



# Enhancing performance knowledge and self-esteem in classroom language learning: The potential of the ACTIVote component of interactive whiteboard technology

Euline Cutrim Schmid \*

*English Department, University of Education (Pädagogische Hochschule), Keplerstraße 87,  
69120 Heidelberg, Germany*

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## Abstract

This article reports on a qualitative study concerning the use of interactive whiteboard (IWB) technology in the teaching of English for Academic Purposes (EAP)/Study Skills to international students. The study was carried out at a British University in the summers of 2003 and 2004. Its primary aim was to throw detailed light on the potential of IWB technology for supporting the language learning process in the context in question. Research data were collected via a variety of ethnographic research instruments, namely classroom observations and feedback from critical colleagues, teacher's field notes, video recording of classes, semi-structured interviews with students, and pre- and post-course student questionnaires. The research findings reveal several perceived pedagogical benefits of using the technology in this context. This article focuses specifically on the ACTIVote component of IWB technology and discusses data which reveal the potential of this technology to assist learners in their language learning processes by allowing them to check their performance and their standing amongst peers in a way that preserves their privacy.

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\* Tel.: +49 6221 477252.

E-mail address: [euline.cutrim.schmid@ph-heidelberg.de](mailto:euline.cutrim.schmid@ph-heidelberg.de)



Fig. 1. How IWB technology works. The computer images are displayed on the board by the digital projector. The images then can be seen and all applications on the computer can be controlled via touching the board, either with your finger, or with an electronic pen/stylus.

## 1. Introduction

The interactive whiteboard is a touch-sensitive electronic presentation device. Fully-functioning interactive whiteboards usually comprise four components: a computer, a projector, appropriate software and the display panel, which is a large free-standing or wall mounted screen up to 2 m by 1 m in size. Fig. 1 illustrates how this technology works.

The Promethean TM (the brand of IWB used in this research) system uses electromagnetic sensing technology with an electronic pen<sup>1</sup>. The company has also developed a whole suite of software and peripheral hardware to complement the use of an interactive whiteboard, such as the “ACTIVstudio” software and the “ACTIVote” system<sup>2</sup>. The ACTIVstudio software enables activities such as handwriting recognition, web browsing, window annotation, dragging and dropping, snapshots, image search and so on. Other brands of IWB technology (e.g. Smartboard and Hitachi) offer very similar capabilities.

The IWB is most commonly used in the regular whole class classroom. The large IWB screen acts as a focus for pupils’ attention and the teacher can use it as a multimedia platform and employ a wide range of ICT tools, such as: CD ROMs, digital videos and audio files, PowerPoint slides, websites, in conjunction with the facility to highlight, annotate, drag, drop and conceal linguistic units.

The ACTIVote system, which is the focus of this paper, is a wireless response system enabling students to respond to assessment and other questions. Students are given an individual voting keypad and can respond to teachers’ questions. Results can then be dis-

<sup>1</sup> Since the time of this research, the hardware and software used in this investigation have not undergone any major changes. There have been only some minor software upgrades.

<sup>2</sup> Promethean Technologies Group Ltd.

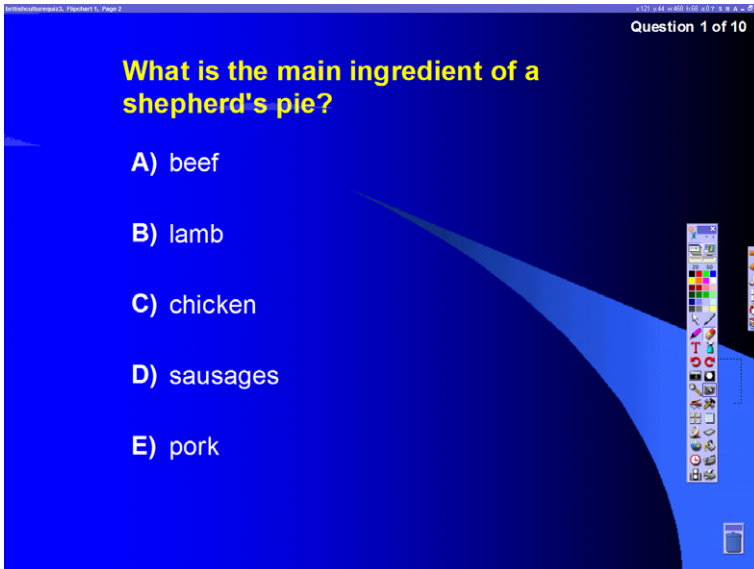


Fig. 2. This is the way the questions and answers are presented to the students. They then have to choose one option and vote by using their voting keypads.

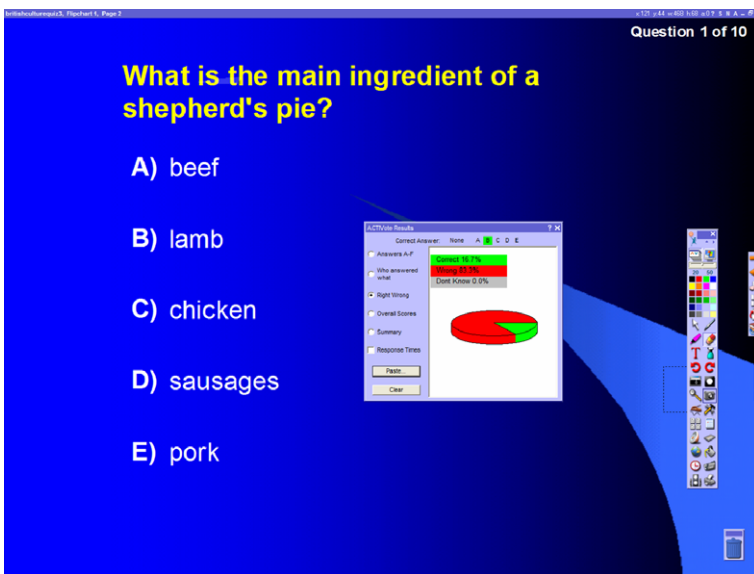


Fig. 3. The results can be shown in terms of percentages of right and wrong answers for each question. This option is usually used when the teacher wants to know the performance of the group as a whole.

played immediately on the interactive whiteboard in graphical format. See Figs. 2–5 for more information on how this system works.

The potential of interactive whiteboard (IWB) technology for facilitating classroom language learning is attracting increasing attention. So far, however, there has been very

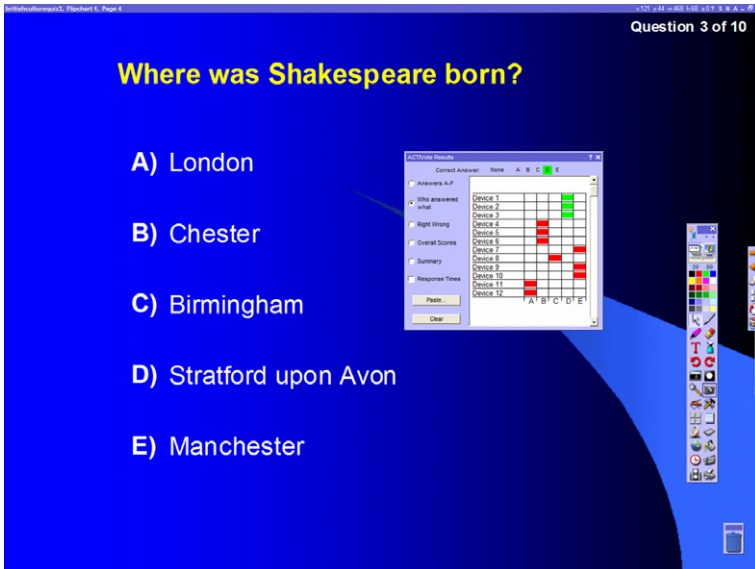


Fig. 4. The teacher can also opt for showing the results in terms of who answered what. If the teacher knows which device (voting keypad number) each student is using it is then possible for her/him to know who got it right and who got it right.

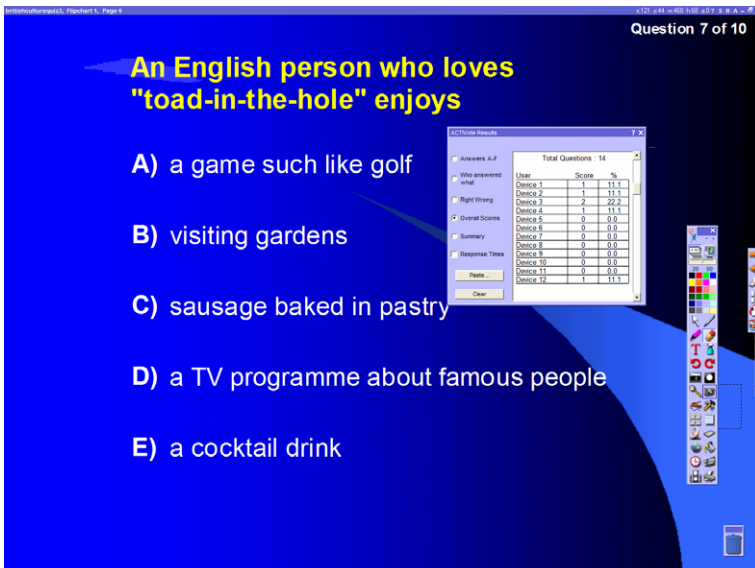


Fig. 5. In the end the teacher can also show the students' overall scores. In this way, they are able to know their overall performance in the activity and check their position in relation to the whole group.

little detailed classroom-based research concerning the teaching–learning processes it is capable of stimulating. This article therefore reports on a study of this kind carried out as part of a PhD research programme in the context of a British University pre-sessional

programme in EAP/Study Skills for international students (Cutrim Schmid, 2005). The research investigated the impact of the use of an IWB (and the peripheral hardware used in conjunction with it) in the research situation by analysing classroom interaction data and the views of a range of participants. Research findings have indicated several perceived pedagogical benefits of this technology in the language learning context. This article focuses specifically on the use of the voting component of Promethean IWB technology (ACTIVote).

## 2. Interactive whiteboard technology research

Because, IWB technology is a relatively new technology in education, the available academic literature is still very limited. In terms of MFL and EFL-related IWB research, no substantial research appears to have been published so far. One of the few “academic” studies on this topic in the MFL context is the work of Gray et al. (2005), who investigated a group of language teachers in UK secondary schools as they integrated the use of the interactive whiteboard (IWB) into their classroom practice. Their findings showed that the IWB has the potential to enhance teaching by supporting classroom management, pace and variety and the drawing of attention to grammatical features and patterns. The teachers investigated also felt that the use of IWB had positive effects on pupils’ memorization skills and writing development (p. 1).

Most IWB literature (across the curriculum) is highly positive about the impact and the potential of the technology. Thus, some of the advantages associated with the use of IWB technology that it identifies are: (a) it facilitates the effective integration of multimedia in the ‘traditional’ whole class language classroom (Hall & Higgins, 2005; Walker, 2003; Gray et al., 2005) it facilitates the design of activities/materials which are tailored to meet the needs of students with diverse learning styles (Wall et al., 2005), (b) its use tends to enhance motivation, interaction and collaborative learning in the classroom (Bell, 2000; Cutrim Schmid, 2006a,b), and (c) it has a positive impact on students’ and teachers’ development of ICT skills and attitudes towards the use of computers for teaching–learning (Goodison, 2002a,b). However, these studies also mention some drawbacks of IWB technology, such as (a) teachers’ feeling of ineptitude and lack of competence concerning their knowledge of ICT (Glover & Miller, 2001) and (b) teachers’ concern about making their lessons more teacher-centred if too much focus is given to the IWB technology (Goodison, 2003).

Regarding the voting system more specifically, although it has been marketed as an important pedagogical tool, there has been only limited coverage of this component of IWB technology in the literature, and what literature there is has focused mainly on academic lecture settings rather than situations such as the research reported here is concerned with, i.e., the language teaching classroom. Several authors (Draper & Brown, 2004; Stuart et al., 2004; Cutts et al., 2004; Cutts & Kennedy, 2005) have conducted research on the use of voting systems in the higher education context.

Their main findings suggest that the use of this technology facilitates a more dynamic form of student interaction in lectures, in which students are encouraged to engage with their difficulties and seek to resolve them. Some of the main benefits of the system cited by the students and lecturers in the various studies were: anonymity (Elliot, 2003), possibility of evaluating student progress (Stuart et al., 2004), increasing student engagement with learning material (Cutts et al., 2004), and encouraging student–lecturer and student–student interaction (Draper & Brown, 2004; Cutts & Kennedy, 2005).

These voting systems (or learner response systems, as they are sometimes called) are also becoming increasingly available to language teachers all over the world (e.g. in British Council ELT Centres). In the UK, the use of this technology (in conjunction with an interactive whiteboard) in primary and secondary schools is fairly well-rooted. However, the academic research on the pedagogical value of this technology in that context is still at its early stages. One of the few examples is a project recently initiated by the University of Wolverhampton (2006–2008), which aims at investigating the pedagogical uses of voting systems in UK primary and secondary schools.

The PhD research from which this article derives has thus attempted to contribute to this field of enquiry by providing a thorough analysis of classroom practices so as to better understand the process of IWB integration in a specific educational context. This article discusses one of the perceived pedagogical benefits of using the ACTIVote component of IWB technology in the context investigated, i.e. the potential of the technology for assisting students in checking their own progress and their standing amongst peers.

### **3. Research context**

The EAP/Study Skills summer programme is intended to prepare the international students for study at the University during the coming academic year, in terms of their English language and study skills needs. The main components of the programme are: (a) academic reading and writing, (b) listening comprehension and (c) speaking skills. The students are also offered a number of “complementary courses”, two of which provided the sites for the research which is the focus of this article.

The first complementary course, entitled “ICT for Academic Study in English” was implemented in the summer of 2003 (stage 1 of the research project). Four units of teaching activities, each lasting for 90 min of class time, were developed for this course on the following topics: (a) Websites for lexical study, (b) Evaluating Web material, (c) Internet search strategies and (d) Avoiding online plagiarism. For the course investigated in stage 2, implemented in the summer of 2004, four units of teaching activities were developed on the following topics: (a) University Life in the UK, (b) British Life and Culture, (c) Learning with Computers and (d) Writing and Reading Online. The two courses offered a combination of general English lessons and development of awareness regarding ICT learning resources.

The IWB technology was used in all stages of the lessons. Several electronic flipcharts and voting questionnaires (involving the use of the ACTIVote system) were designed for all units; the teacher and students used the interactive whiteboard as a presentation device and as a platform for integrating different types of technology (e.g., video, sound, multimedia, and Internet).

The ACTIVote system was used to support a wide range of classroom activities, such as (a) to find out what the students already knew about the theme of a session and/or foster their curiosity about a certain topic (during the introduction stage), (b) to evaluate students’ level of understanding of the content of the lesson before making certain pedagogical decisions, (c) to launch discussions and stimulate debate, and (d) to introduce an element of fun through the design of competition games. For instance, for the session entitled “British life and culture” the students did a voting activity in the beginning of the lesson in the form of a quiz, entitled: What do you know about British life and culture? The quiz contained eight questions related to cultural concepts and general knowledge about

British politics and culture. Students were then divided into groups of three in order to take part in a “competition game” (see Figs. 2–5).

The students came from many parts of the world, but most of them tended to be from mainland China and Taiwan. They had a good command of the English language (intermediate to advanced level). All the students in both studies were postgraduates, apart from one undergraduate in course 1, and their ages ranged from 20 to 36 years. There were 29 students enrolled on the programme involved in stage 1 (Study 1) and 33 students in stage 2 (Study 2).

The aim of the research was to explore the potential of the IWB technology for supporting the language learning process and also for helping learners to acquire electronic literacy during these two courses. In order to address the purposes of such a study, two main research questions were formulated.

1. How is the classroom teaching/learning process affected by the use of IWB technology?
  - a. What kinds of interactions are produced when the technology is implemented?
  - b. What kinds of pedagogical goals (e.g., to enhance collaboration) may the technology help to achieve?
2. How do teachers, learners and researchers perceive the introduction of IWB technology in the language classroom in terms of teaching–learning processes?

#### **4. Research methodology**

The investigation involved a classroom-based qualitative study of the researcher’s own lessons and teaching. Research data were collected via a variety of ethnographic research instruments. In what follows, more detailed information about each of the research instruments that were used in both investigations is provided.

##### *4.1. Field notes*

After each lesson the teacher–researcher typed up field notes into computer word-processing files. They were mainly descriptive of the lesson events as they had unfolded, but also contained some of her thoughts regarding the impact of IWB technology on the pedagogical process.

##### *4.2. Critical colleagues*

Ten critical colleagues were involved in the research, 5 in Study 1 and 5 in Study 2. All of them were highly experienced language teachers and nine of them were also academic researchers with a good level of expertise in qualitative research. Their role was to observe the researcher’s lessons, write field notes and fill out an open-ended questionnaire at the end of the lesson. This open-ended questionnaire was designed in order to have access to critical colleagues’ perceptions regarding some specific aspects of IWB use that I wanted to investigate in greater depth, such as interaction patterns between teacher and students and among students, the impact of the technology on students’ active participation and levels of collaborative learning.

#### 4.3. *Video-recording*

In order to gain insights into the everyday practices of using the IWB, all lessons were video-recorded. One digital camera, set up on a tripod, was placed at the back of the classroom by the teacher–researcher before each session. This camera was aimed directly at the whiteboard, but it also allowed the teacher–researcher to capture general classroom interaction.

#### 4.4. *Classroom discussions*

Since the involvement of the learners in the process of investigation in all stages of the research was considered essential, existing pedagogical practice was also used as a research tool. Therefore, in Study 2, a specific pedagogical activity (questionnaire design and interviewing) was used to launch classroom discussions and elicit data from the students regarding their perceptions of IWB technology use.

#### 4.5. *Post-course questionnaires*

A questionnaire was administered at the end of both modules to find out students' overall response to the courses and to the use of IWB technology in the lessons. The questionnaire contained nine multiple-choice questions on a four-point scale, ranging from strongly agree to strongly disagree, one-off questions (with yes or no answers) and open-ended questions. The students were encouraged to provide written comments in response to all multiple-choice questions.

#### 4.6. *Student focus group*

In Study 1, the researcher ran a focus group discussion with 12 students, who volunteered to take part. The meeting was held after the end of the module. The discussion had the duration of one hour and fifteen minutes and one hour of the session was video recorded and later fully transcribed.

#### 4.7. *Student individual interviews*

After the Study 2 module had finished, the teacher–researcher carried out semi-structured interviews with 10 students who volunteered for this role, and each interview lasted on average for 30 min. They were usually conducted on a one-to-one basis, and on one occasion only, students were interviewed in pairs.

#### 4.8. *Data analysis*

The data analysis was an ongoing process that started from the very beginning of the study when the teacher–researcher thought about the main themes and issues which were emerging. Firstly, the field notes, critical colleagues' feedback questionnaires, teacher's analysis questionnaires and transcripts of video-recorded lessons were analysed and coded according to themes.



The design of research instruments, such as post-course questionnaire, interview protocols (in Study 2) and the focus group topic guide (in Study 1) was only concluded after the first stage of the analysis had been completed. Therefore, the themes and “hypotheses” that emerged during this first stage of analysis helped the teacher–researcher to tailor questionnaire and interview questions towards obtaining more insights into the key issues that had emerged.

The analysis of the questionnaires, which included both quantitative and qualitative information, was undertaken using the Statistical Package for the Social Sciences (SPSS). Firstly, this statistical software program was used to code and compute a scale analysis of the collected questionnaires. Secondly, it was used for descriptive analysis to calculate frequencies, and percentages. Lastly, tables and charts were developed to show more readable results and facilitate the analysis process.

The transcripts of the focus group interview (in Study 1) and individual interviews (in Study 2) were coded for categories on an individual basis and analysed across transcripts to identify common themes. After this stage, a word document was created in order to finalize the coding process. All themes/codes were used as subtitles and all instances of the same “phenomenon” or category found in the various sources of data were cut and pasted to that document, i.e., themes were traced and explored across the data. This process facilitated the identification of the themes or topics that were recurrent in all sets of data.

Therefore, a range of data-collection instruments and techniques were used in order to attempt to maximise reliability through triangulation. As a result, the interpretation of research findings is based on the analysis of data obtained from all sources<sup>3</sup>.

## 5. Research findings and discussion

The research findings indicated that the voting component of IWB technology facilitated several learning effects. However, because of limitations of space, this article focuses on one of these pedagogical benefits, which is its potential for assisting learners in their self-assessment<sup>4</sup>.

### 5.1. Feedback and privacy

If the ACTIVote anonymous mode<sup>5</sup> is used, the voting system gives the students the opportunity to check out their understanding and compare their performances to the group as a whole, in a way that preserves their privacy. Nevertheless, the individual students themselves know immediately if they gave the right or wrong answer, and they

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<sup>3</sup> Although all the other sources of data contributed to the findings, due to space limitations, the data that will be discussed in this article are drawn from interviews with critical colleagues and students.

<sup>4</sup> See the following publications for more detailed information on the research findings (Cutrim Schmid, 2005, 2006a,b).

<sup>5</sup> The term *anonymous mode* is used to indicate that users will be asked to vote and then the results will be displayed after the vote, but the group will be unable to determine who voted for what answer. The term *named mode* is used to indicate that users will be asked to vote and then the results will be displayed and the group will be able to see each individual named alongside their vote.

are given the opportunity to check their progress. In the following interview extract the student emphasised this specific advantage of the technology:

S: it (the ACTIVote system) can test our abilities and... maybe if we find many mistakes you can give me some correct answer, to check and I can know why I am wrong.

(*Post-course Interview with Birdie<sup>6</sup> – Study 2*)

In this sequence, the student was asked in the post course interview if she could think of any advantages of using the voting system. She listed basically three advantages: anonymity, self-evaluation and immediate access to correct answers after the voting results are shown. She also pointed out that the voting system allowed her to know “why she was wrong”. Therefore, she emphasised the role that the system can play not only in testing the learners’ ability, but also in allowing them to progress, since they can identify their errors and misconceptions, and correct themselves. This can be done because when the voting results are shown, students also have access to the correct answer and associated explanation, which can be provided either by the teacher or by their peers.

Another student in Study 2 also highlighted this particular use of the technology, i.e., allowing students to identify their mistakes, when asked whether she liked when the teacher showed their results after the voting sessions.

It makes us know what mistakes we make and maybe we will progress next time.

(*Post-course interview with CJ – Study 2*)

Critical colleagues also considered student self-assessment to be an important advantage offered by the use of the voting system. As one of them pointed out:

The students were given an opportunity to find out about what they knew about the topic before they received more input. They also had a chance to try out straight away what they’d learnt.

(*Critical colleague – 20/08/03 – Unit 2 – Study 1*)

## 5.2. Peer comparison as learning

During the focus group discussion in Study 1 some students also highlighted how the ACTIVote system made it easier for them to check their progress in relation to the other students. One of the students said:

- S3: Yeah... learning by doing... and I think another advantage about the voting... when I saw the results... sometimes I chose the wrong one but then I see the results and then I think Ah, but someone also did like me, also wrong (whole group laughs)... cause if we did not have this system, I do not know, maybe I would think that only me chose the wrong answer... (everybody laughing).
- T: The wrong answer... but there are other people.
- S3: I can value me with the results.

(*Focus group discussion – 22/09/03 – Study 1*)

<sup>6</sup> All names have been changed in order to protect students’ anonymity.

In this sequence, the student described how she felt when she had access to the voting results of the whole class. According to the student, by knowing the percentage of correct and wrong answers, she was able to compare her own results with the results of her classmates, and this allowed her to evaluate her performance in comparison with that of her peers. In particular, this seems in this case to have helped her feel better about having got the wrong answer, since she could see that others had done the same, not only her.

In the following sequence, another student described what went through her mind when she scored poorly in comparison with her classmates.

- T: Why did you compare?
- S: It is just like a self-assessment, ah, I made a mistake, why? Why did I make that? Why did so many people get the correct answer but I cannot?
- for this reason, I will think about that, but for my personality I would not talk to others and I would not discuss with others.

*(Post-course interview with Sheena – Study 2)*

In lines 2–4, the student pointed out that, when her performance was inferior to that of the majority of the class, she started a process of self-evaluation. In lines 4–5, she highlighted that this was an individual process. Therefore, she would not talk to other people about her performance, but she would think about it in order to try to understand why it was not satisfactory. Thus, even when the student cannot find consolation in knowing that many fellow students have also made the same mistake, the ACTIVote technology stimulates greater individualisation and potential for reflection in this area than might have otherwise occurred. These findings are in line with previous studies of the educational use of learner response systems, which show that this technology has the potential to promote increased student engagement with learning material (e.g. Cutts et al., 2004).

Some students also emphasised the role that the voting sessions and the “performance comparison” played in motivating them to improve their knowledge. As it can be seen in the following sequence:

- S: If the others are right and only you are wrong, you must think about to learn more about this topic. For example, in the British culture, I only
- chose three or four correct answers, so after that you feel you need to read more about British culture.
- T: You need to read more. So, is it good for you to analyse your performance?
- S: It lets us know our level.

*(Post-course interview with Win – Study 2)*

In this sequence, the student indicated (in lines 1–2) that the self-evaluation process enabled by the voting system worked for him as an indicator of which areas he had to work on more intensively. In lines 2–4, he gave the example of a voting session that focused on knowledge about British Culture, in which his performance had not been satisfactory. In line 4, he pointed out that this specific exercise thus made him feel that he “needed to read more about British culture”.

The same aspect was emphasised by the following student:

- S: For me it is an assessment for myself, if I follow the teaching, if I am really too bad or if I am like the other students. If I am like the other students, do not panic, but if I am like, but if I am in the last, the wrong list, I have to do more.

*(Post-course interview with Andy – Study 2)*

In this sequence, the student admitted that he would not necessarily “panic” if he had a bad performance in the voting sessions. This would only happen if his performance was inferior to the average of the group. That would be an indication that he would have to work harder in order to improve his knowledge about that specific topic.

Another student pointed out that it was important that the students evaluated themselves during the voting activities because these were “learning activities” and not simply a way for the teacher to evaluate them:

- T: And why did you do that (compare your performances)? Why do you think it was important for you to do that?
- S: Why? Because I think I wanted to have an idea of my own progress.
- T: Yeah, and?
- S: And It is another kind of study, we are doing the revision, we are studying.

*(Post-course interview with Lauren – Study 2)*

In line 3, the student answered that she compared her performance with the others in the group because it helped her to “have an idea of her own progress”. In addition to that, in line 5, she pointed out that the voting sessions involved self-evaluation because they constituted learning activities for the students. In line 5, she referred to them as “another kind of study”, i.e., they created learning opportunities for the students. Therefore, this student’s response seems to imply that, comparing their performances with the others in the group worked for these students not only as a way of understanding their own progress but also as a strategy that could help them to reach another level of understanding of the learning material. Similar pedagogical gains of voting systems, i.e. self-assessment and learning with peers, have also been identified in the research conducted by [Cutts & Kennedy \(2005\)](#), who investigated the use of learner response systems in lectures in the UK context.

### 5.3. *Self-esteem and collaboration*

Other students also highlighted the positive impact that the voting sessions had on their self-esteem on the occasions in which they performed better than most of their classmates. As one of the students pointed out:

- T: Did you use that to test your performance?
- S: Yes, sometimes. Especially for the last, for the last voting system. I was in the that group, we won and I think...Wing I do not remember the name...
- T: Barbie?

- S: Barbie was the number one, I saw her performance and I was number 2 because I saw mine as well and I thought to myself, ah, that is good, I am second!

*(Post-course interview with Soul – Study 2)*

In this sequence, the student is referring to the final assessment voting activity of Study 2. In this session, the class was divided into several groups, who were competing against each other. In line 2, the student declared that he belonged to the group who won the competition. In lines 5–6, he added that, although he did not have the best performance within the group, and thus did not win the “prize”, he managed to have the second best performance. Therefore, the voting activity seemed to have worked for him as an indication that he knew more than most students in the class, which had a positive effect on his self-esteem.

Expanding on the topic of self-evaluation, some students also drew attention to the role that the voting session can play in helping learners to find out what their classmates can offer them in terms of knowledge exchange. As one of the students pointed out:

- T: So you prefer when I show the overall results. . .so you compared, so why did you do that? Why did you compare?
- S: I think it is a good idea to know that some people have more information more than me in a specific topic, so maybe it helps me to enrich my knowledge about this specific topic.
- T: Cause you can see most people know more than me about this topic, so you can work harder?
- S: Cause most people are from different areas, know more about other fields and they can, not teach. . .but they can tell their different opinions or more things about this specific field.

*(Post-course interview with Miriam – Study 2)*

In this sequence, the student raised an important point regarding the use of the voting system, which is its potential for encouraging collaboration and not only competition among students. In lines 3–4, the student declared that she did not mind when her performance was inferior to that of her peers, but she used those situations as learning opportunities; i.e., to learn from her classmates (line 5). She pointed out (line 8) that since the group was formed by people with expertise in various subject areas; it was natural that their performance would vary according to the kind of activity they would engage in.

In lines 9–10, the student pointed out to the potential of the voting sessions for helping learners to get to know more about their peers’ level of knowledge about certain topics. In line 10, the student emphasised the role that the voting sessions can play in encouraging collaboration, i.e., by knowing more about their peers, the students would be in a better position to exchange information and learn from each other. From this point of view, the voting sessions would work as a facilitator in the process of collaboration, since the students would be able to identify their knowledge gaps and also how they could fill them with the help of their classmates.

However, this potential of the voting system may only be fully realized in situations in which the results of the voting sessions can be openly discussed by the whole group. In other words, it is important that the students be willing to expose their strengths and weaknesses within the group without the fear of “showing off” or losing face. Nevertheless, as the research findings have indicated, in the context investigated, most students tended to attach great value to anonymity.

## 6. Summary and conclusion

The findings have shown that the voting system worked as an important pedagogical tool which allowed the students to check their performance and their standing amongst peers. The anonymity aspect of the technology allowed self-conscious students to do that by preserving their privacy. However, it is also important to highlight the potential of the technology for encouraging self-assessment in situations in which students are encouraged to share their strengths and weaknesses within the group without the fear of losing face.

The data have also indicated that the use of the voting system had an impact on the socio-affective dimension of the pedagogical process. The findings that are presented and discussed here suggest that its use changed the class dynamics in terms of social relations since the students interacted with each other in ways that would probably not have been possible without the use of the technology. The fact that the students could immediately check their progress and compare with others without embarrassing themselves was the trigger for these processes, and demonstrates the way in which the voting system creates a potential for significant pedagogical innovation.

This research has provided important contributions to an understanding of the educational potentialities of a voting system used in conjunction with an IWB. The findings presented and discussed here are in line with those of previous studies, which also identified the following factors: (a) anonymity (e.g. Elliot, 2003), (b) self-assessment (e.g. Stuart et al., 2004), and (c) increased student engagement with learning material (e.g. Cutts et al., 2004), as the main pedagogical benefits of using this technology. However, the research in this area is still at its early stages and further long-term research is needed to address these issues and assess the pedagogical value of this technology in the language classroom.

## References

- Bell, M.A., 2000. Impact of the electronic interactive whiteboard on students attitudes and achievement in eighth-grade writing instruction. Unpublished PhD dissertation. Baylor University.
- Cutrim Schmid, E., 2005. An investigation into the use of interactive whiteboard technology in the language classroom: a critical theory of technology perspective. Unpublished PhD Thesis, Lancaster University (UK).
- Cutrim Schmid, E., 2006a. Investigating the use of interactive whiteboard technology in the language classroom through the lens of a critical theory of technology. *Computer Assisted Language Learning* 19 (1), 47–62.
- Cutrim Schmid, E., 2006b. Using a voting system in conjunction with interactive whiteboard technology to enhance learning in the english language classroom. *Computers and Education*, doi:10.1016/j.comp-edu.2006.07.001. <http://www.sciencedirect.com>.
- Cutts, Q., Kennedy, G., Mitchell, C., and Draper, S., 2004. Maximising dialogue in lectures using group response systems. In: *Proceedings of the 7th IASTED International Conference on Computers and Advanced Technology in Education*, Hawaii, USA.
- Cutts, Q., and Kennedy, G., 2005. Connecting learning environments using electronic voting systems. In: Young, A., Tolhurst, A. (Eds), *Conferences and Practice in Information Technology* 42, 181–186.
- Draper, S.W., Brown, M.I., 2004. Increasing interactivity in lectures using an electronic voting system. *Journal of Computer Assisted Learning* 20, 81–94.
- Elliot, C., 2003. Using a personal response system in economics teaching. *International Review of Economics Education* 1 (1), 80–86.
- Glover, D., Miller, D., 2001. Running with technology: the pedagogic impact of the large-scale introduction of interactive whiteboards in one secondary school. *Journal of Information Technologies for Teacher Education* 10 (3), 257–278.
- Goodison, T., 2002a. Learning with ICT at primary level: students' perceptions. *Journal of Computer Assisted Language Learning* 18, 282–295.

- Goodison, T., 2002b. Enhancing learning with ICT at primary level. *British Journal of Educational Technology* 33 (2), 215–228.
- Goodison, T., 2003. Integrating ICT in the classroom: a case study of two contrasting lessons. *British Journal of Educational Technology* 34 (5), 549–566.
- Gray, G., Hagger-Vaughan, L., Pilkington, R., Tomkins, S., 2005. The pros and cons of interactive whiteboards in relation to the Key stage 3 strategies and framework. *Language Learning Journal* 32, 38–44.
- Hall, I., Higgins, S., 2005. Primary school students' perceptions of interactive whiteboard. *Journal of Computer Assisted Learning* 2, 102–117.
- Stuart, S., Brown, M., Draper, S.W., 2004. Using an electronic voting system in logic lectures: one practitioner's application. *Journal of Computer Assisted Learning* 20, 95–102.
- Walker, R., 2003. Interactive whiteboards in the MFL classroom. *TELL & CALL* 3, 14–16.
- Wall, K., Higgins, S., Smith, H., 2005. The visual helps me understand the complicated things': pupils views of teaching and learning with interactive whiteboards. *British Journal of Educational Technology* 36 (5), 851–867.