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Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

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Abstract

Past research into the classroom uses of personal response systems or ‘clickers’ show that their use increases students’ participation and engagement levels. In South Africa, clicker usage is still in its infancy, with little research published in the field. This study reports on Graphic Design students’ perceptions of the use of clickers and on their engagement levels in small clicker classes. Data was collected through student questionnaires, clicker questions during classes and focus group discussions. This paper discusses engagement on three levels. Firstly, clickers seize students’ attention through the simplicity, novelty factor and fun element they bring to class. Secondly, they help participation of students through the anonymity they offer, which is especially important for students whose language of instruction is not their first language. Thirdly and most importantly, clickers encourage peer discussion, forcing students to re-conceptualise their own conclusions. The skill of collaborative decision-making is particularly important for future graphic designers. More research is needed to validate students’ perceptions of their level of engagement and it is suggested to include other disciplines and study levels in the future.

Keywords:

Clickers, Personal Response Systems, Student Engagement, Peer Learning, Class Participation, Graphic Design

Introduction

One way of increasing students’ academic success in Higher Education, is to focus on student engagement: there is wide consensus in the literature that student engagement is the single best predictor of a student’s learning and personal development (Kuh, 2009; Astin, 1984; Astin, 1999; Astin, 1987). Two of the indicators of student engagement, in addition to taking initiative, self-motivation and independent experimentation, are spontaneous collaboration and peer coaching amongst students (Sandholtz et al., 1994).

Electronic voting systems (EVS), also called personal response systems (PRS) or ‘clickers’ have entered the United States and United Kingdom Higher Education system as a tool to enhance students’ participation and engagement (Draper & Brown, 2004; Draper, Cargill, & Cutts, 2002; Kay & LeSage, 2009; Simpson & Oliver, 2007). A distinct research stream in the literature around clickers focuses on the use of clickers to encourage student collaboration and peer learning (Mazur, 1997; Crouch & Mazur, 2001).

In South Africa clickers’ usage is still in its infancy. The Cape Peninsula University of Technology (CPUT), where this study was carried out, invested in 100 clickers at the end of 2009, primarily for Extended Curriculum Programme (ECP) students. The extended nature of these courses, which allows lecturers more time to develop interactive approaches to teaching and learning, was seen as a good testing ground for clickers. A main challenge in the ECP Graphic Design course, the focus of this

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

study, is the lack of student participation in class discussions. To counteract the fear of lecturing staff, that “students’ push of a button may have replaced opportunities for thinking aloud and practising verbal communications skills in the class settings” (Patterson, Kilpatrick, & Woebkenberg, 2010:606), our particular interest in this study was to facilitate active dialogue amongst students. As main conclusion, this study will show that in small classes clickers are best seen as a tool to encourage collaboration and peer learning. This is particularly important for future graphic designers, who will find themselves, in industry, working in teams and relying on collaborative decision-making processes.

Literature review

Benefits of clickers

Clickers are small handheld devices which allow students to answer multiple choice questions in class in an anonymous way, allowing the immediate display of results.

While most research on clickers focuses on their potential to improve teaching in large classrooms and “very little attention has been paid to the impact of clickers in small classes” (Walker & Barwell, 2009:3), our study was set in the context of a small class in a practical subject, with ample space for feedback from lecturers to students. Some of the benefits traditionally linked to clickers, such as improving class attendance, fostering knowledge acquisition or enhancing feedback from lecturers to students, are therefore of less relevance to us. Our main interest in this study centres on students’ perceptions of clickers as a tool to improve their attention and participation in class. Furthermore we are interested in their perceptions of clickers as a tool for enhancing class discussion.

Students’ perceptions of clickers

Students are generally positive about the use of clickers in teaching and learning (Caldwell, 2007; Fies & Marshall, 2006; Hu, Bertok, Hamilton, White, Duff, & Cutt, 2006; Preszler, Dawe, Shuster, & Shuster, 2007; Simpson & Oliver, 2007). Studies show that students in lower level courses especially had more positive overall impressions than students in upper-division courses (Preszler et al., 2007), and had fewer problems accepting the changes associated with introducing clickers in the classroom (Trees & Jackson, 2007). Students in general report that the technology is easy to learn and to use (Kay & LeSage, 2009).

Clickers and student attention

Research shows that students’ attention span lasts no longer than 15 to 20 minutes (D’Inverno, Davis, & White, 2003). Interspersing lectures with carefully designed clicker questions can re-focus students’ attention at crucial moments. Numerous studies have reported that students’ attention can benefit from the use of clickers (Caldwell, 2007; Draper & Brown, 2004; D’Inverno et al., 2003).

Clickers and students’ participation

There is substantial evidence in studies to show that using clickers increases student participation when compared to lectures where clickers are not used (Kay & LeSage, 2009). The anonymity that clickers offer, the possibility of students voting without being judged by their lecturer or their peers, combined with the feedback clickers give to students and staff alike – all these seem to improve student participation (Patterson et al., 2010). They offer students an opportunity to participate in class without “fear of ridicule, should they volunteer an incorrect response” (Banks, 2006:vii). This is particularly important for second language learners, who often struggle to participate in class because of cultural

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

factors inhibiting active participation, such as lack of competency in the language of instruction (Stagg & Lane, 2010).

Clickers and student engagement

Studies looking at student engagement focus on students' perceptions of their own engagement during clicker classes (Kay & LeSage, 2009). Findings are mainly based on quantitative student surveys. These studies link student engagement to students' improved attention and focus through clickers, improved attendance, enjoyment and fun experienced in clicker lectures (Addison, Wright, & Milner, 2009; Preszler et al., 2007; Stagg & Lane, 2010; Trees & Jackson, 2007). However, there is little focus on the reasons why students are more engaged in these lessons and whether their engagement leads to learning (Fies & Marshall, 2006; Kay & LeSage, 2009).

Qualitative elements in studies are predominantly limited to analysing open-ended questions in students' surveys (Graham et al., 2007; Patry, 2009; Kyei-Blankson, 2009). Few studies employ focus group discussions with students about clickers and student engagement. Paterson et al.'s qualitative study (2010) reports that clickers supported increased engagement and interaction in the classroom, which brought the class closer. They stress the importance of assessing lecturers' teaching practices with respect to activities that enhance student engagement and students' perceptions towards activities that students believe engaging, in order to sufficiently capture engagement and the facilitation of learning. Walker and Barwell's study (2009), one of the few studies that focused on the impact of clickers in small classes, report that clickers encourage class engagement, through their functionality, novelty and anonymity. Confirming Banks' findings (2006), they conclude that, in smaller classes, clickers' main benefit lies in "collaborative learning [amongst students] rather than the knowledge transfer from teacher to learner (Walker & Barwell, 2009:45).

Critiques around the use of clickers and student engagement

More critical voices warn against using clickers without carefully planning appropriate pedagogical approaches. van Dijk, van den Beer, and van Keulen (2001) emphasise the need to distinguish between student activity and cognitive experiences. They argue that "interactive teaching will not *automatically* result in students who are more activated compared with students in traditional lectures" (25). Students may simply participate in the voting process for the sake of it, without thinking deeply about questions the lecturer is asking.

Clickers and peer learning

Literature around clickers and improved student learning focuses on the need to engage students in dialogue with the lecturer and with each other. Laurillard's conversational framework (2002) is mentioned in various papers, with its underlying assumption that learning results from the process of ongoing and adaptive dialogue between teacher and learners (Simpson & Oliver, 2007). Mazur (1997) is one of the main proponents of using clickers for peer learning, which can help normally struggling students to improve in examinations. The 'Mazur sequence' suggest first allowing students to vote individually. After showing first results, students discuss with their classmates then vote again. Only then does the lecturer summarise and explain the results. Crouch and Mazur show in their longitudinal study (2001) that using the 'Mazur sequence', combining individual clicker voting with peer discussion, (which is critical to the success of peer learning), resulted in substantially increasing the number of students giving correct responses to conceptual questions and in improving student engagement in class discussion.

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

Context for the study and process of investigation

Context

The 2010 ECP Graphic Design class at CPUT consisted of 39 students. These students were an average of 19 to 20 years old; the majority were male. Students came from disadvantaged communities and schools and entered the ECP course via referral, because they were academically underprepared for first year mainstream tertiary education.

In general, the approach to design education is largely practical and studio-based, helping students develop design-based problem-solving skills by creating artefacts on their own under the facilitation of a lecturer. The studio-based approach in design education encourages collaborative learning through discussion and critical feedback sessions. Studio teaching aims to mimic the ‘real world’ design studio and therefore also the collaborative design processes followed in the real world studio. In the world of work, a group of creatives comes together to solve a client's design problem. This collaborative effort ensures that the final solution to a design problem is one that has been developed by exploring all the possible solution avenues and that the client gets the best possible solution to the problem. It is therefore essential that students start to foster this collaborative decision-making skill at the early stages of their designer careers.

However, because of these students’ academic history of mainly teacher-centred instruction, the majority of students expected to ‘be taught’ as opposed to the constructionist notion of a design classroom (Papert & Harel, 1991), especially in more theoretical subjects such as History of Art. When rated on general class participation by their lecturers on a scale from 1-3 (1 being low participation to 3 being high participation), more than half of the student body of this study were rated on a low participation level (see Table 1).

Table 6: General class participation of students rated by lecturing staff

Participation level	N	%
low participation	22	57%
average participation	10	26%
high participation	7	18%
Total	39	

During 2010 three clicker interventions were designed and implemented with these students. The clicker questions were mainly non-factual questions (without a right or wrong answer) and were meant to lead students into a class discussion. Clicker voting was either preceded or followed by peer and/or class discussion.

Data collection

This study employed a mixed method research design, combining qualitative and, to a limited extent, quantitative data. Data was collected during the three sessions and consisted of written student feedback, clicker questions, a class discussion and focus group discussion (see Table 2).

Table 7: Methods of data collection

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

Method	Time	Number of respondents	Type of data
Written student feedback (open ended questionnaire)	After session 1 (5 questions)	28	Qualitative
Clicker feedback questions	After session 2 (5 questions) and during session 3 (14 questions)	Number of answers varied by question, on average 25	Quantitative
Class discussion	During session 3	29	Qualitative
Focus group discussion	After session 3	6	Qualitative

In total, 37 of the students attended at least one of the clicker interventions (there is no compulsory class attendance in the ECP Graphic Design programme, although class attendance is taken in some of the classes). These 37 make up the sample of this study. Average student attendance in the three interventions was 29 students.

The first intervention was ended with a written questionnaire on students' perceptions of clickers, which comprised four open-ended questions. Students handed in their answers at the end of the class. The four questions focused on the benefits and challenges of using clickers as a learning tool in a Graphic Design class. This was the first time clickers had been used in a Graphic Design classroom and students did not have the opportunity to discuss benefits or challenges of clickers with their peers before completing the questionnaire.

After sessions two and three, students were asked questions about the way clickers had been used in the previous sessions. The questions asked in session three were based on an initial analysis of the written feedback students gave us after session one, to verify some of the emerging themes. We used four-level Likert-scale questions (strongly agree, agree, disagree, strongly disagree). Findings were reported under two categories: agree and disagree.

In both clicker voting sessions, clickers were distributed randomly and students were assured that their responses were anonymous. The clicker software recorded the number of student votes and responses and was used to generate reports on students' answers.

During the last session, students were also encouraged to participate in a class discussion around the posed questions. After the third clicker session, six students took part in a focus group discussion (30 minutes) to revisit the issues that had emerged from their written feedback and the class discussion. Three students were volunteers and three were selected because their written feedback represented a spread of emerging themes. In session three, the discussion around clickers and the focus group was facilitated by the non-teaching member of the research team, one of the CHED lecturers. Students' comments were recorded and transcribed to be used anonymously as prescribed by the institutional research policy.

Data Analysis

Data analysis was conducted on an on-going basis, which allowed us to explore emerging themes and pursue them in more depth in the third intervention and especially in the focus group discussion. We analysed the qualitative questionnaires and focus group data using analytical induction strategy, which involves scanning the data for categories of phenomena or themes and for relationships between such themes (Robinson, 1951; Znaniecki, 1934). Direct quotes were used where necessary, to capture

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

students' intended meaning as fairly and accurately as possible. While our methods for analysing our qualitative data were inductive, we were also guided by theoretical interests and our reading of related literature (Hull et al., 2006).

Findings and discussion

This section discusses findings from the qualitative data such as written feedback, class and focus group discussions, triangulated, where possible, with the quantitative data acquired through the clicker voting sessions. We will report findings along the following three themes which emerged from the findings:

1. Students' general attitudes towards clickers to improve their attention, linked to simplicity, novelty and fun,
2. Students' perceptions towards clickers as a tool to promote active participation and
3. Students' perceptions towards clickers as a tool to encourage discussion and peer learning.

Clickers and student attention

Echoing general findings in the literature (Caldwell, 2007; Kay & Lesage, 2009), our students' responses in the written student questionnaires, were predominantly positive towards using clickers. The majority of students enjoyed the clicker sessions, felt involved and looked forward to using them again. The following statements depict the general attitude of students towards clickers:

I enjoyed myself during the clicker class.

People get kind of involved in the process.

No one left the class bored or tired [but] happy and comfortable.

After the questions were all done, I wanted more!

Looking into more detail at the reasons students enjoyed the sessions, we could identify elements of simplicity, novelty and entertainment (Kay & Lesage, 2009).

Fourteen students appreciated the simplicity and efficiency of the tool (50%):

We just click and it's so simple.

There is less distraction and more discussion.

You learn at a faster pace and get through topics faster.

Thirteen students mentioned the novelty of clickers (46%), and six students highlighted the fun element that clickers bring into their learning (21%).

Clickers make the discussion more fun.

It is full of energy.

The combination of these elements helped seize students' attention and keep their focus in class (d'Inverno et al., 2003), as the following quotations show:

I find it to be very innovative, exciting and it grabs my attention.

You have to refresh your mind and think about what you are going to answer ... it keeps our minds think[ing] all the time.

These results are backed up by the clicker voting session, where 76% of students reported that they enjoyed the clicker sessions.

Clickers and student participation

Clickers help to create a safe, non-threatening class environment (Banks, 2006). In the written feedback eight students (29%) spoke positively about the anonymity clickers offered. In the focus group discussion, students talked about their fear of being judged by their peers, when volunteering to speak

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

out in class. Corresponding to other findings in the literature (Simpson & Oliver, 2007) the anonymity that clickers offer decreased this fear:

Staying anonymous [is good]: people are unsure of their answers or they're too embarrassed to say their answers or they're scared that some people might think of them differently, if they say something wrong.

Students emphasised the fact that, by using clickers, they felt that they were part of the class discussion, without being forced to speak out in class:

You will feel like you have said something because you voted ... you know the answer as to why you wouldn't agree or disagree but you don't feel like saying it in such a way that people will understand it.

Exploring this theme further in the focus group discussion, students reported, that as predominantly second-language students, they experienced major problems with English, the language of instruction at this institution. This comment depicts the problems students faced in class:

You can agree with something whether [or not] you have a reason ... you do agree in your heart, but you don't have a reason, but when someone can say ... feel free to talk with your own language ... then you can have a reason. Because you're not that perfect in English. That's why you feel so scared. But I have a reason in isiXhosa⁴⁴, but I don't know how to say it in English.

Using clickers gave students the feeling of active participation in the classroom, without being judged or ridiculed due to their lack of competency in the language of instruction, as Stagg and Lane (2010) report. In the clicker voting sessions, approximately three quarters of the students felt more active in a clicker class and appreciated the anonymity clickers offer (see table 3).

Table 8: Student feedback in clicker voting session

	I agree	I don't agree	Total %
Clickers help me be more active in class.	71%	29%	100
I like it that clicker answers are anonymous.	77%	23%	100
Every student is active in class when we use clickers.	58%	42%	100

Interestingly, students were divided about class participation as a whole, with only 58% of students agreeing that every student was active in class when clickers were used (see Table 3). This might be explained by some students' critiques on the anonymity clickers afford. In the written feedback, the main concern raised by students (six students, 21%), was the opportunity for their peers to 'hide behind' their anonymous answers. They felt that it led to students not taking the discussion seriously or not giving honest answers:

You might get dishonest answers because it is anonymous ... other people just answer the questions without thinking clearly or don't care.

This was also an issue in the focus group, where some students argued that, because they were all still learning to speak out in class, voting should not have been anonymous – all students should acknowledge their opinions and explain why they agreed or disagreed with a certain issue. During clicker sessions, students seemed to be reluctant to explain why they disagreed with a certain point, especially if they were in the minority, as this student pointed out:

You will hardly find someone said I disagree because of A, B and C.

⁴⁴ isiXhosa is the main African language spoken in the Western Cape.

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

This echoes Walker and Barwell findings (2009), that the anonymity clickers offer can come at the expense of more open and direct discussion in class.

Clickers and peer-to-peer learning

The dominant theme in the written student feedback (20 student responses, 71%) was the potential for clickers to encourage peer learning (Crouch & Mazur, 2001). Students appreciated the fact that they saw how the whole class answered – contrary to traditional class discussions, which were dominated by a few vocal students. The following student statement shows this:

It is exciting because I get to see what the response from the class is and what the majority of the class thinks.

The class discussions following clicker voting helped students refine and re-assess their own opinions:

You hear other people's opinions and then you can weigh it up with your own ... and with that you can formulate a better answer.

You hear different explanations from other people about the things that you don't even know about.

The more people speak out their ideas, the more I think on adding to what they have said.

It helps widening the thinking and helps the flow of thinking juice.

The opportunity for peer learning through clickers emerged strongly in the clicker voting session, with nearly all students agreeing that they enjoyed sharing opinions and learning from each other, as shown in Table 4.

Table 9: Student feedback in clicker voting session

	I agree	I don't agree	Total %
I like to see what others are thinking.	90%	10%	100
Clickers help us learn from each other.	88%	12%	100

Again, this topic was discussed during the focus group discussion. Students reaffirmed the opportunity for peer learning that clicker interventions offered them. Through arguing their case and listening to their peers, they were exposed to different views, which helped them refine and present their own argument:

I become afraid when I [am] the first person who will say something. I have to first hear some opinions and then I come up with my own opinion after that ... You can hear what other people are thinking, what they are saying and now you can take that and put it in your answer and you can provide it to the class.

Their comments relate to Crouch and Mazur's findings (2001), that students are more willing to discuss their responses, when once committed (through voting). Furthermore, combining individual clicker voting with peer and class discussion seems to encourage more students to share their opinions in an open class discussion.

Students tended to explore specific topics on a deeper level and saw it as an opportunity for independent research;

When you speak about it, something else comes up and you go deeper into it ...

Clickers help you gain more information ... it makes you do more research about a topic, to broaden it, know more ...

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

When we go out of this class, we end up going to the computer, searching for more information, after using clickers.

These comments show elements of informal cooperative learning, as defined by Johnson et al. (1998) and resonate with their Controversy theory, which postulates that by engaging with peers, individual students refine and re-conceptualise their own conclusion, and in some cases, are propelled to look for more information outside class.

Critical student feedback around peer learning, focus on the necessity for students to be voting in pairs, especially for questions without a right or wrong answer. Some students reported that compromising on an answer was not always satisfactory and left them with a feeling of frustration. The clicker voting session confirmed this: 80% of students indicated that they would prefer to have one clicker to themselves. However, being forced to reach a compromise in a peer voting situation teaches students the importance of collaborative decision-making, a critical skill for future graphic designers.

Another interesting finding refers to students' judgement of their classmates' opinions as opposed to those of their lecturers. As first year ECP students, the participants in this study were not yet used to critically evaluating lecturers' opinions, and appreciated their peers' explanations of topics, as this student's comment shows:

When you get information from a lecturer ... you've got to take it because it's a lecturer's opinion, but your students, they are like different people with different opinions, so it's always interesting ...

These findings confirm that the importance of peer learning and collaboration is particularly high for Graphic Design students. The nature of art and design can lead to a surface approach to learning, as the assessment focus is often on quality of an artefact rather than on the learning process of a student (Davies, 1996). Students in this study mention how they do not as yet critically assess lecturers' opinions, but rely on the lecturers' judgment as opposed to developing their own skills to assess concepts such as creativity (McKillop, 2005). Peer learning can guide them towards more critical thinking about their own and their peers' work.

Conclusion

Clickers have proved their usefulness for enhancing interactivity and participation in large classes. However, there is less evidence for the use of clickers to enhance student engagement in small classes (Walker & Barwell, 2009). This study set out to investigate students' perceptions on the use of clickers in a small Graphic Design ECP course to improve their attention, participation and class discussion. The findings of this study confirm the levels of students' engagement introduced in the literature review: clickers can capture students' attention through the simplicity, the novelty factor and fun element they bring to class; they improve participation in students through the anonymity they offer, especially important for students whose language of instruction is not their first language.

A lecturer's teaching practices and facilitation skills are crucial in promoting a class discussion which is focused, non-threatening and efficient. However, in this study we found that what students saw as the main contribution of clickers was the facilitation of peer learning, which in turn helped them join the class discussions. These findings strengthen our view, that collaborative learning, rather than knowledge transfer from teacher to learner, should be emphasised in small clicker classes. Even if the

Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

process of collaborative decision-making necessitated through peer-voting is not always a comfortable experience for students, the development of this skill is crucial for future graphic designers.

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Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

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Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

– D. Gachago, A. Morris & E. Simons

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Helping the flow of the thinking juice: student engagement in a Graphic Design clicker class

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