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Learner-generated content, task engagement, affective response, and memory on technology-mediated conversation tasks

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Abstract

This study provides insight into the role of learner-generated content (LGC) in affective response and engagement during interactive tasks on a video conferencing platform. It also examines task content, affect and conation with respect to recall of the language used on tasks. The performances of four learners on recommendation tasks are analyzed in detail, comparing LGC with teacher-generated content (TGC). Results reveal that when listening to technology-mediated recommendations based on LGC, the information-receivers in the study took a more active role in the online tasks, interacted more with the speakers, displayed more positive emotions, felt more interested and focused, and were better able to recall the language and content that the speakers used. The results also revealed that the impact of LGC was consistent across learners of different first languages (Chinese, Indonesian), genders (female, male) and cultures (Confucian, Muslim) and that the effect of LGC in one technology-mediated context was comparable to the effects of LGC documented in previous research in face-to-face contexts. The study expands research on

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the role of the learner in task-based language teaching to measures of affect via facial analysis as well as language retention by learners in the receptive role of technology-mediated interactive tasks.

Keywords: TBLT; learner engagement; psychophysiology; English as a second language; technology-mediated tasks

1. Introduction

Previous research provides evidence that personal investment in the form of learner-generated content (LGC) tailored to personal experiences and needs positively impacts learners' engagement (Afreen & Norton, 2022; Lambert et al., 2017; Lambert & Zhang, 2019; MacIntyre & Wang, 2021) as well as their subsequent recall and target language (Lambert, Gong, et al., 2023). However, two limitations to research on the role of the learner in task-based language teaching (TBLT) as identified in Lambert, Aubrey and Bui (2023) are critical for advancing this research agenda. The first is expanding the methods used to investigate the role of the learner in TBLT (Lambert 2023a, 2023b; Macintyre, 2023), and the second is expanding research to new and emergent technology-mediated contexts (Qiu & Bui, 2022a, 2022b; Smith & Gonzalez-Lloret, 2021; Smith & Ziegler, 2023).

First, researchers have called for more sensitive measurement of learners' responses to tasks. Suggestions include the idiodynamic method (stimulated recalls and follow-up interviews) (MacIntyre, 2023; MacIntyre & Ducker, 2022) and psychophysiological tools to monitor learners' physical responses to tasks (Lambert, 2023b). The present study incorporates idiodynamic methods to gain insight into fluctuations in learners' subjective experiences as well as automated facial expression analysis (FEA) to gain insight into more objective fluctuations in learners' physical responses. Through triangulation of these sources with established discourse analytic measures, the study provides a more nuanced understanding of how learners' responses, self-perceptions, and learning on tasks are interrelated.

Second, additional language learning is rapidly expanding to new contexts in which learners receive and negotiate new information while communicating on digital platforms, including online language classes using synchronous computer-mediated communication (SCMC), multiplayer online role-playing games (MMORPGs) and other virtual worlds (VWs) (Smith & Zeigler, 2023). Smith and Gonzalez-Lloret (2021), for example, argue that these new and emerging technologies are not neutral but interact with task characteristics, learner abilities, and instructional objectives in complex ways. These interactions create unique learning environments due to the constraints that they impose on communication

in terms of time, space, modality, and anonymity (Smith & Gonzalez-Lloret, 2021). These differences raise doubts as to whether previous findings for the impact of tasks in traditional face-to-face task performance are applicable to technology-mediated task performances (Qiu & Bui, 2022b; Smith & Gonzalez-Lloret, 2021).

The present study examines the impact of LGC on task performance and retention of language on a video conferencing platform to identify similarities and differences with previous face-to-face research. Furthermore, the focus is on listeners or information-receivers in information-gap tasks rather than information-providers, which is the typical focus in TBLT research (see Lambert, 2023a for a review). The performance and recall of information-receivers is critical for effective technology-mediated task-based language teaching (TMTBLT).

2. Literature review

2.1. Personal investment and task engagement

In an early article, Lambert (1998) adapted personal investment theory (Maehr, 1984) into a model for TBLT research. The model posits learners' personal experience as an important factor determining the meaningfulness that tasks have for learners. Meaningfulness in turn determines learners' willingness to invest personal resources (time, effort, talents) into their performance, with concrete performance effects, including *direction* or the decision to work on the task rather than doing something else (e.g., checking social media), *persistence* with the task for longer, and *continued motivation* to revisit the task (Lambert 2023a).

To capture these effects, task engagement research has focused on discourse analytic measures (e.g., Aubrey & Philpott, 2023; Dao, 2021; Lambert et al., 2017; Lambert & Zhang, 2019; Qiu & Bui, 2022a; Qiu & Cheng, 2022). A multifaceted discourse analytic model is engagement in language use (ELU) (Lambert & Aubrey, 2023; Lambert et al., 2017) which includes measures of behavioral engagement (words produced, time on task), cognitive engagement (elaboration, language-related episodes) and social engagement (affiliative backchannelling). However, models of task engagement (Philp & Duchesne, 2016) also highlight the importance of assessing the affective dimension of task engagement as learners' feelings and emotional responses can impact performance regardless of whether they reach the level of conscious awareness (Hajcak et al., 2012; Lambert, 2023b). TBLT research to date has often measured affective responses (interest, enjoyment, anxiety) using post-task questionnaires (Nakamura et al., 2021; Tsoi & Aubrey, 2024) and interviews (Qiu & Bui, 2022b). However, in addition to being limited to conscious experiences, such retrospective methods are limited by

memory, potentially biasing learners toward the most recent or salient events on tasks (Hajcak et al., 2012; Lambert, 2023b).

The idiodynamic method (IDM) is one approach which partially overcomes these problems. Learners indicate their level of affective response (e.g., interest, enjoyment) on a moment-to-moment basis while watching a video playback of their performance (MacIntyre, 2023; MacIntyre & Ducker, 2022). These ratings are then graphed, and learners are interviewed on possible reasons for fluctuations in their responses. Patterns that emerge in the graphs can reveal fluctuations that learners were not consciously aware of during or after their performances (Aubrey, 2022a, b). The triangulation of IDM and ELU can provide deeper insight into affective variation during task performance.

TBLT research might also benefit from recent advances in psychophysiology (Lambert, 2023b, 2024). Investigating affective response objectively has been challenging, as it is difficult to distinguish whether a specific behavior (such as laughing) indicates an affective response (e.g., enjoyment, embarrassment, nervousness) or serves as conversational management (e.g., showing solidarity, offering encouragement). Fortunately, advances in technology make it possible to investigate affective response reliably based on immediate facial reactions that learners may not be consciously aware of and able to report (Lambert, 2023b). Webcam-based facial expression analysis software (FEA) allows researchers to track emotional responses with a high degree of reliability (Cacioppo et al., 2017; Lambert, 2023b; Lewinski et al., 2014; Skiendziel et al., 2019) at a sampling rate of 30 times per second (Lambert, 2023b). Triangulating FEA with IDM and ELU might provide new insights into the role of affective response in TBLT. To date little research on task engagement has used FEA.

2.2. Learner-generated content

Converging evidence demonstrates the benefits of tasks incorporating learners' personal experiences and sense of identity (Ellis et al. 2020; Lambert, 2023a; Skehan, 2023). Darvin and Norton (2015), for example, argue that the linguistic, cultural and personal capital that learners possess can improve classroom learning as learners have opportunities to exercise agency and gain respect through using language (Norton, 2018, p. 39). Perhaps the most robust body of evidence in TBLT for these hypotheses comes from research comparing LGC and teacher-generated content (TGC).

LGC meets three criteria: (1) it is personally meaningful to learners, (2) they want to share it, and (3) they think their audience will be genuinely interested in it (Ellis et al., 2020; Lambert, 2023a; Lambert & Zhang, 2019). Multiple lines of research have concluded that instructional activities incorporating learners'

personal experiences enhance their performance (Afreen & Norton, 2022; Boudreau et al., 2018; Lambert et al., 2017; Lambert & Zhang, 2019; MacIntyre & Wang, 2021; Stranger-Johannessen & Norton, 2017, 2019). In TBLT, LGC has been shown to result in more ELU than TGC, including elaboration (asking for and volunteering information), affiliative backchanneling (expressing sympathy and surprise, enthusiastic repetitions, interruptions) and pragmatic devices for managing face and risk (Lambert, 2023a). Previous research has also shown significantly higher recall of lexis connected with LGC than with TGC on immediate and delayed post-tests (Lambert, Gong, et al., 2023). Finally, LGC effects have been consistent across discourse genres (instructions, narratives, opinions) and target languages (English, Chinese) (Lambert & Zhang, 2019).

However, previous LGC research has tended to focus on speakers or information providers as they provide the LGC content. A key question is how LGC impacts listener or information-receiver performance as fully online instruction will typically involve input-based tasks (listening, reading) (Ellis, 2018) to provide new task-based language for learners (Long, 2015, 2021; Shintani, 2016).

2.3. Technology-mediated TBLT

In the present study, tasks were carried out through video conferencing software (Microsoft Teams). The prevalence of video conferencing tools in online language education and tutoring highlights the necessity for more research into how this environment impacts task performance (Smith & Ziegler, 2023). This type of instruction creates a new learning context and may interact with task characteristics, learner abilities, and instructional objectives in complex ways (Smith & Gonzalez-Lloret, 2021; Yamada & Akahori, 2009). Furthermore, task engagement in online video-based communication settings is under-researched in TBLT (see Aubrey & Philpott, 2023; Qiu & Bui, 2022a, b; Soongpankhao et al., 2023, for exceptions). Studies are needed on how task effects differ from comparable face-to-face communication (Qiu & Bui, 2022a, 2022b; Smith & Gonzalez-Lloret, 2021).

2.4. Research questions

The study explored the relationships between task content, conative and affective variation, learners' subjective evaluations, and recall for learners in the information-receiver role of technology-mediated information-gap conversation tasks. The research questions were:

RQ1: Is conative variation measured by ELU higher on LGC than TGC tasks?
RQ2: Are affective responses measured by FEA higher on LGC than TGC tasks?
RQ3: Is self-reported engagement measured by IDM more positive on LGC than TGC tasks?
RQ4: Is recall measured by delayed post-tests higher on LGC than TGC tasks?

3. Methods

A case study methodology was employed to provide detailed analyses of participants' task performance and memory. Raw scores and means for each condition were compared. No inferential analyses were conducted, and there was no attempt to generalize to other situations or to a population of learners. Instead, the study provides a heuristic for future research and the patterns observed for these learners provide empirical data for formulating and testing future hypotheses. The constructs measured and their operationalization are summarized in Table 1.

Table 1 Constructs compared on LGC and TGC tasks

Constructs	Methods	Measures
Conative engagement	ELU	Affiliative responses Elaborative clauses LREs Time on task Words produced
Affective response	FEA	Positive valence Negative valence Emotional neutrality
Learner experiences	IDM	Ratings of interest Ratings of attention
Recall	Delayed post-test	Picture-prompted free-recall test

Note. ELU = engagement in language use (Lambert & Aubrey, 2023); FEA = facial expression snalysis (Lambert, 2023b); IDM = idiodynamic method (MacIntyre & Ducker, 2022); LRE = language-related episodes (Swain & Lapkin, 1998)

3.1. Participants

Four speakers of English as an additional language studying at a university in Western Australia participated in the study. Two were female speakers of Chinese as a first language, and the other two were male speakers of Indonesian as a first language. The pairs were matched for gender and cultural background to control for differences in task engagement related to these variables (Aubrey, 2017; Phung, 2017). All participants had IELTS scores of 5.5 or above. All had lived in Australia for at least one year.

3.2. Materials

Eight versions of a recommendation task were employed: four based on LGC and four on TGC. Each participant produced an LGC version of the task and four parallel TGC versions were created by the researchers. For the LGC versions, participants were asked to choose a local attraction that they enjoyed, wanted to recommend, and thought their partner would be interested in visiting. They provided six photographs of what they felt were the highlights of the attraction. These pictures were inserted into a PowerPoint (PPT). The slide decks included a title slide with the name of the destination followed by six slides with one picture on each and no text. The TGC tasks were formatted identically. Popular local destinations were chosen by the researchers and care was taken to ensure that the type and amount of information in each TGC picture set (e.g., a street, a monument, a building, a landscape, a café, etc.) and the sequence of photos were similar to the corresponding LGC versions (see Appendix).

3.3. Procedures

An announcement was made offering a gift voucher for participation in a study aimed at improving online learning. Participation required attending two research sessions. Participants were told that they would complete online communication tasks with a partner in the first session and rate their performances in the second. They were not told they would be tested.

A week before the study, participants chose a local attraction that they had visited, enjoyed, and would recommend to another student. They were asked to send six pictures of the place that they felt illustrated its most important features for them personally. These could be pictures they had taken themselves or pictures downloaded from the internet.

The first session was conducted in a psychophysiology lab on the university campus. Two computer terminals in different rooms were equipped for FEA and connected with video-conferencing software (Microsoft Teams). Participants were informed that they would be listening to their partner give PPT presentations of different local attractions, and that they should relax and interact naturally as if listening to a recommendation from a friend.

Each participant listened to one LGC recommendation and one TGC recommendation. They alternated roles, so each pair completed four versions of the recommendation task. One pair completed the LGC versions first, and the other completed the TGC versions first to distribute performance effects across the conditions. No time limits were imposed. Participants were free to elaborate

naturally according to their interest in the task content (see Table 2 for time on task). While listening to their partner's presentations, participants were not required to speak but were told that they should feel free to do so if they wished – or whenever they desired clarification or elaboration.

Two weeks after the task performances, participants attended a one-on-one meeting with the second researcher. They expected to be asked about their performances and their opinions of the tasks. On arrival, however, they were given a free-recall test in which they received a printout of the PPT slides of the two tasks they had completed as listener with note boxes next to each picture. They were asked to write down everything they could remember the speaker saying in connection with each slide.

Following the free-recall test, learners were asked to rate their experiences during tasks in which they had been information receivers. They watched a video of the two recommendations (LGC, TGC) and rated their interest and their attention on a scale from -5 to 5 on a minute-by-minute basis.

3.4. Analysis

The database consisted of eight task performances (4 TGC, 4 LGC), the FEA data, learners' ratings of interest and attention, and the language produced on the delayed free-recall test. Verbatim transcriptions of the eight task performances were prepared. Listeners' verbal responses during the recommendations were coded for: (1) affiliative responses, (2) elaborations initiated by listeners, and (3) LREs initiated by listeners. Time on task and number of words were also tallied. Performances in the LGC and TGC conditions were then compared.

Affiliative responses included backchannels, laughter and partner completions that involved enthusiastic interruptions. These responses did not add semantic content to the conversation or aid in the clarification of problematic language. Instead, they demonstrated the listener's interest, enthusiasm, willingness to cooperate, or desire to establish social solidarity with the speaker. Excerpt 1 provides an example by the listener in response to the speaker describing an attraction during an LGC task. The listener's backchannel was emphatic, indicating interest and enthusiasm and encouraging the speaker to elaborate:

Excerpt 1 Affiliative backchannelling (LGC task)

Speaker: This cave has ever been used as a house by the old people who lives here before the World War I. World War I and World War II.
Listener: Oh!
Speaker: But the cave is only small.

In contrast, *elaborations* resulted in additional semantic content being included in the recommendation. They included requests for clarification of content, requests for related information of interest to the listener, and the suppliance of additional information based on the listener's previous experience in similar situations. Excerpt 2 provides an example. The listener initiates a request to clarify content, and the speaker supplies additional information:

Excerpt 2 Elaboration (TGC task)

Speaker: This is the show where the children can feed the sheep directly. And they can have interact with the cattle also
Listener: You mean the farm is inside the park, is it?
Speaker: I don't think so. This is only a part, I think. This is not the big farm, but just an area especially for showing the farm, or we can say this is mini farm.

Finally, LREs involved participants talking about the language they were producing, questioning their language use, or correcting themselves or each other (Swain & Lapkin, 1998). This included completion or recasting of lexis, morphology, syntax, and pronunciation when the speaker either could not supply the item or had supplied it incorrectly. Excerpt 3 provides an example. The listener suggests the word *tram* when the speaker lacked a lexical item, the speaker affirms and uptakes the new word, and the listener confirms comprehension so the speaker can continue:

Excerpt 3 LRE (LGC task)

Speaker: I don't know whether this is the real train or just the car…
Listener: More like a tram, right? Tram?
Speaker: Tram, yeah.
Listener: Mhmn

These three categories of engagement indicators were identified by both authors, who coded all transcripts independently and reached 100% agreement. The number of words produced by listeners was also tallied and time on task was tallied and used as a divisor for all of the other measures to control for length of performance which varied considerably with LGC tasks being longer than TGC (see Table 2).

Noldus FaceReader 8 (https://www.noldus.com/facereader) was utilized for FEA. This software creates and calibrates a personalized "face model" for each participant by marking and tracking different key facial landmarks. By tracking the movement of these landmarks, it identifies affective responses, providing average values for seven basic emotions during each task performance as well as for emotionally neutral responses. Positively valenced emotional responses (happiness, surprise, arousal) and negatively valenced emotional responses (sadness,

anger, fear, disgust) could then be categorized. In addition, the FEA data amplitudes were used to identify the three highest positive emotional peaks, the three highest negative emotional peaks, and the three most neutral plateaus of affective response during each performance. The language that listeners were exposed to at each of these nine points in the performance was then matched to their responses in the free recall test to compare the proportions of content recalled from these moments.

Next, to compare listeners' subjective experiences in each condition, the means of learners' perceived interest and attention ratings were calculated for each participant. This approach thus represented learners' experiences across the entire task.

Finally, learners' performances on the delayed post-test were analyzed for number of words and t-units produced in recounting what was heard in connection with each slide. The number of t-units in which participants recalled content or language that they experienced at conative peaks (affiliative responses, elaborations, LREs) and affective peaks (positively and negatively valenced and neutral facial expressions) were also tabulated.

4. Results

This section summarizes listeners' performances in the LGC and TGC conditions in terms of their ELU, facial expressions, self-ratings on attention and interest, and recall.

4.1. ELU

Listeners' performances manifested more ELU on LGC recommendations than on TGC recommendations. Table 2 summarizes performances before and after controlling for time on task.

Table 2 ELU on LGC and TGC recommendation tasks

	LGC					TGC				
	ToT	Ws	AFF	ELB	LRE	ToT	Ws	AFF	ELB	LRE
Chinese 1	630	319 (.506)	25 (.040)	8 (.013)	2 (.003)	507	115 (.227)	8 (.016)	5 (.010)	2 (.004)
Chinese 2	462	280 (.606)	10 (.022)	21 (.045)	1 (.002)	345	131 (.380)	7 (.020)	7 (.020)	2 (.004)
Indonesian 1	1184	147 (.124)	13 (.011)	6 (.005)	1 (.001)	552	54 (.098)	0 (0)	2 (.004)	1 (.002)
Indonesian 2	1077	447 (.415)	23 (.021)	19 (.018)	4 (.004)	454	104 (.229)	1 (.002)	4 (.009)	1 (.002)
Mean	838	298 (.356)	17.75 (.021)	13.50 (.016)	2.00 (.002)	465	101 (.217)	4.00 (.009)	4.50 (.010)	1.50 (.003)

Note. ToT = time on task in seconds; Ws = number of words produced by the listener; AFF = number of affiliative responses produced by the listener; ELB = number of elaborations initiated by the listener; values in parentheses represent total units divided by ToT

All participants spent longer on the LGC recommendations than on the TGC recommendations. The mean time in the LGC condition was 838 seconds (14 minutes)

versus 465 seconds (7.75 minutes) in the TGC condition. Furthermore, all four participants produced more affiliative responses and more listener-initiated elaborations on average (per second) in response to the LGC recommendations than they did in response to comparable TGC recommendations. In contrast, they tended to produce slightly more listener-initiated LREs on average during the TGC recommendations than during the LGC recommendations. Finally, it is worth noting that the sociodemographic differences between the pairs in terms of the first language (L1) (Chinese vs. Indonesian), gender (female vs. male), and culture (Confucian vs. Muslim) made little observable difference to the trends in their ELU in the LGC and TGC conditions.

4.2. Facial expressions

Listeners' facial expressions suggest that their affective responses during the LGC tasks were more positive than during the TGC tasks overall (LGC: 0.546; TGC: 0.428). This pattern was consistent across participants (see Table 3).

Table 3 Emotional valence

	LGC			TGC		
	Positive	Negative	Neutral	Positive	Negative	Neutral
Chinese 1	0.382	0.132	0.026	0.346	0.201	0.015
Chinese 2	0.451	0.130	0.024	0.320	0.157	0.073
Indonesian 1	0.452	0.170	0.021	0.213	0.277	0.002
Indonesian 2	0.897	0.084	0.006	0.833	0.059	0.023
Mean	0.546	0.129	0.020	0.428	0.174	0.028

Note. values represent means based on Noldus FaceReader 8

In contrast, participants experienced higher levels of negative responses during the TGC tasks than the LGC tasks overall (TGC: 0.174; LGC: 0.129), but only three of the four participants manifested more negative emotion in the TGC condition, with the fourth (Indonesian 2) showing more positive *and* negative emotion on the LGC over TGC version. Finally, the results for neutral responses were mixed with two listeners manifesting more neutral responses for LGC (Chinese 2, Indonesian 2) and two for TGC (Chinese 1, Indonesian 1).

4.3. Attention and interest

Participants' ratings of attention (LGC: 3.37; TGC: 3.14) and interest (LGC: 3.07; TGC: 2.75) throughout the tasks were also higher in the LGC than the TGC condition (see Table 4).

Table 4 Perceived attention and interest

	LGC		TGC	
	Attention	Interest	Attention	Interest
Chinese 1	4.18 (0.60)	3.36 (1.21)	3.50 (0.53)	3.00 (0.76)
Chinese 2	4.00 (1.07)	3.88 (1.13)	4.50 (0.55)	3.67 (1.21)
Indonesian 1	1.06 (1.16)	0.56 (1.10)	1.13 (1.13)	1.00 (0.93)
Indonesian 2	4.21 (0.71)	4.47 (0.61)	3.44 (0.53)	3.33 (0.05)
Means	3.37 (1.73)	3.07 (1.96)	3.14 (1.41)	2.75 (1.32)

Note. Values represent mean per-minute ratings of attention and interest (-5 to 5), and values in parentheses are controlled for time on task (see sections on procedures and analysis above)

However, closer examination reveals that two listeners felt they paid more attention on the TGC task than the LGC task (Chinese 2, Indonesian 1), and one of these also expressed more interest in the TGC task (Indonesian 1). There was thus higher variability in listeners' subjective responses than in the more objective conative (ELU) and affective (FEA) measures.

4.4. Memory

Finally, listeners recalled more of what speakers said during the LGC recommendations than during the TGC recommendations (see Table 5).

Table 5 Recall of language used on task

	Words LGC	Words TGC	TUs LGC	TUs TGC	Words/TUs LGC	Words/TUs TGC
Chinese 1	217	182	24	18	9.04	10.11
Chinese 2	207	162	33	27	6.27	6.00
Indonesian 1	160	97	18	14	8.89	6.93
Indonesian 2	334	326	30	27	11.13	12.07
Means	230	192	29	23	8.60	8.63

Note. TUs = t-units

In attempting to reproduce verbatim what the speaker said about each slide, listeners produced more words and more t-units when recalling LGC over TGC recommendations. Table 6 provides an example of full recall data to illustrate the differences in recall between LGC and TGC recommendations.

The language and content recalled from the LGC recommendation included multiple details embedded into a connected discourse structure. New information is attributed to an initial idea and syntactic markers show relationships between new and old information. In contrast, material recalled from the TGC recommendation reads more like a list of facts in short, repetitive sentences.

Table 6 Content recalled in the LGC and TGC conditions

	Learner-generated recommendation	Teacher-generated recommendation
Slide 1	The beach is for swimming, snorkelling and sun-bathing. People also build tents and bring canoes. Small caves used to be occupied by early settlers on the island.	People can enjoy the picnic with family. Children can play around in the park. Tables for picnic are available.
Slide 2	People use a ferry to go to the island. Penguin Island can be seen on the ferry dock. It is around 2 km from the mainland.	There are old trains to see in the park. People can ride on the train.
Slide 3	Penguin Island is the habitat of many bird species. Pelicans nest in the island. Also, many other small birds. People can see birds all over the island.	People can see Kangaroo in the park. Kangaroos are crowded in the park.
Slide 4	People can do sunbathing while lying in a water hole on the beach. Many holes can be used around the island.	Kids can play Segway and other toys in the park.
Slide 5	Penguin Island has penguin conservation. People visit the conservation two times a day. They see the attraction when the penguins are fed. People can see the attraction by buying the tickets. Children enjoy the penguin attraction. People can take pictures of the penguins and listen to the guide explaining about the attraction.	Whiteman Park's small farm. Farm attraction of farming animals. Children give milk to little lambs. Farm activity, watching the farm show.
Slide 6	People can go on the pathway to walk around the island.	People can do walking around the park. There are many plants to see around the park.

4.5. Conation and memory

Participants recalled more content experienced during elaborations and affiliative responses in the LGC condition than they did in the TGC condition (49% vs. 31% & 83% vs. 61%, respectively, see Table 7).

Table 7 Recall of language used at points of ELU

	Affiliative responses		Elaborations		LREs	
	LGC	TGC	LGC	TGC	LGC	TGC
Chinese 1	8/25 (0.32)	0/8 (0.00)	2/5 (0.40)	4/8 (0.50)	1/2 (0.50)	2/2 (1.00)
Chinese 2	6/10 (0.60)	4/7 (0.57)	7/7 (1.00)	10/21(0.48)	0/1 (0.00)	2/2 (1.00)
Indonesian 1	6/13 (0.46)	0/0 (0.00)	2/2 (1.00)	4/6 (0.67)	0/1 (0.00)	1/1 (1.00)
Indonesian 2	15/23 (0.65)	1/1 (1.00)	4/4 (1.00)	15/19 (0.79)	0/4 (0.00)	1/1 (1.00)
Instances recalled	35/71 (0.49)	5/16 (0.31)	15/18 (0.83)	33/54 (0.61)	1/8 (0.13)	6/6 (1.00)

In contrast, they recalled more content experienced during LREs in the TGC condition than they did in the LGC condition (100% vs. 13%), although instances involved were quite small (see Table 7).

4.6. Affect and memory

Overall, listeners recalled 68% of content processed during emotionally valenced moments whereas they recalled only 46% of content processed during emotionally

neutral moments (see Table 8). They also recalled more content experienced at emotionally valanced moments during TGC tasks than LGC tasks (see Table 8).

Table 8 Recall at emotional peaks and plateaus

	Positive LGC	Negative LGC	Neutral LGC	Positive TGC	Negative TGC	Neutral TGC
Chinese 1	2/3	3/3	1/3	1/3	2/3	1/3
Chinese 2	2/3	2/3	2/3	3/3	3/3	2/3
Indonesian 1	0/3	1/3	1/3	3/3	2/3	2/3
Indonesian 2	2/2*	1/3	1/3	3/3	2/3	2/3
Proportions	6/11	7/12	5/12	10/12	9/12	7/12
recalled	0.55	0.58	0.33	0.83	0.75	0.58

Note. *One of the positive peaks was not identifiable in the recording

5. Discussion

This case study of four learners investigated how LGC and TGC related to conative and affective variation during task performance in a technology-mediated environment as well as to subsequent recall of task content with advanced learners of English. These learners represented different first language, gender and cultural backgrounds. Results revealed that when listening to recommendations based on LGC as opposed to TGC, these learners engaged in language use more, displayed more positive emotions, felt more interested and more focused, and were better able to recall the language used. However, TGC had complementary effects.

RQ 1 asked whether listeners' ELU would be higher on LGC than TGC tasks. This question can be answered affirmatively. Listeners produced more affiliative responses and initiated more elaborations when receiving recommendations based on LGC than on TGC (see Table 1). In contrast, listeners initiated slightly more LREs when listening to presentations based on TGC than LGC. These results are consistent with previous findings which have found that LGC results in more focus on the social and semantic dimensions of language use, whereas TGC results in more focus on language (Lambert & Zhang, 2019). Lambert and Zhang (2019), for example, found that LGC tended to promote fluency of known language and pragmatic skills, whereas TGC tended to focus learners on linguistic complexity and the use of new language (also see Ellis et al., 2020).

RQ 2 then asked whether listeners' affective responses would be more positive on LGC tasks than on TGC tasks as measured by FEA. This question can be answered affirmatively. FEA revealed that the affective responses of all participants during the LGC tasks were more positive than during the TGC tasks. In contrast, three of the four participants manifested more negative emotion on the TGC tasks than on the LGC tasks (see Table 2). These findings are congruent with previous research (Nakamura et al., 2021; Phung, 2017), but the present study used FEA rather than questionnaires to measure affective response.

RQ 3 asked whether self-reported experiences would be more positive on LGC than TGC tasks. This question can be answered affirmatively. Participants reported more positive experiences on the LGC tasks than on the TGC tasks (see Table 4). These results corroborate those for FEA and previous research, which suggests more positive learners' response to LGC than TGC (Lambert & Zhang, 2019; Lambert et al. 2017).

RQ 4 then asked whether recall would be better for LGC than TGC. This question can be answered affirmatively. Results revealed that learners recalled more information from LGC tasks than TGC tasks (see Table 5) and that this content was of a better quality in terms of level of detail and discourse structure (see Table 6). This was as expected based on the previous literature (Ellis et al., 2020) and research. Lambert, Gong and Zhang (2023), for example, found that LGC lexical items were recalled significantly better than TGC lexical items on immediate and delayed post-tests. This could be due to LGC being more emotionally charged than TGC (see Table 2) or because LGC was encoded within broader social and semantic schemata than TGC (Jiménez Catalán & Dewaele, 2017; Kairudin et al. 2012).

In addition to the findings on LGC and TGC, however, two additional findings were that participants recalled information processed at moments of heightened engagement better than at neutral moments and that elaboration seems to have been a particularly important variable in improving these learners' memory for task-based conversations. Comparing Tables 7 and 8, elaboration of task content and affiliative responses both seem to have had a powerful effect on memory.

Finally, the study provides initial evidence that LGC and TGC have similar effects on computer-mediated communication and face-to-face communication. This is important as questions have been raised in the TMTBLT literature regarding the comparability of task effects in technology mediated and face-to-face communication (Qiu & Bui, 2022a, 2022b; Smith & Gonzalez-Lloret, 2021). The present study provides evidence that the effects of LGC on performance and learning may be strong enough to override the effects of any constraints of videoconferencing resulting in similar effects in both contexts.

6. Pedagogic implications

The study highlights the importance of designing tasks that engage learners at the personal level. Integrating LGC tasks into the TBLT curriculum might positively impact learners' responses, engagement, and memory for the language that is used on tasks. The study suggests that these effects can be consistent across learners differing in L1 (Chinese vs. Indonesian), gender (female vs. male) and cultural background (Confucian vs. Muslim). These sociodemographic differences had little impact on performance or memory, indicating that LGC content might be valuable to teachers and course

designers teaching additional languages in various contexts around the world. The results also indicate that teachers implementing tasks fully online through videoconferencing platforms might also aim to design tasks to foster personal connections with task content to improve engagement, learner satisfaction, and memory. Finally, the findings suggest that tasks based on TGC might complement those based on LGC in important ways. Teachers are advised to employ a balance of LGC tasks and TGC tasks across modules of work.

7. Limitations

The small sample size limits the study to suggesting hypotheses that might be tested in future research. It should also be kept in mind that although participants' performances were consistent across conditions in many respects, there was some variability between participants. For example, only three of the four participants manifest more negative emotion in the TGC condition, with the fourth listener showing more positive and negative emotion on the LGC version of the task than the TGC version. Likewise, two of the listeners felt they paid more attention on the TGC task than the LGC task, and one of these also expressed more interest in the TGC task. It is difficult to speculate on patterns that might emerge with a larger sample. Finally, it should be remembered that the present study was completed in a psychophysiology laboratory. Learners' performance might be different when completing tasks in fully online instruction or in real classrooms. Teachers should thus not adopt the ideas in the present study uncritically, but experiment, perhaps through action research (see Lambert, 1997, for an example), to find suitable solutions in their own teaching contexts.

8. Future research

Research on the role of the learner in pedagogic tasks might benefit from the use of objective measures to supplement subjective measures of learners' conscious experiences. In the present study, subjective measures were based on ratings of performances during stimulated recalls to avoid memory bias. However, even this approach resulted in higher variability than objective measures of discourse analytic measures of conation (ELU) and biometric measures of affect (FEA) (see Tables 2-4).

The study also suggests a potential interaction between engagement and task condition (LGC, TGC) in their impact on memory. Participants' production of LREs seem to have had a stronger positive effect on memory when discussing TGC, whereas elaboration and affiliative responses seem to have had a stronger

positive effect on memory when discussing LGC (see Table 7). Future research is needed to determine if these trends might characterize language use with larger representative samples of learners.

It is also possible that the relationship between emotional valence and memory may have been moderated by the task conditions. Participants tended to recall TGC better during emotionally valenced moments than LGC during similar moments. However, this may have been due to testing bias. The content of the TGC recommendations tended to be directly related to the pictures, whereas the content of the LGC recommendations were related to additional elaborations. The TGC might thus have been more easily cued by the pictures on the memory tests. In investigating possible moderating effects of condition on the impact of emotional valence on recall, future researchers should be careful to avoid such testing bias.

9. Conclusion

The study suggests the importance of conation and affect in understanding learning through technology-mediated tasks as well as the potential importance of LGC in improving conation and affect on such tasks. Participants produced more affiliative responses, initiated more elaborations, displayed more positive affective responses, self-reported higher engagement, and recalled more language during LGC than TGC technology-mediated tasks. Furthermore, automated FEA revealed more positive affective responses on LGC than TGC tasks, and delayed post-tests revealed better recall of LGC recommendations both quantitatively and qualitatively. The findings thus support previous research on LGC tasks in face-to-face settings, demonstrating the learning value of personalized content in technology-mediated settings.

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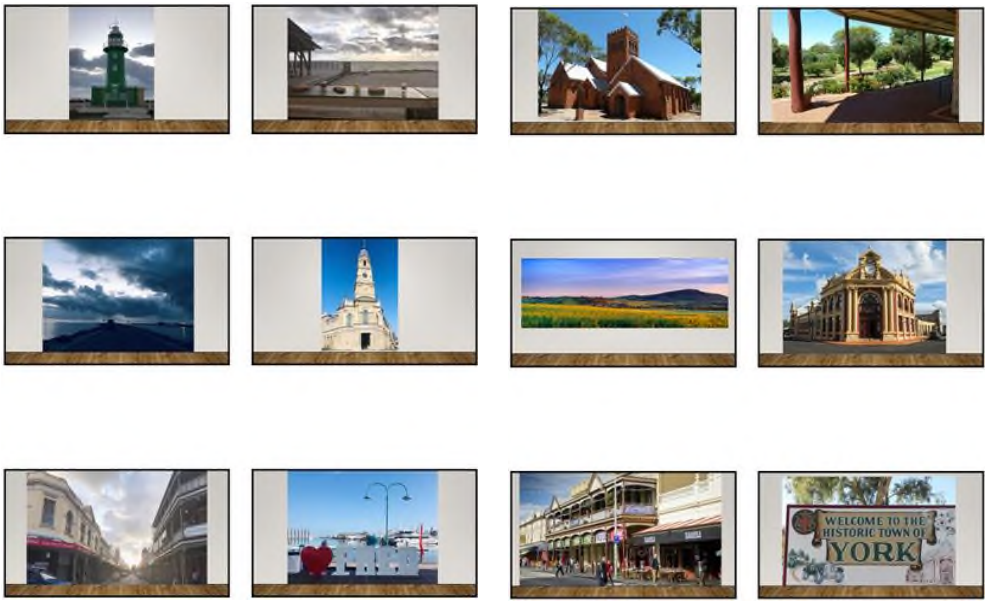
APPENDIX

Sample LGC and TGC tasks

Learner-generated content (Fremantle) Teacher-generated content (York)



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