, integrative, operational definition for teaching is still needed. *Behavioral and Brain Sciences, 38*, E39. doi:10.1017/S0140525X14000661

Ferreira, J. M., Soini, T., Kupiainen, R., & Salum, A. C. (2019). What is learning for secondary-school students? Students' perceptions examined in brazil and finland. *Social Psychology of Education: An International Journal*. https://doi-org.ezproxy.lib.utexas.edu/10.1007/s11218-019-09479-5

Ghazali, Kamila. 2005. Domains of language use and attitudes: Mah Meri. In Danilo T. Dayang & J. Stephen Quakenbush (eds.), Linguistics and language education in the Philippines and beyond, 573–591. Manila: De la Salle University Press

Gladue, B. A. (1991). Qualitative and quantitative sex differences in self-reported aggressive behavioral characteristics. *Psychological Reports*, *68*(2), 675–684.

Gourneau, Bonni (2005) "Five Attitudes of Effective Teachers: Implications for Teacher Training," *Essays in Education*: Vol. 13 , Article 5.
Available at: https://openriver.winona.edu/eie/vol13/iss1/5

Gränsmark, P. (2012). Masters of our time: Impatience and self-control in high-level chess games. *Journal of Economic Behavior & Organization*, *82*(1), 179–191.

Guéguen, N. (2015). "I am sure you'll succeed': When a teacher's verbal encouragement of success increases children's academic performance. *Learning and Motivation.*, *52*, 54–59.

Kensinger, E.A., Corkin, S. (2003). Memory enhancement for emotional words: Are emotional words more vividly remembered than neutral words? *Memory & Cognition* **31,** 1169–1180 (2003). https://doi.org/10.3758/BF03195800

Kunz, G. (2002), "Simplicity, humility, patience", in Gantt, E. and Williams, R.N. (Eds), Psychology for the Other: Levinas, Ethics, and the Practice of Psychology, Duquesne University, Pittsburgh, PA, pp. 118-142.

Kupfer, J.H. (2007), "When waiting is waitless: the virtue of patience", The Journal of Value Inquiry, pp. 265-280.

Lundquist, Ella, et al. (2019) "Time Spent Looking at Food during a Delay of Gratification Task Is Positively Associated with Children's Consumption at Ad Libitum Laboratory Meals." *Appetite*, Academic Press.

Moss, W. L., & Moses, D. A. (2018). Frustration tolerance: Developing your child's patience and ability to manage obstacles. In *Raising independent, self-confident kids: Nine essential skills to teach your child or teen.* (pp. 101–124). Washington, DC: American Psychological Association.

O'Hagan, F. J., & Robertson, J. C. (1984). Primary school children's preferences concerning teachers and teaching methods. *School Psychology International*, *5*(2), 97–102.

Pilgrim, C., & Rueda-Riedle, A. (2002). The importance of social context in cross-cultural comparisons: First graders in Colombia and the United States. *The Journal of Genetic Psychology: Research and Theory on Human Development*, *163*(3), 283–295.

Raskauskas, J., Rubiano, S., Offen, I., & Wayland, A. K. (2015). Do social self-efficacy and self-esteem moderate the relationship between peer victimization and academic performance?

Social Psychology of Education: An International Journal, *18*(2), 297–314. https://doi-org.ezproxy.lib.utexas.edu/10.1007/s11218-015-9292-z

Reese, E. P. (1990). Observational recording of rodent behavior: Behavior profile or ethogram. In V. P. Makosky, C. C. Sileo, L. G. Whittemore, C. P. Landry, & M. L. Skutley (Eds.), *Activities handbook for the teaching of psychology, Vol 3.* (pp. 5–8). Washington, DC: American Psychological Association.

Schnitker, S. (2012). An examination of patience and well-being. *The Journal of Positive Psychology*, *7*(4), 263–280. https://doi-org.ezproxy.lib.utexas.edu/10.1080/17439760.2012.697185

Schnitker, S. A., & Westbrook, J. T. (2014). Do good things come to those who wait?: Patience interventions to improve well-being. In A. C. Parks & S. M. Schueller (Eds.), *The Wiley Blackwell handbook of positive psychological interventions.* (pp. 155–167).

Selmer, J. (2002). Coping strategies applied by Western vs overseas Chinese business expatriates in China. *The International Journal of Human Resource Management*, *13*(1), 19–34.

Sherman, J., Rasmussen, C., & Baydala, L. (2008). The impact of teacher factors on achievement and behavioral outcomes of children with Attention Deficit/Hyperactivity Disorder (ADHD): A review of the literature. *Educational Research*, *50*(4), 347–360.

Shi, R., Wang, K. T., Xie, Z., Zhang, R., & Liu, C. (2019). The mediating role of friendship quality in the relationship between anger coping styles and mental health in Chinese adolescents. *Journal of Social and Personal Relationships*, *36*(11–12), 3796–3813.

Ward, C. (1985). Sex trait stereotypes in Malaysian children. *Sex Roles: A Journal of Research*, *12*(1–2), 35–45. https://doi-org.ezproxy.lib.utexas.edu/10.1007/BF00288035

Wentzel, K. R. (2017). Peer relationships, motivation, and academic performance at school. In A. J. Elliot, C. S. Dweck, & D. S. Yeager (Eds.), *Handbook of competence and motivation: Theory and application., 2nd ed.* (pp. 586–603). New York, NY: The Guilford Press.

World Population Review. (2020) Western Countries 2020. *World Population Review*, worldpopulationreview.com/countries/western-countries/.

Appendix

Appendix Table 1
Natal, Brazil Participant Characteristics

Teacher PID	Student PID	Teacher Sex	Student Sex	Relationship	Age Teacher	Age Student
H287	VTMX	m	m	classmate	8	7.3
WYVL	CJAD	f	m	classmate	8.1	8
E2X7	Q9BX	m	m	friends	6.6	6.7
EAQT	RDMB	m	f	friends	11.2	10.4
HKJN	FMCY	f	m	friends	10.6	9.9
DHHK	KMYF	f	f	friends	12	11.1
A72J	MYHH	m	f	friends	8.6	8.9
FD48	WPBC	f	f	friends	7.4	8
J2KR	E3QR	m	m	friend	10.7	11
M7D3	XRKV	m	f	classmate	11	11.2
ATCF	LNCK	f	m	friends	11.2	10.7
BPLC	CLBY	m	f	classmate	11.3	11.4
PWBJ	HQC2	m	m	friend	9.9	10
VPER	RT3P	f	m	classmate	10.6	10.9
QVKL	H7QJ	f	m	classmate	9.6	8.8
TD4Y	LK3B	f	f	classmate	11	10.6
CVLN	F8BE	m	f	friend	9	8.9
MPCY	CY9J	m	f	classmate	11.4	11.2
QJ8B	VRVF	f	f	friend	10	9.8
V9J9	FY7Q	f	f	friend	10.3	9.8
FWTC	F99D	m	m	friends	11	11.1
DD4W	DENB	f	m	friends	8	8
WYFD	V4FE	m	m	classmate	7.1	6.9
HC74	RV4C	f	f	classmate	8.7	8.4
EVB3	B9MJ	f	m	friends	7.4	8
DXXH	WVDT	m	m	classmate	6.2	5.6
KBCL	HN73	m	f	classmate	8.9	6.8
HKDA	RRND	m	f	friends	6.9	6.9
TWXV	HA4Y	f	f	friends	7	6.4
PMMJ	MKTF	f	m	classmate	9.4	8.9
FNV3	WYND	m	f	classmate	8.6	8

AADM	F8EA	m	f	classmate	8	7.7
RRBW	PTT4	m	m	friends	9.5	9.4
FA8N	K2W4	m	f	by sight	12	12
NWCW	QPCM	f	m	classmate	12.4	12
QHQ8	KRC7	m	m	classmate	12.4	12.9
C7CA	MCKT	m	m	church	12.2	12.1
FW7B	KHVH	f	f	classmates	12	12
HBXP	VPEM	f	m	classmate	12.9	12.6
K7KD	D3DB	f	f	church	12	12
V44H	CAKL	m	m	classmates	11.7	10.4

Note: Participant demographic data for Natal, Brazil. Participant relationship refers to participants'' responses to how they know each other.

Appendix Table 2
Mah Meri, Malaysia Participant Characteristics

T PID	S PID	Teacher Sex	Student Sex	Relationship	Age T	Age S
P8RR	VYRT	f	f	friend	8.6	9
QBV7	Q397	f	f	friend	8.2	8.5
M7B9	A224	m	f	friend	12.1	11.6
LMTQ	EN2J	f	m	friend	11.9	11.9
HLN9	NKL7	f	f	friend	11.3	11.4
EWWR	TE3Y	m	m	friend	11.5	11.8
DFMT	BQ3R	f	m	cousin	7.9	7.3
KXMB	LEVP	f	f	friend	10.1	10
K994	WXC8	m	m	friend	8.5	6.4
E2QQ	Y999	m	m	friend	6.77	6
YADU	HAKK	f	f	friend	5.2	5.5
QBD4	NMBY	m	m	friend	6	6.1
TTRL	BK8K	f	f	friend	5.9	6.1
N8BK	FCK2	m	m	friend	6.9	7
AXTV	N94M	m	f	friend	9.7	9.5
JNB7	WFNQ	f	m	friend	5.8	6
RYKR	W7RB	m	m	friend	6	6
DVBQ	TPXY	f	m	friend	6.5	7.1
VFTP	EBX4	f	f	friend	10.1	9.7
UREF	MD7J	f	m	sibling	12.6	11.7
LTWE	AMBY	f	f	sibling	9.3	7.2
EBX3	Q2BM	f	m	friend	7.3	7.7
KXXT	PHNB	m	m	friend	10.5	10.6
ADCF	KYDV	m	m	friend	9.9	9.8
NFEU	PRJJ	m	m	friend	12.3	12.3
NHED	F9XL	m	f	friend	8.5	9.2
U8JM	QWDW	m	m	friend	9.8	8.3
FWJ9	JU2W	f	f	friend	10.8	9.7
C9KB	T9DK	m	f	friend	7.8	8
U9F8	WVWU	f	f	friend	8	8.1
RTBB	ADV9	m	m	friend	10.3	10.3
Q839	BPRE	f	f	friend	8.2	8
NY42	M7HM	f	f	friend	9.5	10
PWKE	JTX7	f	f	friend	12.5	10.7

N9XN	RFEJ	m	m	friend	10.6	10.6
MMHV	B8C3	m	m	friend	10.3	11.1
LPFR	VKQ8	f	f	friend	10.8	10.9
JY4D	HEQB	f	f	friend	8.7	8.8
JTYP	KQED	m	f	friend	11.2	12
JNRD	MB9Y	f	f	friend	9.1	8
J7FR	L4E7	m	m	friend	10.6	10.6
E9RM	J9DA	f	m	friend	11	10.4
DJYR	EWMW	m	m	friend	12.6	11.5
CJYH	W78T	m	m	friend	11.6	8.9
CMYN	KYMH	f	f	neighbor	10.9	8.5

Note: Participant demographic data for Mah Meri, Malaysia. Participant relationship refers to participants'' responses to how they know each other.

Appendix Table 3

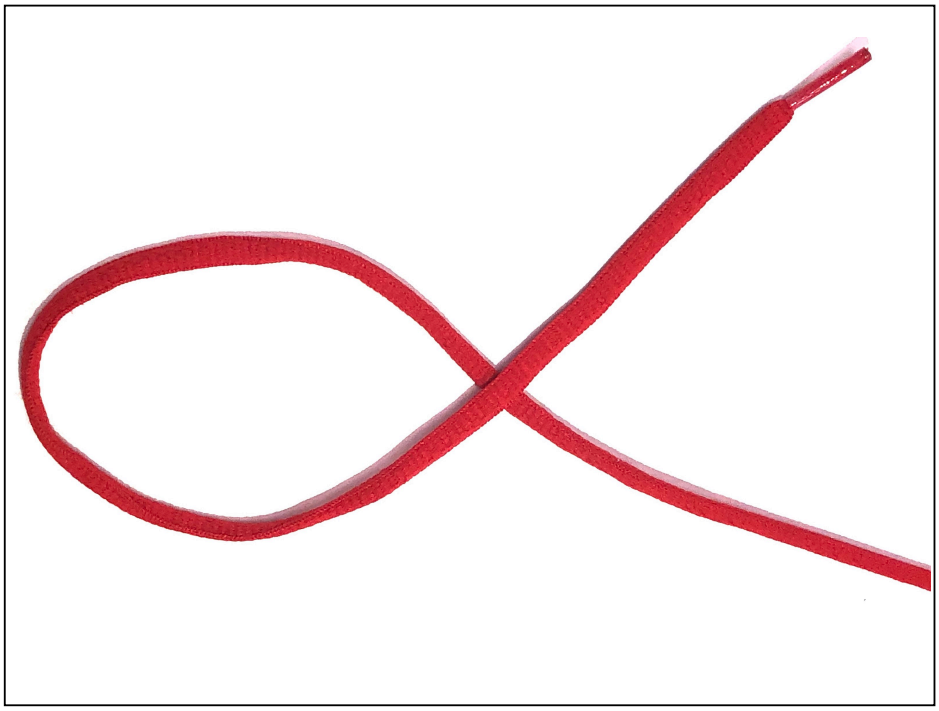
Ethogram used for coding behavior

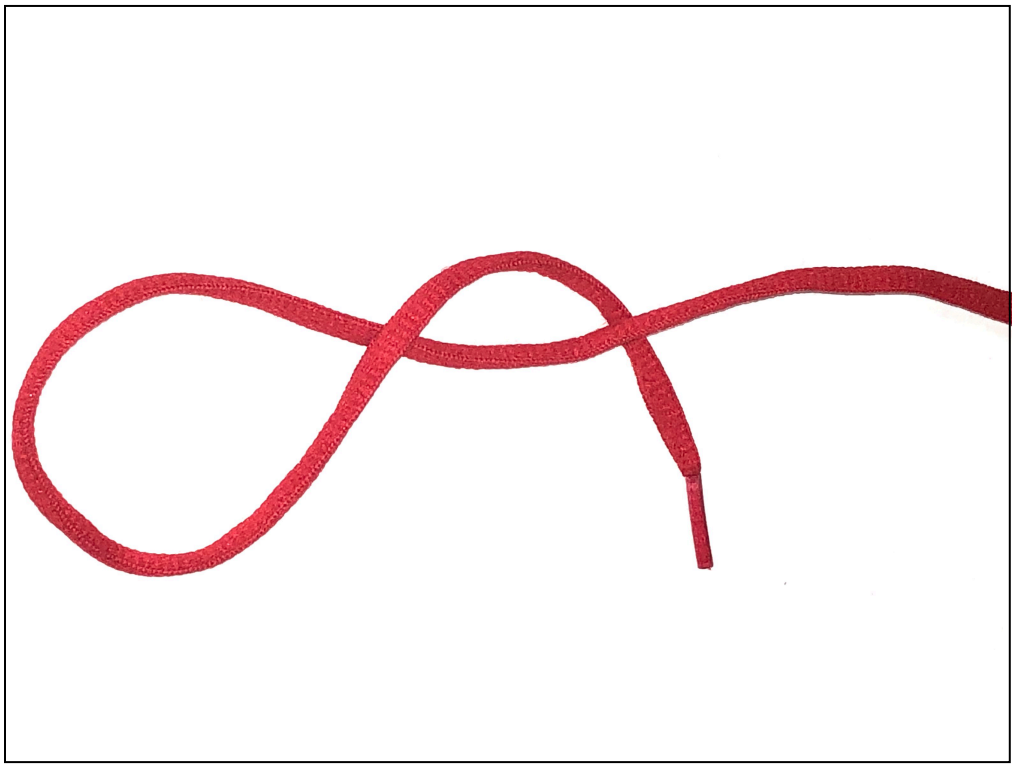
Behavioral Category	Sub-category	Definition and Examples
Patience	Verbal Encouragement	Using words of encouragement or reassurance such as saying phrases like "Go!" Yay!" "You can do it!" "They did it" "You remember!" "Good job", etc. in a positive excited voice or using a calm voice to explain a mistake or a specific part of the task.
	Nonverbal Encouragement	Uses motions to encourage or reassure the student. Examples: works the knot out with the student after they can't get it, pausing to make eye contact and smile, claps for them, re-demonstrates how to make the knot, points to mistakes, etc.
	Questions	Asks the students questions to see if they're understanding, such as asking the student if they're ready to tie the knot on their own or if they understand.
	Frustrated	Appears angry or annoyed with the student. For instance, raises voice, interrupts the student, takes the knot away from the student and takes over, taps fingers, crosses arms. Says things harshly such as "You're doing it wrong" "No, wrong" "Go. Again," etc.
	Distracted	Gets distracted with another activity, walks away, says something off topic, isn't looking at the student, plays with an object

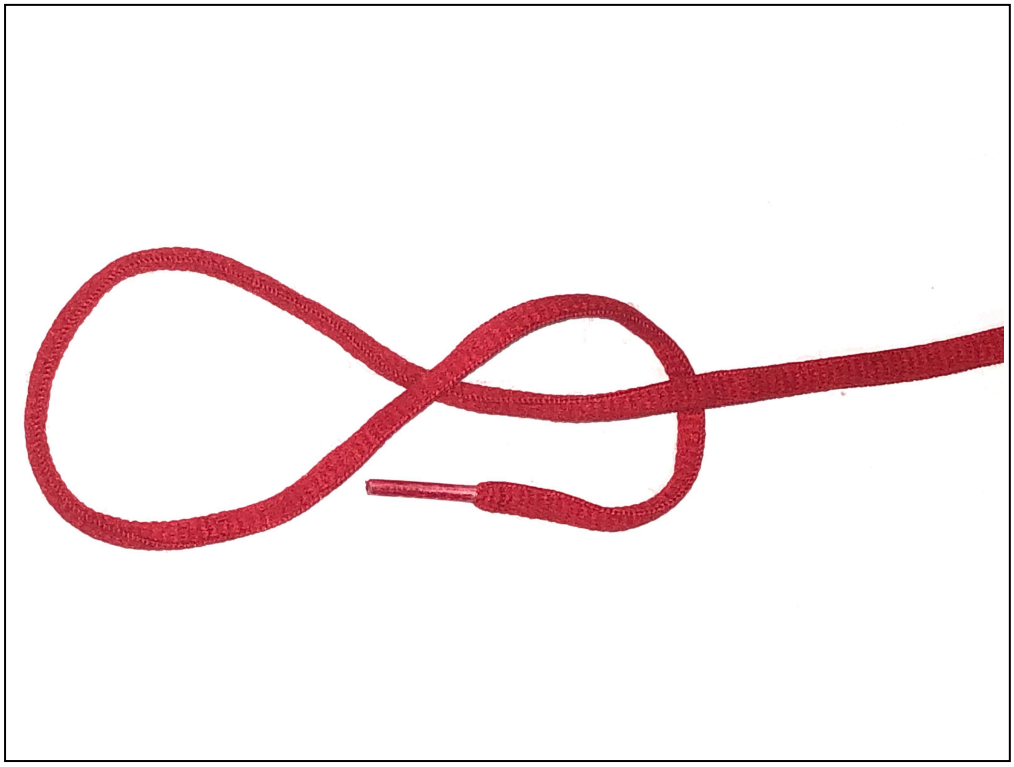
Note: tone shouldn't be used as concrete example, but can help decide if something is said positively or negatively.

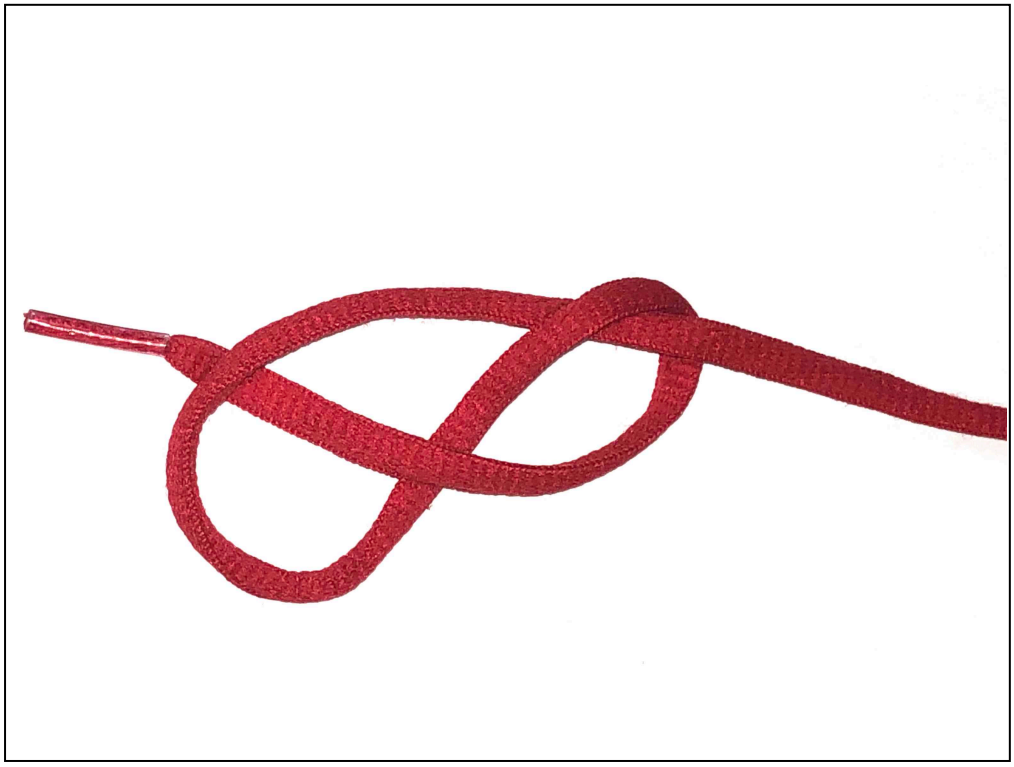
Appendix A

KNOT INSTRUCTION PACK
FIGURE EIGHT KNOT









Appendix B

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EvoLearn Protocol: Peer Knot Task

Objective: In this task, we record a teaching interaction between a child student and a peer teacher.

Estimated Time: 15-20 minutes.

Materials:

- A red shoelace
- Laminated step-by-step picture instruction manual for the figure eight knot
- Stopwatch
- Peer knot scoresheet
- Two child participants, who are familiar with one another:
  - One child, between 5-12 years old, who will be serving as the **student**.
  - One child who will be serving as the **teacher**, who is an older peer of the student but no more than two years older. For example, a 5 year old student can be matched with a 5, 6, or 7 year old teacher. A 6 year old student can be matched with a 6, 7, or 8 year old teacher, etc. However, teachers cannot be younger than 5, or older than 12. Try to recruit a roughly equivalent number of same-sex and different-sex pairs.

Data Recording:

- All interactions between teacher and student are videotaped (phases 1-3).
  - The camera should have a clear, unobstructed view of the experimenter, the participants and their actions.
- If a language other than English is spoken during the task, ask a field assistant to translate verbal interactions from the video (**not during the task**) for the Teaching Phases (see separate teaching translation form for further details).

Reminders:

- The experimenter should learn how to tie the figure eight knot themselves prior to conducting this task.
- The peer and caregiver knot tasks should be in different sessions.
- The two children participating in this task should be recruited together and should be peers.
- The experimenter remains in the testing area during the task.
- Ask the student to wait nearby but out of sight and earshot during Phase 1: Teacher Training. Ideally, they should be close enough that Phase 2: Teaching can begin within a minute after Phase 1 is completed.

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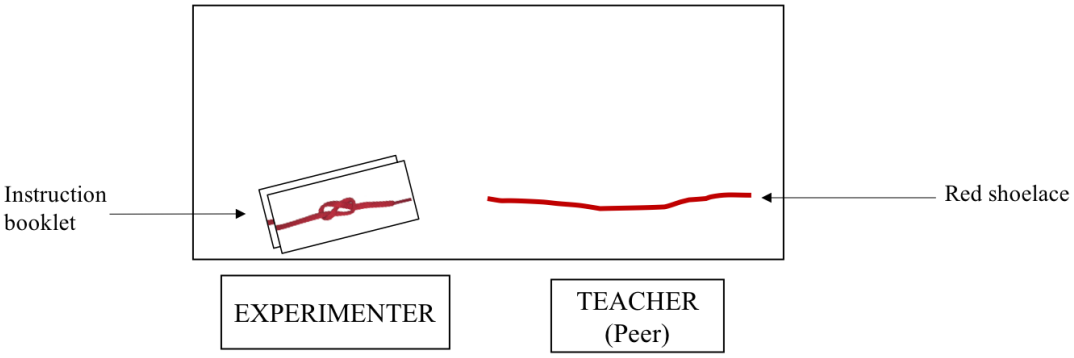
Procedure

Phase 1: Teacher Training

[The teacher is trained out of sight of the student. The experimenter sits next to the teacher during Phase 1 (see Phase 1: Teacher Training image below)]

Phase 1: Teacher Training



Step 1: *"For this task we are going to tie a knot. Have you ever tied knots before today? In what context?"*
[The experimenter records answers on scoresheet]

Step 2: *"Have you ever seen this knot before today?"*
[The experimenter shows the image of the figure eight knot (last image in the instruction booklet) to the teacher]
If yes: *"Have you ever tried to tie this knot before today?"*
[The experimenter records teacher's answers on scoresheet]

Step 3: *"Look at these pictures"*
[The experimenter shows the instruction booklet images to the teacher]
"They will show you how to make this knot. But first, let me show you how to use them."
[The experimenter demonstrates the knot by following the steps in the instruction booklet with the booklet in view of the teacher. The experimenter points between the picture and the actual string after key steps (such as when the string goes over or under) to emphasize that they are using the booklet to direct their movements]

Step 4: "*Now it's your turn. You can use the pictures when you need them but try to learn the knot well enough that you don't have to use them anymore."*
[The experimenter lays out the shoelace and places the instruction booklet in front of the teacher and starts the stopwatch]

[The teacher is given **up to eight minutes** to learn to tie the knot without requiring the instruction book for help. The experimenter should not interact with the teacher's string. The experimenter can provide

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limited corrective feedback using any of the following phrases and pointing to the images in the instruction booklet if the teacher makes a mistake when trying to tie the knot]
"Good job"
"Only this"
"Wait"
"Keep trying"
"Almost"
"Like this"
"This one goes here"

Step 5: Once the teacher begins to feel comfortable with the knot (i.e. they look at the pictures less, or are going through the pictures faster), the experimenter should encourage the teacher to try the knot without the instructions.
"You're doing great, can you try without the pictures? You can still use the pictures if you get stuck."
[The experimenter moves the instruction booklet to the side. If the teacher seems to be struggling, the experimenter should return the instruction booklet and point to the relevant picture (where they are stuck), using the phrases in Step 4 to provide limited instruction.]

Step 6: Once the teacher has tied the knot once without using the pictures, the experimenter asks them to do it again.
"Great! Can you try it one more time without the pictures?"
[A teacher is proficient at tying the knot when they can tie it two times without feedback or help from the instruction booklet. If they make an error on their second try without the pictures, the experimenter gives corrective feedback and says, *"Let's try it again."*]

Step 7: If successful at tying the knot within eight minutes,
[The experimenter records that the teacher as successful and the amount of time taken in the scoresheet, and proceed to Step 8: Teaching]
If the teacher is unsuccessful after the eight minutes is complete, the experimenter says,
"Thank you for your time!"
[The experimenter records the teacher as unsuccessful and provides them with a locally appropriate reward and stops the experiment. If it is not possible to use the student who is waiting outside in another pair, also provide them with a reward]

Step 8: *"Great, now I'm going to bring in* (student's name) *so that you can show them how to tie this knot. You can show them any way you want to."*

Step 9: *"They must be able to show me the same knot alone, without your help once you are done."*
[**Before the student enters,** the experimenter unties any existing knot, lays the shoelace out in front of the teacher and moves the instruction booklet out of sight]

Phase 2: Teaching

The experimenter is NOT allowed to give corrective feedback or assistance during this phase.

Step 10: The **experimenter brings the student into the testing area** and sits them down next to the teacher (see Phase 2: Teaching image on the next page).

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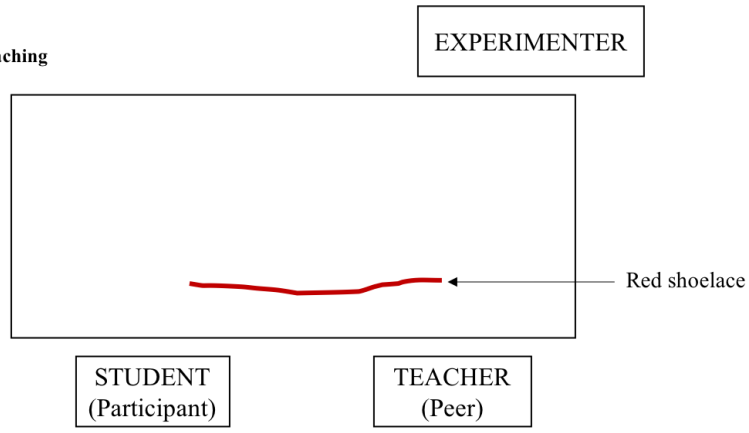
[The experimenter remains in the room but sits or stands to the side of the teacher and student so that they can see what is going on]

Phase 2: Teaching



Step 11: If relationship between the student and teacher is unknown to the experimenter:
The experimenter says to the student or teacher,
"How do you know (teacher's/student's name*)?"*
[The experimenter records this relationship in the scoresheet]

Step 12: The experimenter says to the student:
"(Teacher's name) *is going to show you how to tie a knot."*
[The experimenter gestures to the shoelace in front of the teacher]
"You need to learn how to tie this knot so that you can show me by yourself afterwards."

Step 13: The experimenter says to the teacher:
"Let me know when you think (student's name) *is able to make the knot by himself/herself, so that he/she can show me."*
[The teacher is given **up to eight minutes** to teach the student how to tie the knot in any way they want. They can use this whole time, or they can stop earlier if they are satisfied that the student has learned the knot]

Step 14: If the teacher appears to be finished before the eight minutes is up, but has not indicated that the student has learned the knot, the experimenter clarifies by asking the teacher,
"Do you think (student's name) *can make the knot by himself/herself?"*
If teacher indicates yes, move on to Step 15.
If teacher indicates no, the experimenter says to the teacher,
"Okay, let me know when you think that they he/she is ready."

Step 15: After eight minutes have passed or if the teacher has indicated that the student is ready, the experimenter says to the teacher:
"Great, thank you! Can you wait outside while we finish up?"

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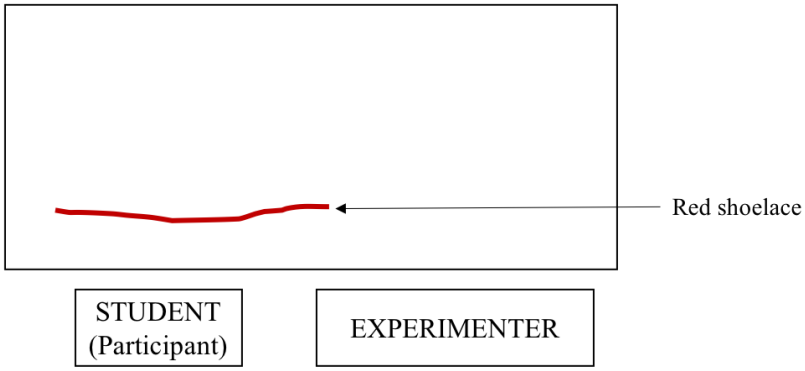
[The experimenter provides the teacher with a locally appropriate reward and escorts them out of testing area]

Phase 3: Student Assessment

The experimenter is NOT allowed to give corrective feedback or assistance during this phase.

[The experimenter sits to the right of the student and places the red shoelace in front of them (See Phase 3: Student Assessment image below)]

Phase 3: Student Assessment



Step 16: *"Can you show me how to tie the knot you just learned from* (teacher's name)? *Tell me when you are finished."*
[The experimenter starts the stopwatch. The student is given up to five minutes to complete the knot. The experimenter records the time taken in the scoresheet and whether the student was successful or not. If **5 minutes pass and the student is unsuccessful** at tying the knot, the experimenter shows them how to complete the knot]

Step 17: *"Have you ever tied knots before today? In what context?"*
[The experimenter records the student's answer in the scoresheet]

Step 18: *"Have you ever seen this knot before today?"*
[The experimenter shows the student the image of the figure eight knot (last image in the instruction booklet)]
If yes: *"Have you ever tried to tie this knot before today?"*
[The experimenter records the student's answer in the scoresheet]

Step 19: *"Thank you for taking part"*
[Provide student with a locally appropriate reward]

Appendix C

EvoLearn Scoresheet: Peer (Child) Knot

Date	Time	Exp	Student PID	Teacher PID	TEACHER TRAINING						STUDENT ASSESSMENT					Film ?
					Knot Experience	Seen knot	Tied knot	Knot success ?	Time Taken (secs)	Relation to student?	Knot Success ?	Time Taken (secs)	Knot Experience	Seen knot	Tied knot	
DD/MM /YYYY	16:30	Emily	NCCN	QVWN	Bags	Y/N	Y/N	Y/N	345	Friend	Y/N	300	Shoelaces	Y/N	Y/N	✓
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	
						Y/N	Y/N	Y/N			Y/N			Y/N	Y/N	

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