The effect of educational travel programmes on children's engagement, curiosity and wonder: a pilot study

Research Report

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Executive Summary

Theoretical Background

- Active, curiosity-driven learning has long been considered crucial for more enjoyable learning experiences and better memory of the learned information, with stronger individual tendencies to experience curiosity and wonder being linked to greater academic success, adaptability, and personal well-being.
- Pedagogical approaches fostering such active learning aim to promote exploration, experimentation, questioning and reflection, as well as stimulating imagination and creativity during lessons.
- Environments enriched through nature, art and technology are uniquely positioned to facilitate curiosity and wonder with positive effects found for learning outside of the classroom and during educational trips.

Research Aim

- With this pilot study, we wanted to better understand how taking part in educational school trips may affect adolescent pupils' positive attitudes and predispositions towards learning due to being more varied, awe-inspiring, curiosity-driven and fun.

Participants

- Results are based on N = 122 responses from pupils in UK's Key Stage 2 & 3 across 6 schools going on a *Next Generation Travel* trip to Berlin (4 schools, 81 responses) and Iceland (2 schools, 41 responses), with n = 38 matched pre- and post-trip responses. Data collection took place between February and July 2024.

Key findings

- Pupil's Capacity for Wonder, Need for Cognition, Curiosity, Attitudes towards Curiosity and Knowledge Gap awareness were significantly elevated after the trip. Although Behavioural and Agentic Engagement as well as Situation Interest did increase, these differences were more varied or reached ceiling levels, and consequently, were not statistically significant.
- Among the most highly scored trip signing-up reasons were the desire to gain new experiences, desire to travel, leisure and entertainment, friends, and the destination itself. Post-trip responses indicated that these motivations were very much fulfilled by the trip. Additionally, aspects fulfilled by the trip even though not initially listed as strong reasons to sign up, were increased topic understanding, facing challenges, being independent, and improving (German) language skills (for Berlin trip).
- Pupils evaluated the educational trips positively in terms of planning, pedagogy and outcomes. In particular, the Berlin trip was most highly evaluated due to intensified and more enjoyable learning of also otherwise useful information, while the Iceland trip was commended for offering more novelty and eliciting excitement about exploration.
- Additionally, pupils' engagement with the trips' topics was indirectly captured by pupils generating many relevant and varied associations (words, phrases or questions), both before and after the trips. While there is no direct evidence of quantitative nor qualitative changes in their responses based on the descriptive observations, future investigations will test this more specifically through larger

samples of matched responses and comparisons to control groups which may have less initial interest and expertise in the topics already.

Limitations

- While the overall sample size was rather large, the much smaller subsample of matched responses leaves opens many possibilities for individual differences and self-selection bias that could not be investigated or controlled for in this study.
- To make robust and generalisable conclusions about the effects of such educational trips, additional control groups of similar size as well as responses at two timepoints for all participants would be needed.
- It was not possible for all data to be collected in a coherent fashion as some pupils were asked to complete the online questionnaires in their own time while others received dedicated time during a class to do so. Thus, we need to assume large differences in the motivation and dedication to answer all aspects of the survey.

Conclusions

- The results support the positive effect of educational trips on psychological constructs crucial to a positive and long-lasting learning experience, even though perhaps not directly affecting their behaviour.
- The Next Generation Travel trips received positive evaluations about achieving the expected motivations and structural aims of their destination specific educational programmes.
- Future studies including identical data collection procedures and additional control groups are necessary to draw more robust conclusions.

Key Take-Home Messages:

The goal of this pilot study was to better understand how taking part in educational school trips may positively benefit young people due to being more varied, wonder- and awe-inspiring, curiosity-driven, and fun.

The results show that during the trip, secondary school children are more likely to experience wonder and curiosity and feel the desire and need to learn, as compared to during their daily classroom setting.

While the main reasons for signing up for the educational trip may not have been related to learning outcomes per se (such as being with friends or travelling abroad or to a specific destination as such), adolescents nevertheless benefit from the trip in terms of greater curiosity, wonder and desire to learn.

Pupils positively evaluated the trips on indices related to trip's organisation, pedagogy and personal outcomes.

Pupils indicated that the trip provided them with new experiences, increased their topic understanding, fulfilled their desire for travel, leisure, friendship and entertainment, and allowed them to face challenges and be independent.

While this is a pilot study with some methodological limitations, the findings are statistically significant, which means they are not due to chance and are meaningful.

Introduction

Background and rationale for research

This pilot study investigated the effect of educational travel programmes on children's active engagement, curiosity, and wonder in learning environments outside of the classroom.

Active engagement and motivation for learning have long been considered crucial for successful learning outcomes. Learners who take control of their learning process not only achieve better results but also enjoy the process more, which positively relates to their subjective well-being and continued motivation. Thus, different learning contexts and pedagogies might positively (or negatively) affect learners' engagement, where ideally, educational contexts would aim to deliberately enable such active learning. The positive effects of such pedagogical approaches were also supported in a recent experimental study (Liu et al., 2024).

One way to promote active learning is through eliciting curiosity and wonder in learners. Curiosity, generally considered an individual's desire for knowledge in the absence of external rewards or pressures, drives active engagement with the world and is deemed crucial for learning as well as predictive of more successful life outcomes. This is because curiosity prompts information-seeking to find answers that allow them to better understand the world (e.g., what is a rainbow?). Furthermore, wanting to obtain the answer to such questions is linked to the reward and memory centres of the brain (Kang et al., 2009, Gruber et al., 2014), making the learning experience not only personally rewarding but letting us remember the answers better, as well.

Curiosity can be specific to the topic or phenomenon, or general as a psychological characteristic of the person. A large meta-analysis (von Strumm et al., 2011) showed that children's intellectual curiosity was an important factor in their academic success, on par with intelligence and effort.

Closely linked to aspects that can trigger curious information seeking is the experience of wonder. Wonder, however, taps into a much deeper fascination, perplexion, contemplation, and reflection about phenomena in the world. It leads us to immerse ourselves in the greatest mysteries and so-called "big questions" (e.g., why is the rainbow perceived as beautiful?) (Schinkel, 2020).

Both curiosity and wonder can be seen as psychological traits, inherent to the person as part of their personality, but also as momentarily arising states in response to a topic or situation. A third perspective is that of malleable skills or predispositions that can be improved or hindered, for example by positive or negative learning experiences across different learning contexts.

To foster these, a "wonder-full education" approach (Conijn et al., 2022; Wolbert, & Schinkel, 2020) encourages specific strategies that teachers and schools could deploy, such as encouraging children's personal wonder experiences, creating conditions for exploration, experimentation, questioning and reflection, or stimulating imagination

and creativity during lessons. Notably, learning opportunities taking place in enriched environments enabled through nature, art and technology are uniquely positioned to facilitate curiosity and wonder to aid learning.

The benefits of alternative learning contexts outside of the traditional classroom, such as outdoor lessons, field or educational trips, are starting to accumulate in psychological and education literature. For instance, exposure to education outside in nature or at a museum was associated with better motivation for indoor classroom engagement (Kuo et al., 2018), doing schoolwork (Bølling et al., 2018), and even scoring higher in science assessments and literacy (Scott et al., 2014). Educational trips can be seen as outdoor lessons on a bigger scale, with research demonstrating that they provide an opportunity for powerful and meaningful learning experiences. For example, learners deemed a study visit to India as positively transformational along cognitive and emotional dimensions (Scoffham & Barnes, 2009).

Therefore, prior literature suggests that educational trips may increase children's positive attitudes and predispositions towards learning due to being more varied, awe-inspiring, curiosity-driven and fun, compared to the traditional classroom. However, empirical investigations addressing this research question, particularly in adolescents, remain scarce.

Current Study

Through this pilot research project, we aimed to gain a better understanding of how children in UK's Key Stage 2 & 3, feel about their learning in different ways, and how this may be modified during learning contexts outside of the classroom. More specifically, we aimed to understand the effects of taking part in educational school trips, such as the ones offered by Next Generation Travel. Children taking part in such school trips were surveyed before and after the trip using previously validated and age-appropriate psychological measures of key target constructs using online questionnaires.

We investigated if taking part in an educational travel intervention impacted secondary school children's curiosity, sense of wonder, and active engagement in learning. We expected to see increases in each of these constructs following the educational trip. The here reported results can improve our understanding of how we can nurture children's curiosity, sense of wonder, and enjoyment of learning through a variety of educational activities in and out of the classroom.

Sample/Participants:

Overall, we received *N* = 122 responses from pupils across 6 schools going on a *Next Generation Travel* trip to Berlin (4 schools, 81 responses) and Iceland (2 schools, 41 responses). Additionally, *n* = 14 pupils completed the post-trip questionnaire after their peers went on a trip to Iceland and represent a control group, which, due to its small size, will not be further discussed in this report. It is to be noted, that pupils were not necessarily required to respond and complete the questionnaires. Thus, the here presented responses capture a self-selected population and might not reflect the less motivated or less enthusiastic pupils. Data collection took place between February and July 2024. The study was approved by the Lancaster University Faculty of Science and Technology research ethics committee.

Berlin: *N* = 81 pupils who went on a trip to Berlin responded to the **Pre-Trip** questionnaire (mean age = 15.9, *SD* = 1.03) with a gender distribution of 42 females, 36 males, 1 non-binary/other, and 2 preferred not to say. Of these, 70 indicated to be ethnically white, 10 indicated to be mixed or from multiple ethnic groups, one 1 indicated to be Asian or Asian British. A subset of *n* =33 responded to the **Post-Trip** survey (mean age = 16.6, *SD* = 0.95, with 17 females, 14 males, 1 non-binary and 1 preferred not to say; and 28 indicating to be white, 4 indicated to be mixed or from multiple ethnic groups, and 1 indicated to be Asian or Asian British).

Iceland: *N* = 41 pupils who went on a trip to Iceland responded to any questionnaire, with *n* = 13 responding to the **Pre-trip** survey (mean age = 14.5, SD = 1.02, with 4 females, 9 males, and 12 indicating a White ethnic background and one Asian or Asian British) and *n* = 33 responding to the **Post-Trip** survey (mean age = 15.6, *SD* = 1.19). Here, however, a subsample (*n* = 13) did not provide demographic data due to their school's regulations. The remaining sample was constituted of 18 females, 1 male, and 1 selecting 'prefer not to say', and 16 indicating to be white, 3 indicating to be Asian or Asian British, and one indicating to be Black British, Caribbean, or African.

Matched: *N* = 38 pupils responded to both Pre- and Post-Trip questionnaires (mean age = 16.4, *SD* = 0.98, 19 females, 17 males, 1 non-binary, 1 preferred not to say), of which 32 indicated to be white, 4 to be mixed or from multiple ethnic groups, and 2 indicated to be Asian or Asian British. Note, that only 5 of these pupils were from the group going on the Iceland trip. Consequently, these comparisons largely reflect the pupils' responses going on the Berlin trip.

Educational Activities of the Whole Sample

On average, pupils reported to read books as well as global news several times a month, watched national news and documentaries several times a year, and engaged in discussions as well as games involving the mind (e.g. board games, puzzles, mind teasers) several times a month. Furthermore, they reported to travel around the UK

several times a year, and to travel to other countries as well as visit a museum on average once a year.

Method and measures

Research Design

The study employed a pre- and post-intervention design using self-report measures. A battery of measures capturing key constructs of interest were administered via an online research platform (Qualtrics) and took approximately 15-20 minutes at each of the two time points. Of note, it was aimed to recruit a matched control group (that would not be taking part in the programme but will be instead offered to enrol in the intervention at a later point) but this was not feasible in the current pilot project (with only 14 responses collected). We were therefore unable to test the effect of time, in addition to the effect of the educational trip intervention.

Procedure

School heads who already signed up to take part in the educational trips offered by the NGT partners were contacted by the NGT representatives via email or phone calls to share information about the study. School head's consent was obtained by the researchers via Qualtrics prior to data collection. Caregivers of children taking part in the study were contacted at least 2 weeks prior to the trip with the description of the study and a chance to opt their children out of taking part. No opt-outs were received in this study.

Pupils were provided with the Qualtrics survey link to the study by the school trip lead/teacher and told that taking part is optional and they are free to withdraw at any time, including two weeks after taking part (no withdrawals were received). Children either took part while at school during a dedicated time slot provided by the teacher, during the journey to the destination (e.g., on the bus to the airport leaving for Berlin) or were sent a link to fill out a survey from home. Instructions to children included a request to respond at their own pace, make sure to thoroughly read all instructions and statements**,** to consider and evaluate each question as honestly as possible, and that there are no right or wrong answers. They were also asked to work independently and not worry about what anyone next to them was doing as the questions were presented in random order and everyone completing the questionnaire will respond to them in a different sequence. Finally, pupils were assured that their responses are confidential, and visible only to researchers and not anyone in the school, such as teachers.

Measures

The following **categories of measures** were included: sample and demographic information, personality and attitudinal factors (6 scales), trip/topic-specific questions (4 scales), and the trip evaluation questionnaire. The order of these specific parts was created to avoid some responses affecting others (e.g., open ended questions at the start and evaluation and demographic questions at the end, with psychological measures in a randomised order in between).

First, pupils were asked to contribute their demographic information, as well as rate different reasons for their motivations to sign up for the trip (e.g., "to learn or improve their understanding of the topic at hand" or "desire to travel") on a scale from 1-7. We also asked how often children typically engaged in various educational activities, such as visiting museums, watching documentaries or visiting foreign countries.

Second, psychometrically validated measures of the following psychological constructs tapping into ***personality traits and attitudes*** were administered. These included:

Trait curiosity (Kashdan et al., 2009) is a 10-item self-report scale with items such as *"I actively seek as much information as I can in new situations"*, which assesses the general propensity for curiosity.

Capacity for wonder (Geller et al., 2020) is a 10-item self-report scale with items such as *"I see the world with an interest of a child",* which assesses the general propensity to experience wonder.

Attitudes towards curiosity (Post et al., 2019) is a 17-item self-report scale with items such as "I think people who often come up with interesting questions are very important to society" that measures attitudes towards being curious for learning and general societal value.

Need for cognition scale (Keller et al., 2016) is a 14-item self-report scale with items such as "I like thinking to find solutions to problems", that assesses the cognitive motivation for learning and thinking.

Note that for the post-test questionnaire, all items in each of the above measures were retained however the instructions were modified slightly to be specific to the experiences of the past week (e.g., with instructions like this: "*Consider yourself during learning activities on your trip to Berlin and evaluate how each of the following describes you."*). This was to achieve measures specific to the level of change in perceptions and attitudes that have occurred over the period when the educational trip took place.

Behavioral engagement (Skinner et al., 2008) is a 5-item subscale with items such as *"I try hard to do well in school"* to tap into pupils' engagement with learning in class. In the post-trip version, we modified the items to reflect the out-of-class nature of learning activities (e.g., *"I tried hard to do well during learning activities";* with instructions such as: *Please carefully read each statement and indicate how much they may or may not have applied to you during learning activities (e.g., presentations, tours, museums, etc.) throughout your trip to Berlin")*.

Agentic Engagement (Reeve & Tseng, 2011) is a 5-item subscale with items such as: "*I let my teacher know what I am interested in*" to tap into pupils' sense of agency in learning. In the post-trip version, we modified the items to reflect the out-of-class nature of learning activities (e.g., *"I let my teacher know what I was interested in*", with instructions indicating: "*Think about a situation during the trip when you learned*

something with the help of someone like your teacher or a guide, and choose the option that was most like you").

Third, **trip/topic-specific measures** included to target pupils' level of knowledge, interest and awareness of lack of knowledge.

Knowledge gap scale (McPhetres, 2019) is a 7-item self-report scale with questions such as "*I find myself wanting to learn more about the activities included in the trip to Iceland/Germany"*.

Situational interest scale (Schmidt & Rotgans, 2021) is a 4-item scale with items like *"I enjoy working on this topic",* where instructions asked pupils to focus on *"thinking about a time when you learned about Iceland/German history in the past"*.

Open ended knowledge question (adapted from Scoffham & Barnes, 2009) asked pupils to write down associations (e.g., words, phrases or questions) related to the topic and the trip to Iceland or Germany. This was to assess, both quantitatively and qualitatively, any changes after the trip.

Embedded Interest Scale (Ainley & Ainley, 2011) asked pupils to self-rate how much interest they had in different topics, with one of them being related to the trip they signed up for, while others serving as distractor items (e.g., Iceland trip for pupils going on the Berlin trip). This question was only administered before the trip.

Finally, post-trip specific **trip evaluation** questions were asked (modified from Alon & Tal, 2015) to target three areas: planning (8 items, e.g., *"The trip helped me understand things we learned in school"*), pedagogy (15 items, e.g., *"The guide told us interesting things about the places we visited"*) and outcomes (10 items, e.g., *"During the trip, I got to enjoy new experiences"*).

Results

Embedded Interest

Figure 1. Evaluation of various destinations and topics covered by other NGT trips before (Pre-Trip; striped bars) and after each trip (Post-trip; solid bars), across all responses divided by pupils going to Berlin (dark blue) and to Iceland (green). Boxes highlight the trip-specific topics.

Each trip was specifically related to clear topic preferences (Berlin & History; Iceland & Geography). While pupils going to Berlin evaluated the related topics slightly more positively post-trip, there seem to be slight decreases regarding the Iceland-specific post-trip evaluations. However, it should be noted that the Iceland sample constituted of fewer matched responses which means pre-trip and post-trip responses were largely given by different pupils. Thus, some of the differences in those responses may reflect individual differences rather than causal relationships and should thus be interpreted with extreme caution.

Psychological Constructs

We conducted repeated measures t-tests (or nonparametric alternatives where the data were not normally distributed) to assess if the scores on the key psychological measures have changed following the trip. The summary of these analyses is in the Table below, with each construct plotted separately in the following Figures.

Table 1. Overview of Measure Comparisons before and after the trip.

Construct	All Pre	All Post	t-test matched responses
Trait Curiosity	*M* = 3.08 *SD* = 0.79	*M* = 3.57 *SD* = 0.80	*t*(37) = -3.94, *p* < .001 Significantly increased after trip
Capacity for Wonder	*M* = 4.95, *SD* = .92	*M* = 5.42, *SD* = .90	*t*(37) = -2.87, *p* = .007 Significantly increased after trip
Attitudes towards Curiosity	*M* = 3.34 *SD* = 0.52	*M* = 3.49 *SD* = 0.51	*t*(36) = -2.50, *p* = .017 Significantly increased after trip
Need for Cognition	*M* = 3.316 *SD* = 0.67	*M* = 3.59 *SD* = 0.75	*t*(36) = -3.01, *p* = .005 Significantly increased after trip
Behavioural Engagement	*M* = 5.73 *SD* = 0.87	*M* = 5.81 *SD* = 1.00	*V* = 321, *p* = .692 NOT sig. different after trip
Agentic Engagement	*M* = 2.82 *SD* = 0.96	*M* = 3.00 *SD* = 0.86	*t*(36) = -1.63, *p* = .111 NOT sig. different after trip
Knowledge Gap	*M* = 4.93 *SD* = 0.83	*M* = 5.29 *SD* = 0.96	*t*(36) = -3.03, *p* = .005 Significantly increased after trip
Situational Interest	*M* = 4.00 *SD* = 0.69	*M* = 4.15 *SD* = 0.70	*V* = 152.5, *p* = .098 NOT sig. different after trip

Note. Statistical significance is reached at *p* < .05.

Pre-Post Comparisons in Detail

Trait Curiosity/Experience of Curiosity

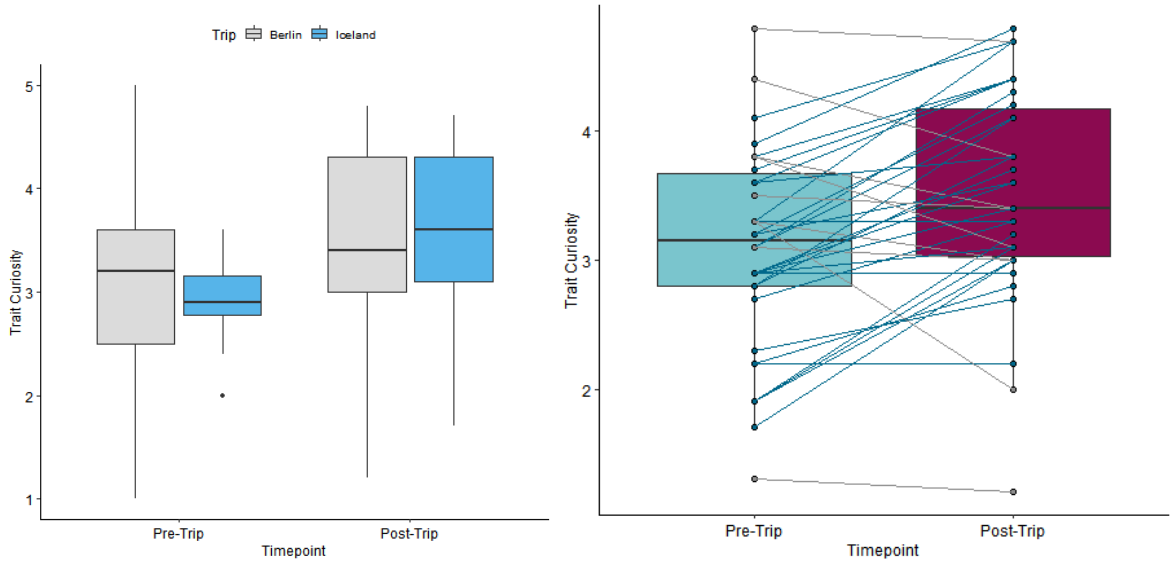


Figure 2. Boxplots of pupils' average scores on Trait Curiosity before and after going on the trip. **Left:** across all responses for Berlin (grey) and Iceland (blue), respectively. **Right:** Matched responses included in the statistical tests with single points indicating the responses of an individual and connecting lines showing the direction of response changes.

Overall, we see that pupils experienced higher levels of Curiosity during the trips to Berlin and Iceland (Post-trip: $M = 3.57$, $SD = .80$) compared to their daily lives and school environment (Pre-trip: $M = 3.08$, $SD = .79$) - slightly more so regarding the Iceland trip. This was confirmed statistically through significantly increased mean scores between matched responses ($t(37) = -3.94$, $p < .001$).

Capacity for Wonder

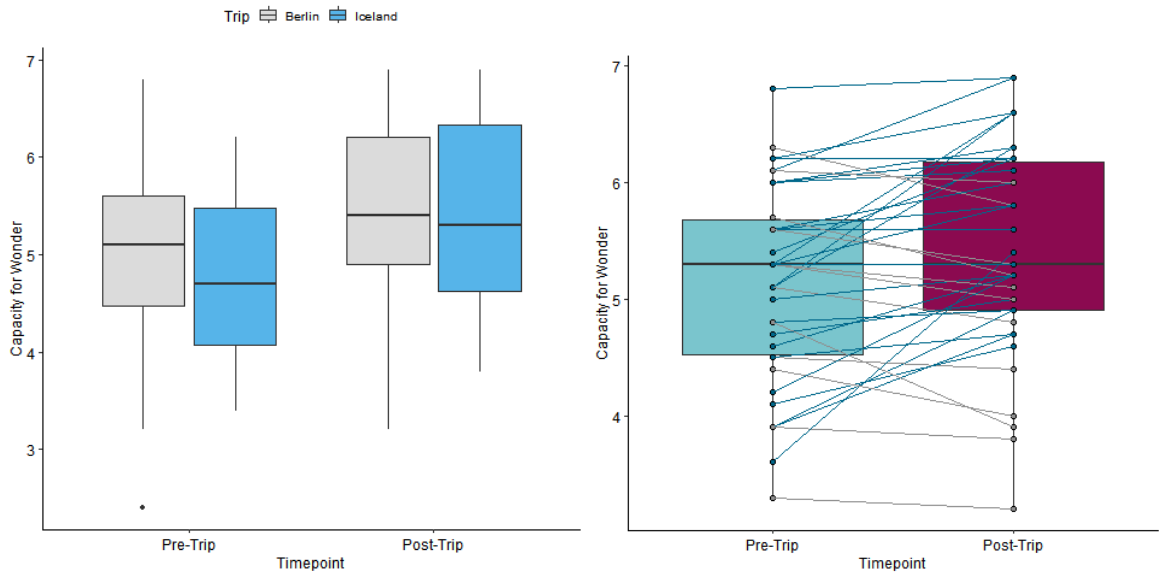


Figure 3. Boxplots of pupils' average scores on Capacity for Wonder before (left sides) and after (right sides) going on the trip. Horizontal lines indicate the sample mean, whereas larger box sizes and longer vertical lines indicate greater variability in pupils' responses. **Left:** across all responses for Berlin (grey) and Iceland (blue), respectively. **Right:** Matched responses included in the statistical tests with single points indicating the responses of an individual pre-trip (left, turquoise) and post-trip (right, red), and connecting lines showing the direction of response changes (increases in blue, decreases in grey).

Overall, we see that pupils experienced more Capacity for Wonder during the trips to Berlin and Iceland (Post-trip: $M = 5.42$, $SD = .90$) compared to their daily lives and school environment (Pre-trip: $M = 4.95$, $SD = .92$). This was confirmed statistically through significantly increased mean scores between matched responses ($t(37) = -2.87$, $p = .007$).

Attitudes towards Curiosity

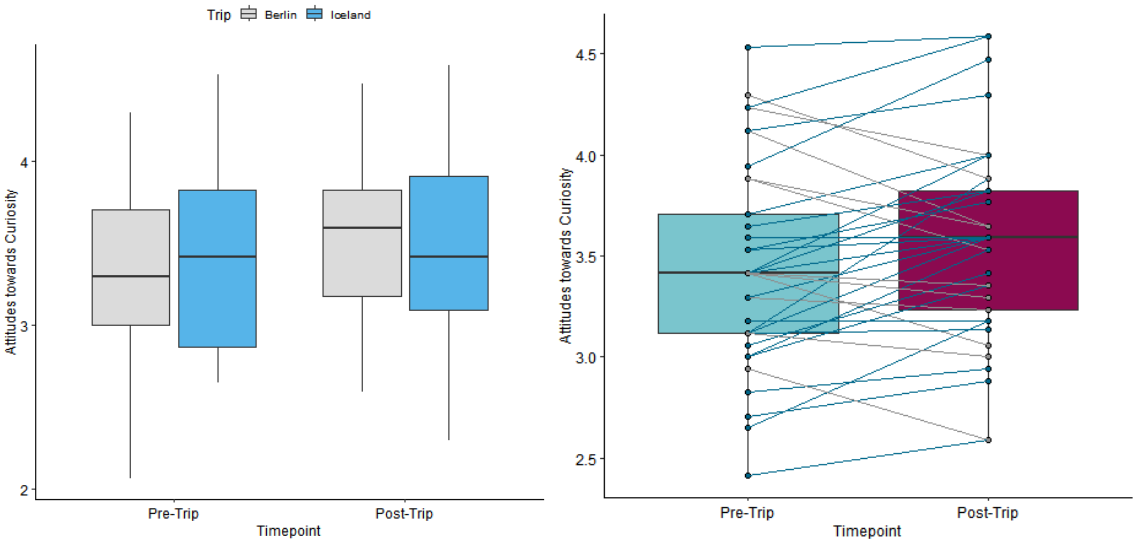


Figure 4. Boxplots of pupils' average scores on Attitudes towards Curiosity before and after going on the trip. **Left:** across all responses for Berlin (grey) and Iceland (blue), respectively. **Right:** Matched responses included in the statistical tests with single points indicating the responses of an individual and connecting lines showing the direction of response changes.

Overall, we see that pupils held more positive Attitudes towards Curiosity during the trips to Berlin and Iceland (Post-trip: $M = 3.49$, $SD = .51$) compared to their daily lives and school environment (Pre-trip: $M = 3.34$, $SD = .52$) - slightly more so regarding the Berlin trip. This was confirmed statistically through significantly increased mean scores between matched responses ($t(36) = -2.50$, $p = .017$).

Need for Cognition

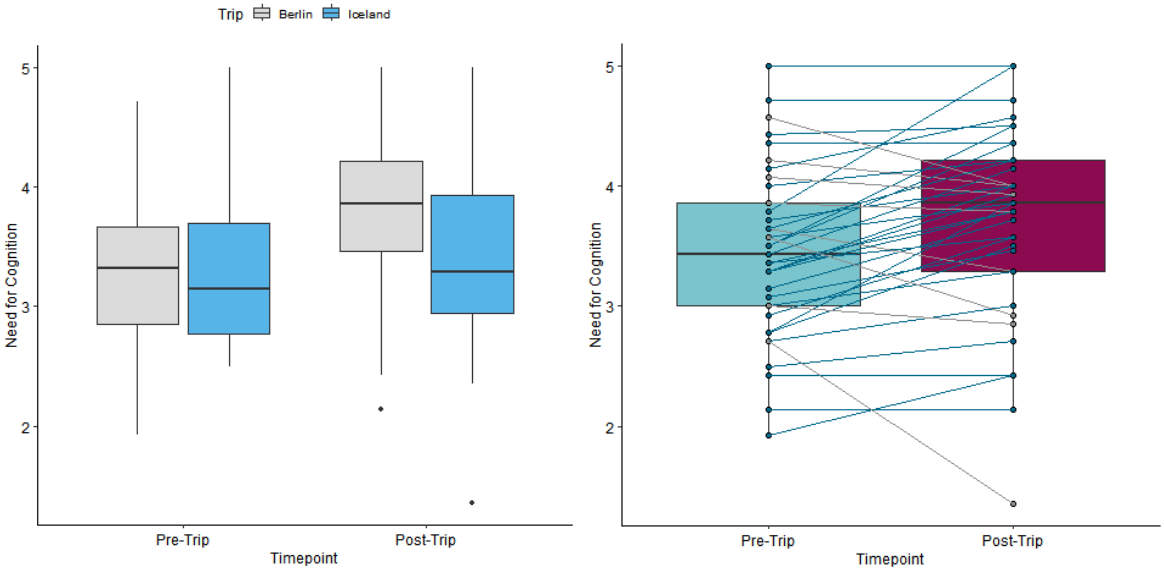


Figure 5. Boxplots of pupils' average scores on Need for Cognition before and after going on the trip. **Left:** across all responses for Berlin (grey) and Iceland (blue), respectively. **Right:** Matched responses included in the statistical tests with single points indicating the responses of an individual and connecting lines showing the direction of response changes.

Overall, we see that pupils experienced more Need for Cognition during the trips to Berlin and Iceland (Post-trip: $M = 3.59$, $SD = .75$) compared to their daily lives and school environment (Pre-trip: $M = 3.32$, $SD = .67$) - slightly more so regarding the Berlin trip. This was confirmed statistically through significantly increased mean scores between matched responses ($t(36) = -3.01$, $p = .005$).

Behavioural Engagement

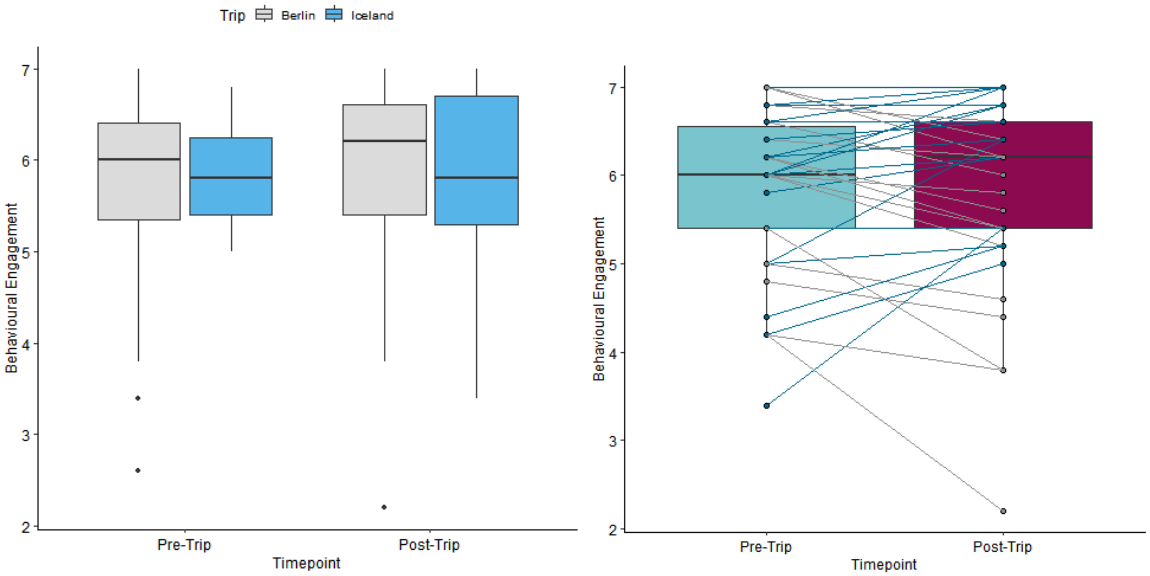


Figure 6. Boxplots of pupils' average Behavioural Engagement in class before and during the trip. **Left:** across all responses for Berlin (grey) and Iceland (blue), respectively. **Right:** Matched responses included in the statistical tests with single points indicating the responses of an individual and connecting lines showing the direction of response changes.

While we do see that pupils on average did indicate increased Behavioural Engagement with the learning opportunities (e.g., paying attention and working hard) during the trip (M = 5.81, SD = 1.00) compared to in their normal school environment (M = 5.73, SD = .87), this effect was, however, not statistically significant (V = 321, p > .05). It should be noted that responses were generally very high to begin with, so that there was little room for a statistically significant increase. Furthermore, we observed large individual differences, where some pupils who indicated to be less eagerly engaged during class were more engaged during the trip but also vice versa. When inspecting the specific items of this scale, it seemed that pupils indicated to have paid closer attention and listened more carefully during the trip than they normally did in class and worked similarly hard. However, they indicated that they did not try as hard to do well and participated less during group discussions, perhaps, reflecting lower experienced performance pressure during the trip.

Agentic Engagement

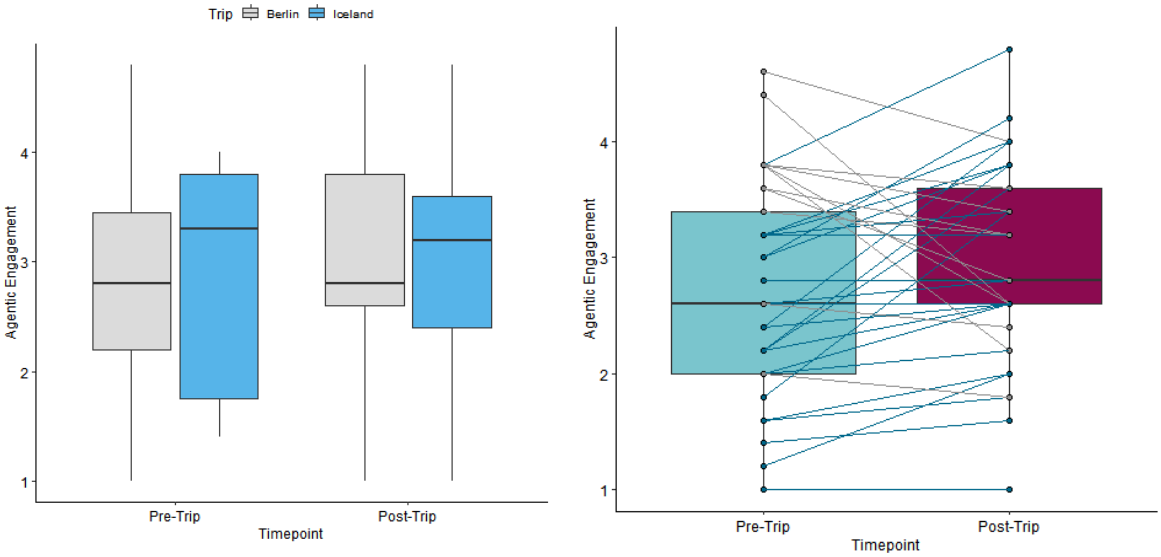


Figure 7. Boxplots of pupils' average Agentic Engagement in class before and during the trip. **Left:** across all responses for Berlin (grey) and Iceland (blue), respectively. **Right:** Matched responses included in the statistical tests with single points indicating the responses of an individual and connecting lines showing the direction of response changes.

While we do see that pupils on average did indicate increased Agentic Engagement during the trip (e.g., expressing their interests and opinions) during the trip (M = 3.00, SD = .86) compared to in their normal school environment (M = 2.82, SD = 0.96), this effect was, however, not statistically significant ($t(36)$ = -1.63, p > .05). Once more, we observed large individual differences, where some pupils who indicated to be less eagerly engaged during class were more engaged during the trip but also vice versa. When inspecting the specific items of this scale, it seemed that pupils generally did express their interests, opinions, and preferences more during the trip but did not necessarily ask more questions than they already normally did in class.

Knowledge Gap

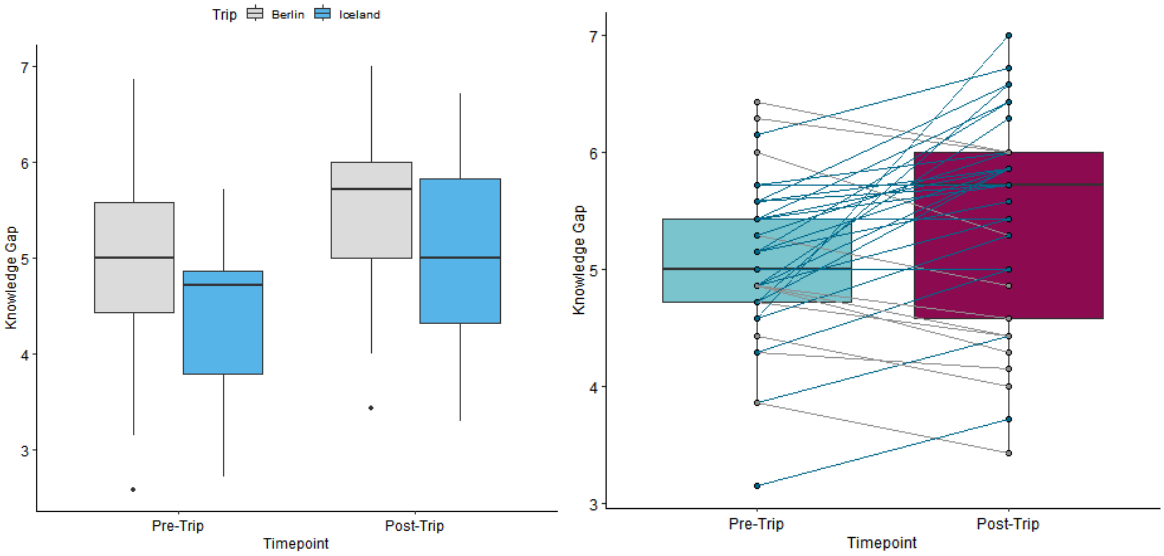


Figure 8. Boxplots of pupils' average experience of topic-specific Knowledge Gaps before and after going on the trip. **Left:** across all responses for Berlin (grey) and Iceland (blue), respectively. **Right:** Matched responses included in the statistical tests with single points indicating the responses of an individual and connecting lines showing the direction of response changes.

Overall, we see that pupils experienced more topic-specific Knowledge Gaps during the trips to Berlin and Iceland (Post-trip: M = 5.29, SD = .96) compared to their daily lives and school environment (Pre-trip: M = 4.93, SD = .83) - slightly more so regarding the Berlin trip. This was confirmed statistically through significantly increased mean scores between matched responses ($t(36)$ = -3.03, p = .005).

Situational Interest

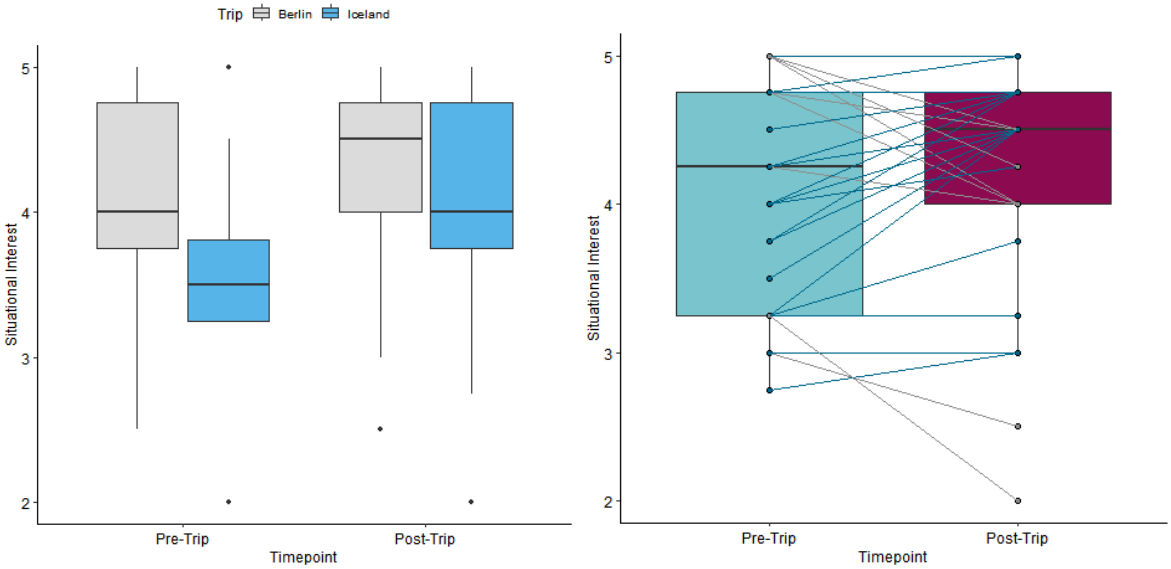


Figure 9. Boxplots of pupils' average Situational Interest in class before and during the trip. **Left:** across all responses for Berlin (grey) and Iceland (blue), respectively. **Right:** Matched responses included in the statistical tests with single points indicating the responses of an individual and connecting lines showing the direction of response changes.

While we do see that pupils on average did indicate increased Situational Interest during the trip (e.g., enjoying working on the topic and being fully focused while doing so) during the trip (M = 4.15, SD = .70) compared to in their normal school environment (M = 4.00, SD = 0.69), this effect was not statistically significant (V = 152.5, p > .05). Once more, it should be noted that responses were generally very high to begin with, especially regarding the History related to the Berlin trip, so that there was little room for a statistically significant increase.

Summary

Overall, responses on the psychological constructs of Trait Curiosity, Capacity for Wonder, Attitudes towards Curiosity, Need for Cognition, and Knowledge Gap increased significantly in response to going on the trip. However, while mean scores for Behavioural Engagement, Agentic Engagement, and Situational Interest did increase, these increases did not reach significance.

A potential explanation might be that these three constructs are more anchored in the pupils' behaviour within learning contexts, whereas the other constructs are more psychologically based, meaning they more strongly reflect the pupils' perceptions and experiences. Yet, this behaviour was often already reported to be highly engaged and enthusiastic in school, with little to no room for increase. On the other hand, being in a

very different learning environment may have also led to behaving quite differently which is reflected in the large individual differences we observed.

Nevertheless, the results converge on pupils perceiving the trips' learning environments as more positive, more engaging, and more intriguing than their common class experience.

Trip Evaluations

Sign-up Reasons (expectations vs. fulfilment)

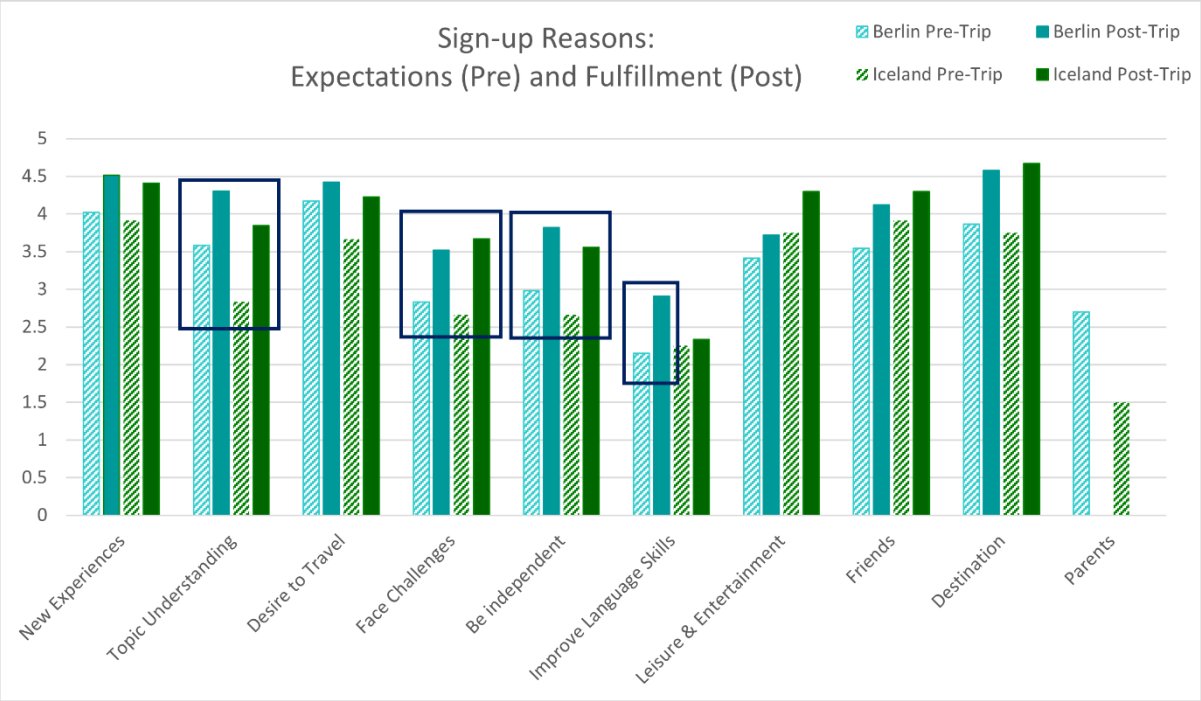


Figure 10. Evaluation of various reasons to sign up for each trip (striped bars) and the fulfilment of these reasons as evaluated post-trip (solid bars) across all responses. The Berlin trip data is displayed in turquoise and always on the left, whereas the Iceland trip data is displayed in dark green and always on the right. Boxes highlight large differences between lower valued sign-up reasons and higher scoring fulfilment.

The highest scoring self-rated reasons for signing up to the Berlin trip were the desire to gain new experiences, desire to travel, friends and the destination itself. The highest scoring self-rated reasons for signing up for Iceland trip were the desire to travel, gain new experiences, the destination itself, friends, and leisure and entertainment. While pupils going on the Berlin trip did indicate their parents to be part of the reason to have signed up, this was not the case for the Iceland trip.

Overall, pupils gave very positive responses regarding to which degree their initial sign-up reasons were fulfilled. Interestingly, we found that some aspects, which were not

initially listed as primary reasons to sign up ended up being fulfilled by the trip; such as increased topic understanding, facing challenges, being independent, and improving their (German) language skills.

Pupils additionally had the chance to specify other reasons for signing up. Noteworthy reasons for signing up to the Berlin trip were related to an embodied learning experience allowing seeing the historic sites they learned about in school and offering new perspectives through the architectural and cultural context in which such important history took place. Others found Berlin itself great as a destination for interesting new insights on lifestyles and potential future work opportunities abroad. A striking reason that one respondent pupil named regarding the Iceland trip highlighted the uniqueness of its environment which cannot be experienced anywhere else on the planet.

Trip Evaluation: Berlin

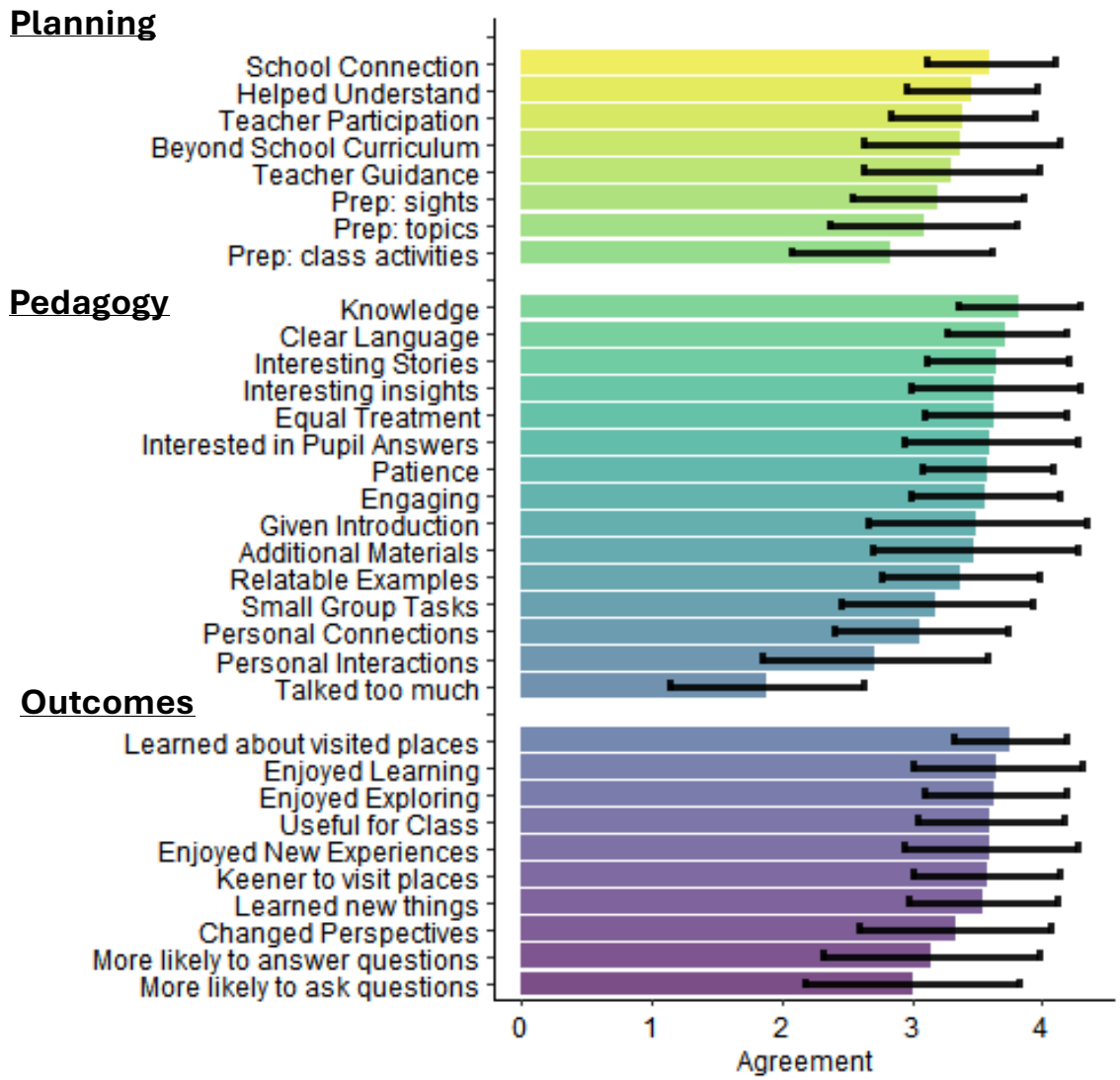


Figure 11. Mean scores for each evaluation point for the Berlin trip grouped by theme and in descending order. Black bars indicate variability in pupils' responses.

Overall, pupils evaluated the Berlin trip very positively with a Mean Score of 3.43 (*SD* = 0.27) out of 4. The highest scoring aspects per theme were that the included topics connected to what they learned in school (planning/content), that the guide knew a lot about the places they visited (pedagogy), and that they truly learned about the places they visited (outcomes). Please note that the lowest score for "Talked too much" by design in fact speaks positively about the guide's performance.

Trip Evaluation: Iceland

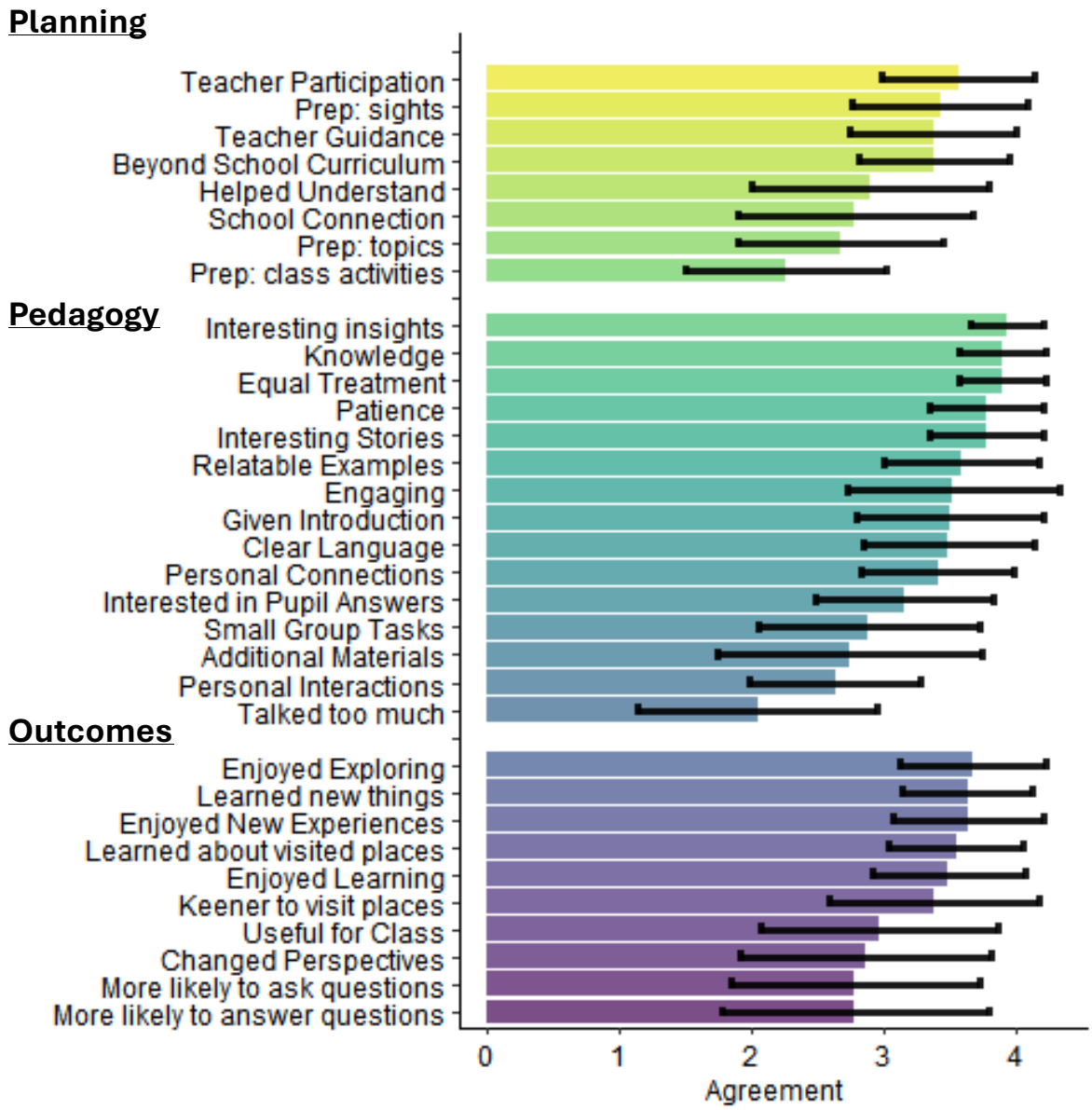


Figure 12. Mean scores for each evaluation point for the Iceland trip grouped by theme and in descending order. Black bars indicate variability in pupils' responses.

Overall, pupils evaluated the Iceland trip very positively with a Mean Score of 3.28 (SD = 0.44) out of 4. The highest scoring aspects per theme were that the teacher took part in the activities during the trip (planning/content), that the guide was able to offer interesting insights (pedagogy), and that they got to enjoy exploring new places (outcomes).

Cross-trip evaluation comparison

While both trips were evaluated very positively, specific highlights regarding their outcomes seemed to differ between them. For example, Iceland offered more novelty and excitement about exploration, whereas Berlin offered intensified and more enjoyable learning of information which pupils deemed also useful for class. This can be seen as in line with the trips' differential contents and objectives.

Insights from the open-ended question

Pupils were asked a question specific to the trip they were going to:

> *Please write down any technical expressions, terms, or questions that you associate with the history of Germany/Berlin (or Iceland – specific to the trip).*
>
> *Here, we are not looking for your feelings or evaluations of this topic.*
> *Rather, we are interested in various academic associations that come to your mind when you think of this subject.*
>
> *Please dedicate at least a full minute to this.*

Respondents could not skip over the question. This was done intentionally to ensure they spend sufficient time to consider their prior knowledge, level of curiosity and wonder related to it.

There were 75 pupils in the ***Berlin trip group*** who provided responses to the question before the trip. On average, they produced 6.5 tokens (words, phrases or questions), ranging from 1-29 per person.

The most frequent responses were "Berlin Wall" (28 students mentioned it), "Nazi" (28 mentions), "Hitler" (28), "World War 2" (22), "Holocaust" (16), and "Cold war" (15). There were 40 phrases words with more than 2 mentions across the sample, out of a total of 214.

Berlin pre-trip: Word Cloud representing the responses as separate words

Berlin pre-trip: Word Cloud representing the responses as full phrases

There were 35 pupils in the Berlin trip group who provided responses to this question after the trip. On average, they produced 8.7 tokens (words, phrases or questions), ranging from 1-30 per person. Of note, for students who provided the responses to this question both the before and after the trip survey, the number of responses, did not change, being on average 8.7.

The most frequent responses were “Berlin Wall” (20 mentions), “Nazi” (15 mentions), “Reichstag” (12), “Holocaust” (10), and “Hitler” (8). There were 27 phrases or words with more than 2 mentions across the sample, out of a total of 178.

Berlin post-trip: Word Cloud representing the responses as separate words

Berlin post-trip: Word Cloud representing the responses as full phrases

While we see no evidence of the quantitative (in the matched responses sample) nor pronounced qualitative changes in pupils' responses from before and after the trip, there appear to be more responses with new, more fine-grained/detailed terms not mentioned at the pre-trip (e.g., Gestapo, Night of Long Knives, Treaty of Versailles).

In addition, there are more responses indicative of children's curiosity and wonder related to the topic in the post-trip responses. This is evident in responses such as *"it's really amazing to understand the past"*. Children posed questions of more psychological, rhetorical, wonder-like nature, e.g., *"Do the modern population of Berlin think about this daily?"* (compared to questions indicating curiosity that can be

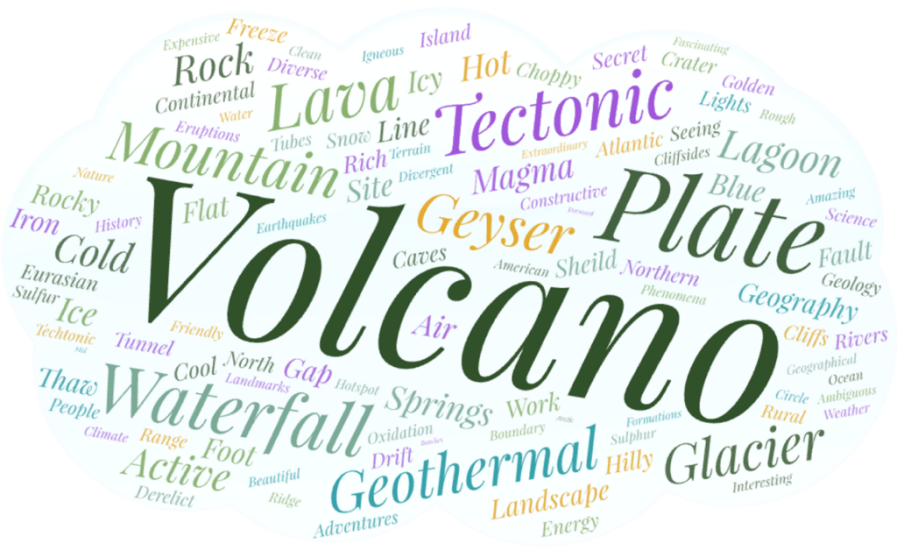
answered with factual information-gathering, e.g., *"How long was the Berlin Wall?")*. Responses also point to a greater awareness of the complexities and intricacies of the history (e.g., "*I think of Germany (and Berlin) through a series of eras rather than one running time of a country")*, and a more holistic view on the country: *"I went to Berlin and my view changed a little. Having slept in a hotel in Berlin, gone shopping and visited sites unrelatable to the world wars and the berlin wall. I have come to really like the city with its organisation, beautiful landmarks and art and literature."*

There were 12 pupils in the ***Iceland trip*** group who provided responses to the question before the trip, and 24 after the trip. On average, before the trip, pupils produced 4.6 tokens (words, phrases or questions), ranging from 1-9 per person, and after the trip, they produced 6 tokens, ranging from 1-10. While the increase in the number of associations is plausible, the small sample of pre-trip responses presents difficulty to meaningfully interpret the differences before and after the trip.

Responses represent the geographical focus of the educational trip. In addition, pupils posed some questions, evidencing curiosity before the trip, e.g., *"How does a geyser work? Why is the secret lagoon hot? How quickly does lava run down the volcano? What causes the northern lights?"* After the trip, there were several responses (while there were none in the pre-trip responses) where students seem to express their fascination and wonder using adjectives such as "interesting" and "fascinating", e.g., *"Iceland was a very beautiful but derelict country, the landmarks like Geysers and volcanos were extraordinary as well."*

We combined pupil responses to produce the word cloud presented below. Overall, students generated 105 unique words. The most frequent words were "Volcano" (29 mentions), "plate" (15 mentions), "tectonic" (10), "waterfall" (10), "lava" (9), and "geothermal", "mountain", "geyser", "glacier" (each 8). There were 31 phrases words with more than 2 mentions across the full sample.

Iceland trip (combined pre and post): Word Cloud representing the responses as words



Methodological considerations

The results of this pilot study should be treated with a degree of caution due to the following methodological limitations which emerged from the wide-reaching, ambitious, yet less controllable data recruitment efforts.

First, the quantitative analyses on the measures collected before and after the educational trip, which serves as an experimental intervention, would have higher validity if they could be compared to the same measures collected from a control group of participants matched on key characteristics, who did not partake in the intervention. In this study, we were unfortunately unable to collect such a comparison sample.

Second, the participants in this study have self-selected into the intervention, rather than being assigned to it: that means that the study included only children who wanted (and could afford) to take part in the educational trip as well as offer their time to respond to the questionnaires. We therefore cannot be confident that the effects reported are not due to some characteristics inherent to this sample, rather than due to the intervention as such.

Third, our analyses did not include statistical controls for several demographic and personal factors, such as socio-economic status, race or ethnicity, place of origin, type of school attended, which may have impacted the results. Relatedly, we did not account for individual differences in response patterns.

Fourth, the obtained sample size on which inferential statistical analyses are based is moderate (N=38), which increases the chance to obtain false positive results. Due to the sample size of participants undertaking the Iceland trip being particularly low compared to Berlin trip, we did not compare the two and instead combined all responses. In the future, if the sample size could be increased, comparisons between different educational trips would be warranted. Relatedly, for some analyses, such as qualitative and descriptive observations, we included the full sample (not necessarily matched before and after).

Fifth, related to the study administration, the survey-based research design is prone to participant fatigue and loss of interest, although based on the data, we do not observe any evidence of the loss of quality.

Finally, the survey-based measures were administered in varied settings: some schools asked pupils to complete the questionnaire while on the journey to the airport, while others did it at home in their own free time, and yet others while at school in the classroom setting during a dedicated time provided by the collaborating schoolteacher. This might have affected how children responded to the questionnaire and added variance we did not account for in the analyses conducted. Furthermore, no researchers were present while pupils filled out the questionnaires to ensure independent responses. Instead, teachers were provided with standardised

instructions to ensure the quality of the data collected. Of note, none of the teachers reported any issues with data collection.

Notably, the current study design does not allow us to make any conclusions with regards to the transfer effects – that is, whether the heightened sense of wonder, curiosity and desire to learn remains after the trip is over or persists when learning is brought back to the traditional classroom. These are among the most exciting research questions for future investigations.

Despite the limitations listed above, this pilot study has several notable **strengths.**

First and foremost, many educational studies only report post-intervention evaluations of context-specific and often ad-hoc collected aspects, are typically based on smaller sample sizes and do not necessarily include statistical tests. Consequently, the above reported limitations reflect a maximally rigorous experimental approach to such evaluation efforts not generally taken.

It should also be acknowledged that this study did manage to collect a substantial sample including matched, pre- and post-trip responses, which enabled conducting proper inferential statistical analyses on all included measures. As these came from six different schools going on two types of trips, this also made the data more representative compared to focusing on only one school and only one type of trip.

Furthermore, the authors ensured via verbal reports of the responsible teachers and the assessment of the quality of the data (e.g., evident through use of the full response scales and normal distribution of the data) that pupils who filled out the surveys took it seriously and responded honestly, rather than in a socially desirable or random way, supporting the credibility of the here reported findings.

Lastly, the study included a range of different validated psychological measures allowing deeper investigations and insights into *why* educational trips and learning outside of the classroom might be uniquely beneficial. In this way, the results can inform pedagogical approaches directly by indicating which aspects of the pupils' psychological experiences might be especially worth focusing on to elicit similar benefits in more typical school contexts.

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Additional Resources:

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How to experience more wow. Summer Allen. PSYCHE Magazine. https://psyche.co/guides/how-to-fill-your-life-with-more-awe-every-single-day

Why good teachers allow a child's mind to wander and wonder. Anders Schinkel. PSYCHE Magazine. https://psyche.co/ideas/why-good-teachers-allow-a-childs-mind-to-wander-and-wonder

How wonder works. Jesse Prinz. AEON Magazine. https://aeon.co/essays/why-wonder-is-the-most-human-of-all-emotions

The engine of achievement: The role of curiosity in learner engagement. Jade Blue. Cambridge University Press & Assessment. https://www.cambridge.org/elt/blog/2022/02/22/engine-achievement-role-curiosity-learner-engagement/

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