Students' Perceived Ability in the Use of a Computer Application in a Community Outreach Project

Huibrecht M. van der Poll
Aletta McGee
Nico J. Booyse

Abstract

Students from a disadvantaged background in a community outreach project often do not have the opportunity to gain knowledge on computer applications (for instance, word processing and spreadsheets) at school level. In the project being reported on here, the students' perception of their ability in the use of a spreadsheet program was measured with the use of a pre- and post training questionnaire. A further comparison was drawn between the students' perception of their ability and the mark achieved in the summative assessment at the end of the training. The aims of the project were to establish whether: 1) training in the use of a spreadsheet program affected the students' perception of their own ability; 2) the *perceived ability* of students differed from their *actual ability*; and 3) the assumption that students from a privileged community may overestimate their ability and that students from underprivileged communities may underestimate their ability in the use of computer applications, is valid.

The findings indicate that the students' perceptions did change after training and that their *perceived* and *actual ability* do differ. However, the disadvantaged students from this study also overestimated their ability in the use of a computer program. To improve the *ability* of students, they should gain basic mathematical, accounting and language skills before they are introduced to a spreadsheet program.

Keywords: Community engagement, perception, ability, performance, disadvantaged students

1. Introduction

To have access to technology from an early age is an important factor in unlocking the *perceived ability* and confidence in using computers, especially at school level in privileged communities (Gupta & Houtz 2000). Therefore, students from poor communities may face more barriers than students from wealthy communities regarding confidence in using technology and other educational resources.

It is generally accepted that students with an underprivileged background where there is a lack of access to computer facilities have less knowledge of computers than students who have access to computer facilities. This leads to the belief that the perception of students from an underprivileged background about their ability may be less over-inflated than that of students from privileged societies where they have access to computers from a young age up to the end of their school years. Providing these underprivileged students with computer training should increase their knowledge, however, their perception of their abilities may impede their true ability.

In the technology-intensive world, the younger generation is viewed as digital natives, having been brought up with computers and speaking the digital language. People who are older and who have not grown up with technology but who embraced new technology at some stage do not speak the digital language well, and are known as digital immigrants (Prensky 2001). Students from a disadvantaged community who do not have exposure to computers from a young age and who are often both ill-equipped to use a computer in general and who have had very little experience with the use of computers may also be viewed as digital immigrants.

The access to computer technology in rural areas and other underprivileged communities in South Africa is of great concern and has been addressed numerous times (Herselman 2003; Burger & Blignaut 2004; Akinsola *et al.* 2005; Sikhakhane *et al.* 2005; Dalvit *et al.* 2007). However, this is not a problem unique to South Africa as this concern is shared by

authors from Australia (Haywood 1998; Bolt & Crawford 2000; Compaine 2001; McLaren & Zappalà 2002; Angus *et al.* 2004) when they discuss the digital divide. The lack of technology in these students' home environment may in the end influence their perception of their computer skills or ability.

The aim of the study on which this article is based, was to establish firstly, whether training in the use of a computer application program has an effect on the *perceived ability* of a student, secondly, whether underprivileged students have an over- or under-inflated perception of their own abilities, and finally, whether a summative assessment provides proof of these perceptions. It was assumed that the perception of students from a disadvantage background would differ from that of students from a privileged community, which is often over-inflated on account of the latter's access to computers, the internet and computer gaming. The latter furthermore believe they are computer literate because they have used computers at some stage.

The study was done based on a community upliftment project where the authors were asked to teach underprivileged students, mostly in the age group 20 to 30 years, how to make use of a spreadsheet program. It was found that training alone might not change the perception that these disadvantaged students may have of their ability in relation to their measured ability after the training.

In the following section, the literature and the concepts used in this article are discussed. This is followed by a description of the research methodology, the data analysis and the results. The article concludes with a discussion of the findings and some recommendations.

2. Literature Survey

For the end-user computing environment to be successful, users with the necessary skills are more important than mere good information systems (Torkzadeh & Lee 2003). However, familiarity with end-user computing of students from different backgrounds may differ quite substantially. Bialaszewski *et al.* (1996) state that student familiarity with information technology is likely to affect the teaching style used by facilitators as well as the academic expectations of the facilitators about their students' ability and readiness to use software programs, like spreadsheets and word processing program (Case *et al.* 2004).

When students have the knowledge and ability to use a specific computer application, in this instance a spreadsheet program, it is known as computer proficiency or computer literacy (Grant *et al.* 2009). Students who can send emails, download music files and use instant messaging, may view themselves as computer literate but, according to employers, these are not the skills they need (Young 2004). This is emphasised by Gibbs (2008) when she states that, although young people seem at ease in the digital age, they still face the challenge of having the knowledge and skills required to make use of computer applications at a level suitable for tertiary education or in the workplace.

Students may develop computer skills during their training but it may not be to the degree required by employers (Wallace & Clariana 2005). Therefore, training should be directed at attaining the necessary skills to make use of technology. Torkzadeh & Lee (2003), Case *et al.* (2004), Ballantine *et al.* (2007) and Gibbs (2008) argue, 'perceptions of knowledge and ability in computing do not always correspond to the reality'. The studies by the previous authors were done either at school level or at first-year university level. Therefore, it may be necessary to establish whether the gap between *perceived ability* and *actual ability* also exists in disadvantaged communities.

Community engagement means that an organisation, in this instance a university, makes contact and fosters a relationship with a group of people who are unrelated to the university. The purpose is to support or educate (in this specific engagement training in the use of a spreadsheet) the community and to increase awareness of the university's goals (Oxford 2009).

The perception of an individual entails the direct recognition or understanding of something, whereas ability is viewed as mental power or cleverness (Oxford 2009). People may have certain perceptions of their own ability. Bandura (1997) calls this self-efficacy. Self-efficacy is defined as people's judgments of their own ability to execute a task and of the effect this perception may have on their future activities. It can be expected that students who have had no access to computers from a young age may have a different perception of their ability to make use of an application program than students who have grown up with computers and technology might have.

The success of individuals may be influenced by the perceptions of these individuals of their ability. According to Hall & Ponton (2002), individuals can increase their self-efficacy when they understand how a positive change in their belief can affect outcomes and in return increase their success rate in achieving their goals. Lim (2004: 72) states that it is these students' *perceived ability* or confidence that governs their ability to use technology and their perseverance when difficulties arise rather than their *actual ability*. Therefore, it may be assumed that students with a higher *perceived ability* may experience more success.

3. Research Methodology

The study on which this article is based, sought to examine whether discrepancies exist between students' perception of their spreadsheet application skills and their actual performance. The objective of the training was to equip students with the necessary skills to use a spreadsheet program to assist them to attain a job. In this case, where students were from an underprivileged background, the instruction was very basic and elementary.

First, a survey questionnaire was developed to capture basic demographics and information on how the students *perceived* their proficiency in spreadsheet applications. Hindi *et al.* (2002) indicated that a survey questionnaire is an important instrument to direct the delivery of training and course content. Second, a practical summative assessment was prepared based on the groups of skills used in the survey.

3.1 Data Collection

In the following sections the target population, the measuring instrument and the research method are discussed.

3.1.1 Target Population

The authors were contacted by a community upliftment centre and were requested to teach students the basics of a spreadsheet program. This centre started out as a shelter but, because people only came to the shelter for food and a roof over their heads and never tried to change their circumstances, it was changed to an upliftment centre. Students from underprivileged

communities can register for training in a number of courses, such as computer training, guesthouse maintenance and care of the elderly. All students undertake compulsory life skills training when they first arrive. The target population for the study being reported here consisted of all four classes of students enrolled for the spreadsheet course, in total 42 students.

3.1.2 Measuring Instrument

The questionnaire was divided in three sections. The first section collected biographical information. In the second, the students indicated their *perceived* computer literacy, and the last section of the survey questionnaire collected information on the students' *perceived* degree of proficiency. This section was designed so as to allow students to rate their *perceived* spreadsheet proficiency using a 5-point Likert scale evaluation (Salkind 2009) where one (1) indicated they understand the question while five (5) indicated expert skill.

The following five-point Likert scale was used in the questionnaire:

1. No, I do not understand the question.
2. No, I am not able to do it.
3. I am uncertain.
4. I partially know how to do it.
5. I know how to do it.

The *actual ability* of students was measured with the use of a summative assessment at the end of the training. Assessment is defined as 'the process or means of evaluating academic work; an examination or test' (Oxford 2009). In the study being reported here, the summative assessment had the following objectives:

1. to measure the extent to which the students mastered the range of concepts and actions covered during the training;
2. to measure the extent to which the course adds to the computer knowledge of students receiving the training; and
3. the comparison of *perceived ability* and *actual ability*.

3.1.3 Research Method

To compare the *perceived ability* to the *actual ability*, the questions asked in the questionnaire had to be linked to the questions in the summative assessment.

The questionnaire was given to 42 students enrolled for the course at the commencement (pre) and the end (post) of the three-week period and indicated the *perceived ability* of the students. The results from the pre- and post-questionnaire were compared to each other. A second comparison was made between the second questionnaire and the summative assessment. The summative assessment was done at the end of the course and indicated the *actual ability* of the students. The results from the questionnaire were categorised into groups similar to the categories tested in the summative assessment to enable the comparison between the different questions.

3.2 Data Analysis

The data collected from the two questionnaires, representing the students' *perceived ability*, was used for the first part of the data analysis in each section. The second part of the analysis in each section was based on the second questionnaire and the summative assessment or *actual ability*. The questions from the questionnaire and summative assessment were grouped into the following six (6) categories:

1. Create, open and save a spreadsheet
2. Editing a spreadsheet
3. Formatting a spreadsheet
4. Formulas
5. Charts
6. Printing a worksheet

3.2.1 Results

In Table 1, the first section of the survey questionnaire, which collected personal information on age, gender, qualifications and whether the student had access to a computer lab, is displayed.

Table 1: *Population of the Study*

Age		**Highest Qualification**	
<20	4	Grade 11	3
20 – 30	33	Grade 12	37
>30	5	Other (N3)	2
Access to Computer Lab		**Gender**	
Yes	14	Male	18
No	28	Female	24

In the second section of the survey questionnaire, the students needed to indicate their computer proficiency, and this is displayed in Table 2.

Table 2: *Perceived Computer Literacy of the Respondents*

Computer Literacy			
		Before training	**After training**
1	No knowledge	4	3
2	Some knowledge	15	2
3	Average knowledge	9	12
4	Basic knowledge	14	20
5	Advanced knowledge	0	5

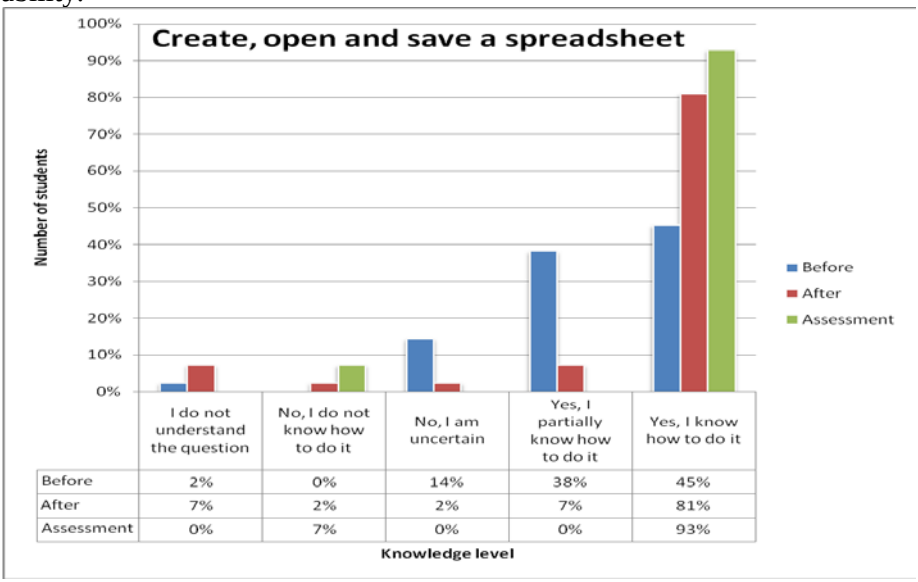
From the above table one can see that most of the students did not have access to a computer lab. This may have influenced their *perceived ability* of their computer literacy. However, the training did contribute to a difference in their *perceived ability* if we compare the indication in the table above of their computer literacy before the training to the indication after the training.

The results from each category are discussed in the following sections.

Category 1: Create, Open and Save a Spreadsheet

Before starting their training, the students taking part in the study were quite confident of their ability to create, open and save a spreadsheet, as 45% indicated that they knew how to do it and another 38% indicated that they partially knew how to do it. Only a small number of the students were

uncertain. When compared to the post-questionnaire, the training seemed to have a positive impact on the students' *perceived ability* because 81% indicated that they now know how to create, open and save a spreadsheet. A small discrepancy exists between the pre- and post-questionnaires where only one student did not understand the question before the training, and afterwards three did not understand the question. The reason might be the lack of time spent on explaining the scales of the questionnaire to the students because of time pressure or it could be attributed to a language problem. English is the second or even third language of these students. The result from the *perceived ability* (81%) is still less than the *actual ability* (93%) of the students when the results of the summative assessment are taken into account. In this instance, students still underestimated their own ability.



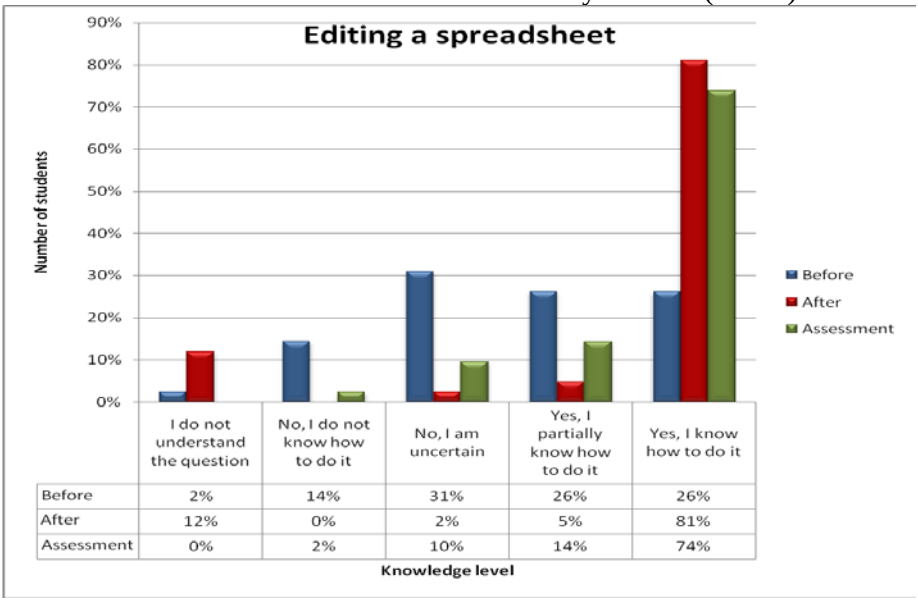
	I do not understand the question	No, I do not know how to do it	No, I am uncertain	Yes, I partially know how to do it	Yes, I know how to do it
Before	2%	0%	14%	38%	45%
After	7%	2%	2%	7%	81%
Assessment	0%	7%	0%	0%	93%

Figure 1: *Results for the Category 'Create, Open and Save a Spreadsheet'*

Category 2: Editing a Spreadsheet

Before the training started, 48% of the students indicated they either did not know how to edit a document, or they were uncertain. An equal number of students (26% in both cases) were either partial or very certain that they

knew how to edit a document. The training seemed to have a positive impact on the students' *perceived ability* when compared to the post-questionnaire as 81% of the students indicated they know how to edit a spreadsheet. Again, the same small discrepancy exists between the pre- and post-questionnaires, where only one student did not understand the question before the training, while afterwards five did not understand the question. The *perceived ability* (81%) is more than the *actual ability* (74%) of the students when the results of the summative assessment are taken into account. The percentage with which the students overestimated their own ability was 7% (81–74)..



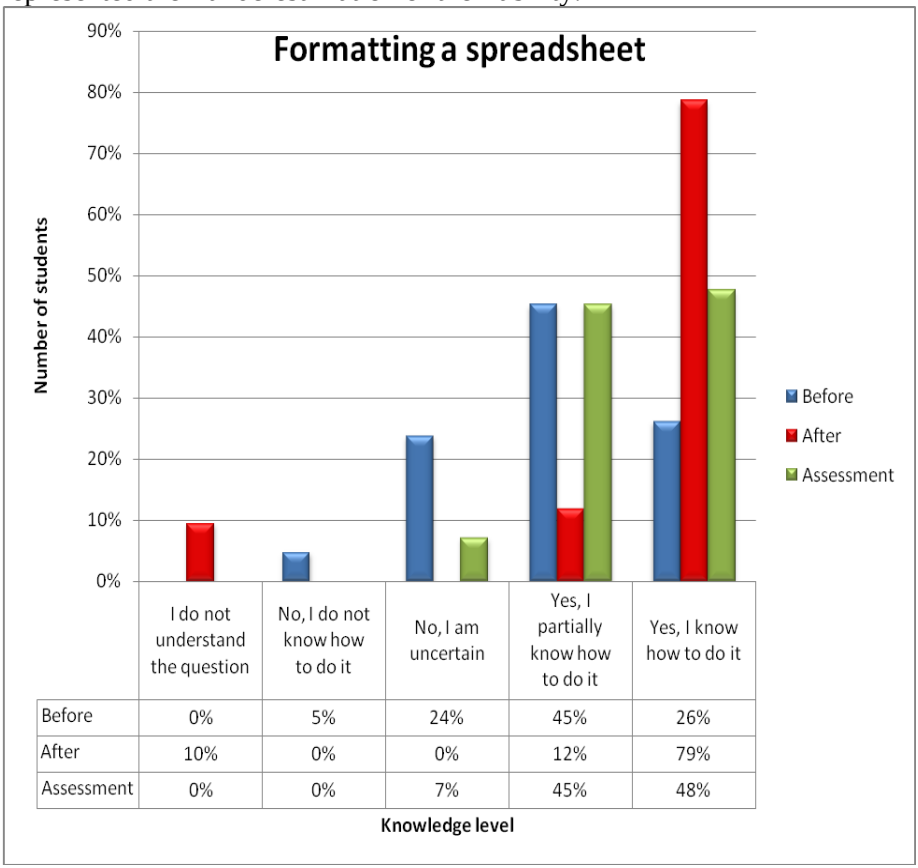
	I do not understand the question	No, I do not know how to do it	No, I am uncertain	Yes, I partially know how to do it	Yes, I know how to do it
Before	2%	14%	31%	26%	26%
After	12%	0%	2%	5%	81%
Assessment	0%	2%	10%	14%	74%

Figure 2: *Results for the Category 'Editing a Spreadsheet'*

Category 3: Formatting a Spreadsheet

At the onset of the training, 24% of the students indicated their uncertainty with regard to the formatting of a spreadsheet. Students who perceived that they were able to format a spreadsheet equalled 26%. After the three weeks of training, 79% of the students felt they knew how to format a spreadsheet, which indicates a positive impact on the students' *perceived ability*. The students who indicated they were certain about whether they can format a spreadsheet (79%) overestimated themselves as the summative assessment

indicated that only 48% were able to format a spreadsheet in practice. However, when we look at the breakdown between *partially and fully certain*, 12% felt that they were partially able to do it whereas the assessment indicated that 45% partially knew how to format a spreadsheet, which represented their underestimation of their ability.



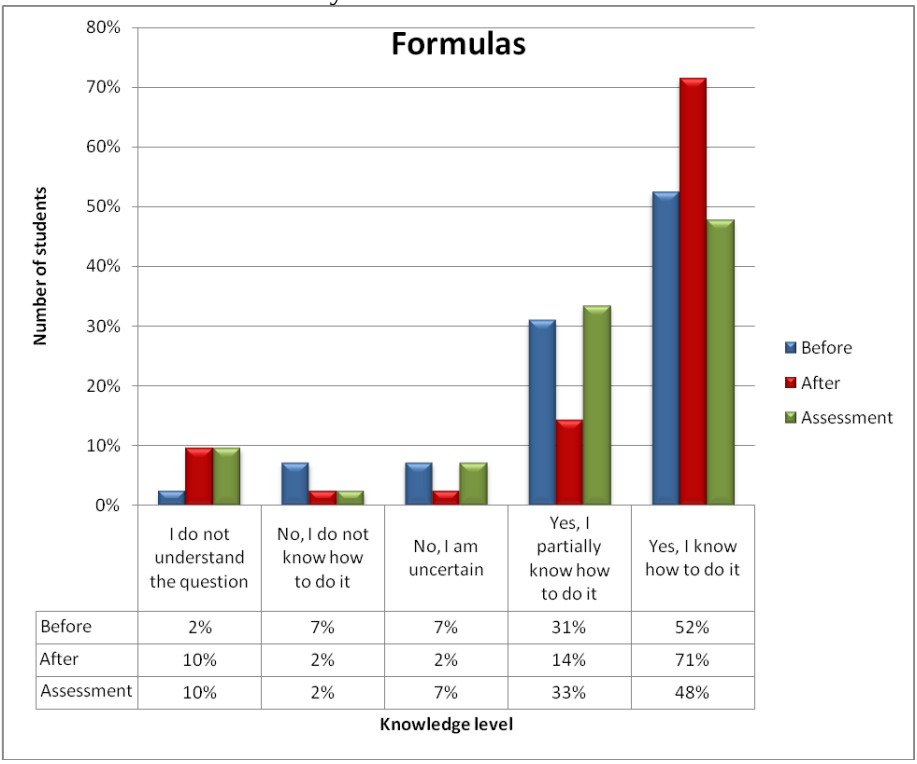
	I do not understand the question	No, I do not know how to do it	No, I am uncertain	Yes, I partially know how to do it	Yes, I know how to do it
Before	0%	5%	24%	45%	26%
After	10%	0%	0%	12%	79%
Assessment	0%	0%	7%	45%	48%

Figure 3: *Results for the Category 'Formatting a Spreadsheet'*

Category 4: Formulas

The students indicated that 52% of them knew how to set up a formula in a spreadsheet program before the training started. This may be an indication that they did not really understand what it entails to set up a formula. In this

case, the result from the summative assessment (48%) is in line with their initial perception. However, the *perceived ability* (71%) of students after training indicating that they knew exactly how to set up a formula deviated quite substantially from the result of the assessment where only 48% of the students were able to set up the correct formula in full. In order to use formulas in spreadsheets, the user needs an underlying knowledge of basic mathematic calculations, for example multiplication. It is also advisable to have an understanding of basic accounting terminology. A lack of the aforementioned abilities may be a reason for the deviation.



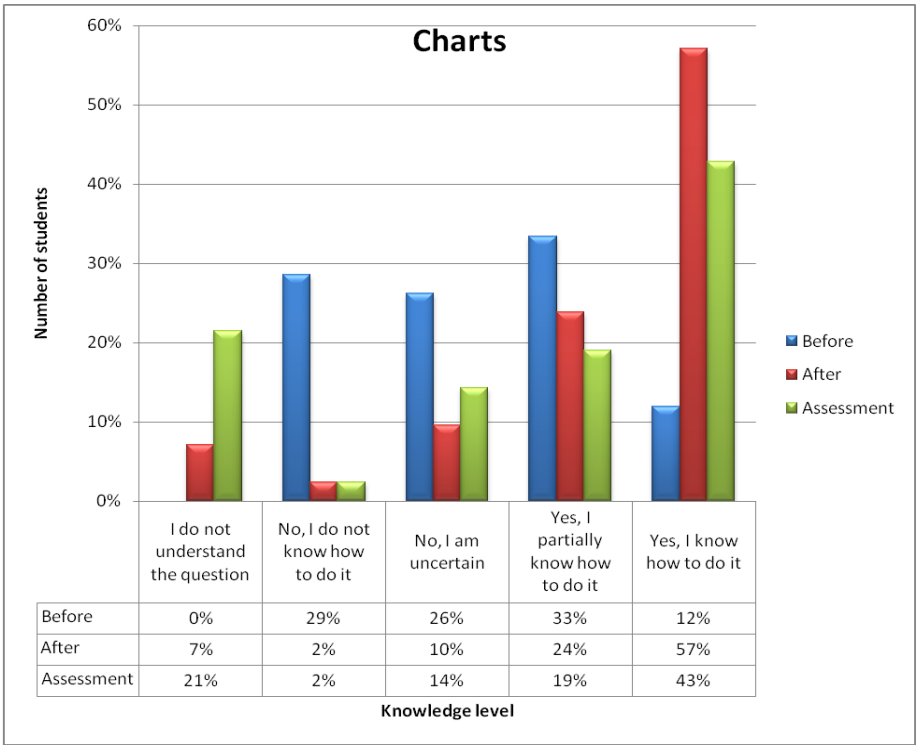
	I do not understand the question	No, I do not know how to do it	No, I am uncertain	Yes, I partially know how to do it	Yes, I know how to do it
Before	2%	7%	7%	31%	52%
After	10%	2%	2%	14%	71%
Assessment	10%	2%	7%	33%	48%

Figure 4: *Results for the Category 'Formulas'*

Category 5: Charts

At the beginning of the training, the majority of students (55%) either indicated that they did not know (29%) how to use graphs in a spreadsheet or

that they were uncertain (26%). Those students who knew partially how to use a graph represented 33% of the students enrolled for the training. After the training, students overestimated their ability to use a graph, as 57% indicated they knew in full how to do it while only 43% were able to do it in practice. The students who indicated they partially knew how to use a graph represented 33% at the beginning of the training, 24% after the training while 19% of the students were actually able to use a graph partially in the assessment. A chart is in many instances the result of formulas; therefore, the deviation may be attributed to the deviation experienced in the formulas as well.



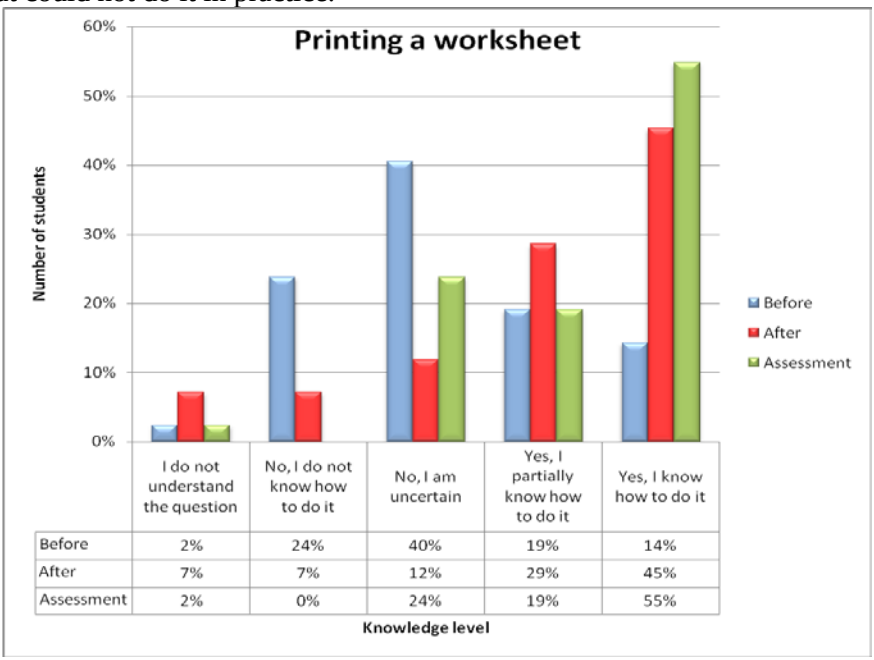
	I do not understand the question	No, I do not know how to do it	No, I am uncertain	Yes, I partially know how to do it	Yes, I know how to do it
Before	0%	29%	26%	33%	12%
After	7%	2%	10%	24%	57%
Assessment	21%	2%	14%	19%	43%

Figure 5: *Results for the Category 'Charts'*

Category 6: Printing a Worksheet

Just more than 64% of the students indicated at the beginning of the training

that they either did not know (24%) how to print a spreadsheet or that they were uncertain (40%). Students might have found access to printers more of a challenge because they did not have access to their own computers or to labs and might therefore have found it necessary to go to internet cafes where printing is not always a possibility. After the training, students were confident of their ability to print a spreadsheet as 45% indicated that they were able to print a spreadsheet and the assessment indicated that 55% could do it in practice. This may be attributed to the fact that the students had training in a word processing program before they started their spreadsheet training. However, quite a few students (24%) were still uncertain how to print a spreadsheet in practice. This may be attributed to the fact that students did not have the chance to make use of printers as we had technical difficulties and could only show them the steps on how to print on the screen but could not do it in practice.



	I do not understand the question	No, I do not know how to do it	No, I am uncertain	Yes, I partially know how to do it	Yes, I know how to do it
Before	2%	24%	40%	19%	14%
After	7%	7%	12%	29%	45%
Assessment	2%	0%	24%	19%	55%

Figure 6: *Results for the Category 'Printing a Worksheet'*

Open-ended Question

An open-ended question was asked in the questionnaire to establish whether the students knew or understood what a spreadsheet was. We asked whether they knew of a situation in everyday life where they could apply a spreadsheet. Before the training, 20 of the 42 students were not able to formulate an answer to this question; however, the rest knew that it could be used to compile a budget or class list with test marks. At the end of the training, 10 of the 42 students still did not supply an answer or did not know where they could apply spreadsheets. The students do not have the necessary business background to know about budgets, financial statements and terminology such as profit and sales. Although numerous practical examples were supplied during the training, they were still not sure how to apply the gained knowledge after the training. This can also be attributed to the fact that the students had not yet been exposed to the working society.

3.3 Summary of the Results

The students' perception of their ability was measured by way of the questionnaire, which was completed before and after the training. The students' *actual ability* was measured by a formal practical assessment to determine their actual practical skills after the training.

Figure 7 indicates the summary of the results of the pre- and post-questionnaire as well as the assessment.

The *perceived ability* of students before the training started changed positively during this study. In Category 1 (create, open and save), the *perceived ability* of students increased from 45% to 81%. For Category 2 (editing) the increase was from 26% to 81%. Category 3 (formatting) showed an increase from 26% to 79% in the *perceived* ability of the students. In Category 4 (formulas), the perception increased from 52% to 71%, while Category 5 (graphs) showed a substantial increase from 12% to 57%. The last category (printing), showed an increase from 14% to 45%. If we take the average for all the questions into consideration and we compare the *perceived ability* before the training (29%) with the *perceived ability* after the training (69%) as depicted in Figure 7, it is clear that the formal training had a positive effect on the perception of the students.

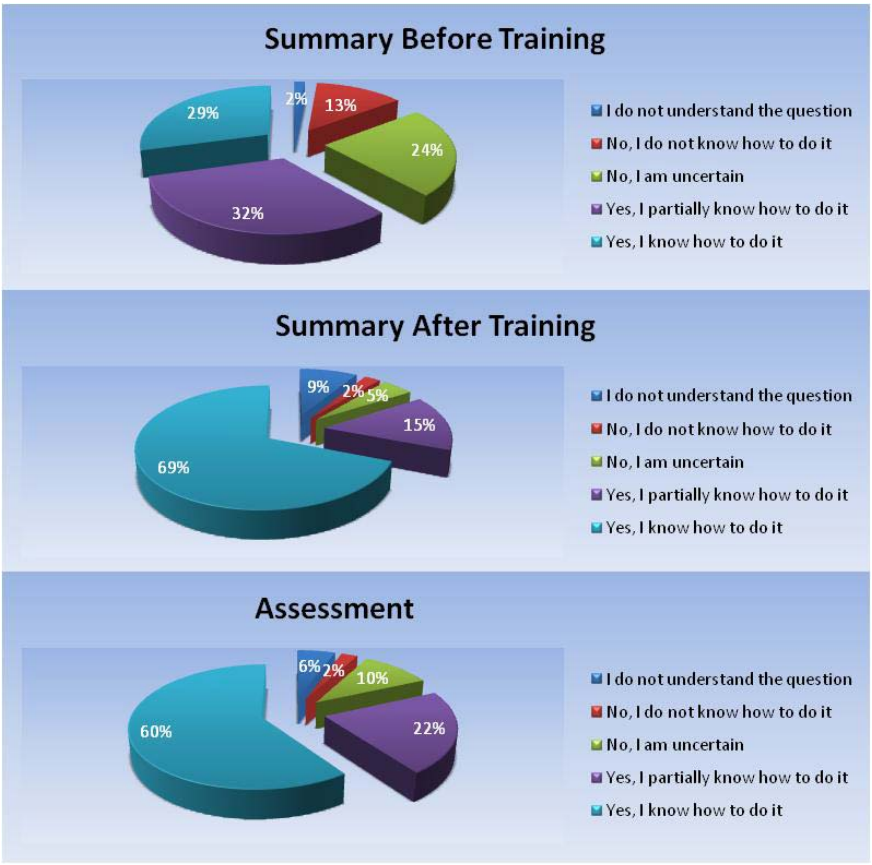


Figure 7: *Summary of the Results Before and After Training as well as for the Assessment*

In some cases, students overestimated their ability while in other cases, they underestimated their ability. As stated before, *perceived* and *actual ability* in computing does not always correspond with the reality. The *perceived ability* of students after training was 81% for Category 1 (create, open and save) and the *actual ability*, 93%. In Category 2 (editing), the *perceived ability* and the *actual ability* was 81% and 74% respectively. Category 3 (formatting) showed a *perceived ability* of 79% and an *actual ability* of 48%. *Perceived ability* (71%) for Category 4 (formulas) deviates

from the *actual ability* of 48%. For Category 5 (graphs), the *perceived ability* was 57% and the *actual ability*, 43%. The deviations between *perceived* (71%, 57%) and *actual ability* (48%, 43%) (in Category 4 and 5 may be attributed to the need of an underlying knowledge of basic mathematic calculations and an understanding of basic accounting terminology. The results recorded for Category 6 (printing) were 45% *perceived ability* and 55% for the *actual ability*, which could be the result of training in a word processing program before this course. Overall, taking the average of all the questions into consideration, the *perceived ability* (69%) deviated from the *actual ability* (60%) by 9%, according to Figure 7. Therefore, in this study students overestimated their overall ability to apply spreadsheets by 9%.

4. Conclusion

The above discussion of the results and the literature reveal that there is not always a relationship between the perception of students of their computer ability and their actual performance. Students, who play computer games, download music and read their emails perceive themselves to be computer literate but this ability is unfortunately not what is expected of them in the workplace. The analysis suggests that the students from the group taking part in the study on which this article is based, underestimated their ability in the less complex tasks such as editing and formatting, and overestimated their ability in the more complex tasks, such as creating formulas and designing graphs.

Despite the limitations of 1) the short period of time available to teach the students, and 2) the language barrier, which was especially experienced when the questionnaire was completed by the students, the end result was very positive as 71% of the students passed the course.

The results of the analysis suggest that the authors' assumption that students from privileged communities overestimate their abilities is not only true for them but also for students from underprivileged communities. Perception of ability to make use of computers may therefore not only be based on the background of the person involved, but other factors could play a role as well. Factors impeding on *actual ability* could be divided into 4 broad categories of barriers:

- Language;
- Mathematics;
- Accounting terminology; and
- Lack of work/ business experience.

The identified reasons for the deviation between the *perceived ability* and the *actual ability* of students could assist facilitators of future similar courses (computer courses in spreadsheet application) on how to prepare the course material and how to redirect their preparation method. Facilitators should ensure that students who are unemployed, have a lack of mathematical skills and/or accounting terminology, receive assistance in basic skills in these areas before they start training such students in spreadsheet programs.

In conclusion, it is important to align the *perceived* and *actual* abilities of students as this has an impact on their efficiency in their future workplace. The *actual ability* could be brought in line with the *perceived ability* if the abovementioned barriers could be addressed before training starts.

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HM van der Poll
Department of Management Accounting
Unisa
South Africa
vdpolhm@unisa.ac.za

A McGee
Department of Management Accounting
Unisa
South Africa
mcgeea@unisa.ac.za

NJ Booyse
Department of Management Accounting
Unisa
South Africa
booysnj@unisa.ac.za