Learners' satisfaction comparison between text and speech dialogue-based computer assisted language learning system

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Abstract. This paper is about the learners' satisfaction comparison between text and speech Dialogue-Based Computer-Assisted Language Learning systems (DB-CALL system). A DB-CALL system aims to allow learners to talk to the system in a foreign language as if they were talking with a native speaker and to provide learning feedback that will grammatically correct spoken foreign language or recommend a better expression. The satisfaction analysis of the text DB-CALL system was conducted by 20 learners. The satisfaction analysis of the speech DB-CALL system was conducted by 36 learners. The average satisfaction of the text DB-CALL system was 3.44 points. This system needs to improve the ability to respond appropriately to out-of-topic conversations (2.10 points). The average satisfaction of the speech DB-CALL system was 3.87 points. This system needs to enhance the speech recognition function (3.36 points).

Keywords: satisfaction analysis, computer assisted language learning system, dialogue system, DB-CALL.

1. Introduction

The DB-CALL system aims to either grammatically correct learners' foreign language utterance or to provide learning feedback that recommends better expressions. The Electronics and Telecommunications Research Institute (ETRI) has developed the DB-CALL system since 2010. The DB-CALL system developed

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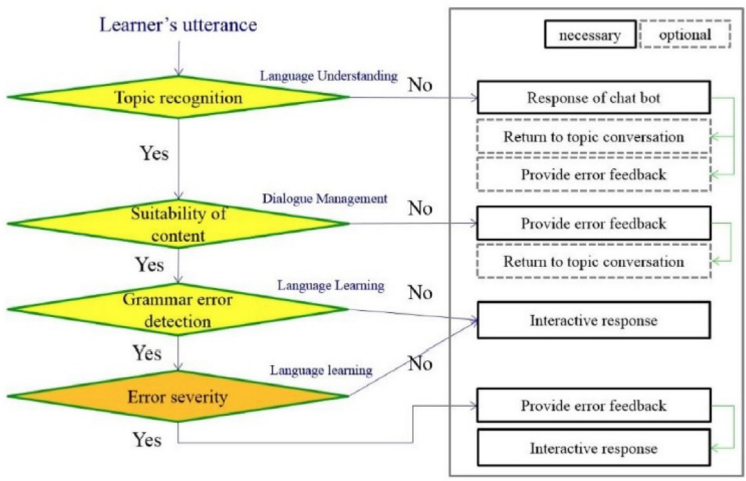
from 2010 to 2015 was text-based and system-oriented, which restricted the learner's dialogue flow and did not allow free conversation beyond the topic (Choi, Kwon, Kim, & Lee, 2016). As a hybrid approach between the DB-CALL system and a chat bot became active (Dingli & Scerri, 2013), the DB-CALL systems evolved from system-oriented to a mixed form between system-oriented and user-oriented. The DB-CALL system developed from 2016 to 2018 was speech-based and a mix of system-oriented and user-oriented, that allowed free conversation outside the topic and feedback on grammar errors without limiting the learner's flow of conversation (Choi, Kwon, & Kim, 2017). In this paper, we describe the learners' satisfaction comparison between the text DB-CALL system and the speech DB-CALL system.

2. Configuration of ETRI's speech DB-CALL system

ETRI's speech DB-CALL system consists of speech recognition, language understanding, computer-assisted language learning, dialogue management, language generation, and speech synthesis. As described in detail in Choi et al. (2017), the speech DB-CALL system's strategy for user utterance is shown in Figure 1.

Figure 1. Dialogue strategy of ETRI speech DB-CALL system



When a learner makes an utterance, ETRI speech DB-CALL system first confirms whether the utterance is topic-oriented. If the utterance is not a topic conversation,

ETRI speech DB-CALL system responds with the chat bot and then returns to the topic conversation. If the learner's utterance is topic-oriented, ETRI speech DB-CALL system in turn processes suitability of content, grammar error detection, and error severity (Choi et al., 2017).

3. Text DB-CALL system

3.1. Evaluation

The evaluation of the text DB-CALL system was conducted by 20 testers, whose English level was beginner (ten) and intermediate (ten). Each tester communicated with the system literally about the four topics. Topics for evaluation consist of purchasing tickets for a New York city tour, ordering food, talking about health habits, and thinking about future currency. Participants performed ten missions on four topics, each taking an average of 50 minutes per person. The success rate of dialogue turns on four topics was 80.86% as follows:

> Success rate of dialogue turn (%) = (number of correct system's responses to learner's utterance)/(total number of learners' utterances) × 100.

3.2. Learners' satisfaction

Satisfaction analysis was based on the questionnaire of 20 people who experimented with the text DB-CALL system. Five-point Likert scales were assigned to each question. One point was 'very unsatisfied' and 5 points were 'very satisfied'. The satisfaction results were as follows (Table 1).

Table 1. Learners' satisfaction of text DB-CALL system

Questionnaire	**Score**
1. Questions about system performance	
1.1. Did the system respond appropriately?	2.90
1.2. Do you feel free to talk to the system?	2.90
1.3. Did the system properly point out grammatical errors?	3.15
1.4. Did the system adequately recommend sentences that would help you learn?	3.60
1.5. Did the out-of-topic conversations (ex. chat bots) respond appropriately?	2.10
Average	2.93

2. Questions about system function	
2.1. Do you think the ability to correct grammatical errors is necessary for the conversation system?	4.40
2.2. Do you think the ability to recommend sentences is necessary for the conversation system?	4.55
2.3. Do you think conversations outside of the topic (ex. chat bots) are necessary for the conversation system?	3.60
Average	4.18
3. Questions about system effects	
3.1. After using the system, did the DB-CALL system help you learn English?	3.60
3.2. Do you think this DB-CALL system helps you learn English better than traditional learning methods (such as conversation texts)?	3.55
3.3. Do you think this DB-CALL system will help you motivate your learning?	3.60
3.4. Does this DB-CALL system have fun?	3.35
Average	3.53
4. Questions about future services	
4.1. Would you like to use the online education service of the DB-CALL system?	3.65
4.2. Do you want to use the above service even if it is charged?	2.40
4.3. Are you willing to repeat many times (on average 4-5 times or more) on a topic conversation?	3.30
Average	3.12

Overall, the satisfaction rate of the text DB-CALL system was 3.44 points out of 5 points. A factor that lowers overall satisfaction is the DB-CALL system's inability to respond appropriately to out-of-topic conversations (2.10 points). Therefore, it is expected that the learner's satisfaction with the text DB-CALL system will increase if the topic-oriented chat bot system is improved.

4. Speech DB-CALL system

4.1. Evaluation

The speech DB-CALL system was tested in voice on speech phones. Thirty-six learners whose English level was beginner (18) and intermediate (18) were divided into three groups. Topics to talk with were given differently for each group. Table 2 shows the progress of satisfaction analysis.

Table 2. Evaluation method of speech DB-CALL system

	Group A	Group B	Group C
Participants	12 college students (7 male, 5 female)	12 middle school students (male 1, female 11)	12 middle school students (male 2, female 10)
Topic	• How can we save our environment? • What is your opinion about DIY fashion? • What do you think of Korean food culture? • Which role on the rowing team do you think you'll be good at?	How can we save our environment?	What healthy habit do you have?
Evaluation items	• Usability in class • Content and Services • Speech recognition		
How to proceed	• System introduction and explanation of learning method • Distribution of test equipment • Pre-learning: after learning words, sentences and expression, 3 free conversations with DB-CALL system • Learning • Confirm result • Fill out the questionnaire		

4.2. Learners' satisfaction

Five-point Likert scales were assigned to each question. One point was 'very poor' and 5 points were 'very satisfied'. The satisfaction results were as follows (Table 3).

Satisfaction with speech DB-CALL system was 3.87 out of 5 points. Specifically, the satisfaction of usability in class was 4.11, the content and service satisfaction was 4.14, and the speech recognition satisfaction was 3.36. The speech recognition function should be improved. The satisfaction analysis of the speech DB-CALL system is similar to that of the online survey of speech assisted language learning of Grimshaw, Cardoso, and Collins (2017). If technology of speech recognition improves further, the satisfaction level of Table 3 below will be higher.

Table 3. Learners' satisfaction of speech DB-CALL system

	Group A	Group B	Group C	Total
Usability in class	3.92 very satisfied(0) satisfied(11) moderate(1) unsatisfied(0) very unsatisfied(0)	4.50 very satisfied(6) satisfied(6) moderate(0) unsatisfied(0) very unsatisfied(0)	3.92 very satisfied(1) satisfied(9) moderate(2) unsatisfied(0) very unsatisfied(0)	4.11
Content and Services	3.83 very satisfied(0) satisfied(10) moderate(2) unsatisfied(0) very unsatisfied(0)	4.50 very satisfied(6) satisfied(6) moderate(0) unsatisfied(0) very unsatisfied(0)	4.08 very satisfied(2) satisfied(9) moderate(1) unsatisfied(0) very unsatisfied(0)	4.14
Speech recognition	3.00 very satisfied(1) satisfied(2) moderate(5) unsatisfied(4) very unsatisfied(0)	3.83 very satisfied(1) satisfied(8) moderate(3) unsatisfied(0) very unsatisfied(0)	3.25 very satisfied(1) satisfied(4) moderate(4) unsatisfied(3) very unsatisfied(0)	3.36
Total				**3.87**

5. Conclusions

In this paper, we described the learners' satisfaction comparison between text and speech DB-CALL system. The average satisfaction rate of the text DB-CALL system was 3.44 points. The average satisfaction rate of the speech DB-CALL system was 3.87 points.

In the future, we will further enhance the performance of the speech DB-CALL system by improving speech recognition and dialogue management modules.

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References

Choi, S. K., Kwon, O. W., & Kim, Y. K. (2017). Computer-assisted English learning system based on free conversation by topic. In K. Borthwick, L. Bradley & S. Thouësny (Eds), *CALL in a climate of change: adapting to turbulent global conditions – short papers from EUROCALL 2017* (pp. 79-85). Research-publishing.net. https://doi.org/10.14705/rpnet.2017.eurocall2017.693

Choi, S. K., Kwon, O. W., Kim, Y. K., & Lee, Y. K. (2016). Using a dialogue system based on dialogue maps for computer assisted second language learning. In S. Papadima-Sophocleous, L. Bradley & S. Thouësny (Eds), *CALL communities and culture – short papers from EUROCALL 2016* (pp. 106-112). Research-publishing.net. https://doi.org/10.14705/rpnet.2016.eurocall2016.546

Dingli, A., & Scerri, D. (2013). Building a hybrid: chatterbot-dialog system. *Proceedings of 16*th *International Conference of Text, Speech, and Dialogue* (pp. 145-152). https://doi.org/10.1007/978-3-642-40585-3_19

Grimshaw, J., Cardoso, W., & Collins, L. (2017). Teacher perspectives on the integration of mobile-assisted language learning. In K. Borthwick, L. Bradley & S. Thouësny (Eds), *CALL in a climate of change: adapting to turbulent global conditions – short papers from EUROCALL 2017* (pp. 135-139). Research-publishing.net. https://doi.org/10.14705/rpnet.2017.eurocall2017.702

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