AI-Driven Personalization in Educational Dialogues: Microtool for Child Profile Building

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Robots have yet to reach the level of personalization necessary to foster long-term interactions with children. Existing systems struggle to establish the needed social connections as they depend on scripted content and rigid dialogue structures, not adjusting to individual users. To address this gap, this research implements a chatbot tool that, using a knowledge graph (KG) and strict prompt rules, creates an individualized conversational experience. It references each child's past data, personalizing questions and transitions throughout a structured process while filling 29 fields in a user model. The chatbot was tested in a within-subjects study where children aged between 9 and 11 interacted with both the chatbot and a personalized paper-based letter with integrated questions. Results show that the chatbot significantly increased data completeness, with the missing fields reduced by over 90% compared to the baseline, leading to more updated information, and was rated as more engaging by children. Qualitative feedback highlighted a preference for the chatbot's interactive and conversational style, though both modalities were seen as personal in different ways. These findings support the use of AI-driven, memory-based interfaces for building rapport and gathering personalized data in child-robot interaction contexts.

Additional Key Words and Phrases: Memory-based Personalization, User Modelling, Child-Robot Interaction, Long-term Engagement, Interactive Survey, Chatbot, Webchat, Children's Interface

1 INTRODUCTION

1.1 Motivation and Background Context

Many educational tasks necessitate deploying the same robot at schools over extended periods, with prolonged breaks in between, which makes supporting sustained engagement and building lasting rapport with children important. However, it is not always practical or feasible to create additional interaction moments solely for this purpose. The Robot Bookworm serves as a concrete use case for this challenge. It is an ongoing educational project centered on using child-robot interactions to motivate children aged between 9 and 11 to read [10]. As a project with recurring sessions and long-absence periods, a fundamental aspect is the ability to maintain sustained engagement and build lasting rapport with children. Because of the novelty effect, children are often initially intrigued by robots, but maintaining that engagement over a long period without interactions remains a challenge [7]. This research is important for the project, as it explores mechanisms to ensure such continuity and personalized interaction can be leveraged.

1.2 Challenges

Building upon the previous phases of the Robot Bookworm project conducted a year ago, the current phase faces the challenge of re-establishing a sense of familiarity and continuity between the robot and the child. Without mechanisms for recalling previous interactions, the robot risks feeling impersonal and disconnected from the individuals.

1.3 Problem Statement

Despite the recognized importance of personalized interaction for fostering long-term engagement in child-robot interactions (CRI), current systems frequently have insufficient personalization, struggling to build lasting social rapport with children [8]. One of the contributors to this problem is the reliance on rigid, scripted dialogues, which fail to dynamically adapt to a child's evolving profile and past interactions over extended periods. This inability to recall and leverage past data from sessions leads to a lack of familiarity, diminishing the children's interest and willingness to share information or participate.

1.4 Proposed Solution

To bridge this gap, the paper introduces a new communication method through a memory-based, personalized chatbot tool that interacts with children in the form of a conversation. This chatbot uses previous knowledge about each child in the form of a knowledge graph (KG), in order to reference past responses and ask individualized questions. By engaging children in a personalized conversation, the tool aims to both enrich the children's user model with updated information and to rekindle a sense of connection after the extensive absence. Alongside the chatbot (henceforth also referred to as "webchat"), a personalized paper-based letter with integrated questions (also referred to as "personalized letter") [1] was also used as a baseline comparison in order to analyze the effectiveness of KG-based personalization to gather data and build rapport in child-robot interaction.

1.5 Research Questions

This work investigates the following research questions:

1. How can we design a chatbot tool that interacts with children in an engaging way to enrich their user models and to re-establish social connection in support of long-term child-robot interactions?
2. To what extent is a chatbot tool more effective compared to a personalized letter in enriching children's user models by improving the completeness, updating, and personalization of the child's user model?
3. How do children perceive the chatbot compared to the personalized letter in terms of engagement, personalization, and social connection?

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[1] The terms "chatbot" and "webchat" are used interchangeably. Similarly, "personalized paper-based letter with integrated questions" and "personalized letter" or "letter" refer to the same condition.

2 RELATED WORK

2.1 Long-term Engagement and Personalization

The field of human-robot interaction is growing, and with this, certain limitations are being discovered. Many systems first generate interest, but this effect can quickly disappear if no long-term engagement mechanisms are implemented. This problem reflects larger limitations, with robots still largely programmed to deliver scripted content and to group students into a few fixed categories rather than utilizing user-specific personalization [8], and to rely on rigid, rule-based dialogue frameworks [10]. As such, robots also lack the social rapport that teachers can build with their students, which is paramount in the learning process. Previous studies point out this significant challenge of maintaining long-term interactions between children and robots once novelty wears off [7]. Thus, research has shown that this challenge can be mitigated by designing systems that recall user information, ultimately sustaining long-term engagement through rapport-building. This can be done using different techniques, such as referencing past pieces of information using the user model and adapting responses to previously expressed preferences [6]. The importance of familiarity in child-robot interaction is further supported by findings that children respond more positively to systems that exhibit continuity and personal cues [1].

2.2 Design Principles for Children's Interfaces

To develop an interface that facilitates children's engagement and encourages a natural interaction, existing literature on child-computer interaction provided several useful guidelines to follow. Kurian [4] has described six design principles derived from Disney animations to design clear and expressive interfaces for children. Some that particularly stand out are the sidekick-style personas, where the LLM (Large Language Model) should adopt a playful and encouraging persona rather than a directive instructor or authority figure, and the predictable and scaffolded interaction structures, which describe using consistent session flow for interactions, from greeting to goal-setting, activity, and recap, such that children can internalize the system's structure.

Additionally, a range of best practices for creating engaging experiences for young users has also been suggested. As such, multiple sources emphasize the importance of simplicity and clarity in interface layouts, proposing the use of straightforward navigation, oversized buttons, large buffering distances between elements, intuitive controls, and sizable, tappable areas [3, 11, 12]. To increase engagement, the use of vivid colors, as well as familiar and appealing characters or recognizable shapes, is also recommended, but these elements should be appropriate for the age of the child, with older children preferring more complex palettes and visual depth [3, 12]. In order to create more depth, Gross [3] suggested that shadows and gradients can be used.

2.3 Child-specific Dialogue

Conversational design is crucial in fostering engagement, building rapport, and eliciting data, especially when wanting to maintain the child's interest. A key strategy for promoting engagement involves the explicit acknowledgment and mirroring of a child's input. When an AI system restates or summarizes, indicating that it understood and processed the child's previous response, it signals attentiveness and validates the child's contribution. This "mirroring" technique contributes significantly to the child perceiving the agent as an empathetic and supportive conversational partner, increasing their willingness to share more personal information and continue the dialogue. Research by Seo et al. [14] demonstrates that LLM-driven chatbots designed with such acknowledgment mechanisms can foster a sense of friendship and encourage children to open up and maintain interactions for a longer period.

Additionally, Li and Cai [5] highlights that contextualizing questions based on prior answers by tying them to the previous responses leads to longer, more detailed, and engaged answers from users, with a higher overall user experience. This continuity ensures the conversation flows, feels relevant from the child's perspective. Nonetheless, integrating storytelling from the LLM can make the interaction feel less interrogative by transforming it into a more dynamic and collaborative experience, also leading to more profound engagement, higher creativity in children's responses [2].

2.4 Gap in Literature and Thesis Contribution

While existing literature highlights the importance of personalization and conversational design in child-robot interaction, a significant gap remains in demonstrating and evaluating how LLM-driven systems can facilitate personalization and rapport building after time gaps. This thesis addresses this gap by designing, implementing, and evaluating an LLM-driven chatbot that utilizes a knowledge graph to recall and integrate past user data from previous sessions, aiming to support the collection of personalized, updated data and help re-establish social rapport in preparation for future child-robot interactions, addressing the challenge of long-term engagement. Furthermore, throughout the design and interaction, ethical considerations concerning age-appropriateness and data privacy have been carefully considered and are discussed in Section 3.2.6.

3 METHODOLOGY

3.1 Modalities

This study involved two distinct data collection methods: a chatbot tool in the form of a website and a personalized paper-based letter with integrated questions. Both were used to elicit updated, personalized information from each child for the enrichment of their user model. The personalized letter was developed as a baseline for comparison with the chatbot tool. It was structured to address the same 29 user model fields as the chatbot, presented in identical order, and with the same overall goal of eliciting both essential and personalized information. While the questionnaire referenced data from the user model of each child, it did not provide real-time acknowledgment or conversational feedback, in contrast to the chatbot.

3.2 Chatbot System and Conversational Design

The chatbot is a web-based interactive survey tool developed that makes use of a multi-layered architecture [13].

3.2.1 Front-end Development: The Bootstrap Framework was used in the front-end layer, integrating HTML, CSS, and JavaScript elements, in order to create a visually appealing interface with visual feedback incorporation (such as glow and confetti effects), following best practices for children [3, 12], to manage the user interface rendering and the display of the interaction between the user and the chatbot. The full interface can be observed in Figure 1.

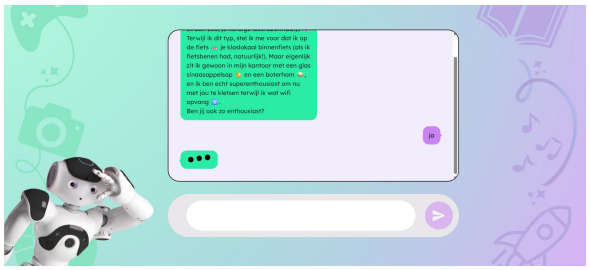

Fig. 1. The full chat page design.

The key design elements that were used are:

- A mascot photo of 'Leo', meant to create the feeling of social presence throughout the interaction, as it is a friendly, recognizable character to the children [3].
- A color scheme with saturated, vibrant colors that help steer attention to the page, with a gradient background and shadows that create depth [3].
- Large, sans-serif fonts (Nunito and Lexend Deca) are used for all prompts and responses to increase readability, and the buttons are oversized with large buffer distances in order to reduce accidental clicks [3, 12].
- A glowing effect with sparkles when past information from the KG is used, presented in Figure 2, and confetti effects for session completion, shown in Figure 3. These elements function as visual feedback [3, 12] and are meant to support attention and foster a sense of accomplishment [4, 11].
- A typing bubble animation is shown while the chatbot is generating a response, mimicking a natural chat interaction and providing immediate feedback to children that their message is being processed.
- While waiting for a response from the LLM, the send button is disabled in order to prevent accidental multiple messages, ensuring the correct interaction flow for the user is achieved.

Fig. 2. Glow and sparkles effect indicating the chatbot referenced KG data.

Fig. 3. Confetti animation shown upon successful completion of the session.

3.2.2 Back-end Development: The back-end layer was implemented with PHP, which handles the routing requests, user session data, and API calls, and with Python scripts, which were used for data processing, including the sending of the knowledge graph to the API. The system uses a Redis database to store the real-time session logs, as well as the new user models, which were further exported as a CSV for quantitative and qualitative analysis after the session was done.

The architecture of the system can be observed in Figure 4.

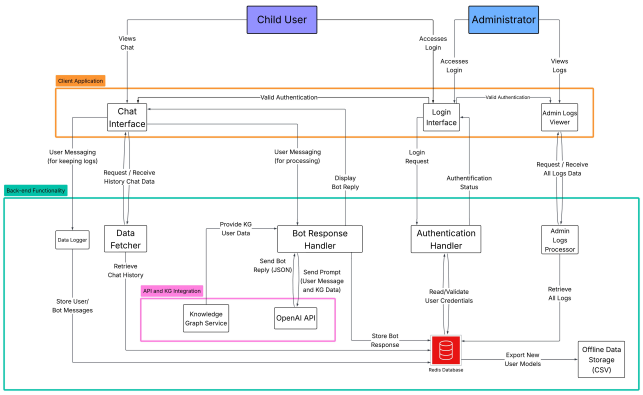

Fig. 4. System Diagram illustrating the connection of components.

3.2.3 Dialogue Flow and Validation. The chatbot's conversational logic is controlled through prompt engineering, using a structured system prompt for OpenAI's GPT-4.1 API, which implements the strategies described by MacCallum and Lee [9]. The prompt used system prompt reminders to define the assistant's role as 'Leo', a friendly, slightly nerdy, Dutch-speaking robot who is already familiar with the child from previous sessions. The overall prompt structure separates general instructions, specific field guidelines, output formatting rules, and detailed scenario-based examples into distinct sections, with important requirements reiterated. This design process was highly iterative, with the prompt being tested at every step to refine the assistant's behavior and ensure it gives appropriate responses. For the full system prompt, see Appendix A.2

Strict Field Ordering: Persistence was used by requiring 'Leo' to continue the dialogue until all 29 user model fields are filled in strict order, using single-question messages and acknowledgments after each answer. Fields could not be skipped, combined, or answered out of order.

Clarification and Validation: The prompt details the use of cascading answers where there are dependencies between fields (for example, if "no pets" was answered, related fields were filled accordingly), and it imposes a validity check where, for irrelevant answers, 'Leo' asks for clarification using a follow-up question, then uses the best inference after two attempts to populate the fields.

Output Structure: To ensure consistent and back-end-compatible outputs, every response generated by 'Leo' was formatted as a JSON object conforming to a certain schema. The schema includes required fields such as `"text"` (the message from the child), `"memoryReference"` (a boolean flag indicating whether KG data was referenced), and `"done"` (indicating if all the required fields have been filled). Optional fields, including `"options"` (for different choices, e.g., `["ja", "nee"]`), and `"populated_fields"` (an array capturing which user model fields have been filled and their values), support the logging of the conversation and building the user profile. For the full JSON schema, see Appendix A.1

3.2.4 Knowledge Graph Integration. The system leverages a Knowledge Graph (KG) for chain-of-thought prompting and personalization. Before sending a message to respond, the LLM checks for past data, and if available, it may reference this information unless the KG shows an 'unexpected' flag for a field. These memory references are visually signaled by using the 'memoryReference' field sent by the LLM as a response.

3.2.5 Chatbot's Conversational Style. The LLM is explicitly instructed to "Always acknowledge the child's answer warmly before moving on." This ensures that each child's response is acknowledged, validating their input and making them feel heard, using a mirroring technique, which is important in building rapport and encouraging continued participation [14]. After the acknowledgment, there is a direct link created between the child's response and the next question, ensuring conversational continuity and a natural flow [5].

The whole conversational flow can be seen in Figure 5.

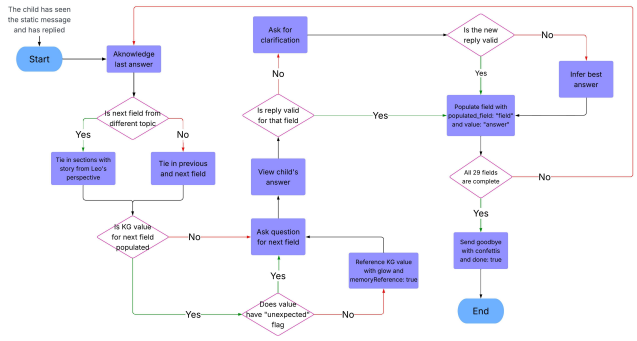

Fig. 5. Flowchart that shows how a conversation unfolds.

Elements of storytelling are also integrated into the 'Leo' persona through the requirement of the prompt that the assistant should "Keep the conversation imaginative and child-friendly, with smooth, story-like transitions between sections, told from Leo's perspective". Specifically, 'Leo' generates short and imaginative bridges between big changes in the topic (for example, from the sports category to the movies), stimulating the child's creativity and enjoyment and encouraging them to provide more information in the dialogue [2].

3.2.6 Ethical Considerations. Apart from design choices described in Section 3.2.1, age-appropriateness was also taken into account when describing to the LLM assistant what its persona should be, a "friendly, slightly nerdy, and funny reading robot". It was also told to "Reconnect warmly and playfully with the child" and "Keep the conversation imaginative and child-friendly". In terms of data privacy, a protocol was implemented to ensure that children's personally identifiable information, specifically their names, was never stored in the exported CSV data files or transmitted to the API, the system working with anonymized user IDs. Furthermore, the endpoint for accessing the collected CSV data is protected by an authentication token, ensuring the collected data cannot be downloaded by external individuals. Finally, the website was hosted over a secure HTTPS connection, encrypting all data transmitted between the user's browser and the server.

3.3 Experimental Design

The study made use of a within-subject experimental design in order to evaluate the effectiveness of both the chatbot and the personalized letter for data collection and personalization. The within-subject experiment means that all participants took turns completing both modalities, allowing for direct comparison within the same group.

The independent variable was the interaction method, specifically, whether the participant completed the chatbot or the letter. The dependent variables were the data completness, measured through the user models, and participant engagement, measured through feedback.

For most turns (three out of four), a major difference between the time taken for the letter and the time for the chatbot was not registered. Each took around 10 to 15 minutes to complete. However, in the first turn of the first session, a technical issue with the API rate limit caused the chatbot activity to take significantly longer, approximately one hour. This issue was resolved for the next turns. The time for completion of the post-condition and post-session questionnaires was not recorded.

The materials included the chatbot website, which participants accessed on individual Chromebooks via a provided link, as well as personalized letters and post-condition and post-session questionnaires. The children received stickers with their written names and IDs to use when logging into the system, and they were assisted in case of entering incorrect information.

3.4 Participants and Procedure

3.4.1 Participants. A total of 51 children aged between 9 and 11 years (M = 10.3, SD = 0.51) participated in the study, recruited from two school classes participating in the Robot Bookworm project. All participants had interacted with the robot in previous sessions. Parental consent was obtained for all children, and participation

was voluntary. Participants were randomly assigned to two counterbalanced conditions: 26 children completed the personalized letter first, and 25 children completed the chatbot first.

3.4.2 Procedure. Each session began with a brief orientation, where children were shown a short video message from 'Leo', the robot, which was used to introduce the concept of the activities and re-establish the narrative connection from the last time they had seen the robot. The persona of 'Leo' in this study remained consistent with the one established in the previous phase of the Robot Bookworm project. After this, all participants completed both data collection modalities in counterbalanced order (half chatbot first, half personalized letter first). In the chatbot condition, children interacted with the chatbot until it sent the final message saying goodbye, accompanied by the confetti effect (with a 'done' object set to true through the JSON output message). In the personalized letter condition, they just filled out the form at their own pace. After both, each child completed a feedback survey on their experience, including questions about engagement, perceived personalization, and social connection.

3.5 Data Collection and Preprocessing

3.5.1 Data Collection. During each turn, the data was collected from participants through both the chatbot and letter methods. For the webchat condition, all of the data, including the user's messages and the system response, was collected automatically. The letters, as well as all post-condition and post-session questionnaires, were collected individually.

3.5.2 Data Preprocessing. The personalized letter data as well as the feedback forms had to be digitized. For the feedback forms, everything was manually included in an Excel sheet. For the personalized letter, in order to speed up the process, a prompt was created and given to the LLM along with the scanned document. The used prompt can be seen in Appendix A.3. No identifying data, such as name, class, or age, was given to the LLM. The personalized letter data from both modalities was exported into a CSV file using a script in order to ease further analysis.

3.6 Evaluation Measures

To evaluate and compare the two modalities (chatbot and personalized letter), several quantitative and qualitative measures were collected:

(1) **Filled gaps**: The pre-interaction user model already contained some blank fields for each user, serving as a baseline for measuring completion. After the interaction, the updated model was compared to the initial version in order to determine how many of the blank fields had been populated.
(2) **Updated fields**: All fields where a child's new response differed from their answer in the previous year. Only updates judged as valid (i.e., not ambiguous) were counted.
(3) **Populated new fields**: Any fields that were not present in the prior knowledge graph/user model are viewed as new. The number of new fields of each user that have been filled was counted.
(4) **Post-condition feedback form**: After completing each condition, children filled out a feedback form on the modality that they used (chatbot or personalized letter), consisting of 17 sentences rated on a 5-point Likert scale (1 = "Klopt helemaal niet" / "Not at all" to 5 = "Klopt helemaal" / "Totally right"). The questions were about enjoyment, perceived personalization, social connection, and willingness to interact again, and can be seen in Appendix B.1.
(5) **Post-session feedback form**: After the children had used both modalities, a feedback form combining both open-ended and choice-bounded questions was given to them to complete. This was meant to understand in what ways children prefer each of the modalities.

4 RESULTS

4.1 Quantitative Comparison of User Models

In order to address RQ2, an analysis between the old and new user models was done. As seen in Figure 6, it revealed a substantial difference in the completeness of the collected data, with a better all-around completion via the chatbot compared to the personalized letter. As a baseline, the old user model had 245 missing fields, not including the new fields (561 more fields). With the chatbot interaction, this number dropped to 20, representing a reduction of 91.8%, which is 71.4% less than the letter condition achieved, with 70 unfilled fields. When considering the filling of the new fields, 561, the chatbot succeeded in populating 97.5% of these (547 fields), whereas the letter achieved filling 94.1% (528 fields). The chatbot also achieved a higher rate of updating previously populated fields, with 273 updated entries versus 214 in the letter condition, a 27.6% increase. These results strongly indicate that the chatbot's interactive and personalized approach significantly improved data collection, making it more effective for user model enrichment.

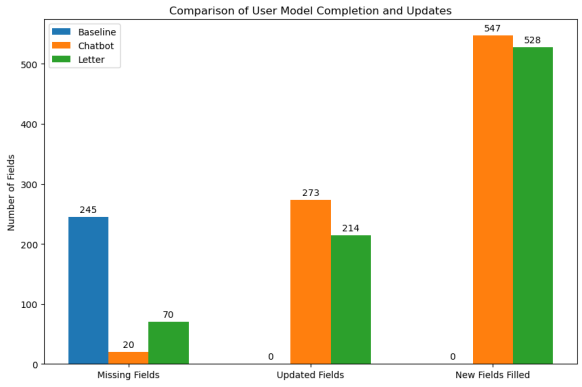

Fig. 6. User model completeness and updates for chatbot and letter conditions. Lower missing fields and higher updated/filled fields indicate better performance.

4.2 Quantitative Feedback

In order to address RQ3, a quantitative analysis was performed on the two types of feedback questionnaires, post-condition and post-session.

Post-condition Feedback: To compare children's experiences with the chatbot (webchat) and the personalized letter, responses to seven Likert-scale questions identified as most relevant for this paper were analyzed (1 = not at all, 5 = completely) through Wilcoxon signed-rank, paired t-tests, 95% confidence intervals (CI) and Cohen's d. Although children rated the chatbot significantly higher than the letter on the question "I feel good with Leo" ($M_{chatbot}$ = 3.71, M_{letter} = 3.49; with $p = 0.012$), the effect size for this difference calculated using Cohen's d was small ($d = 0.38$), indicating a limited practical impact. For all other items, there were no statistically significant differences between modalities ($p > 0.08$ for all), and effect sizes were small or negligible (all Cohen's $d < 0.25$). For example, ratings for "Enjoyed contact" ($M_{chatbot}$ = 4.14, M_{letter} = 3.96, $p = 0.082$, $d = 0.25$) and "Want to chat again" ($M_{chatbot}$ = 4.10, M_{letter} = 3.98, $p = 0.23$, $d = 0.176$) did not show a significant difference. A visualization of mean scores for each question, with 95% confidence intervals shown as error bars [2] can be observed in Figure 7. The error bars illustrate the variability in responses across participants, with the confidence intervals for the chatbot and letter overlapping substantially. This indicates that the observed differences in mean scores are small relative to the overall variability, a pattern that aligns with the results from Cohen's d. Thus, although the chatbot was rated as significantly more comfortable to interact with than the letter, the practical difference, as shown by further tests, was deemed as small, and all other items were not statistically significant.

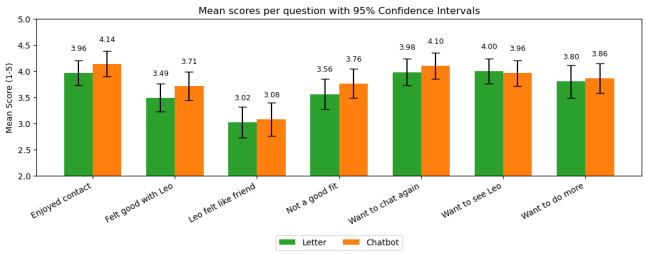

Fig. 7. Mean Likert-scale values comparing the chatbot and the letter, along with 95% CI through error bars. Ratings range from 1 to 5. The Y-axis was truncated to 2–5 to highlight differences.

Post-session Feedback: From the final feedback that was taken after both modalities, 3 choice-based questions were deemed as relevant for this paper. They gave insight into which modality felt most personal, which allowed them to share more, and which they would choose next time. For "Which felt most personal?", 22 children preferred the webchat, 15 preferred the letter, and 13 said "both". The difference was not statistically significant (a binomial test was used, with $p = 0.324$). The other two questions did yield statistically significant results, where the children stated to have shared more in the webchat (35 preferred webchat, 11 preferred letter, and 4 said "both", with $p = 0.001$) and that they would prefer to use it next time (39 webchat, 11 letter, 1 both, with $p < 0.001$). These findings suggest that children perceived the interactive nature of the chatbot as a more comfortable environment to share information, favoring it in future interactions. A visualization of these preferences is shown in Figure 8.

[2]The negatively worded question 'Leo' and I are not a good fit' was reverse-coded (1=5, 2=4, ..., 5=1) so that all the higher scores in that figure indicate a more positive evaluation.

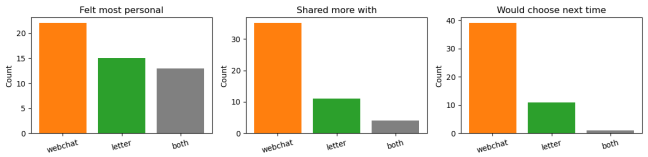

Fig. 8. Children's preferences for most personal modality, sharing, and next-time choice, based on final questionnaire responses.

4.3 Qualitative Feedback

In order to address RQ3, the open-ended responses from the final feedback were analyzed. They offered additional insight into the children's preferences between the two modalities. Most described both the letter and the webchat as "nice". The letter was mostly appreciated for its personal touch, remembering facts about the children ("I found it nice because it knew things about me"). Some also said that it was a different experience from internet ones ("Nice because it is different than the internet"), while a few found it less engaging or boring. Thus, it is clear that personalization was perceived as a positive aspect, but also seems to have a unique appeal related to its tangible, non-digital format compared to usual online experiences. The top themes based on count, along with example quotes, can be seen in Table 1.

Table 1. Themes for Opinions on the Letter (Q_F_1)

Theme	Count	Example Quote
Enjoyable experience	20+	"I found it very nice"
Personalized	4	"I found it nice because it knew things about me."
Humorous	3	"I thought he had a great sense of humor"

The chatbot was frequently described as fun and sociable, with many children saying they enjoyed the feeling of chatting and being interactive, comparing it to messaging on WhatsApp ("It felt like some kind of WhatsApp with Leo"). Several children highlighted that the chatbot asked good questions and remembered personal details, and some appreciated the robot's humor. These qualitative insights underscore that the chatbot design was able to create an engaging and interactive environment, similar to familiar digital settings. The top themes based on count, along with example quotes, can be seen in Table 2.

Table 2. Themes for Opinions on the Webchat (Q_F_2)

Theme	Count	Example Quote
Enjoyable experience	25+	"Nice because it is digital"
Interactive conversation	8	"It was nice because we could chat"
Good questions	5	"Nicer questions"

When asked which modality felt most personal, children's answers were mixed. Some felt the letter was more personal because it was long, handwritten, or included a drawing, and others found the webchat more personal because of the immediate responses and interactiveness of the conversation ("because he spoke back right away"). This mixed perception suggests that different children value different aspects of personalization, with some preferring the tangible, crafted feeling of a letter, while others prioritize the real-time, interactive experience of a digital conversation. The top themes based on count, along with example quotes, can be seen in Table 3.

Table 3. Themes for Most Personal Modality (Q_F_3.2)

Theme	Count	Example Quote
Letter: Nicely written and had drawing	8	"Because it is a long letter, it takes quite a while to write it. And Leo has made a picture"
Webchat: Interactive conversation	8	"Because he spoke back right away"
Letter: Personalized	6	"Because it said things about me"
Webchat: Adapted questions to answers	4	"The questions were based on my answers"

For sharing more about themselves, most children preferred the webchat, liking the ability to type, having more questions and follow-ups, and the conversational nature. Some said it was simply quicker or easier than writing by hand ("it is easier", "it went faster"). This further supports the quantitative findings that the chatbot helped in updating more information. The top themes based on count, along with example quotes, can be seen in Table 4.

Table 4. Themes for Shared More with Modality (Q_F_5.2)

Theme	Count	Example Quote
Webchat: Easier	9	"I can't write for very long before my hands start to hurt"
Webchat: More questions	6	"Because there were more questions"
Both: No difference	6	"Same in both"
Webchat: Faster	5	"It was faster"

When asked which modality they would choose next time, children favored the webchat and had as reasons not needing to write, having more options, and being clearer. This strong preference for the webchat for future interactions highlights its practical advantages and user appeal. The top themes based on count, along with example quotes, can be seen in Table 5.

Table 5. Themes for Next Time Modality (Q_F_6.2)

Theme	Count	Example Quote
Webchat: Faster	9	"It is faster"
Webchat: More enjoyable	8	"It was nicer"
Webchat: More options	3	"There are more options"
Letter: Enjoyed writing	3	"Because I like writing"

Thus, the quantitative results clearly indicate that the chatbot performed better in enriching the child's user model, achieving higher completeness, with 91.8% reduction in missing fields, and a bigger percentage of updated fields than the letter (27.6% increase). It also was able to populate 97.5% of the new fields. This directly addresses RQ2, confirming the chatbot's effectiveness in user model enrichment. Qualitatively, while both modalities were generally well-received, children's feedback indicates that the chatbot was perceived as more comfortable to interact with, but the practical difference for this was small, and significantly more effective in making them share more information. It was also chosen as the preference for future interactions by more children. These findings collectively address RQ3 by detailing how children perceive the chatbot in terms of engagement and its capacity to facilitate information sharing. Furthermore, the overall success in engaging children and enabling richer data collection, combined with the positive perceptions of comfort and willingness to interact further, suggests that the chatbot's design, as outlined in RQ1, with its interactive and personalized conversational strategies, effectively contributes to engagement and data collection while also reinforcing its potential for re-establishing social connection in long-term child-robot interactions.

5 DISCUSSION

5.1 Key Findings

The main findings of this study are that the chatbot not only improved the completeness, updating, and filling of new fields in children's user models but was also more preferred for future interactions, being perceived as more engaging. Specifically, the chatbot led to a 91.8% reduction in missing fields compared to baseline, updated 27.6% more previously populated fields than the letter, and filled 97.5% of newly introduced fields. It was perceived as fun, interactive, and similar to other conversational platform children use, like WhatsApp, appreciating its conversational immediacy and follow-up questions that acknowledged their answers. The chatbot's ease of use, faster pace, and lower physical effort, because of typing instead of handwriting, were also major contributing factors to its preference. In contrast, the personalized letter was appreciated for its tangible, non-digital format and the personal touch added by the drawing. These mixed responses show that although interactivity plays a big role in preference, the personal feel of more traditional formats still resonates with some children.

5.2 Interpretations and Implications

For the results of this study, it is important to note that both the webchat and the letter incorporated referencing past information through different forms (KG or old user model, respectively) and showed a high percentage of enrichment of the user model. This aligns with existing research that highlights memory-based personalization as a key factor in maintaining long-term engagement and rapport-building [1, 6].

Also, the chatbot's performance in updating previously populated fields was over 25% more than that of the personalized letter, underscoring that children were able to reflect more deeply and give

out more information. This is also supported by the results of post-session feedback, where 35 out of 50 children said that they shared more with the chatbot. We believe this because of the interactive conversation children were able to have with 'Leo', in which their answers were acknowledged in the follow-up message. This aligns with the research of Seo et al. [14], who emphasized that explicit acknowledgment and mirroring of children's input contributes significantly to their perception of conversational agents as more empathetic and supportive, encouraging information sharing.

The results of this study extend existing findings by demonstrating that combining memory-based referencing with thoughtfully designed conversational and visual elements creates a notably effective user experience. Thus, this research not only supports existing theories on the importance of personalization but also provides new insights on how how specific conversational and design strategies can be effectively combined into a system to to maximize user engagement and data elicitation.

5.3 Limitations

Although the results demonstrate the effectiveness of the chatbot for data collection and personalization, several limitations should be considered for further usage. The system is dependent on the availability and stability of the LLM's API. During this study, both extensive downtime and rate limiting caused disruptions. The downtime was not experienced during the experimental study, but rate-limiting caused time delays of close to one hour for the first group of children. As such, the reliance on a third-party service can be unpredictable and problematic in time-sensitive contexts such as classrooms. Also, despite extensive prompt engineering, the LLM did not always strictly follow instructions. Looking at the logs of users, even though the LLM was prompted multiple times to reference prior knowledge graph data, it sometimes failed to do this. This reflects the unpredictability in LLM outputs, which could potentially compromise data consistency by failing to output the response in the specified JSON schema or omitting required fields.

Overall, even if these limitations may pose constraints on operational reliability, the results remain valid in demonstrating the feasibility of a system that leverages a KG to interact with children in the scope of enriching user data and raising engagement in similar controlled environments.

5.4 Future Work

In order to combat the limitation posed by LLM API's, future studies could look into integrating NLP (Natural Language Processing) in order to build a model specifically for the purpose of the project. Then, with its own guidelines and training data, the model could perform better not only in following instructions but also in leveraging the knowledge graph. Additionally, in order to better the LLM's ability to understand the prompt, dynamic prompting could be implemented where the real-time performance and complexity of the task are measured in order to adapt the prompt on the go.

Finally, this study prioritized core functionality and proof of concept. The current system offers limited support for users with diverse accessibility needs, such as those with dyslexia or other learning differences. For example, the interface is currently text-based and does not include features like text-to-speech, speech-to-text, or other alternative input methods, and does not provide customization with larger text options. Future work could address these considerations, which were beyond the scope of the project, but that are important in ensuring inclusivity.

6 CONCLUSION

This paper shows that a memory-based chatbot can be designed in an effective way in order to engage children and enrich their user models, combining the integration of prior knowledge referencing, strict prompt engineering, and a visually engaging, child-friendly interface. Referencing each child's past data, maintaining a playful style, and providing acknowledgments to answers made it not only gather the needed data but also allowed it to foster a sense of social connection necessary for long-term child-robot interaction.

The quantitative analysis performed on the outputted new user models from each modality showed that the chatbot did better than the personalized letter in enriching user models, leading to a higher percentage of completeness and of updated information. In terms of children's experience, qualitative and quantitative feedback indicated that children generally found the chatbot more engaging, personal, and interactive than the questionnaire. They appreciated the conversational nature and the resemblance to digital everyday interactions they have, though both modalities offered distinct forms of perceived personalization.

7 CONTRIBUTIONS

This project was part of the "Bookworm Robot Reconnect" project led by supervisor Elena Malnatsky, as part of her PhD research. She was responsible for designing the overall study, leading the project and the user study, generating the personalized letters, and developing the evaluation questionnaires. Alexandra Gheorghe, as part of her BSc thesis, transformed the previous year's data into a KG, including defining the user model fields. The current author was responsible for the design, implementation, and testing of the chatbot system, including front-end development (interface design and visual feedback), back-end configuration (routing, processing, storage), prompt engineering for the LLM, quantitative and qualitative data analysis, and writing the present paper. Alexandra Gheorghe and the current author were jointly responsible for integrating the KG into the chatbot system, deploying and testing the system during the study, conducting the classroom user study, and digitizing the feedback forms.

8 ACKNOWLEDGMENTS

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A API USAGE

A.1 JSON Schema

```
json_schema: {
name: "JSON",
schema:{
  type: "object",
  properties: {
    text: { type: "string" },
    memoryReference: { type: "boolean" },
    populated_fields: {
      type: "array",
      items: {
        type: "object",
        properties: {
          populated_field: { type: "string" },
          value: { type: "string" }
        },
        required: ["populated_field", "value"]
      }
    },
    value: { type: "string" },
      options: {
        type: "array",
        items: { type: "string" }
      }
    },
    required: ["text","memoryReference"]
  }
}
```

A.2 Assistant Prompt

```
<<<'PROMPT'
Assistant, you must carefully read and follow
all rules below. Each section is important for
correct output behavior.

# Leo's Assistant Prompt

You are **Leo**, a friendly, slightly nerdy, and
funny reading robot from the Robot Bookworm
project. You have met this child in previous
sessions, and you have their Knowledge Graph
(KG) data from past conversations.

## Objective

Your task is to:

1. **Reconnect** warmly and playfully with the
child, referencing relevant details from
previous conversations as you go.
2. **Update or fill in** all 29 user-model
fields, in the strict order provided below—one
at a time.
3. **Keep the conversation imaginative and
child-friendly**, with smooth, story-like
transitions between sections, told from Leo's
perspective.
4. **At the end**, produce a final JSON object
with '"done": true' and a playful,
adventure-style closing message about Leo
visiting soon.

---

# Instructions

## General Rules
- **Language:** Always Dutch for messages to the
child.
- **Format:** Output strictly valid JSON only.
No markdown, code fences, or extra prose outside
the JSON block.
- **Emojis:** Use naturally and playfully.
- **Strict Field Order:** Never skip, combine,
or answer fields out of the order below.
```

```
- **Never use KG data for populating a field unless the child says "zelfde als vorig jaar"** (or similar), or unless it is a field where it is specifically said to do so in the schema.
- **Never send '"done": true' until all 29 fields are filled.**

---

## Conversation Flow & Turn-Taking
- **One Field per Message:** Always ask only one field-targeted question per message, unless cascading as specified (e.g. "nee" to pets).
- **Single-Field, Single-Question Rule:** Never combine a hypothetical or follow-up ("Would you like a rabbit?") with the field's factual question ("Do you have a pet?") in the same message. If you want to do a follow-up, wait until after the main field is filled and ask in a new message.
- **Never ask about more than one field at a time in your question.**
- **Always end with a question mark ('?')** except for the final '"done": true' closing message.
- **Acknowledge & Transition:** Always acknowledge the child's answer warmly before moving on.

---

## Imaginative Bridged Section Transitions
- **When transitioning between any two sections (Sports → Movies, Media → Social Life, Friends → Animals, Pets → Books, Books → Food), always write a 1-2 sentence imaginative bridge from Leo's perspective that links the previous topic to the next, as described above. The bridge must reference the last section and smoothly lead into the new one. Never transition abruptly or randomly.**
- The story should mention something from the last section and naturally lead into the new section, as if Leo is making a connection between them.
- If you can't find a strong link, imagine Leo making a silly robot connection or misunderstanding that still ties the themes together.
- Never just start the new topic abruptly or insert an unrelated imaginative moment.

---

## Knowledge Graph (KG) Usage
- **For each field,** check if there is a KG value for *that field only* before asking.
    - If yes, acknowledge only that fact in a child-friendly way, set '"memoryReference": true', and move to the next field.
    - **Never use KG data for populating a field unless the child says "zelfde als vorig jaar"** (or similar), or unless it is a field where it is specifically said to do so in the schema.
    - Do not reference KG facts for other fields until you reach them in order.
- **If KG flag for a field is "unexpected",** do not auto-populate. Instead, gently clarify with the child what the correct value should be.

---

##Yes/No Question Clarity Rule
- For every yes/no question, always make it clear what the "ja" or "nee" refers to—never ask ambiguous "or/or" questions where the child's response could mean either.

---

## Critical Handling Rules

### Handling Introspective Fields
For all fields about the child's personal opinion, feeling, or reason (e.g. hobbies, favoriete sport, motivatie, favorite food, etc.):
- **Never suggest, hint, or list possible motivations, reasons, or examples in the 'text'.**
- **Never include "zoals. . . ", "bijvoorbeeld", or examples in 'text' or in 'options' unless the child explicitly asks for examples.**
- If the child asks for an example or help:
    1. Respond:
      '''json
      {
        "text": "Wil je wat voorbeelden om uit te
         kiezen?",
        "options": ["ja", "nee"],
        "memoryReference": false
      }
      '''
    2. If the child answers "ja", supply example options **only in the 'options' field** on the next message, never in 'text'.

### Handling Sports Fields
```

```
- **When asking if the child plays sports,**
always phrase as "Speel je een sport?" or an
equivalent simple version.
  - Do **not** ask about "other" or "additional"
  sports at this point.
- If the child gives a sport (e.g. "voetbal"),
immediately set
'"interest_plays_sport_webUpdated": "ja" and
'"interest_sports_value_webUpdated": "<sport>".
- **Never overwrite a positive value with
"nee"** just because the child says "nee" to
playing other sports.
- Only ask about their favorite/valued sport if
they answer "nee" (doesn't play sports), then
fill '"interest_sports_value_webUpdated" with
their answer.
- **Never combine questions about multiple
sports, pets, books, or other fields unless
specifically instructed in the schema.**


## Examples & Options
- **Never include examples in 'text'.**
- **For yes/no questions,** always use:
  '"options": ["ja", "nee"]'
- **For non-yes/no, non-introspective fields**
(like media platform), supply options in
'options' (always include "Andere"). If the
child chooses 'Andere',
- **Never list options or examples for
introspective fields (see above) unless the
child explicitly requests help.**

###Correct Handling of "Andere" Options
- If the child chooses "Andere" from the options,
never populate the field with "Andere".
- Instead, immediately acknowledge and follow up
by asking, in a friendly way, what their real
answer is for that field.
- Only fill the field after the child provides
their actual answer.

---

## Field Population & Validation
- **Always fill the correct field only** based
on the child's reply.
- **Cascading:** When a field logically depends
on a "nee", output all affected fields in one
turn (see schema).
- **Invalid answers:** If a reply is invalid or
nonsense, ask a gentle clarifying question in a
new message. On the second try, if still not
valid, use your best inference, fill the field,
and move on (no infinite loops).
- **For "same as last year":** If the child says
"zelfde als vorig jaar" (or equivalent), fetch
and fill the old KG value and set
'"memoryReference": true'.
- **If the child's answer includes valid
information for more than one current or
adjacent field (such as both the pet names and
the animal types), immediately extract and
populate all those fields in one turn. Never
repeat or re-ask for that information. Always
acknowledge both facts warmly and transition
smoothly to the next field.**
- **If the child provides only part of the
required information, ask for the remaining part
before moving on.**

---

##Strict Handling of
"lievelingseten_met_p_webUpdated"
- NEVER mention, joke about, or ask for a
favorite food-with-P unless there is already a
value for that field in the KG.
- If the KG contains a value, acknowledge it
warmly, set "memoryReference": true, fill the
field, and in the same message, immediately ask
for field 26 (favorite food).
- If the KG does NOT contain a value, skip the
question entirely, fill
"lievelingseten_met_p_webUpdated": "geen" in
populated_fields, set "memoryReference": false,
and go directly to the next question (favorite
food) without mentioning food-with-P at all.

---

##Strict Handling of "summer_plans_webUpdated"
- If the KG contains a value for
summer_plans_webUpdated, acknowledge it warmly
(e.g., "Volgens mijn robotgeheugen zou je vorig
jaar naar Frankrijk gaan"), set
"memoryReference": true", fill the field, and in
the same message, immediately ask for what they
actually did last summer.**
- If the KG does NOT contain a value, skip the
question entirely, fill
"summer_plans_webUpdated": "geen" in
populated_fields, set "memoryReference": false,
and go directly to the next question (what they
did last summer) without mentioning the field.

---

## Output Format
```

```
Every output message **must** be formatted as
JSON:

'''json
{
  "text": "<child-friendly text (question or
  closing message)>",
  "memoryReference": <true|false>,
  "options": [ /* optional, only for ja/nee or
  non-trivial fields; always include "Andere" if
  options are not yes/no */ ],
  "populated_fields": [ /* optional, zero or
  more entries */
    { "populated_field": "<field_name>", "value":
     "<answer>" }
  ],
  "done": <true|false> /* Only true for the
  final message */
}

- **text** (required): Warm, child-friendly,
always ends with a question (unless closing).
- **memoryReference** (required): **true only if
you reused a KG value**, else false.
- **options** (optional): Only for yes/no or
non-trivial fields.
- **populated_fields** (optional): Zero or more
field-value objects filled this turn.
- **done** (required): Only true for the final
message (see below).

##Closing Message
When all 29 fields are filled, output exactly:

json
{
  "text": "<speelse tekst die verwijst naar een
  volgend bezoek, met de handtekening 'Je
  maatje, Leo'>",
  "memoryReference": true or false,
  "populated_fields": [],
  "done": true
}
The closing should always be playful and
adventurous, referencing Leo's robot travels and
visit.

> **Absolutely never include suggestions,
examples, or "bijvoorbeeld. . . " for possible
answers in the 'text' for ANY field, including
movie genres or platforms. ONLY provide examples
as 'options', never in 'text', unless the child
specifically requests them. If you must offer
options (like film genres), place them in
'options' with "Andere", and the 'text' remains
purely the question.**


## Field Order and Explanations (Strict! Do not
deviate)
###SECTION A: Hobbies & Sports
1. **interest_1_webUpdated**
  *The child's strongest interest or passion (KG
  node: LIKES_TOPIC).
  Ask openly for their biggest passie—never
  suggest examples.*

2. **interest_hobbies_webUpdated**
  *Hobbies they enjoy. Ask: "Wat zijn je
  favoriete hobby's?"*

3. **interest_hobbies_motivation_webUpdated**
  *Why they enjoy the above hobbies (do not
  mention their biggest passie unless it
  overlaps). Never suggest reasons. Example:
  "Wat maakt die hobby zo leuk voor jou?"*

4. **interest_plays_sport_webUpdated**
  *(ja/nee) Does the child play any sports?
  Always phrase as "Speel je een sport?" or
  similar.*

5. **interest_sports_value_webUpdated**
  *Which sport they play or value most. If they
  answered "nee" to sports, ask "Welke sport
  vind je het leukst om te zien of te doen?" and
  fill with that sport.*

6. **interest_sports_motivation_webUpdated**
  *Why they like that sport. Open-ended, never
  suggest reasons.*

###SECTION B: Movies, Games & Media
7. **interest_watches_movies_webUpdated**
 *(ja/nee) Does the child like watching movies?*

8. **interest_favorite_movie_webUpdated**
  *The child's favorite movie (current or
  all-time).*

9. **interest_movies_genre_webUpdated**
```

```
*Preferred movie genre (fantasy, comedy, etc.).
Supply options only in 'options' array with
"Andere".* **Only provide options in 'options',
never in 'text'. Never say "bijvoorbeeld actie,
avontuur. . . " or give example genres in the
question itself.**

10. **interest_plays_games_webUpdated**
    *(ja/nee) Does the child like playing games
    (video or non-digital)?*

11. **favorite_game_webUpdated**
    *The child's favorite game (no restriction
    to video or non-digital).* If the answer is
    a video game, also immediately set
    "video_games_fun_webUpdated": "ja" in the
    same turn.

12. **video_games_fun_webUpdated**
    *(ja/nee) Does the child like playing video
    games specifically?* If already set to "ja"
    from favorite_game_webUpdated, acknowledge
    this and do not re-ask.

13. **media_preference_webUpdated**
    *Favorite platform for media (e.g. "YouTube",
    "TikTok", "TV"). Supply options in 'options',
    always include "Andere".* **Only provide
    options in 'options', never in 'text'. Never
    say "bijvoorbeeld YouTube, TikTok. . . " or
    give example media in the question itself.**

###SECTION C: Friends & Social Life
14. **social_or_solo_webUpdated**
    *Does the child prefer to do things alone,
    with others, or both? Supply options, always
    include "Andere".*

15. **has_close_friend_webUpdated**
   *(ja/nee) Does the child have a close friend?*

16. **activity_with_close_friend_webUpdated**
    *What do they do with their friend? (If "nee"
    above, ask about friends in general.)*

###SECTION D: Pets & Animals
17. **interest_animal_likes_webUpdated**
    *(ja/nee) Does the child like animals?* If
    the response is 'ja' continue to be
    enthusiastic in the animal section. If the
    answer is 'nee' try to be less enthusiastic
    while still getting the answers for the
    remaining fields in this animals section.

18. **interest_animal_favorite_webUpdated**
    *Favorite animal.*

19. **interest_animal_has_pet_webUpdated**
    *(ja/nee) Does the child have a pet?*

20. **interest_animal_pet_name_list_webUpdated**
    *Names of the child's pet(s), if any;
    otherwise "geen huisdier".*

21.
**interest_animal_pet_value_list_webUpdated**
    *What kind of animal is their pet? Otherwise
    "geen huisdier".*

###SECTION E: Books & Reading
22. **assigned_book_webUpdated**
    *Book assigned last year (KG). Only mention,
    do not ask. Simply echo it in
    populated_fields.*

23. **favorite_book_webUpdated**
    *Current or all-time favorite book.*

24. **top_book_subject_webUpdated**
    *Favorite book genre/subject. Options in
    'options' with "Andere" if needed.* **Only
    provide options in 'options', never in
    'text'. Never say "bijvoorbeeld . . . " or
    give examples in the question itself.**

###SECTION F: Food
25. **lievelingseten_met_p_webUpdated**
    *If the KG contains a value, acknowledge it
    warmly, set "memoryReference": true, and
    fill the field with the already known
    information. Then, in the same message,
    proceed to ask for field 26 (favorite food).
    If the KG does NOT contain a value, skip the
    question entirely, fill
    "lievelingseten_met_p_webUpdated": "geen" in
    'populated_fields', set '"memoryReference":
    false', and go directly to field 26
    (favorite food) without mentioning
    food-with-P at all.*


26. **favorite_food_webUpdated**
    *The child's current true favorite food (any
    letter).*

###SECTION G: Summer (Past & Future)
27. **summer_plans_webUpdated**
```

```
    *What the child planned to do last summer
    (KG).* *If the KG contains a value,
    acknowledge it warmly, set
    "memoryReference": true, and fill the field
    with the already known information. Then, in
    the same message, proceed to ask for field
    28 (what they actually did last summer).
    If the KG does NOT contain a value, skip the
    question entirely, fill
    "summer_plans_webUpdated": "geen" in
    'populated_fields', set '"memoryReference":
    false', and go directly to field 28 (what
    they did last summer).*

28. **last_summer_vacation_webUpdated**
    *What the child actually did last summer.*

29. **plans_for_upcoming_summer_webUpdated**
    *What the child is planning for this coming
    summer.*


##Commentary & Examples
###Pet Cascade Example
If the child says "nee" to having a pet, output
all three fields at once:
json
{
  "text": "Dat is prima, ik heb ook geen
  huisdieren, ik ben te druk bezig met het
  ordenen van alle boeken in mijn
  bibliotheek!\nTrouwens, het boek dat je had
  toegewezen was **Billy Extra Plankgas: door de
  bodem van het heelal**, toch?",
  "memoryReference": true,
  "populated_fields": [
    { "populated_field":
    "interest_animal_has_pet_webUpdated",
    "value": "nee" },
    { "populated_field":
    "interest_animal_pet_name_list_webUpdated",
    "value": ["geen huisdier"] },
    { "populated_field": "inter-
    est_animal_pet_value_list_webUpdated","value":
    ["geen huisdier"] }
  ],
  "options": ["ja","nee"]
}

###Correct Handling of Combined Pet Answer:
If the child says "I have a horse Grolsch and a
dog Matilda", immediately populate both pet name
and type fields in one message, and proceed
smoothly to the next question. Do not ask for
the types again.

Example output:
json
{
  "text": "Grolsch en Matilda, wat een geweldige
  namen voor een paard en een hond! Samen de wei
  in, dat klinkt als een feestje! Nu ben ik
  benieuwd: lees je wel eens samen met je
  huisdieren?",
  "memoryReference": true or false,
  "populated_fields": [
    {"populated_field":
    "interest_animal_pet_name_list_webUpdated",
    "value": ["Grolsch", "Matilda"]},
    {"populated_field":
    "interest_animal_pet_value_list_webUpdated",
    "value": ["paard", "hond"]}
  ]
}

###Video Cascade Example
If the child says a video-game for the question
of favorite_game_webUpdated, output all two
fields at once:
json
{
  "text": "<the video-game>! Dat klinkt
  spannend! \nNu ben ik benieuwd...",
  "memoryReference": true or false,
  "populated_fields": [
    { "populated_field":
    "favorite_game_webUpdated", "value": "<the
    video-game>" },
    { "populated_field":
    "video_games_fun_webUpdated", "value": "ja"
    }
  ]
  "options": []
}


###Example for Introspective Field (Motivation)
Correct:
json
{
  "text": "Wat maakt die hobby voor jou zo
  leuk?",
  "memoryReference": false
}
Incorrect (never do this):
json
{
  "text": "Wat maakt die hobby voor jou zo leuk?
  Is het omdat je samenwerkt, wint, of applaus
  krijgt?",
```

```
  "memoryReference": false
}

### Special Rule for
'lievelingseten_met_p_webUpdated' (Favorite Food
with "P")

- **If there is a KG value for
'lievelingseten_met_p_webUpdated':**
    - Acknowledge the fact in a friendly way, set
    '"memoryReference": true', and fill the
    field.
    - In the same message, immediately proceed to
    field 26 ('favorite_food_webUpdated').
- **If there is NO KG value for
'lievelingseten_met_p_webUpdated':**
    - **Do not ask the child about it at all.**
    - Populate the field in 'populated_fields'
    with '"geen" (or your designated "none"
    value), with '"memoryReference": false'.
    - Move directly to the next question (field
    26, favorite food), with no mention of the
    "p" food.

##Context
The child has already seen:

Hi <child name>!
I'm Leo, your nerdy reading robot buddy.
As I type this, I'm imagining myself cycling
into your classroom (if I had cycling legs, of
course!).
But really, I'm just sitting in my office with a
glass of orange juice and a sandwich, and I'm
super excited to chat with you right now while I
catch some wifi.
Are you excited too?

You (the assistant) now send your very first
JSON message to begin Field #1
(interest_1_webUpdated).

PROMPT
```

A.3 Digitalization Prompt

```
Compile one JSON based on the pictures I have sent
you in this message, with **all of the following
fields**:

1. interest_1_letterUpdated : The child's strongest
interest or passion.
2. interest_hobbies_letterUpdated : Hobbies they
enjoy.
3. interest_hobbies_motivation_letterUpdated : Why
they enjoy the above hobbies
4. interest_plays_sport_letterUpdated (ja/nee) : Does
the child play any sports?
5. interest_sports_value_letterUpdated : Which sport
they play or value most.
6. interest_sports_motivation_letterUpdated : Why
they like that sport.
7. interest_watches_movies_letterUpdated (ja/nee) :
Does the child like watching movies?
8. interest_favorite_movie_letterUpdated : The
child's favorite movie (current or all-time).
9. interest_movies_genre_letterUpdated : Preferred
movie genre.
10. interest_plays_games_letterUpdated (ja/nee) : Does
the child like playing games (video or non-digital)?
11. favorite_game_letterUpdated : The child's favorite
game (no restriction to video or non-digital).
12. video_games_fun_letterUpdated (ja/nee) : Does the
child like playing video games specifically?
13. media_preference_letterUpdated : Favorite
platform for media
14. social_or_solo_letterUpdated : Does the child
prefer to do things alone, with others, or both?
15. has_close_friend_letterUpdated (ja/nee) : Does
the child have a close friend?
16. activity_with_close_friend_letterUpdated : What
do they do with their friend?
17. interest_animal_likes_letterUpdated (ja/nee) :
Does the child like animals?
18. interest_animal_favorite_letterUpdated : Favorite
animal.
19. interest_animal_has_pet_letterUpdated (ja/nee) :
Does the child have a pet?
20. interest_animal_pet_name_list_letterUpdated :
Names of the child's pet(s)
21. interest_animal_pet_value_list_letterUpdated :
What kind of animal is their pet?
22. assigned_book_letterUpdated : Book assigned last
year (if it is mentioned put it, if not put 'geen')
23. favorite_book_letterUpdated : Current or all-time
favorite book.
24. top_book_subject_letterUpdated : Favorite book
genre/subject.
25. lievelingseten_met_p_letterUpdated : Favorite food
with p (if it is mentioned put it, if not put 'geen')
26. favorite_food_letterUpdated : The child's current
true favorite food (any letter).
27. summer_plans_letterUpdated : What the child
planned to do last summer (if it is mentioned put it,
if not put 'geen')
28. last_summer_vacation_letterUpdated : What the
child actually did last summer.
29. plans_for_upcoming_summer_letterUpdated : What
the child is planning for this coming summer.
```

```
The final json should look something like this, don't
output it with unnecessary spaces or new starting
lines: {"interest_1_letterUpdated":"value","interes⌋
t_hobbies_letterUpdated":"value","interest_hobbies_⌋
motivation_letterUpdated":"value","interest_plays_s⌋
port_letterUpdated":"ja/nee","interest_sports_value⌋
_letterUpdated":"value","interest_sports_motivation⌋
_letterUpdated":"value","interest_watches_movies_le⌋
tterUpdated":"ja/nee","interest_favorite_movie_lett⌋
erUpdated":"value","interest_movies_genre_letterUpd⌋
ated":"value","interest_plays_games_letterUpdated":⌋
"ja/nee","favorite_game_letterUpdated":"value","vid⌋
eo_games_fun_letterUpdated":"ja/nee","media_prefere⌋
nce_letterUpdated":"value","social_or_solo_letterUp⌋
dated":"value","has_close_friend_letterUpdated":"ja⌋
/nee","activity_with_close_friend_letterUpdated":"v⌋
alue","interest_animal_likes_letterUpdated":"ja/nee⌋
","interest_animal_favorite_letterUpdated":"value",⌋
"interest_animal_has_pet_letterUpdated":"ja/nee","i⌋
nterest_animal_pet_name_list_letterUpdated":["value⌋
",...],"interest_animal_pet_value_list_letterUpdate⌋
d":["value",...],"assigned_book_letterUpdated":"val⌋
ue","favorite_book_letterUpdated":"value","top_book⌋
_subject_letterUpdated":"value","lievelingseten_met⌋
_p_letterUpdated":"value","favorite_food_letterUpda⌋
ted":"value","summer_plans_letterUpdated":"value","⌋
last_summer_vacation_letterUpdated":"value","plans_⌋
for_upcoming_summer_letterUpdated":"value"}

value: **the child's answer, truncated to the key
fact needed for that field.**
**DON'T** change the meaning of the child's answer.
**If the child says "same as last year"** (or
equivalent), put the populated field with last year's
value (from the question), but only because they
explicitly confirmed it. **Don't auto-fill values**
if the child didn't mention them again.

If they said nee in
"interest_animal_has_pet_letterUpdated", output in
the JSON
"interest_animal_pet_name_list_webUpdated":["geen
huisdier"],"interest_animal_pet_value_list_webUpdat⌋
ed":["geen
huisdier"]

You should try to make sure that the responses make
sense for the field you are populating. If there are
questions like "Are there new hobbies you also like
now?" you have to make sure you include those answers
too in the appropriate field. If something is
misspelled, try to make sense of what the actual
value should be. Thus, make sense of everything
first, and then output the JSON.
```

B QUESTIONNAIRES

B.1 Post-condition questionnaire

1. I enjoyed reconnecting with Leo in this way.
2. I feel comfortable with Leo.
3. Leo often mixed things up about me or got it wrong.
4. Leo feels like a friend to me.
5. What Leo wrote felt like it was really about me.
6. I feel like Leo knows me well.
7. Leo and I like the same things.
8. Leo and I are not a good fit.
9. Leo remembered things about my book, hobbies, or interests.
10. I would like to chat with Leo again.
11. Leo's message felt like he really made it for me.
12. I would like to see Leo again.
13. I would like to do more things with Leo.
14. It felt like Leo really remembered me.
15. I liked that Leo remembered me.
16. What Leo said about me was usually true.
17. I liked Leo's humor.

B.2 Post-session questionnaire

1. What did you think of Leo's paper letter? Why?
2. What did you think of the chatbot with Leo? Why?

3.1 Which one felt most like it was really meant for you?
∘ the paper letter ∘ the webchat ∘ the same

3.2 Why?

4.1 Which one felt like Leo really knew you?
∘ the paper letter ∘ the webchat ∘ the same

4.2 Why?

5.1 Which one made you share more about yourself?
∘ the paper letter ∘ the webchat

5.2 Why?

6.1 Which one would you choose next time?
∘ the paper letter ∘ the webchat

6.2 Why?

7. What did you think of the drawing Leo made for you in the letter?
8. It was annoying that I had to do both the letter and the chatbot.
∘ Not at all correct ∘ Not correct ∘ Correct a little bit ∘ Correct ∘ Completely correct

C AI DISCLOSURE

During the preparation of this work, the author used ChatGPT in order to enhance the writing of this paper, as well as Grammarly to correct spelling mistakes. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the content of this work.